F I N A L

MIDNITE MINE REMEDIAL INVESTIGATION REPORT

Prepared for

U.S. Environmental Protection Agency
Region 10
1200 Sixth Avenue
Seattle, Washington 98101

September 2005

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Contract No. 68-W-98-228
Work Assignment No. 018-RI-CO-102Q

FINAL
REMEDIAL INVESTIGATION REPORT
FOR
MIDNITE MINE
STEVENS COUNTY, WASHINGTON

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ABBREVIATIONS AND ACRONYMS

AEC	Atomic Energy Commission
ANOVA	analysis of variation
AOI	area of interest
ARAR	applicable or relevant and appropriate requirement
ARD	acid-rock drainage
BERA	baseline ecological risk assessment
bgs	below ground surface
BIA	Bureau of Indian Affairs
BL	background limit
BLM	Bureau of Land Management
BOM	Bureau of Mines
BPD	backfilled pit dewatering
BTAG	Biological Technical Assistance Group
CAD	Computer-Aided Design
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cfs	cubic feet per second
COC	contaminant of concern
COPC	contaminant of potential concern
CV	coefficient of variation
DMC	Dawn Mining Company
DOH	Department of Health
DQO	data quality objective
E&E	Ecology and Environment
EcoRA	ecological risk assessment
EIS	environmental impact statement
EPA	Environmental Protection Agency
ESI	Expanded Site Investigation
FONSI	Finding of No Significant Impact
FS	feasibility study
GIS	Geographic Information System
gpm	gallons per minute
HCT	humidity cell testing
HELP	Hydrologic Evaluation of Landfill Performance
HHRA	human health risk assessment
IFIM	in-stream flow incremental methodology
LCL	lower confidence limit
MA	mined area

ABBREVIATIONS AND ACRONYMS (Continued)

MAA	mining affected area
msl	mean sea level
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NURE	National Uranium Resource Evaluation
NWI	National Wetlands Inventory
PARCC	precision, accuracy, representativeness, comparability, and completeness
PCP	pollution control pond
PIA	potentially impacted area
pCi/L	picoCuries per liter
pCi/m^2s	picoCuries per meter squared
ppb	parts per billion
ppm	parts per million
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
R	ratio
RAWS	remote-activated weather station
RBL	retest background limit
RCRA	Resource Conservation and Recovery Act
RI	remedial investigation
RPD	relative percent difference
SAP	Sampling and Analysis Plan
SLERA	screening level risk assessment
SMI	Shepard Miller Incorporated
SOP	standard operating procedure
TDA	tailings disposal area
TPH	total petroleum hydrocarbons
Tribe	Spokane Tribe of Indians
U_3O_8	uranium oxide
UCL	upper confidence limit
UPL	upper prediction limit
UTL	upper tolerance limit
UTM	Universal Transverse Mercator
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WTP	water treatment plant

1.0 INTRODUCTION

Midnite Mine is an inactive, open-pit, hard rock uranium mine. It is located in Washington State approximately 40 air miles northwest of Spokane and 8 air miles northwest of Wellpinit, as shown on Figure 1-1. The mine is situated entirely within the 154,000-acre Spokane Indian Reservation. Access to the mine is via gravel roads leading off the paved Ford-Wellpinit Road.

The mine was developed on the southwestern slope of Spokane Mountain, which lies at the southern end of the Huckleberry Mountains. The Huckleberry Mountains, including Spokane Mountain, lie within the Okanogan Highlands physiographic division of the Northern Rocky Mountain Province (Fenneman 1931).

Midnite Mine was operated by the Dawn Mining Company, LLC (DMC) from 1955 through 1981, except for a four-year hiatus from 1965 to 1969. Mined uranium ore was transported by truck approximately 12 air miles east to the DMC mill. Newmont USA Limited holds the majority interest in DMC. The former mine lease area, identified as the DMC lease area, encompasses approximately 811 acres (SMI 1996), of which 350 acres (an area approximately 0.5 mile wide by 1 mile long) were disturbed during mining operations. The most notable features present at the inactive mine today include haul roads, waste rock piles, protore piles, two open pits, a seep collection system, pollution control pond (PCP), mine buildings, and a water treatment plant (WTP). Less visible are areas of waste rock fill, including the backfilled pits.

The past mining of uranium at Midnite Mine has resulted in releases of naturally-occurring radioactive compounds, metals and other substances into surface material, sediment, surface water, groundwater, and air at and around the mine. Previous investigations of the mine and surrounding area provide some documentation of contaminant concentrations and their potential migration.

Based on data from the U.S. Environmental Protection Agency (EPA) Expanded Site Investigation (ESI) (E&E 1998) of the mine and from previous investigations, EPA proposed Midnite Mine for inclusion on the National Priorities List (NPL) in February 1999, with final listing in May 2000. A fund-lead remedial investigation/feasibility study (RI/FS) also was initiated in February 1999. This report presents the results of the RI of the Midnite Mine Superfund site conducted under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

1.1 PURPOSE OF REMEDIAL INVESTIGATION

The purpose of this RI is to 1) characterize the nature and extent of mining-related contamination in surface materials, sediment, surface water, groundwater, and air, 2) describe the fate and transport of mining-related contamination, 3) provide sufficient information to assess human health risk and ecological risks, and 4) obtain data to support the evaluation of remedial alternatives in the FS. As part of the RI, URS evaluated the distribution of contaminants of potential concern (COPCs) likely to have been present prior to development of the Midnite Mine (typically called "background" concentrations). Adequate pre-mining data were not available for the site so nearby reference areas were selected as reasonable analogs for site background. Reference area selection is discussed in Section 3.2.1. The results of this background evaluation were used to assist in defining which portions of the mine and surrounding area are impacted by historic mining practices.

The use of the term "site" in this report refers to 1) the actual area disturbed by mining, or the mined area (MA), and 2) the surrounding area(s) where mining related contamination may have come to rest, or the potentially impacted area (PIA). During the RI and associated risk assessments, the site will be refined by 1) reducing the list of COPCs to a list of contaminants of concern (COCs), 2) determining the extent of contamination in the various media, and 3) identifying human health and ecological risks by media. Ultimately, areas of the site identified as impacted by COCs and posing a human health or ecological risk will be addressed in development of remedial alternatives in the FS.

1.2 REPORT ORGANIZATION

This RI report is divided into the following sections:

1. **Introduction** – This section briefly discusses the location of the mine, historic mining impacts, mine ownership, and the purpose of the RI.

2. **Site Setting, Description, and History** – This section discusses the study area, including demographics and land use, climate and meteorology, topography and geographic features, geologic setting, and pre-mining conditions. It also discusses current site conditions and site history, including enforcement and reclamation history.

3. **Study Area Investigations** – This section summarizes the previous investigations performed at the site and the approach to characterizing natural background levels of constituents, as well as field work performed for this RI. A complete

description of the RI field activities is provided in Appendix A. Technical memoranda prepared during the RI are presented in Appendix B.

4. **Current Site Conditions and Remedial Investigation Data Summary** – This section describes the physical characteristics of the MA and PIA, including areas and volumes of waste and ore remaining on site, physical characteristics of the open pits, and descriptions of the surface water drainages and seeps near the site. This section also summarizes the site hydrology and hydrologic controls, as well as site habitat. A discussion of background levels for indicator parameters also is included.

5. **Nature and Extent of Contamination** – This section presents the results of chemical testing performed on samples of groundwater, surface water, sediments, and surface materials collected from the MA and PIA, and compares these results to the results from background areas. A discussion of the methods used to characterize the natural background levels of metals, inorganic chemicals, radionuclides, external gamma radiation, airborne radon, and radon flux is presented, along with the methods used to compare these data to data collected in the PIA to identify mine-affected areas. A brief discussion of acid-rock drainage (ARD) and radiological chemistry is included. The complete data and the results of quality assurance/quality control (QA/QC) evaluations are provided in Appendices C and D.

6. **Contaminant Fate and Transport** – This section describes the potential routes of migration for contaminants in the affected environmental media at the site and discusses the factors that control contaminant migration and contaminant persistence. A summary of the fate and transport modeling conducted for the site is presented.

7. **References** – This section lists the references used to prepare this report.

2.0 SITE SETTING, DESCRIPTION, AND HISTORY

2.1 SITE SETTING

The Midnite Mine Superfund site encompasses the area of land visibly disturbed by mining activities (the MA) and the surrounding areas in which mining related contamination may have come to rest (the PIA) (Figure 2-1). This section of the RI describes the general conditions at and around the site, the mining history, and the history of enforcement actions.

2.1.1 Demographics and Land Use

Wellpinit, Washington, the nearest town to the Midnite Mine, is the population and cultural center of the Spokane Indian Reservation (Figure 1-1). The membership of the Spokane Tribe (Tribe) was 2,258 persons in 1997, up from 1,502 persons in 1990. The population of Stevens County was 40,066 persons in 2000 (USCB 2000). The median age of Tribe members is 22 years, compared to 35 years for all of Stevens County. Recent figures show that unemployment is over 50 percent for the Spokane Tribe.

There are approximately 600 housing units on the reservation. According to the 1990 census, the average household size on the reservation is 3.2 persons, compared to 2.7 persons per household in Stevens County and 2.5 persons per household for Washington State. The majority of houses on the reservation rely on private sources for drinking water, septic tanks for waste, and wood as their primary source of heat. The nearest occupied residence is located approximately 3 miles from the MA. The site is not currently used for residential purposes.

Primary land uses within 50 miles of the Midnite Mine are timber and multiple-use forestry, grazing, and agriculture (SMI 1996). Of the 154,000-acre Spokane Indian Reservation, in 1971 approximately 78 percent was used for timber and multiple-use forestry, 17 percent for grazing, and 5 percent for agriculture and other uses (SMI 1996). Much of the timber and multiple-use lands also are used for grazing. Pre-mining use of the Midnite Mine area was for timber and multiple-use forestry.

Land use on the reservation supports a traditional lifestyle that includes subsistence, cultural/spiritual, and medicinal components. This type of land use is very specific to the Tribe, and is not well reflected by typical CERCLA categories of human land use (e.g., residential, commercial, recreational, hunting, fishing). Each member of the Tribe may hunt, fish, or gather anywhere on the reservation. Hunting and gathering are done on a regular basis to supply families with a wide variety of aquatic and terrestrial wild plants and animals used for subsistence, cultural/spiritual, and medicinal purposes. While in the field, tribal members live

off the land by consuming surface water, groundwater (from seeps or springs), and wild plants and animals.

Portions of the PIA may be used by members of the Tribe for conducting cultural/spiritual ceremonies, such as sweat lodge ceremonies. Sweat lodges are constructed of natural materials (i.e., branches, moss, leaf materials) near a source of surface water or groundwater. Sweat lodges that use spring water have a different spiritual significance than those that use surface water.

Most livestock owned by the Tribe are free to forage throughout the reservation (i.e., the livestock are not fenced in). Logging operations are conducted throughout the reservation and provide an important source of income to the Tribe.

The Tribe owns several campgrounds and beaches along the Spokane Arm of Franklin D. Roosevelt Lake, which are used primarily for recreation by members of the Tribe. Franklin D. Roosevelt Lake is a lake created by the Grand Coulee Dam. The Spokane Arm is the part of the lake where the Spokane River water level has risen and flow has slowed. A Children's Culture Camp for cultural education operates at the Blue Creek Campground, located at the confluence of Blue Creek and Franklin D. Roosevelt Lake, 3.5 miles from the MA, for part of each summer.

2.1.2 Climate and Meteorology

In general, the area has a continental climate characterized by warm, dry summers and moderately moist, cold winters. The mean annual temperature is approximately 47° F, with monthly average temperatures ranging from 29.2° F in January to 71.0° F in August. The sun shines 70 percent of the daylight hours in summer and 30 percent in winter. Average relative humidity ranges from 37.9 percent in August to 83.4 percent in December. Humidity at the MA is generally higher at night (USDA 1982). The average relative humidity can be expected to be around 50 percent in mid-afternoon, increasing during the night, and rising to around 70 percent near dawn.

Two remote-activated weather stations (RAWS), operated by the Bureau of Land Management (BLM), are located at Midnite Mine. As shown on Figure 2-2, the stations are located just above the east highwall of Pit 3 (RAWS 324F26B8), and south of the South Topsoil Area in the Southwest Downwind Area (RAWS 3244756C). Data are available from the two stations for the period April 1991 through December 2000. Data were not collected continuously for all measured parameters. The majority of the data collected by the BLM are from the weather station located above Pit 3 and have not been published. Data from the station near the South Topsoil pile were used to fill in the gaps in the record. Table 2-1 provides a monthly summary of the average precipitation, temperatures, wind speed (both constant and gusts), relative humidity, and solar radiation for the period of record using the combined data from both stations.

Average annual precipitation at the site is about 18.5 inches, with snowfall the dominant form of precipitation between mid-November and mid-April (SMI 1996). Monthly average precipitation ranges from about 0.3 inch in August to 2.5 inches in December. Of the total annual precipitation, 40 percent (7 inches) generally falls in April through September, which includes the growing season for most crops. Thunderstorms occur on about 10 days each year, and most occur in summer. Average seasonal snowfall is 47 inches. The greatest snow depth at any one time during the period of record is 34 inches. December has the highest snowfall with an average depth of 17.9 inches. In an average year, at least 1 inch of snow is on the ground for an average of 38 days. Figure 2-3 shows the monthly precipitation for the period from April 1991 to December 2000.

The primary prevailing wind direction at the site is northeast and the secondary direction is southwest (SMI 1999a, USDA 1982). The average wind speed at the site ranges from 3.0 mph in January to 4.9 mph in April, May, and June. Average wind gusts range from 8.5 mph in January to 13.1 mph in July. Figure 2-4 presents a wind rose for the site, derived from data collected from 1991 to 1998.

The 1996 Revised Midnite Mine Reclamation Plan (SMI 1996) gave a lake evaporation estimate of 38 inches for the site based on the temperature data from Wellpinit and solar radiation data from Spokane. The estimated 38 inches of lake evaporation is considerably higher than subsequent calculations by SMI based on the results of an on-site 1998–1999 evaporation study (SMI 1999a).

SMI conducted the on-site evaporation study during the nonfreezing periods of September 17 to October 31, 1998, and March 26 to September 30, 1999. A total of 39.63 inches of pan evaporation was recorded during this time period. Evaporation calculated from the RAWS data using the Penman Equation (Jensen 1983) for the same period predicted total evaporation of 41.25 inches. Based on 39.63 inches of pan evaporation and a pan coefficient of 0.72 derived from evaporation maps for eastern Washington (Weather Bureau 1959), the calculated lake evaporation is approximately 28.5 inches. The results of this study appear to be a reasonable basis for estimating lake evaporation at the site.

2.1.3 Topography and Geographic Features

Midnite Mine is located in a mountainous region with approximately 2,500 feet of relief in the general vicinity of the site (Figure 2-1). Surface elevations of the mine and surrounding area range from approximately 3,870 feet above mean sea level (msl) atop Spokane Mountain to approximately 1,290 feet above msl at Franklin D. Roosevelt Lake. The mine is situated in a small topographic drainage area, or watershed. Within the watershed land elevations vary depending on mine features and localized topography. Elevations range from 3,400 feet above msl at the northern end of the watershed to 2,400 feet above msl at the southern end. Elevations

in the watershed are highest to the north and decrease in a southwesterly direction to Blue Creek. Surface elevations continue to decrease in a southerly direction along Blue Creek to Franklin D. Roosevelt Lake.

In general, precipitation falling in the watershed (excluding evaporation, storage or treatment) ultimately exits the watershed as surface water or groundwater. Water leaving the watershed is either conveyed via Blue Creek as surface water, or as groundwater under the Blue Creek Drainage. For the RI the following terminology will be used:

- **Drainage channel:** The currently active channel in which sediments are being transported and/or deposited. Drainage channels at the site tend to have intermittent flow.
- **Stream channel:** The currently active channel in which sediments are being transported and/or deposited. Stream channels tend to have water flowing most of the year.
- **Drainage area:** The area of land surface that is drained by a drainage channel or stream channel.
- **Watershed boundary:** The topographic high points surrounding an area that influence the direction of surface water and groundwater flow.
- **Watershed:** The area enclosed by a watershed boundary in which the drainage and stream channels collect and transport water downgradient to a discharge point.

The following paragraphs provide a general description of topographic features of the area surrounding the mine.

North of the Mine

As shown on Figure 2-1, the Northwest Ridge is a northeast-trending topographic high located northwest of the MA. The ridge, which terminates at Spokane Mountain, forms the northern portion of the watershed boundary for the area in which the MA is located. Sand Creek, a northeast-trending drainage channel, is located on the north side of the Northwest Ridge. Sand Creek is the primary drainage channel collecting surface water runoff from the north side of the Northwest Ridge and Spokane Mountain.

East of the Mine

A ridge of land extending in a southerly direction from Spokane Mountain forms the eastern topographic watershed boundary for the MA and adjacent area (Figure 2-1). West of the ridge, several small drainage channels receive surface water runoff from the MA. The smaller drainages convey water to the Northern Drainage, which flows in a southerly direction and discharges to Blue Creek, the predominant stream channel east and south of the mine.

South of the Mine

The Eastern, Central, and Western Drainages convey water from the southern end of the MA to Blue Creek (Figure 2-1). Seeps are present in the drainages. Blue Creek flows in a westerly direction from Turtle Lake to the confluence with the Eastern Drainage, then in a southwesterly direction until discharging into the Spokane Arm of Franklin D. Roosevelt Lake. Oyachen Creek is the largest tributary contributing water to Blue Creek. The confluence of Oyachen Creek and Blue Creek is located about 7,000 feet upstream from the lake.

West of the Mine

The Northwest Ridge extends from north of the MA in a southwesterly direction forming the western watershed boundary (Figure 2-1) for MA drainage. The east and west branches of the Far West Drainage drain west and do not discharge to Blue Creek.

Modification of Topographic Coverages

To facilitate presentation of data, the MA topography for the map base was generated by combining topographic information available on regional maps with later survey data available for the MA. The changes made to the map base were as follows:

- The topographic contour data available for the MA were generated from several different information sources, including geographic data that were (1) in a relative coordinate system (LOCAL) to the mine, (2) in state plane projection, and (3) in a Universal Transverse Mercator (UTM) projection. The contour lines for the interior area around the mine had been resurveyed by Shepard Miller Incorporated (SMI), and then merged with the rest of the area's contour lines from the U.S. Geological Survey (USGS). Some of the point locations originally were inserted by surveyed coordinates, yet these layers were shifted to match the mine (GEOGRAPHIC) features layer. Topographic contour lines generated

independently from the data sets did not match well, given the different scales at which the data were generated.

- To create a single set of topographic contours for use in the RI/FS, the two data sets were corrected to agree with USGS elevation data, and then merged into one contour line data set. Then, the various Computer-Aided Design/Geographic Information System (CAD/GIS) coverages of the site and surrounding area were evaluated to identify possible misalignments resulting from the contour merging. The coverages were first compared to USGS information, and then spatially corrected to match the validated contour line data set. Once the coverages had been checked against each other, they were evaluated using available aerial photography. Coverages that best fit the contour lines and the aerial photography were selected for the creation of the base map. This coverage was then reprojected to Washington State Plane North, NAD27. After the base map had been created, point location data, such as the monitoring well and soil sampling locations, were displayed on the map.

2.1.4 Regional Geologic Setting, Geologic Sequence, and Ore Bodies

The geologic history and ore emplacement at Midnite Mine were studied and documented in numerous reports that are referenced in this RI. While previous studies have further advanced the understanding of the geology, rock alteration/deformation and emplacement of uranium, many spatial, temporal and mineralogical aspects of the geologic history and ore emplacement can only be generalized, or are unknown. This uncertainty imposes practical limitations on the use or interpretation of the available information for understanding complex issues such as background concentrations.

2.1.4.1 Regional Geologic Setting

The Midnite Trend is a northeast-trending zone of variable width that is delineated by a sub parallel alignment of rock types, structures, geophysical lineaments, and uranium mineralization (Bendix 1981). It begins south of the Midnite Mine, passes through the mine and Spokane Mountain uranium deposits, and then extends northeast beyond Sand Creek (Figure 2-5).

As an introduction to the geologic discussion in this section, the following bullets present a simplified sequence of events leading to emplacement of the Midnite Mine ore deposits. The sequence is from the 1981 National Uranium Resource Evaluation (NURE) report (Bendix 1981). This general overview of the geologic history is one interpretation of the available data.

- **Induration of Precambrian muds and associated sediments to argillitic rocks.** During Precambrian geologic time (more than 500 million years ago) sediments

and calcareous material were deposited in a relatively shallow-water environment in the area of Midnite Mine. A portion of these original deposits have been mapped and named the Togo Formation.

- **Partial transformation through time and consolidation by overlying units into low-grade metamorphics.** As material is deposited on top of the muds (eventually part of the Togo Formation), the muds and sediment start to compress and become harder. This consolidation starts to change the character and types of minerals present in the muds and sediment (metamorphism).

- **Structural ground preparation by Jurassic tectonism.** Between 200 and 45 million years ago a period of rock deformation and mountain building (Laramide Orogeny) affected the area. The Togo Formation (along with other sediments) were folded and further altered, or metamorphosed. Folding of the Togo Formation and other sediments generally occurred in a north-south direction creating an elongated structure, or a north trending anticline. (Anticlines are elongated folds of rock that are upwardly convex.)

- **Intrusion of primeval uranium source rocks as granitic plutons during the Laramide time.** About 75 million years ago, the region was intruded by molten rock originating from a substantial depth. The rock generally can be characterized as granitic in composition. The intrusion, originating at depth, migrated upward and encompassed and further metamorphosed the Togo Formation. This activity left isolated blocks of the Togo Formation (called "roof pendants") underlain and in some cases mostly surrounded by granitic rock.

- **Initial resetting of the geologic clock during Paleocene igneous activity.** The age and timing of rock formation, alteration and intrusion can be determined to some extent from certain rock or mineral properties. Intrusive activity can alter rock/mineral properties, making it difficult to later establish the original age relationships.

- **Establishment of a partially closed, thermal circulatory system developed by intrusive dikes and widespread volcanic flows during the Eocene, thus triggering the dissolution of uranium in the granitic rocks at depth, by a probable mixture of both juvenile and meteoric waters.** Deep molten rock moved up, intruding faults and zones of weakness. The molten rock flowed over the land surface burying the existing surface Sanpoil Volcanics. This volcanic activity was the likely start of uranium movement or leaching from the granitic rocks and its concentration into ore deposits.

- **Culmination of the above events through reduction of the "younger," remobilized uranium by existing sulfides and precipitation as the solutions cooled while ascending to positions in contact with the Precambrian metasediments.** Uranium was transported by heated solution and deposited at and close to the granite-Togo contact in the subsurface. The age of uranium ore emplacement is estimated to be about 51 million years ago.

2.1.4.2 Local Geologic Setting

The bedrock geologic setting of the Midnite Mine and surrounding area is dominated by once-molten granitic rock that intruded older metamorphosed sedimentary ("meta-sedimentary") rocks. The older rocks formed the roof for the intrusive quartz monzonite body or "stock" as it cooled. This so-called "roof pendant" has been locally eroded away or mined out, thereby exposing the granite stock. The meta-sedimentary rocks are the primary host for the uranium ore that was mined at the Midnite Mine. The ore is localized along the contact between the intrusive rocks and the meta-sedimentary rocks. All of the rock units are fractured and faults are present. Figure 2-5 presents a generalized geologic map. A schematic cross-section of the geology of the study area is provided on Figure 2-6. As shown on Figure 2-6, the Sanpoil Volcanics and part of the Togo Formation have eroded away at the Midnite Mine Section.

Geologic units exposed in the area consist of meta-sedimentary rocks of the Togo Formation, a series of quartz monzonite intrusions of Tertiary or Cretaceous age, igneous dikes, Quaternary stream and rock deposits derived from these rocks, and Late Quaternary glacial deposits. The metamorphic rocks are considered part of the Precambrian Togo Formation of the Deer Trail Group that is equivalent to the upper part of the Belt Supergroup (Miller 2000, Miller and Clark 1975). Togo Formation meta-sedimentary rocks include phyllite, marble, calc-silicate hornfels, and quartzite. Exposures of the Togo Formation indicate a roof pendant ranging up to approximately 600 feet thick that has been folded and overturned to the east as part of the regional northeast-trending Deer Trail Anticline (Bendix 1981, Ludwig et al. 1981, Nash and Lehrman 1975, Robbins 1978). The base of the formation is not exposed in the study area.

The Togo Formation is the primary host rock for uranium mineralization at Midnite Mine. Mineralized zones are characterized by an increase in grain size, foliation, and iron sulfide (pyrite and pyrrhotite) abundance. The ore bodies at the Midnite Mine were localized within the phyllite and calc-silicate hornfels of the Togo Formation adjacent to the contact with the quartz monzonite intrusion (Barrington and Kerr 1961, Becraft and Weis 1963, Nash 1975, Sheldon 1959). The metamorphic rocks of the Togo Formation include phyllite, consisting of gray to black, fine grained, strong rock interbedded with calc-silicate rocks consisting of gray to white, fine grained, thin-bedded, and strong to very strong rocks. The phyllite was observed to have a schistose texture near portions of the intrusive contact and often was highly altered and mineralized. The calc-silicate rocks contain beds of marble, quartzite, and hornfels. Bedding is

present in the phyllite and calc-silicate rocks and is oriented generally north-south to north-30°-east, and dips about 45° to 70° southeast.

Eight ore bodies were present at the mine along the intrusive contact for a distance of about 1 mile (Barrington and Kerr 1961). The depth to ore was reported to vary from less than 16 feet to about 300 feet (Nash 1975). Mining of uranium on the site started where uranium ore was known to be present at shallow depths. Uranium ore at the Midnite Mine was excavated by first stripping off overlaying material to expose the ore. The ore was then removed and shipped by truck for processing. The mining progressed in a northward direction to areas of higher elevation. Consequently, open pits became larger and deeper to expose uranium ore along the granite-Togo contact deeper below the surface.

Locally, surficial deposits overlie the bedrock. These surficial deposits were laid down by stream and glacial activity and by soils developed through weathering of bedrock. Surficial deposits up to several tens of feet in thickness are present in drainages within and south of the MA. These unconsolidated units include residual soils, colluvium, fluvial sediments, and glacial deposits (E&E 1998) Deposits of glacial lake silt are present east of the MA near Turtle Lake. The most extensive deposition of surficial deposits in the area originated from floodwaters of glacial Lake Missoula about 15,000 to 20,000 years ago. Following breaches of ice dams that impounded Lake Missoula, a series of catastrophic floods swept across the area and left sand and gravel deposits up to approximately 90 meters (300 feet) thick along the Spokane River valley and adjacent areas. Hillsides adjacent to Blue Creek downstream of Oyachen Creek are composed largely of these sand and gravel deposits.

2.1.4.3 Ore Bodies

Midnite Mine Ore Bodies

Ore bodies mined at the Midnite Mine were localized within the phyllite and calc-silicate hornfels of the Togo Formation adjacent to the contact with the quartz monzonite intrusion (Barrington and Kerr 1961, Becraft and Weis 1963, Nash 1975, Sheldon 1959). Eight ore bodies were present at the mine along the intrusive contact for a distance of about 1 mile (Barrington and Kerr 1961). The depth to ore was reported to range from less than 15 feet to about 300 feet (Nash 1975), with two ore bodies having no surface expression and others giving little evidence of their potential at depth (Barrington and Kerr 1961).

Individual ore bodies ranged from a few feet to 700 feet in length and from a few feet to 200 feet in width, with the greatest concentrations of ore occurring above depressions in subhorizontal intrusive contacts (Barrington and Kerr 1961, Nash 1975). The ore bodies were irregular in the oxidized zone, where the shape of the ore bodies was influenced by bedding, schistocity, faults, shear zones, dikes, and other structural features (Sheldon 1959). Stratigraphic controls on ore

deposition were not identified. Instead, mineralized zones cut across lithologic boundaries if permeability was adequate for movement of the ore-forming hydrothermal fluids (Nash 1975).

NURE Report Uranium Anomalies

Ten areas of anomalous uranium (and other metal) concentrations were identified by the NURE subregional soil survey. Only two of the anomalies were associated with known ore deposits. The anomalies are shown on Figure 62 of the NURE report (Bendix 1981):

- Six of the anomalies, not related to known mineralization, were located east and northeast of the Midnite Mine. These were eliminated from further consideration because most did not overlie meta-sedimentary host rocks, and therefore did not conform to the geologic aspect of the NURE genetic model. The anomalies located northeast of the Midnite Mine (Grouse Ridge area northeast of Spokane Mountain) also were rejected because they lacked the typically associated metal halos.

- Two anomalies not related to known ore deposits were considered viable as possible areas for further exploration. These were an area on Bear Mountain, northeast of Spokane Mountain, and an area along the Sand Creek channel.

The results of the NURE stream sediment study also indicated the presence of 11 anomalies:

- Five anomalies are located within the proximity of the Midnite Mine Open Pits and considered by NURE a result of mine contamination.

- One anomaly present southeast of the mine near the confluence of the Northern Drainage and Blue Creek may be indicative of mineralization. This anomaly may be associated with Twilight deposit (Fleshman and Dodd 1982).

- Two of the anomalies identified are associated with the Spokane Mountain deposit. A third anomaly is located northwest of Spokane Mountain near Grouse Ridge.

- Two anomalies are located west of the Midnite Mine. According to the NURE report these two anomalies indicate a source area (uranium) to the east which could be an extension of the Midnite Deposit and a future exploration target.

The NURE study provides an analysis of metal concentrations present within the portion of the Midnite Trend that includes the Midnite Mine. The multiple uranium anomalies were found to occur in both meta-sedimentary and plutonic rocks over a broad geographic area in the vicinity

of the mine. For the purposes of the RI, all metal concentrations in the NURE study not rejected as due to mine contamination are within the natural background distribution.

Sherwood Uranium Mine Ore Bodies

Uranium mineralization along the Midnite Trend extends for several miles. The Sherwood Mine is another large uranium mine located approximately four miles southeast of the Midnite Mine (Figure 2-1). While close to the Midnite Mine, the geology and mineralization of the Sherwood deposit is very different from the Midnite deposit. At the Sherwood Mine, quartz monzonite bedrock is overlain by andesitic lava flows, tuffaceous sandstone, arkosic sandstone, carbonaceous shale, and conglomerates of the Gerome Formation (Becraft and Weis 1963). The Togo Formation is absent from the area. Uranium mineralization occurs in the lower part of the conglomerate member of the Gerome Formation. The primary ore minerals are uraninite, metatorbernite, metatyuyamunite, uranophane, phosphuranylite, and coffinite (Dames & Moore 1976).

2.1.5 Pre-Mining Conditions

Prior to the RI, historical information about the site was described in various reports. One such effort was an interpretation of site history from aerial photographs by Peters Geosciences (Peters 1999a). Peters studied historical aerial photographs of the site and described the pre-mining conditions. This report was reviewed for the RI and found to present a reasonable description of pre-mining conditions and site history. For completeness, the Peters summary of the site conditions and mining activity is excerpted and presented below.

> "Before the Midnite uranium deposit was discovered and mining began, the dominant vegetation was grasses and other low plants, with scattered individual trees and small stands. The drainages supported fairly dense populations of evergreen and deciduous trees and riparian vegetation, particularly along the East Drainage and lower half of the West Drainage.
>
> As of the 1950 photograph, there is no significant evidence of extensive logging in the area of the mine. However, it is possible that logging had occurred in the early 1940s or earlier and would not be easily apparent by 1950.
>
> The 1950 photograph does provide some indication of springs and wet area through visible differences in the vegetation in terms of type and density. Drainages are favored by vegetation, of course, because of the relatively dry climate in the area and the general south-facing slope of the mountainside. The Central Drainage in particular shows strong evidence of such wet areas by clusters of heavy vegetation along its length. The West Drainage shows little such

evidence in its upper half. The East Drainage, and a couple of small tributaries on its west side, show some clustering of vegetation which could be controlled by springs or wet areas. Such "wet areas" indicate that there was significant near-surface groundwater activity in the mine area prior to mining and covering of some of the wet areas with waste. Such shallow groundwater and its flowpaths may still be contributing to seepage from the waste piles today.

With respect to mineral development activity, there was a small excavation at the mine site prior to the uranium discovery in 1954. Three small prospect pits (one may be an adit in part) are present on the hillside where the Adit Pit ultimately was developed at the Midnite Mine. Ms. Donna Bruce of the BIA noted that this was a "gold" prospect. However, there is and was no known significant gold within the Midnite deposit or surroundings. The prospectors probably were misled by the locally abundant pyrite and/or spotty trace occurrences of molybdenite in the uranium deposit, and they believed they were onto a precious or base metal deposit even though there was none.

A lineament (linear feature) analysis of the mine area was performed as a means of identifying any potential large fracture systems that were present in the mine area prior to mining activity. Lineaments are straight to curvilinear features on the earth's surface that are apparent in aerial photographs and/or satellite images. The fracture system, both large- and small-scale, is thought to be important for understanding groundwater flow in and around the mine site. The presumption, backed up by a long history of such analyses by geologists and remote sensing experts, is that most large linear features represent fractures (faults, fracture zones, joints, etc.) that extend to some depth, although the depth cannot be inferred from the photographs alone.

Vegetation anomalies occur throughout the area, indicating some control upon vegetation by fracture-flow groundwater. The main mine area itself is dominated by northwest-to-north-northwest (NW-NNW) and north-northeast (NNE) oriented structures which control the primary drainages. The NW-NNW features appear to be dominant and most continuous in the main mine area, which accounts for major segments of the East and West Drainages being oriented those directions. The lower half of the East Drainage and part of Blue Creek may be controlled by a northeast (NE) to NNE structure that is discontinuously apparent across the area. There are a few east-west (EW) to east-northeast (ENE) structures in the main mine area, but most are quite short and do not appear to be part of a strong trend."

2.2 CURRENT SITE CONDITIONS

The site and surrounding area are generally moderately sloping and forested, with occasional open parks typical of the foothill setting (SMI 1996). The original topography of the site has been altered by development of the mine pits, mine waste dumps, (or waste rock piles), protore, ore and topsoil stockpiles, access roads, mine haul roads and other mine facilities.

The major features of the MA are shown in Figure 2-2 and include:

- Two open pits, Pit 3 and Pit 4, that are partially filled with water
- Areas of mine spoils and waste rock
- Ore and protore stockpiles
- Former open pits that have been backfilled with waste materials
- Other surface water, including surface impoundments, seeps, and ditches
- A WTP and associated seep collection sumps and weirs
- Access and haul roads

Access to the site and Pit 3 is controlled with locked gates or chain-link fences.

Within the MA, the original Western Drainage and Central Drainage are partially filled with waste rock from mining operations. South of the MA, the Western Drainage and the Central Drainage flow into the Eastern Drainage. The Eastern Drainage discharges to Blue Creek (Figure 2-1), which is a perennial stream that flows into the Spokane River Arm of Franklin D. Roosevelt Lake. Four other surface water drainages receive some surface water runoff and/or groundwater from the MA. These include the West and Middle Forks of the Northeastern Drainage (which becomes the Eastern Drainage), East Branch of the Far West Drainage, and Upper Eastern Drainage.

The majority of surface water from the southern portion of the MA is conveyed by the Eastern Drainage, Central Drainage, and Western Drainage. During the summer months, flow in the lower Eastern Drainage is sustained by discharge from the WTP (Figures 2-1 and 2-2).

The groundwater flow direction at the site is generally from the Northwest Ridge southward to Blue Creek (Figure 2-1). The depth to water on the site ranges from about 130 feet below ground surface (bgs) on the Northeast Ridge to a few feet bgs along the drainages south of the MA. As groundwater flows through the site in unconsolidated material, it likely converges along the hydraulic sinks created by the filled in drainages and the open pits. Groundwater flow directions on the site may vary locally in response to encountering post-mining surface topography underlying the waste rock piles.

2.3 SITE HISTORY

This section describes the history of mining operations at the site, regulatory enforcement actions, and reclamation activities that have been performed to date.

2.3.1 Mining History

Uranium was discovered on the Northwest Ridge in 1954 by John C. and James V. LeBret of the Spokane Tribe. The mine was developed and operated by DMC, a subsidiary that is 49% owned by Midnite Mines, Incorporated, and 51% owned by Newmont USA Limited.

The Midnite Mine was leased by DMC from the Spokane Tribe in 1954 to produce uranium for the Atomic Energy Commission (AEC). Mining began in early 1955 at the Adit Pit and uranium was first shipped to the AEC in May 1955. Starting in 1955, the ore was milled at the DMC mill in Ford, just outside the reservation boundary. Mining at Midnite Mine continued until 1965 when the DMC contracts with AEC expired. Mining was resumed in 1969 under commercial contracts and continued until November 1981 (SMI 1996). The Bureau of Indian Affairs (BIA) terminated mining leases held by DMC in April 1991, but continued the companies' obligation for site management and reclamation. Although mining was discontinued in 1981, DMC has remained on site to perform limited reclamation work and operate the WTP.

Production of ore and waste rock at the site is summarized as follows:

- Approximately 5.3 million tons of ore and protore were mined at the Midnite Mine from 1955 to 1981 (SMI 1996).
- Of this total, 2.9 million tons of ore were processed at the DMC mill in Ford, Washington. The ore processed at the mill averaged 0.2 percent uranium oxide (U_3O_8). Approximately 11 million pounds of U_3O_8 were recovered at the DMC mill during the life of the mine (SMI 1996).
- The remaining 2.4 million tons of ore and protore (low grade ore) were stockpiled at the site, where they remain. In addition to the ore and protore, approximately 33 million tons of waste rock was mined and heaped into piles at the site, or used to fill pits and grade the surface.

During the period the mine was active, nine pits or subpits were excavated: Adit Pit, old Pit 2, Pit 2 East, old Pit 3 (Pit 6), Boyd Pit, Boyd Pit 2, Pit 3 North, new Pit 2, Pit 4, new Pit 3, and Boyd 2 East Pit. The numbering of the pits is not sequential, because pits evolved and merged. Pit 3 North consumed old Pit 3 (Pit 6), and was in turn subsumed into new Pit 3, along with Boyd 2 East Pit. As mining progressed, several of these pits were subsequently backfilled with

overburden and waste rock material (Figure 2-2). Waste rock was also dumped in piles or used as fill for surface grading. The two largest waste rock piles are the South Spoils and the Hillside Dump. DMC stockpiled some materials that were near market grade. Seven stockpiles of ore/protore are located at the surface. Existing backfilled pits are the Boyd Pit, Pit 2, Pit 2 East, and Adit Pit. Two pits (Pit 3 and Pit 4) remain open. A detailed description of the development of the pits, waste rock piles, ore stockpiles, and other mine features is provided in Peters (1999a), who used historical aerial photography of the site to investigate the sequence of mining activities, as described in Section 4.1.1.

2.3.2 Enforcement and Reclamation History

This summary of enforcement actions and reclamation activity is listed from oldest to most recent. SMI was retained by the mining companies to conduct much of the interim on-site work.

Construction of the Pollution Control Pond - In 1979, DMC constructed the PCP at the toe of the South Spoils waste rock pile within the Central Drainage to contain surface water runoff and water seeping from the largest of the waste rock dumps.

Pumpback of Water From PCP to Pit 3 - In 1981, in response to the growing quantities of water contained in the PCP, DMC installed pumps to pump excess water from the PCP to Pit 3.

South Spoils Reclamation - DMC performed partial reclamation of the South Spoils side slopes in 1980 by placing approximately 8 inches of stockpiled topsoil over the south-facing slopes (SMI 1996, E&E 1998). The topsoil was seeded with a mixture of grasses. In 2002, vegetation growing on the South Spoils slopes consisted of a mixture of grasses, small shrubs, and a few small Ponderosa pine trees.

NPDES Permit - DMC obtained authorization to discharge under the National Pollutant Discharge Elimination System (NPDES) starting October 30, 1995. The named receiving water is Blue Creek, a tributary to Franklin D. Roosevelt Reservoir. Discharge from the on-site WTP to the Outfall Pond is authorized by this permit.

Consensual Compliance Order - In 1987, DMC and EPA entered into a consensual Compliance Order that required DMC to eliminate discharges of pollutants to waters of the United States. The Compliance Order directed DMC to install sumps and pump systems to intercept seepage water that enters Blue Creek, and to build a water treatment facility to remove pollutants and allow discharge of the water accumulating in Pit 3 (Figure 2-2). In response to the order, DMC took the following actions:

- Constructed a pumpback system in the Western Drainage in 1987 to collect water from the Western Drainage seep and Western Drainage Junior seep. The

collection system was upgraded in 1998 by the construction of an enlarged concrete collection area.

- Constructed a pumpback system in the Central Drainage that consists of a buried 55-gallon drum that collects water from several seeps at the toe of the South Spoils downhill from the PCP. Water from these two seep collection systems is currently pumped to the PCP and subsequently to Pit 3 (E&E 1998).

- Constructed a collection system at the East (Boyd) Seep in 1978. Seep water is collected in a 55-gallon drum and piped to a pumpback building located adjacent to the East Haul Road near the Blood Pool (Figure 2-2). This system also collects water that overflows from the Blood Pool. The water is pumped from this system directly to Pit 3.

Water Treatment Plant Construction - In 1988, DMC constructed a WTP on site to treat the growing quantities of water contained in the PCP and Pit 3 (Figure 2-2). The WTP currently has a maximum treatment capacity of 500 gallons per minute (gpm) using barium chloride precipitation of radium, application of hydrated lime to precipitate heavy metals and uranium, and final clarification to reduce suspended solids.

Termination of Mine Leases and Reclamation Plan - On May 29, 1991, the BIA terminated the DMC mining lease. DMC was instructed to submit a reclamation plan by July 15, 1991, for the closure of the Midnite Mine. The Midnite Mine Reclamation Plan (SMI 1991) was submitted on July 12, 1991, but was not accepted by the agencies.

Operation of Treatment Plant - The BLM, which was the primary federal agency managing the mining lease after the mine closed, issued a Mine Order on December 9, 1991. The order required DMC to begin dewatering Pits 3 and 4 and treating the water to the discharge quality specified in the 1985 NPDES permit. Water treatment operations are summarized as follows:

- The WTP began operations in October 1992 and has typically operated from April through November each year. Treated water is discharged to the Eastern Drainage under NPDES permit Number WA-002572-1, issued in February 1985 and reissued in October 1995.

- On July 23, 1993, the BLM ordered DMC to increase the water treatment rate to 400 gpm by August 15, 1993, and then to 500 gpm by October 15, 1993.

- Sludge generated from the WTP was trucked to the DMC mill in Ford, processed to remove the U_3O_8, and disposed of as 11(e)(2) byproduct until 2001. It is now disposed of directly in the tailings disposal area (TDA) 4 tailings impoundment at

the mill pursuant to a Washington State Department of Health (DOH) license amendment in 2001. On average, two truckloads of sludge were hauled each day during April to November of each year when the WTP was operating continuously.

- Because the water levels have been drawn down since 1992, the treatment schedule has been scaled back, and sludge production has dropped accordingly.

Development of Environmental Impact Statement - In 1995, the BLM initiated scoping of the studies for an environmental impact statement (EIS) for mine reclamation under the National Environmental Policy Act (NEPA). The EPA participated in this process, requesting that elements of CERCLA be incorporated. DMC produced a revised site Reclamation Plan in 1996 (SMI 1996) that outlined the mining companies' proposed plan for reclamation of the site. This plan was not accepted by the BLM. The BLM and EPA negotiated with DMC and Newmont USA Limited to complete site studies and reclamation, following the scoping phase.

Completion of an Expanded Site Investigation - EPA completed an ESI (E&E 1998) to support the potential listing of the site on the NPL.

Interim Agreement - Newmont USA Limited and DMC agreed to conduct limited work in an interim 1998 agreement with the U.S. Department of Justice and BLM (BLM 1998). The interim studies are described in the Work Plan for the Midnite Mine (SMI 1998a); these studies were finished in 2001. A summary of the studies conducted by SMI for the mining companies is presented in Table 3-1 in Section 3. Subsequent negotiations for a comprehensive study and site reclamation addressing CERCLA requirements failed.

NPL Listing and Start of RI - EPA proposed the site to the NPL in February 1999 and initiated negotiations with DMC for conducting an RI/FS. Final listing as an NPL site was in May 2000. The RI/FS negotiations failed, and EPA began work on a CERCLA RI/FS using fund monies while the interim work was being conducted by SMI. In accordance with the EPA data quality objectives (DQOs) process guidance, preliminary scoping of RI/FS data needs was completed by early June 1999 and separated into two phases of work. The RI/FS program was finalized and a Quality Assurance Project Plan (QAPP) was prepared to address each phase of work (URS 1999, 2000a).

Dewatering Test of Boyd Pit and Pit 2 - On December 20, 1999, the BLM (BLM 1999) issued a Finding of No Significant Impact (FONSI) for the Backfilled Pit Dewatering Plan (SMI 1999b), which was part of the work specified in the 1998 agreement between Newmont USA Limited, DMC, the U.S. Department of Justice, and BLM. The agreement required DMC to dewater the backfilled Boyd Pit and Pit 2 temporarily and to monitor the effects on the Central and Western Drainage pumpbacks (Figure 2-2). DMC also monitored the rate that groundwater

refilled the pit during dry season. In addition, the FONSI required DMC to build a fence on the access road to Pit 3; monitor wildlife access to the pits, PCP, and the Western Drainage seeps; and leave a minimum of 3 feet of water over the sediments in Pit 3 and Pit 4. Monitoring for the Backfilled Pit Dewatering Plan was implemented in July 1999.

Table 2-1
MONTHLY PRECIPITATION, TEMPERATURE, WIND SPEED, RELATIVE HUMIDITY, AND SOLAR RADIATION

Month	Precip (in)	Max. Temp. (^{0}F)	Min. Temp. (^{0}F)	Avg. Temp. (^{0}F)	Wind Speed (mph)	Wind Speed (Gusts) (mph)	Avg. Relative Humidity (%)	Avg. Solar Radiation (L/day)
January	2.38	34.4	24.9	29.2	3.0	8.5	78.8	79.3
February	1.71	41.7	29.8	34.6	3.9	10.0	78.4	165.4
March	1.66	52.2	38.1	42.9	4.4	9.9	65.7	278.5
April	1.34	59.4	43.1	49.7	4.9	12.4	57.6	374.1
May	1.66	69.1	50.9	57.6	4.9	12.8	54.2	484.7
June	1.70	73.0	53.0	61.7	4.9	12.5	53.1	534.1
July	1.06	82.2	60.2	70.0	4.6	13.1	45.4	556.9
August	0.32	83.5	60.1	71.0	4.6	11.4	37.9	513.6
September	0.60	75.2	53.6	62.8	4.3	10.9	43.3	392.8
October	1.32	57.7	41.6	48.7	3.9	9.4	60.5	248.6
November	2.20	40.2	30.8	35.0	3.6	8.9	83.0	117.0
December	2.50	33.4	25.2	28.7	3.6	8.7	83.4	130.1
TOTAL	18.45							

Notes:

Based on data from RAWS Stations 324F26B8 and 3244756C located on the mine site for the period April 1991 through December 2000.
°F - degrees Fahrenheit
mph - miles per hour
L/day - Langleys per day
in - inches

3.0 STUDY AREA INVESTIGATIONS

Prior to the RI, several organizations conducted studies of the mine and surrounding area. EPA reviewed previous investigations to identify data of sufficient quality for use in the RI and risk assessments and to identify data gaps relevant to completion of the RI. Data from previous investigations helped provide a basis to design a sampling program to fill data gaps, including sampling to evaluate background concentrations of COPCs.

Section 3.1 identifies and briefly summarizes the previous investigations. Section 3.2 presents the approach used to characterize natural background levels, and Section 3.3 presents the approach EPA used in conducting the RI, along with elements of work completed and a summary of data generated.

3.1 PREVIOUS INVESTIGATIONS

Previous investigations related to the mine and mining impacts were performed by the mining companies, U.S. Bureau of Mines (BOM), BLM, USGS, EPA, and the Upper Columbia United Tribes Fisheries Center, among others. In addition, as part of the NURE program, the Bendix Corporation provided an integrated approach to exploration for contact uranium ore deposits by studying a portion of the Midnite Trend, which includes the Midnite Mine (Bendix 1981).

EPA reviewed the investigations and summarized the information in the following two reports:

- Midnite Mine Existing Data Summary (URS 2000b)
- Midnite Mine Focused Historical Data Assessment (URS 2000c)

Work conducted under the various investigations is summarized in Table 3-1. The RI/FS data set includes data collected by SMI for the mining companies and by Ecology and Environment (E&E) for EPA's expanded site investigation. These data are compiled together with data collected by EPA for the RI/FS in Appendix D. Existing chemical and radiological data collected by the mining companies and by EPA under the ESI were combined with chemical and radiological data collected under the RI/FS to characterize the nature and extent of contamination at the site. Background concentrations of COPCs were characterized using samples collected by EPA for the RI/FS (see Sections 3.2 and 3.3.1). The numbers of samples and sampling locations evaluated in the background areas, the MA, and the PIA are presented in Table 3-2 for surface water, sediment, surface materials, and groundwater.

The MA and PIA sampling locations are shown by medium and area in the following figures:

- Figure 3-1 shows surface water and sediment sampling locations in the MA and the mine drainages
- Figure 3-2 shows surface water and sediment sampling locations in Blue Creek and its tributaries
- Figure 3-3 shows surface and subsurface material and airborne radon sampling locations in the MA and adjacent downwind areas
- Figure 3-4 shows groundwater and seep water sampling locations in the MA and the PIA
- Figure 3-5 shows surface water, sediment, and surface and subsurface materials sampling locations and gamma radiation survey locations in and adjacent to the haul roads
- Figure 3-6 shows radon flux measurement locations in the MA

3.2 APPROACH TO CHARACTERIZATION OF NATURAL BACKGROUND LEVELS OF CONSTITUENTS

Estimated background concentrations are used to help evaluate whether environmental media in the PIA have been impacted by mining. Transport of COPCs from the MA may have occurred via groundwater migration, surface water runoff, wind transport, or mechanical movement of materials.

Background concentrations also are important for determining cleanup levels in the FS if constituents naturally occur at concentrations greater than applicable or relevant and appropriate requirements (ARARs) or risk-based cleanup levels.

For all media, “background” is defined for this RI/FS as the range of chemical/radiological concentrations naturally occurring in the site vicinity, in areas unaffected by mining.

Uncertainties in Determining Background

Prior to mining, the spatial distribution of naturally-occurring metals and radionuclides in surface water, groundwater, sediments, surface materials, plants, and air were not quantitatively assessed at Midnite Mine or in downgradient environmental media. The RI/FS characterized the MA and

PIA, as well as nearby areas EPA considers unaffected by mining and which have similar hydrogeologic and geochemical conditions. For remediation purposes, conditions in these background areas represent the range of conditions at and near Midnite Mine.

Background levels can be used to delineate the nature and extent of contamination, identify COPCs for a site, define exposure areas for risk assessment, and in some cases to estimate areas and cleanup levels for remediation. Estimates of background are of particular importance at mining sites, where the COCs were present prior to mining, but as a result of mining activities were exposed, mobilized, or concentrated at higher rates than those that occur under natural conditions. As with any study, sample data can only approximate the actual distribution of concentrations in site and background media. Where concentrations are naturally variable, the distribution of concentrations in the sample data may not encompass the true range of conditions.

To define areas potentially needing cleanup with a relatively high confidence, EPA compared site data to an upper statistical threshold of the data from the background areas. The comparison relied on a statistical approach intended to balance the chance of overestimating impacts (where an unaffected area appears affected) against the chance of underestimating impacts (where an affected area appears unaffected). Generally, however, near the edges of a contaminated area site conditions approach background conditions, increasing the uncertainty in comparing the two. EPA may have thus underestimated areas near Midnite Mine where concentrations of metals increased due to mining.

Selection of different areas to represent site background conditions, collection of additional or different samples in the area used, and use of different statistical thresholds for assessing changes in conditions caused by mining could result in different but similarly valid conclusions. As required by CERCLA, EPA is focusing on areas where, despite natural variability, the data demonstrate that mining impacts have occurred and that the associated risks to human health and the environment warrant response actions.

EPA reviewed data from the area around Midnite Mine to select background sample locations, which were identified in sampling and analysis plans. The data were evaluated statistically and EPA considers them reasonably representative of background conditions for remediation purposes. EPA used a sample-by-sample comparison between site data and background data to identify potentially impacted locations, applying knowledge of site characteristics, mining practices, and professional judgment in determining mining affected areas. This sample-by-sample approach was followed by a population comparison. Both comparisons demonstrate that the MA concentrations are markedly higher than background, while concentrations further from the source become increasingly harder to distinguish from those in nearby unaffected areas.

The background reference areas near Midnite Mine were characterized as described in the Phase 1A and Phase 2A/1B QAPPs (URS 1999, 2000a). Historic data sources were reviewed to

assess the distribution of rock types, chemical concentrations, and mineralized zones undisturbed by mining to help identify background reference areas in which to collect background samples. Data sources reviewed are discussed below:

1. **National Uranium Resource Evaluation – An Exploration Systems Approach to the Spokane Mountain Area Uranium Deposits, Northeastern Washington** (Bendix 1981) - The report investigates the Spokane Mountain uranium deposit, which was not mined, and the surrounding area (which includes Midnite Mine). The report provides a comprehensive evaluation of naturally-occurring geochemical and geophysical conditions absent mining impacts. The evaluation further focuses on interpretation of anomalous metal concentrations in sediment, surface water, and soil as potential indicators of a buried or hidden uranium ore body.

2. **Exploration drill hole data provided by Associated Environmental Scientists and Engineers** (AESE 1999) - A series of spreadsheets summarizing historic drilling conducted by Western Nuclear, Inc, including uranium content for different sampling intervals, provided to EPA. These data were used to identify the lateral extent and depth of mineralized zones on Spokane Mountain, which in turn were used to help identify target zones for background monitoring wells.

3. **Geological Survey Bulletin 1131 Geology and Mineral Deposits of the Turtle Lake Quadrangle, Washington** (Becraft and Weis 1963) - The geological report includes a geologic description and location of the Deer Mountain uranium prospect. The RI background surface water/sediment samples were collected downstream of the prospect. The prospect was not mined; therefore, the background sample locations are outside of the likely range of influence of this disturbance.

4. **Inventory, Characterization, and Water Quality of Springs, Seeps, and Streams near Midnite Mine, Stevens County, Washington** (USGS 1996) - This report characterizes water quality in basins near the Midnite Mine that have not been influenced by the mine. The analytical results were considered in selection of RI background surface water locations.

3.2.1 Selection of Background Reference Areas

Background reference area selection (URS 1999, 2000a) was based on defining sample locations that met the following conditions:

- Proximity to the MA and PIA

- Geologic/geochemical/hydrogeologic characteristics similar to the Midnite Mine
- In an area not affected by mining
- Accessible for drilling and sampling activities

Areas selected for background sampling include Spokane Mountain (Background Area A), Northwest Ridge, Eastern Background Sampling Area (Background Area B), and Sand Creek. These areas are described in more detail below.

Spokane Mountain

A portion of the Spokane Mountain area that is unaffected by the operations of the Midnite Mine was chosen as a pre-mining analog for the Midnite Mine area because of its proximity to the mine, presence of uranium ore deposits at depth, and similarity of rock types and geologic structure. This area is referred to as Background Area A. Background groundwater samples were collected from monitoring wells completed in both unmineralized and known hydrothermally uranium-mineralized zones. Surface material samples were collected from soils that had developed on bedrock covering the ore deposits. Stream sediment and surface water samples were collected from stream courses that drain the area.

Geologic and geochemical information available for this area included NURE data (Bendix 1981). The exploratory work conducted as part of NURE, and other investigations, indicated the presence of an unmined uranium deposit north of Spokane Mountain hosted within the Togo Formation (Figure 2-5) and documented the similarity between the Midnite Mine and the Spokane Mountain area.

Northwest Ridge

The Northwest Ridge is at the head of the surface watershed that contains the Midnite Mine, but does not have the uranium ore deposits that are present at the mine. The ridge follows the contact between the Togo Formation and the underlying quartz monzonite. Wells drilled along Northwest Ridge are either completed in the quartz monzonite, span the contact between the quartz monzonite and the Togo Formation, or are completed in the Togo Formation. An additional purpose of the wells (URS 1999) was to assess whether the hydraulic gradient from Northwest Ridge was toward the MA.

Eastern Background Sampling Area

Surface material samples were collected from an area without evidence of potentially economic uranium mineralization (based on the NURE data) east of the MA in a separate drainage basin (Figure 3-7). This area is referred to as Background Area B. Background Area B is entirely within the quartz monzonite. Based on NURE data and the results of the RI/FS sampling, the

quartz monzonite locally contains uranium minerals, even in areas that are not associated with the Midnite Trend or with known subsurface ore bodies.

Sand Creek

Sand Creek was sampled as a background reference area because it drains areas with both mineralized rock (which contain buried ore deposits), and unmineralized rock. Sand Creek tributaries that contain previously-operated mines or uranium exploration targets were avoided in the sampling. Sand Creek is considered similar to lower Blue Creek (part of the PIA) in that it has tributary drainages with and without evidence of uranium ore deposits. Although the proportions may be different, all of the rock types, rock alteration types, and surficial deposits present in the PIA are reflected in the drainage area for Sand Creek, except for the Lake Missoula flood sediments located in the lower part of the Blue Creek Drainage area.

Blue Creek, before mining, was affected by the halo of mineralization surrounding the Midnite Mine and by the mineralization in the upper part of Oyachen Creek. Due to the contributions of stream sediments and water from mineralized zones of the Midnite Mine drainage area, Blue Creek contained higher levels of metals than it would have had the creek flowed through less mineralized areas. Although the ore mineralization was closer to the surface at the Midnite Mine, mineralized areas, such as the deposits beneath Spokane Mountain and the potential deposits near Bear Mountain and Grouse Ridge, also contribute sediment and water to Sand Creek.

3.2.2 Development of Sampling Plan

Based on the data evaluation, a plan for collecting background data was prepared. DQOs were used in the QAPP (URS 1999, 2000a) to aid in developing an appropriate sampling plan. These DQOs provided a standard to determine the acceptability of existing data for estimating the range of background values and guided new data collection and analysis. Where existing data of acceptable quality were available, these data were used in assessing background. Additional data collection was necessary to address data gaps.

The Sampling and Analysis Plan (SAP) (URS 1999, 2000a) guided the collection of new data to ensure that sampling location, collection, and analyses would be properly documented and would meet the requirements of the CERCLA process. Statistical methods (power analysis) were used as guidance in selecting the number of samples to be collected. A standard operating procedure (SOP) prescribed the specific sampling procedures. Locations for sampling were randomized within the background reference area or specified subsets of that area, and thus fully support statistical analysis and quantification of statistical uncertainty. Existing geologic information and information collected during preparation of the RI were used to verify that the sampling locations selected constituted a valid representation of the range of background values.

Laboratory analysis of all samples was undertaken using standard analytical methods approved by EPA. Data verification procedures were used to assess whether data met the specified quality control acceptance criteria. Data validation was performed by chemists, who were not involved in generation of the data, to make an overall assessment of the data set and the usability of each analytical result.

3.3 SUMMARY OF REMEDIAL INVESTIGATION FIELD WORK

The following sections discuss the data collection rationale, investigation methods, sampling locations, and samples collected by media. Sampling and data collection is described in Section 3.3.1 for the background areas and in Section 3.3.2 for the MA and PIA. DQOs and data quality are discussed in Section 3.3.3. Additional details of the RI sampling program are provided in Appendix A.

3.3.1 Background Sampling Locations and Data Collection

To address the variety of conditions present in the background study area, samples were taken to characterize the range of values for each of the media types. The following locations were sampled to characterize background conditions:

- 27 surface water and sediment sampling locations (seven locations were dry and were not sampled for surface water; five locations contained no sediment)
- 40 surface material sampling locations; 16 subsurface material sampling locations and 18 radon flux and airborne radon measurement locations were co-located with surface sampling locations
- 19 groundwater monitoring wells

Background sampling locations for sediment, surface water, surface materials, and groundwater are shown on Figure 3-7. Background sampling locations for surface materials, radon, and external gamma radiation are shown in Figure 3-8 (Background Area A) and Figure 3-9 (Background Area B). The rationale for selection of the sampling locations and the numbers of samples collected are summarized in the following sections.

3.3.1.1 Sediment/Surface Water

Sediment and surface water background samples were collected in fall 1999. Both composite and grab sediment samples were collected at each background sampling location so that earlier data collected by the mining companies (composite) and EPA (grab) could be compared to the

appropriate background levels. To characterize the seasonal variability of surface water quality, additional surface water samples were collected at the same locations in spring 2000 and fall 2000. Sediment samples were collected at a total of 22 locations, and surface water samples were collected at a total of 20 locations. The background data are presented in Section 4.6, with sampling locations shown in Figure 3-7. Figure 3-7 includes a table that indicates which medium (sediment, surface water, or both sediment and surface water) was sampled at each sediment/surface water background sampling location.

The existing sediment data collected downstream of the MA were from both discrete (E&E 1998) and composite (SMI 1999g) samples. Both types of samples were collected at each background sampling location and statistically analyzed. Based on the analysis, it was concluded that data from discrete and composite samples could be combined for data evaluation.

3.3.1.2 Surface and Subsurface Material

Surface material sampling areas (Background Area A and Background Area B) were located more than 1 mile northeast of the MA to avoid the effects of windblown dust deposition from the MA. Background Area A is known to be underlain by uranium ore deposits, based on NURE data (Bendix 1981). Background Area B was selected because there is no evidence of uranium ore deposits, based on NURE and other available geologic data.

Each background sampling area was divided into 100- by 100-foot grid cells. Twenty sampling locations were selected within each background area by choosing individual grid cells at random (Figures 3-8 and 3-9). At each sampling location, composite samples were collected by combining five subsamples collected from the corners and center of the sample grid cell. Twenty surface soil samples (0 to 5 cm bgs) and 8 subsurface soil samples (5 to 20 cm bgs) were collected in each area. Samples were taken at these two depths to assist in the determination of evidence for surface contamination.

The background surface and subsurface material data are presented in Section 4.6, with sampling locations shown in Figures 3-7, 3-8, and 3-9.

3.3.1.3 Groundwater

Groundwater flowing in bedrock moves preferentially in fractures and, in part, reflects the wall chemistry of those fractures. Groundwater in alluvial materials frequently reflects recharge from surface water, inflow from bedrock groundwater (if present), and the interaction of the groundwater with the alluvial sediments. Spokane Mountain is a natural analog for the Midnite Mine area before mining. Groundwater samples were collected from wells completed within and downgradient of the buried ore deposit to provide information on how metals concentrations changed with distance from an ore body.

A total of 19 monitoring wells were located in and near the uranium deposits on Spokane Mountain (Background Area A), in non-mineralized areas in the Sand Creek Drainage, along the Northwest Ridge, and in an area that drains into upper Blue Creek (Background Area B). Ten monitoring wells were completed within the bedrock aquifer, and nine monitoring wells were completed in the alluvial aquifer. Each well was sampled three times (except MWBA-09, which was sampled twice), in the fall seasons of 1999 and 2000 and in the spring of 2000, to assess whether metals concentrations changed as a function of groundwater table variations. None of the background wells are downgradient of the MA.

The background groundwater data are presented in Section 4.6, with sampling locations shown in Figure 3-7.

3.3.1.4 Radon and Gamma Radiation Measurements

Airborne radon, radon flux, and unshielded gamma radiation measurements were made to allow comparisons with measurements in the MA and PIA. The areas for background measurements were located in both mineralized (Background Area A) and non-mineralized (Background Area B) areas, for reasons described in Section 3.3.1.2. These areas are outside of the primary downwind areas, as determined from wind rose plots (Figure 2-4). The locations of the measurements are shown in Figures 3-8 and 3-9 (Background Areas A and B).

Airborne radon and radon flux rates were measured at a total of 18 locations in the two background surface material sampling areas. The measurements were co-located with surface material sampling locations. The airborne radon measurements were taken over a period of 11 months. Radon flux rates were measured in September 2000. At 12 of the 18 locations, three additional measurements of radon flux were made in August, September, and October 2001.

Unshielded gamma radiation was measured at each of the 40 surface material background sampling locations. Five subsampling locations were established at each of the sampling locations. A total of 186 unshielded gamma radiation measurements were made at subsampling locations in the two background surface material sampling areas. At each selected sampling location, unshielded gamma radiation was measured at the ground surface for a period of one minute.

3.3.2 MA and PIA Sampling and Testing

During the RI, sampling and testing was conducted in the MA and PIA to help evaluate the following site characterization issues:

- Nature and extent of COPCs in environmental media
- Potential migration of COPCs from the MA and haul roads to the PIA

- Physical, geological, and hydrological conditions
- Baseline risks to potential human and ecological receptors
- Evaluation of remedial alternatives in the FS

3.3.2.1 Surface Water and Sediment Data Collection

Surface water and sediment sampling locations, including both locations sampled under previous investigations and locations sampled under the RI, are shown in Figure 3-1 for the MA and the mine drainages, Figure 3-2 for Blue Creek and its tributaries downstream of its confluence with the Eastern Drainage, and Figure 3-5 for tributaries to Blue Creek upstream of its confluence with the Eastern Drainage.

Based on a review of data collected during the previous investigations, the following data gaps were identified:

- Potential migration of COPCs from the MA to the PIA in surface water drainages east, northwest, west, and southwest of the MA

- Background constituent concentrations in surface water and sediments

- Concentrations of COPCs in riparian sediments in the PIA

To address these data gaps, the following activities were performed.

Surface Water Sampling and Flow Measurements

Surface water sampling locations are shown on Figures 3-1, 3-2, and 3-5. A detailed description of each surface water sampling location is provided in Appendix A.

Phase 1A Round 1 (Fall 1999). A total of 26 surface water sampling locations in the PIA were identified. Samples were collected and flow measured at 15 of the locations; 11 of the 26 locations were dry and could not be sampled.

Phase 1A Round 2 (Spring 2000). Surface water samples were collected at 19 locations in the PIA. Three locations were also sampled in March, when the WTP was not operating, to evaluate the nature of contamination in the Eastern Drainage under natural flow conditions.

Phase 2A (Fall 2000). A total of three surface water locations were sampled during this phase of field work. One sample was collected in the Northern Drainage downgradient from the East Haul Road, one sample was collected from Pit 3, and one was collected from Pit 4. These locations had not been sampled in the previous phases of work.

Sediment Sampling

Sediments were sampled at all of the originally planned sites regardless of whether water was present. Three types of sediment samples were collected: composite stream (or pit) sediments, grab stream sediments, and composite riparian sediments.

Sediment sampling locations are shown on Figures 3-1, 3-2, and 3-5. Sediment sampling field data sheets are provided in Appendix A, Attachment 4.

Phase 1A Round 1 (Fall 1999). Composite sediment samples were collected at 31 PIA locations (composite samples only, except for site SDBK-03, where both a composite and a grab sample were collected).

Phase 1A Round 2 (Spring 2000). No sediment samples collected.

Phase 2A/1B (Fall 2000). Sediment samples were collected at 26 locations.

- Composite sediment samples were collected at seven previously sampled locations in the PIA where preliminary analytical results from the Phase 1A, Round 1 sampling indicated one or more exceedances of background limits.
- Composite sediment samples were collected at three new locations: Pit 3, Pit 4, and the Northern Drainage south of the East Haul Road.
- Composite riparian sediment samples were collected at 16 new locations (13 at randomly-selected locations and three biased to seeps) along the Eastern Drainage, Western Drainage, Central Drainage, and Blue Creek to evaluate the concentrations of metals and radionuclides in the overbank sediments and saturated soils in riparian areas.

Phase 2B (Summer 2001). Composite riparian sediment samples were collected at nine previously-sampled PIA locations where preliminary analytical results from the Phase 2A sampling indicated an exceedance of one or more of the background limits.

3.3.2.2 Surface and Subsurface Material Data Collection

During previous studies of the site, SMI and E&E conducted limited sampling of surface and subsurface materials within and adjacent to the MA. Areas or data gaps addressed with RI surface/subsurface sampling included the:

- MA

- PIA (including areas potentially affected by wind deposition or transport from the East and West Haul Roads)

Surface and subsurface material sample locations are shown in Figures 3-3 and 3-5.

Phase 2A (Fall 2000). Surface and subsurface material samples were collected in three PIA subareas and the MA. Surface and subsurface material sampling field data sheets are presented in Appendix A, Attachment 5.

Sampling was conducted in two PIA subareas, the Northeast and Southwest Downwind Areas (Figure 3-3), as determined from the wind rose constructed by SMI (Figure 2-4). Each downwind sampling area (the southwest downwind and northeast downwind sampling grids) was composed of 100- by 100-foot grid cells. Sixteen sampling locations were selected at random within each PIA downwind area. Sampling sites were located within each grid by compass and tape, traversing from known points on a surveyed baseline. At each sampling location, composite samples were collected from depths of 0 to 5 cm (0 to 2 inches) and 5 to 20 cm (2 to 8 inches) by combining five subsamples collected from the corners and center of the sample grid.

Surface and subsurface material samples were collected adjacent to and on the East Haul Road and West Haul Road, as shown in Figure 3-5. For the haul roads, 30- by 335-foot grid cells were established on the road surfaces and 100- by 100-foot grid cells were located along each side of the roads. A total of 16 sampling locations (13 off the roads and 3 on the roads) were then selected at random for sampling. Samples were collected at depths of 0 to 5 cm and 5 to 20 cm for the locations adjacent to the road and from 0 to 5 cm only for the locations on the road.

Surface material samples were also collected at 16 locations in the MA, as shown on Figure 3-3. A sampling grid composed of 100- by 100-foot grid cells was constructed in the MA. Sixteen sampling locations were selected at random from within the MA grid. Each composite sample was aggregated from five subsamples collected from a depth of 0 to 5 cm. Samples of various materials were collected, including phyllitic ore, quartz monzonite, and slightly organic soil on waste rock piles, ore and protore stockpiles, and other disturbed ground.

Phase 2B (Summer 2001). During this phase of work, verification surface material samples were collected at two previously sampled locations in the West Haul Road area, seven previously sampled locations in the East Haul Road area, and nine previously sampled locations in the Northeast Downwind Area where preliminary analytical results from the Phase 2A/1B sampling indicated one or more exceedances of background limits.

Radon emanation fraction measurements were conducted on the MA surface material samples using the closed-can gamma radiation assay method. The objective of the radon emanation

fraction measurements was to estimate the fraction of radon gas that escapes the surface materials.

3.3.2.3 Groundwater

Based on a review of data collected during the previous investigations, the following data gaps were identified:

- Nature and extent of COPCs in drainages east, south, and west of the MA
- Groundwater quality in deep bedrock in the PIA and downgradient of the open pits

Identified data gaps were addressed by installing and sampling a total of 37 monitoring wells. The monitoring wells were installed during two periods of field work: September 8 to October 11, 1999, and October 9 to 29, 2000. Groundwater monitoring well and seep sampling locations, including both existing locations and well installed for the RI, are shown in Figures 3-4 and 3-5.

As part of the subsurface investigation, all deep bedrock boreholes (boreholes advanced below the depth to first water) were geophysically logged (fluid temperature, caliper, single-point resistivity, and natural gamma) using a portable Mt. Sopris MGX logger. Geophysical logging was used to help identify water bearing zones and select appropriate screen intervals.

Boreholes for the new monitoring well installations were drilled using air rotary and auger methods. Monitoring wells were installed in the open borehole through the surface casing for air-rotary boreholes and through the augers for auger borings. Surface casings were removed by hydraulic jacking after installation of the well casing. Construction details for each well, along with boring logs, well development records, and observations made during drilling (including the depth to water, results of geophysical logging performed, and the presence of fractures), are presented in Appendix A.

Groundwater Sampling

The RI groundwater sampling locations, including both existing wells and new wells installed for the RI, are shown in Figures 3-4 and 3-5. Samples collected during phases of field work include:

- **Phase 1A Round 1 (Fall 1999).** 39 wells and three seeps (Western Drainage Seep, Central Drainage [Dam Toe] Seep, and East [Boyd] Seep) in the PIA were sampled.

- **Phase 1A Round 2 (Spring 2000).** The same wells and seeps sampled during Round 1 were resampled. Well MWED-05, which was dry in fall 1999, was also sampled.

- **Phase 2A/1B (Fall 2000).** Five wells in the MA and one well in the PIA near Blue Creek were sampled. The six wells were sampled for an abbreviated list of dissolved metals, radionuclides, and water quality parameters to evaluate the presence of contamination at these locations.

Water levels were measured in all new and existing wells and piezometers in the MA and PIA during the October 1999, April 2000, October 2000, and August 2001 field work. The measurements were used to determine the volumes of water to be purged from the wells prior to sampling and for the construction of a map of the potentiometric surface beneath the site. The map is presented in the Phase I Hydrologic Modeling for Midnite Mine RI/FS report (URS 2002a).

Slug Testing

Hydraulic slug testing was performed in 10 alluvial monitoring wells in the Eastern, Western, Central, and Northeastern Drainages and the one alluvial well near Blue Creek during Phase 2A/1B. Rising-head and falling-head tests were conducted in 10 of the wells. The raw slug test data are provided in Appendix A.

3.3.2.4 Other Radiological Data Collection

During the RI, radiological data were collected to help evaluate the following site characterization issues:

- Levels of external gamma radiation on the haul roads, pump house access roads, and pit access roads, adjacent to the haul roads, and in the downwind areas

- Radon flux in the MA

- Levels of airborne radon in the MA and PIA

The mining companies conducted measurements of external gamma radiation on a grid across the MA and along 20 traverses that extend from the MA into the PIA. The mining companies also measured radon flux over the backfilled pit area. However, additional measurements of external gamma radiation levels, radon flux, and airborne radon were needed to help address the issues identified above. Measurements made are described below.

Gamma Radiation Surveying

Gamma radiation surveys were conducted in several areas of the site during two phases of field work. Measurements of external gamma radiation were obtained using a calibrated Ludlum gamma radiation meter.

Phase 1A. Gamma radiation surveys were conducted on the East Haul Road, West Haul Road, Pit 3 access road, Pit 4 access road, and several short lengths of road south of the South Spoils and west of the MA (Figure 3-5). At each road, unshielded gamma radiation was recorded in counts per minute for a 1-minute interval at the starting point and every 30 meters (approximately 100 feet) along a continuous transect, at a height of 1 meter (approximately 3 feet) above the ground surface.

Unshielded gamma radiation measurements also were recorded at each surface material subsample location in the PIA, including locations adjacent to the haul roads and in the downwind areas. These measurements were recorded at ground level in counts per minute for a 1-minute count.

Phase 2B. Unshielded gamma radiation was recorded along traverses oriented perpendicular to both haul roads (Figure 3-5). These measurements were conducted to provide an estimate of the extent of radionuclide contamination in surface materials adjacent to the haul roads, as described in Addendum No. 1 to the Phase 2A/1B QAPP (URS 2001a).

Radon Flux Measurement

In the RI, radon flux was measured in the MA in two phases. For each of the radon flux measurements, a charcoal canister was set on the ground surface, recovered approximately 24 hours later, and shipped to the laboratory for analysis. MA radon flux measurement locations are shown on Figure 3-6.

Phase 2A/1B (Fall 2000). In the MA, 18 radon flux measurements were made for each of three types of material present: ore and protore stockpiles, waste rock dumps, and other disturbed ground. Separate 100- by 100-foot grids were established for each of these materials on a base map prior to field mobilization. Radon flux measurement locations were then selected at random for each material grid.

Phase 2B (Summer and Fall 2001). Serial radon flux measurements were obtained at the locations with the two highest, two lowest, and two closest to the mean values of radon flux measured during the first round of measurements. The measurements were obtained in August, September, and October 2001 and the serial measurement locations are shown on Figure 3-6.

Airborne Radon Measurements

Airborne radon was measured over a period of approximately 11 months to characterize the potential range of activity concentrations. Data collection consisted of using three alpha track radon detectors placed in a shaker jar with the lid taped open. The shaker jars were placed at each sampling location at a height of about two meters above the ground. Detectors were placed during early October 2000 and retrieved in mid-August 2001. Of the 34 groups of detectors placed, 32 were recovered.

Airborne radon measurements were obtained in the MA and PIA. In the MA, 16 airborne radon measurements were co-located with surface material samples (Figure 3-3). In addition, one airborne radon measurement was obtained within each of the following areas: Pit 3, Pit 4, the Southwest and Northeast Downwind Areas, and along both haul roads, as shown in Figure 3-3.

3.3.2.5 Geotechnical Investigation

During the RI, geotechnical data were collected to help evaluate the following site issues:

- Physical properties of the waste rock materials
- Stability of the open pits and waste rock piles
- Feasibility of remedial alternatives in the FS

A geotechnical investigation of the stability of the major waste rock piles and open pit walls was performed during the Phase 2A field investigation. The geotechnical investigation consisted of excavating and logging six test pits in the South Spoils and three test pits in the Hillside Dump, drilling and logging six test holes in the South Spoils and three test holes in the Hillside Dump, installing piezometers in the test holes, and reconnaissance mapping of the open pit walls. Additional information on the geotechnical investigation is provided in the slope stability report in Appendix A, Attachment 8.

3.3.2.6 Ecological Risk Assessment Sampling

Site-specific aquatic studies were performed during the spring of 2003, encompassing sampling at six stations on Blue Creek and one station on the Eastern Drainage. The sampling regime at each station included water quality analyses, metal analyses of surface water and sediments, metal analyses of benthic macroinvertebrate tissue samples, and a survey of the macroinvertebrate communities. Appendix O of the Ecological Risk Assessment (EPA 2005a) provides the details of this study.

3.3.2.7 Surveying

All new monitoring wells, test pits, test holes, and surface water/sediment sampling locations were surveyed using both conventional and GPS methods. Surveying methods, precision, and the surveyed coordinates for all sampling locations established for the RI are provided in Appendix F.

3.3.3 Data Quality Objectives and Data Quality

Data collected during Phase 1A Round 1, Phase 1A Round 2, Phase 2A/1B, and Phase 2B field work were evaluated for precision, accuracy, representativeness, comparability, and completeness (PARCC). Additional detail regarding the satisfaction of DQOs specific to a given phase of sampling can be found in Appendix C.

Except as noted in the data quality assessment reports, the data collected by URS as part of RI/FS activities are considered acceptable as qualified for use in meeting project objectives, including the risk assessments. A general overall assessment of the DQOs presented in the QAPPs (URS 1999, 2000a) is provided below.

3.3.3.1 Precision

Precision is the agreement between a set of measurements of the same property without assumption or knowledge of the true value. Precision of laboratory measurements was evaluated through the comparison of sample/sample duplicate and matrix spike/matrix spike duplicate results. Precision of sampling and analytical processes was evaluated by comparing field duplicate sample results. Overall measured laboratory precision was found to be acceptable (Appendix C). Similarly, overall measured field duplicate precision was found to be acceptable for sampling and analytical processes (Appendix C). Therefore, the overall level of precision demonstrated by project analyses was considered acceptable.

3.3.3.2 Accuracy

Accuracy is the measure of closeness of an individual measurement to an accepted reference or true value. Accuracy was measured as the percent recovery of an analyte in a reference standard or spiked sample of known concentration. As documented in data validation reports, the overall level of accuracy demonstrated by project analyses was considered acceptable.

3.3.3.3 Representativeness

Representativeness is the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or an environmental condition.

Representativeness was maintained during the sampling and analytical efforts by completing all sampling using similar sampling procedures and completing all analyses using standard analytical procedures described in the QAPPs. Additionally, field duplicate sample precision indicated satisfactory sampling and analysis precision and demonstrated that samples collected and analyzed were adequately representative of the medium sampled.

3.3.3.4 Comparability

Comparability expresses the confidence with which one data set can be compared to another. Comparability can be related to accuracy and precision because these quantities are measures of data reliability. Data are comparable if collection techniques, measurement procedures and analytical methods used, and data reporting are equivalent for the samples within a sample set. To maximize comparability, all URS samples were collected and analyzed in accordance with prescribed quality assurance and quality control measures.

Additionally, quality control (QC) split samples were collected by SMI and analyzed by separate laboratories to evaluate the comparability of SMI and URS data. Results of the QC split sample evaluation are presented in two separate technical memoranda: Evaluation of Metals Analysis Agreement on Split Samples, Midnite Mine RI/FS (URS 2001c), and Inter-Laboratory Comparisons for Radiochemical Analyses, Midnite Mine RI/FS (URS 2001d).

3.3.3.5 Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount of data expected to be obtained under correct, normal conditions. Valid analytical results include those values qualified as estimated. Data quality assessment reports summarize all data determined to be unusable for project objectives as a result of validation and evaluation. More than 99 percent of the data collected by URS for this project were considered usable for meeting project objectives. Therefore, the overall project analytical completeness goal of 80 percent was met.

The evaluation of the SMI and URS QC split sample data generally supports the comparability of these data.

3.4 RISK ASSESSMENTS

During the RI, EPA conducted a Human Health Risk Assessment (EPA 2005b) and an Ecological Risk Assessment (EPA 2005a). Work conducted as part of these risk assessments are summarized in the following sections.

3.4.1 Human Health Risk Assessment

As part of the RI/FS, a baseline human health risk assessment (HHRA) was performed to assess whether remedial actions at the site are required to address potential human health risks. The risk assessment assumed a "baseline" condition of no remedial activities. A brief summary of the HHRA is provided here with the complete details presented in the Human Health Risk Assessment (EPA 2005b).

The site is located on the Spokane Indian Reservation, so a primary focus of the risk assessment was exposures to tribal members. Exposure factors and pathways representative of tribal subsistence activities were selected as representing the most intensive future use of the land and were based on recommendations from the Spokane Tribe of Indians. Residential and non-residential risks and hazards were estimated for exposure to media (specifically soil, groundwater, surface water, sediment, plants, and air) contaminated with metals and radionuclides. Calculated risks and hazards were used to determine the need for remedial action at the site. The trigger points for action, based on human health, are a cancer risk exceeding 10^{-4} (1 in 10,000) and a hazard quotient exceeding 1 for non-carcinogens.

Risks and hazards were quantitatively evaluated for the following exposure scenarios:

- Residents of the MA who are exposed to radionuclides through external radiation, chemicals in soil, groundwater used for drinking and sweat lodges, chemicals in plants, and livestock raised on the site.

- Residents of the MAA who are exposed to radionuclides through external radiation, chemicals in soil adjacent to the haul road, groundwater or drainages used for drinking and sweat lodges, and livestock raised on the site.

- Non-residential populations who are exposed to chemicals in the pits in the MA during use of the pits for water recreation through ingestion of pit surface water during swimming and incidental ingestion of pit sediment.

- Non-residential populations who are exposed to chemicals in plants, chemicals in soil adjacent to the haul roads, chemicals in Blue Creek water (drinking water and sweat lodge use), and chemicals in Blue Creek sediment (during plant harvesting activities) during subsistence activities in the MAA.

The HHRA estimated excess hazards exceeding 1 and lifetime cancer risks exceeding 1 in 10,000 (a 1×10^{-4} risk) for nearly all scenarios. The risk assessment presents the complete details of the risk calculations and results. The pathways that resulted in the greatest risks are inhalation of chemicals in sweat lodge vapor (either from groundwater or from the drainages),

inhalation of radon in indoor air, and ingestion of plants. These three pathways resulted in cancer risks exceeding 1 in 10, considerably above the target cancer goal of no more than 1 in 10,000.

All the COCs assessed occur naturally at the site and were present on the site prior to mining activities. Estimates of the cancer risks associated with exposure to background concentrations of the COCs show cancer risks for the background area that exceed target health goals for most of the pathways evaluated in this assessment. However, because COC levels are significantly higher at the site, risks from background levels of COCs are a small percentage of the risk at Midnite Mine, indicating that mining activities have resulted in significant site-related risks.

3.4.2 Ecological Risk Assessment

An ecological risk assessment (EcoRA) was performed for the aquatic, riparian/wetland, and terrestrial components of the Midnite Mine site utilizing the analytical data for samples of soil, surface water, and instream and riparian sediments (EPA 2004). The ERA included both the screening level ecological risk assessment (SLERA) and the baseline ecological risk assessment (BERA), which encompass steps 1 through 7 of the eight-step EPA ecological risk assessment guidance for Superfund (EPA 1997). The eighth step, risk management, follows the completion of the ERA process and is not included in the ERA. The ERA evaluated risks for areas of interest (AOIs) in both the MA and the MAA.

In the SLERA, the metals COPCs were screened by comparing conservative benchmark values to maximum metal concentrations detected at each AOI. The COPCs were not screened based on background. The resulting list of retained COPCs was further evaluated in the BERA.

In the BERA, 22 assessment endpoints were identified that encompass the aquatic, riparian, and terrestrial ecosystems within the MA and MAA. An assessment endpoint is a species, ecological resource, or habitat type that is to be protected, and which is used to guide the development of the study design at the site. Each of the 22 assessment endpoints was evaluated to determine if it was or was not at risk from each of the COPCs retained the SLERA.

Table 3-1
Summary of Previous Investigations

AGENCY	ACTIVITY	USE OF DATA	REFERENCE
GEOLOGIC/GEOCHEMICAL/GEOTECHNICAL CHARACTERIZATION			
BLM	**1997—**Monitored potential movement of the South Spoils waste rock pile in response to isolated occurrences of slope instability due to high precipitation	Concluded that none of the areas monitored moved during the time period of the investigation	Courtright 1997
	1999—Interpreted historical aerial photographs of the mine site to determine the general sequence of mining activities	Documented ore stockpiles buried by waste rock in portions of the South Spoils and East Dump. Unmined ore bodies remain in the Boyd Pit, Pit 3, and Hillside Dump.	Peters 1999a
	1999—Obtained data from exploration drilling logs to construct 2D and 3D shell models of the MA	Background for hydrogeologic modeling	Peters 1999b
BOM	**1977—**Mapped geologic area and provided expanded geology information	Understanding nature of the ore deposits	Nash 1977
	1981—Assessed subsurface conditions from drill core logs of the area; interpreted ore deposition, metamorphic effects, alteration, mineralogy, and metals zoning from petrographic studies; overviewed regional stratigraphy, structure, and mineralization	Understanding nature of the ore deposits	Bendix 1981
	1992–1994—Collected samples from 17 borings and analyzed for acid-based accounting (ABA) parameters, metals, and uranium (selected samples studied with humidity cell tests)	Data collection to understand the environmental effects of mining including acid mine drainage	Moore et al. 1996
NURE	**1981—**Conducted soil geochemical surveys to investigate the effect of the scale studied on the ability to identify anomalies	Uranium exploration work used to locate suitable background areas for the RI/FS	Bendix 1981
	1981—Conducted regional gravity and magnetic surveys to identify the regional structural geologic features	Uranium exploration work used to locate suitable background areas for the RI/FS	Bendix 1981

Table 3-1 (Continued)
Summary of Previous Investigations

AGENCY	ACTIVITY	USE OF DATA	REFERENCE
NURE (Continued)	**1981**—Performed induced polarization (IP) survey; detected strong IP anomaly trending northeast along the Midnite Trend	Uranium exploration work used to locate suitable background areas for the RI/FS	Bendix 1981
SMI	**1998**—Conducted trenching and sampling of seven ore/protore stockpiles (samples were analyzed for ABA parameters)	Data collection to understand the environmental effects of mining including acid mine drainage	SMI 1998d SMI 1998e
	1999—Performed whole rock and SPLP leachate analyses on 13 composite ore/protore samples	Data collection to understand the environmental effects of mining	SMI 1999hh
	1999—Reviewed analytical results for waste rock samples collected by BOM during 1992 and 1994 from boreholes in Hillside Dump and South Spoils	Data collection to understand the environmental effects of mining	SMI 1999n
	1999—Performed Humidity Cell Testing (HCT) on 13 composite ore/protore samples	Data collection to understand the environmental effects of mining	SMI 1999ii
USGS	**1975**—Conducted ore deposit studies including testing for and measuring uranium occurrence	General information/selection of background sampling locations, understanding nature of the ore deposits	Nash 1975
	1975—Described the geology of the Midnite Mine	General information/selection of background sampling locations	Nash and Lehrman 1975
	1975—Described the geology of the adjacent Chewlah-Loon Lake area	General information	Miller and Clark 1975
	1976—Distinguished major rock types and potential structures in the Pit 4 area using ground magnetic and E-mode very low frequency (VLF) measurements	Understanding nature of the ore deposits	Campbell and Flanigan 1976
	1977—Further described the geology of the Midnite Mine	General information/selection of background sampling locations	Nash 1977
	2000—Provided a geologic map of the adjacent 30′ x 60′ Chewlah quadrangle	General information	Miller 2000

Table 3-1 (Continued)
Summary of Previous Investigations

AGENCY	ACTIVITY	USE OF DATA	REFERENCE
Other Investigations	**1959**—Described the early history of mine development and the shape and occurrence of the ore bodies	Understanding history of ore deposit formation	Sheldon 1959
	1961—Described the deposition and mineralogy of the uranium ore at Midnite Mine and mineralogy and petrology of the major rock types in the MA	Understanding history of ore deposit formation	Barrington and Kerr 1961
SURFACE MATERIALS			
SMI	**1998**—Made measurements of radon flux and gamma radiation at 33 locations in the backfilled pit area	Supplement to the data collected for the RI/FS	SMI 1998f
	1999—Background surface soil results	Evaluation of areas for background sampling	SMI 1999jj
	1999—Performed equilibrium analysis of Midnite Mine soil samples	Understanding mine effects on site	SMI 1999nn
	1999—Tested soil samples for radiation; tested soil around PIA for radiation; tested soil along sides of Ford-Wellpinit Road for radiation	Extent of contamination from the MA and haul roads	SMI 1999mm
	1999—Collected 48 soil samples at two depths (0 to 5 cm [0 to 2 inches] and 5 to 20 cm [2 to 8 inches]) from 24 plots within the four upland vegetation areas and analyzed them for trace metals and isotopes of uranium.	Human Health and Ecological Risk Assessment studies	SMI 1999pp
	1999—Made background gamma radiation measurements at 25 locations within each background soil area. Soil samples were also collected at each point from 0.5 to 12 inches. All of the soil samples were analyzed for ^{226}Ra and 12 samples were analyzed for ^{230}Th, ^{234}U, ^{235}U, ^{238}U.	Analytical results used to the activities of radionuclides in the soils characterize surrounding the MA	SMI 1999jj

Table 3-1 (Continued)
Summary of Previous Investigations

AGENCY	ACTIVITY	USE OF DATA	REFERENCE
SMI (Continued)	**1999—**Conducted gamma radiation surveys along 20 transects that extended a minimum of 400 meters into the PIA in all directions. 50 soil samples were collected at 25 locations (0-6 and 6-12 inch depths) along the transects with the highest gamma values.	Characterization of the activities of the radionuclides in the soils surrounding the MA	SMI 1999kk
	1999—Conducted on-site gamma ray exposure survey at 408 grid points in the MA. Composite surface material samples were collected from 17 grids that could not be walked, and samples from 86 grids were analyzed for ^{226}Ra and 15 samples for ^{230}Th, ^{234}U, ^{235}U, and ^{238}U.	Characterization of the activities of the radionuclides in the surface materials of the MA	SMI 1999ll
	1999—Made gamma radiation measurements along the Ford-Wellpinit Road at 1,000-ft intervals and obtained a soil sample at each measurement location	Characterization of the activities of the radionuclides along the road	SMI 1999mm
EPA	**1998—**Collected soil samples from the South Spoils and ore/protore piles	Level of radiation and metals in the MA	E&E 1998
NURE	**1981—**Conducted regional (16 square mile) soil survey and detailed (0.5 square mile) soil survey over Spokane Mountain deposit to identify geochemical halos directly over uranium mineralization and to evaluate the extent and distribution of mineralization	Basis for selecting background surface material sampling sites and selecting Sand Creek as a background location	Bendix 1981
Other Investigations	**1982—**Evaluated the probability of metal movement from waste rock (including different types of rock) to soil and root uptake	General information	Harsh et al. undated

Table 3-1 (Continued)
Summary of Previous Investigations

AGENCY	ACTIVITY	USE OF DATA	REFERENCE
STREAM SEDIMENT CHARACTERIZATION			
NURE	**1981—**Conducted sediment survey to identify geochemical data in Spokane Mountain, Midnite Mine, and Sherwood uranium deposits, and the area sampled for the RI/FS background characterization program	Provided characterization data useful for planning RI background sampling program	Bendix 1981
SMI	**1999—**Collected composite sediment samples from 17 of 20 aquatic sampling sites; sites consisted of 12 riparian sampling sites plus 8 intermediate sites between the riparian sites on Blue Creek and the PIA drainages south of the MA. Part of Human Health and Ecological Risk Assessment studies.	Supplement to RI/FS data and used for risk assessment	SMI 1999g
SURFACE WATER			
EPA	**1998—**Collected surface water samples from pits, drainages, and seeps on site, from Blue Creek and its tributaries, and from Franklin D. Roosevelt Lake	Supplement to RI/FS data and used for risk assessment	E&E 1998
NURE	**1981—**Conducted stream water survey for geochemical data in Spokane Mountain, Midnite Mine, and Sherwood uranium deposits, and the area sampled for the RI/FS background characterization program	Provided sample data useful for designing RI background sampling program	Bendix 1981
SMI	**1998–99—**Conducted daily monitoring of pan evaporation levels at Midnite Mine and DMC mill site	Established evaporation levels to be used in water balance and other calculations	SMI 1999a
	1998—Collected surface water samples from Blue Creek, East Drainage, Mine Drainage, Western Drainage, Central Drainage, PCP, Pit 3, Pit 4, Turtle Lake, and Blood Pool Seep	Supplement to RI/FS data	SMI 1999q SMI 1999v SMI 1999x

Table 3-1 (Continued)
Summary of Previous Investigations

AGENCY	ACTIVITY	USE OF DATA	REFERENCE
SMI (Continued)	**1999—**Conducted a survey of surface drainage and seeps and water quality data from mine site; Western, Central, and Eastern drainages; Blue Creek; and Oyachen Creek	Supplement to RI/FS data	SMI 1999c
	1999—Collected surface water samples from Blue Creek, East Drainage, Mine Drainage, Western Drainage, Central Drainage, PCP, Pit 3, Pit 4, and Blood Pool Seep	Supplement to RI/FS data	SMI 1999y SMI 1999aa SMI 1999bb SMI 1999ee SMI 1999gg
	1999—Sampled surface water and seeps from July/August and December	Supplement to RI/FS data	SMI 1999ss SMI 2000a SMI 2000c
USGS	**1984–85—**Determined monthly/annual water budgets and probable variation in runoff from Blue Creek basin; tested if precipitation is the source of low pH water in Pit 3; determined water quality in pits 3 and 4, the PCP, basin streams, and Blue Creek; evaluated groundwater quality discharged from mine basin into Blue Creek; determined discharge, water temperature, specific conductance, and pH for Eastern Drainage and Blue Creek	Historical information and data for designing RI/FS sampling program	Sumioka 1989
	1995—Characterized water chemistry of springs, seeps, streams, and boreholes in parts of Sand Creek and Blue Creek drainage basins not influenced by mining activities	Information to supplement RI/FS and design background sampling program	Ames et al. 1996

Table 3-1 (Continued)
Summary of Previous Investigations

AGENCY	ACTIVITY	USE OF DATA	REFERENCE
Upper Columbia United Tribes Fisheries Center	**1986—**Measured water quality parameters in the pre-impact, impact, and recovery zones of Blue Creek, in the Eastern Drainage, and Oyachen Creek	Information used to characterize historical conditions, used for planning RI and risk assessments	Plotnikoff and Scholz 1988
	1993—Described surface water resources; mapped perennial and intermittent streams, riparian areas, lengths of streams populated by fish, and springs	Information used to characterize historical conditions, used for planning RI and risk assessments	Peone et al. 1993
	1993—Described water resources on the Spokane Indian Reservation organized by drainage basin	Information used to characterize historical conditions, used for planning RI and risk assessments	Doughtie et al. 1993
GROUNDWATER HYDROLOGY/GEOCHEMISTRY			
BOM	**1989–1996—**Monitored wells for water levels, sulfate, uranium, and zinc; provided hydraulic conductivity measurements determined from five slug tests; conducted geophysical survey to identify groundwater flow paths in the MA	Data to supplement RI/FS	Williams et al.1996
	1989–1992—Used water quality data to model aqueous species distribution and calculate solid phase controls on solubility	Data to supplement RI/FS	Marcy 1993
	1989–1992—Used water quality data from monitoring wells, seeps, and pits to model aqueous species distribution and calculate potential solid phase controls on solubility; identified potential groundwater flow paths	Data to supplement RI/FS	Marcy et al. 1994
	1991—Delineated the three-dimensional distribution of hydrostatic heads at the site; identified contaminant source areas and pathways; evaluated potential chemical mechanisms that control water chemistry	Data to supplement RI/FS	Riley et al. 1991

Table 3-1 (Continued)
Summary of Previous Investigations

AGENCY	ACTIVITY	USE OF DATA	REFERENCE
BOM (Continued)	**1993—**Used water level and water quality data to evaluate whether Pit 4 would refill with water if it were to be dewatered and determined the water quality in Pit 3 if it were dewatered	Data to supplement RI/FS	Williams and Riley 1993
	1996—Conducted slug and pump tests in bedrock monitoring wells at the site	Data to supplement RI/FS	Williams and Riley 1996
	1996—Developed a shell model of site geology and a groundwater flow model of the bedrock system using MODFLOW and MODPATH	Supplement to RI/FS	Kirschner 1996
SMI	**1996—**Developed conceptual model of groundwater flow paths from backfilled pits	Supplement to RI/FS	SMI 1999l
	1998—Installed 15 monitoring wells – 9 wells in unconsolidated materials upgradient and downgradient from potential source areas, 2 wells in bedrock, and 4 wells in waste rock within backfilled pits	Data to supplement RI/FS	SMI 1999r
	1999—Performed a study to evaluate the possibility of using geochemical indicators to distinguish between various source waters	Information to supplement RI/FS	SMI 1999m
	1999—Tested the conceptual hydrogeologic model by the collection of hydrologic data during dewatering of the backfilled pits (installed two additional monitoring wells for this investigation)	Data to supplement RI/FS	SMI 1999b SMI 1999d SMI 1999e
	1999—Measured flow rates, groundwater level elevations, and field parameters from monitoring wells	Data to supplement RI/FS	SMI 1999ss

Table 3-1 (Continued)
Summary of Previous Investigations

AGENCY	ACTIVITY	USE OF DATA	REFERENCE
SMI (Continued)	**1999—**Conducted slug or pump tests in 11 wells to estimate the hydraulic properties of unconsolidated and bedrock materials	Data to supplement RI/FS	SMI 1999t SMI 1999u
	1999—Sampled groundwater quality and measured water level from July/August and December	Data to supplement RI/FS	SMI 1999ss
	1999—January–June monthly groundwater quality sampling for water quality parameters, major anions, total radionuclides, dissolved cations, and trace metals.	Data to supplement RI/FS	SMI 1999y SMI 1999aa SMI 1999bb SMI 1999ee SMI 1999gg
	1999–2000—Prior to backfilled pit dewatering, collected water quality samples; performed daily measurements of flow and field parameters at seeps, surface water and groundwater levels, seep collection system pumpback volumes, and precipitation and air temperature.	Data to supplement RI/FS	SMI 2000a
	1999–2000—Dewatered backfilled pits, monitored water quality and performed daily measurements of flow and field parameters at seeps, surface water and groundwater levels, seep collection system pumpback volumes, precipitation, and air temperature	Data to supplement RI/FS	SMI 2000b
	1999—Collected monthly water quality samples from groundwater sampling locations in Eastern, Western, and Central drainages	Data to supplement RI/FS	SMI 1999y SMI 1999aa SMI 1999bb SMI 1999ee SMI 1999ff SMI 1999gg

Table 3-1 (Continued)
Summary of Previous Investigations

AGENCY	ACTIVITY	USE OF DATA	REFERENCE
SMI (Continued)	**1999—**Conducted weekly monitoring of groundwater level elevations	Data to supplement RI/FS	SMI 1998b SMI 1998c SMI 1999o SMI 1999p SMI 1999s SMI 1999w SMI 1999z SMI 1999cc SMI 1999dd
	1999—Developed a water balance using the HELP infiltration model to evaluate alluvial groundwater system's water source	Data to supplement RI/FS	SMI 1999l
EPA	**1998—**Collected groundwater samples from six wells installed for Expanded Site Investigation (ESI)	Data to supplement RI/FS	E&E 1998
Upper Columbia United Tribes Fisheries Center	**1993—**Described groundwater resources on the Spokane Indian Reservation; mapped wells (with their yields)	Regional information for RI/FS planning	Peone et al. 1993
AIRBORNE RADIOLOGICAL SURVEYS			
NURE	**1981—**Acquired radon and helium data for two survey grids; identified anomalies in radon or helium concentrations in surface soils	Regional information for RI/FS planning and for designing background sampling program	Bendix 1981
BOM	**1995—**Conducted radiation survey of MA using a gamma radiation "face scanner"; performed gross gamma radiation survey using Ludlum meter	Data to supplement RI/FS	Stroud and Droullard 1995
SMI	**1998—**Measured radon flux at 33 locations in backfilled pit area	Data to supplement RI/FS	SMI 1998f
	1999—Developed gamma-^{226}Ra correlations with site data from transmittal report R-4	Data to supplement RI/FS	SMI 1999h

Table 3-1 (Continued)
Summary of Previous Investigations

AGENCY	ACTIVITY	USE OF DATA	REFERENCE
SMI (Continued)	**1999**—Measured gamma radiation in background soil areas	Data to supplement RI/FS	SMI 1999jj
	1999—Conducted radiological survey around PIA	Data to supplement RI/FS	SMI 1999kk
	1999—Conducted on-site gamma radiation surveys within MA	Data to supplement RI/FS	SMI 1999ll
	1999—Investigated radiation levels along Ford-Wellpinit Road	Anomalies associated ore fragments next to road; some anomalies were related to natural outcrops of granite	SMI 1999mm
	1999—Evaluated the equilibrium status of the ^{238}U decay series in surface materials and soils	Data to supplement RI/FS	SMI 1999nn
	1999—Developed correlations between gamma radiation measurements and ^{226}Ra activities for unshielded, shielded, and composite exposure rate gamma radiation measurements	Data to supplement RI/FS	SMI 1999h
	1999—Calculated the correlation of radon flux to ^{226}Ra concentration	Data to supplement RI/FS	SMI 1999i
	1999—Presented on-site soils and transect radiological characterization survey data on site maps	Data to supplement RI/FS	SMI 1999oo
NURE	**1981**—Conducted regional airborne 4-channel gamma-ray spectrometry survey	Data for planning RI/FS and designing background sampling program	Bendix 1981
EPA	**1999**—Conducted radiological scan along East Haul Road and Ford-Wellpinit Road from Midnite Mine to DMC mill in Ford	Data to supplement RI/FS	Dempsey et al. 1999

Table 3-1 (Continued)
Summary of Previous Investigations

AGENCY	ACTIVITY	USE OF DATA	REFERENCE
ECOLOGICAL ASSESSMENT AND HUMAN HEALTH			
SMI	**1998—**Mapped upland and riparian vegetation to identify areas for soil, sediment, vegetation, and invertebrate sampling programs	Data to supplement RI/FS and risk assessment	SMI 1999qq
	1998—Sampled aboveground plant tissue, plant root tissue, and aquatic plant tissue, analyzed the samples for trace metals and uranium isotopes	Data to supplement RI/FS and risk assessment	SMI 1999f
	1999—Developed transfer chains for upland, riparian, and aquatic locations and safe concentration levels for the trace metals and elemental uranium for different habitats	Data to supplement RI/FS and risk assessment	SMI 1999k
	1999—Collected terrestrial and aquatic invertebrate samples at 4 upland, 12 riparian, and 17 aquatic locations; analyzed 17 terrestrial and 9 aquatic invertebrate samples for trace metals and elemental uranium	Data to supplement RI/FS and risk assessment	SMI 1999rr
	1999—Conducted baseline screening-level human health risk assessment using site-specific measured concentrations of chemical and radiological constituents in environmental media and radiation exposure rates	Planning of risk assessment approach	SMI 1999j
Upper Columbia United Tribes Fisheries Center	**1987—**Analyzed metal concentrations in fish to evaluate the effects of surface water drainage from the Midnite Mine	Historical information for RI/FS and risk assessment planning	Nichols and Scholz 1987
	1988—Assessed habitat availability for fish above and below the Eastern Drainage	Historical information for RI/FS and risk assessment planning	Barber et al. 1988
	1985–1987—Assessed the impact of Midnite Mine drainage on rainbow trout in Blue Creek	Historical information for RI/FS and risk assessment planning	Scholz et al. 1988

Table 3-1 (Continued)
Summary of Previous Investigations

AGENCY	ACTIVITY	USE OF DATA	REFERENCE
Upper Columbia United Tribes Fisheries Center (Continued)	**1988—**Collected samples from the pre-impact, impact, and recovery zones along Blue Creek during 1987; invertebrate communities were analyzed for density, diversity, similarity, presence-absence, and number of taxa	Historical information for RI/FS and risk assessment planning	Cairns et al. 1988
	1988—Collected samples at two stations upstream of the Eastern Drainage; invertebrate communities were analyzed for density, diversity, and similarity	Historical information for RI/FS and risk assessment planning	Plotnikoff et al. 1988
REVEGETATION			
SMI	**1994–1999—**Field trials applied heavy amelioration within the upper 18 inches of ore/protore and added topsoil up to a depth of 12 inches	Helped to prevent erosion. Base of reference data for FS work.	SMI 1994
	1995–1998—Investigation of metal uptake and translocation in grasses	Base of reference data for FS work	
Washington State University	**1982—**Greenhouse and field trials that documented various conditions for metals uptake and migration	Base of reference data for FS work	Harsh et al. undated

Table 3-2
Numbers of Samples and Sample Locations

Medium	Area	EPA Expanded Site Investigation		Mining Companies		RI	
		Locations	Samples	Locations	Samples	Locations	Samples
Surface Water	Background Areas	0	0	0	0	20	57
	MA	13	13	4	34	3	4
	PIA	16	16	9	84	18	35
	Total	29	29	13	118	41	96
Sediment	Background Areas	0	0	0	0	22	44
	MA	12	12	0	0	3	3
	PIA	32	32	35	35	51	68
	Total	44	44	35	35	76	115
Surface and Subsurface Materials	Background Areas	0	0	0	0	56	56
	MA	11	11	131	131	16	16
	PIA	0	0	86	111	93	111
	Total	11	11	217	242	189	207
Groundwater	Background Areas	0	0	0	0	19	56
	MA	0	0	15	109	5	5
	PIA	11	11	13	103	44	90
	Total	11	11	28	212	68	151

Note: Some locations sampled by EPA under the Expanded Site Investigation and by the mining companies were re-sampled under the RI.

4.0 CURRENT SITE CONDITIONS AND RESULTS OF BACKGROUND INVESTIGATION

Previous sections of the RI described the demographics, geology, enforcement history, and general setting of the Midnite Mine and surrounding area. The discussions in the previous sections identified the MA, which encompasses the area visibly disturbed by mining, and the PIA, which encompasses the area where COPCs from the MA may have come to rest. Together, the MA and PIA are referred to as the site.

This section of the RI summarizes the:

- Physical characteristics of the MA
- Physical characteristics of the PIA
- Site hydrology
- Existing water management system
- Site habitat
- Background evaluation
- Use of background data to establish nature and extent of contamination

Descriptions of the MA, PIA and background areas are based on a combination of historically available information and RI field activities. The evaluation and discussion of background data provides the results and supports the selection of screening concentrations for indicator parameters. The indicator parameters are used to establish the nature and extent of contamination on the site (Section 5).

4.1 PHYSICAL CHARACTERISTICS OF THE MINED AREA

Midnite Mine is located on the southern slope of Spokane Mountain. The area of land that was leased for mine operations encompassed approximately 811 acres, of which about 350 acres (the MA) was disturbed by mining activity (SMI 1996). This excludes areas subjected only to mineral exploration drilling.

The uranium mineralization at the mine occurs in an elongated zone along the contact between the quartz monzonite and Togo Formation, and trends in a north-south direction. Consequently, as mining progressed, mine features such as the open pits were excavated in a north-south direction to follow the contact. Elevations within the MA range from approximately 3,400 feet above msl at the northern end to 2,400 feet above msl at the southern end. Access to the MA is by two former haul roads, the East Haul Road and the West Haul Road (also known as the West

Access Road), as shown on Figure 2-1. The former mine office, core shack, vehicle shop, and other maintenance buildings are located on the southwest side of the MA.

Waste rock from the mining operations was deposited in various locations in the MA. However, the majority of the waste rock was deposited on the land surface in the area now known as the South Spoils (also called the Gully Waste Dump) and the Hillside Dump. The Boyd Pit and several smaller pits connected to it were backfilled with waste rock. Peters (1999a) provides an extensive discussion of the development of the waste rock piles and the sequence of mining at the site, as determined from analysis of historical aerial photographs. Details of the physical characteristics and the sequence of construction of the waste rock piles are provided in Section 4.1.4.

After cessation of uranium mining at the Midnite Mine in 1981, water accumulated in the two largest open pits in the MA, Pit 3 and Pit 4. Pit 3 is the larger of the two pits. The bottom of Pit 3 is about 550 feet below the surface elevation of the surrounding land. The floor of Pit 4 is approximately 450 feet below the surrounding land at its deepest point. These pits impound water from groundwater inflow, precipitation, and runoff. In addition, Pit 3 receives water pumped from the PCP and seep collection systems. Water levels in both pits fluctuate due to seasonal removal of water and variations in accumulation rates.

Some of the ore and protore mined at the site was stockpiled on site, apparently in anticipation of later milling when the price of uranium would be higher. Three ore stockpiles and six protore stockpiles are located on top of the pre-existing waste rock piles. In addition, several smaller stockpiles are buried under waste rock. A more detailed discussion of the physical characteristics of the ore and protore stockpiles is provided in Section 4.1.3.

Three small stockpiles of topsoil also exist within the MA. The North Topsoil Area is located north of the mine office area and consists of two topsoil piles that have been undisturbed since being stockpiled. The South Topsoil Area is located along the West Haul Road south of the mine office area.

Surface materials in the MA consist mainly of rock, waste rock, ore, protore, gravel, and disturbed ground. On the waste rock and ore/protore stockpiles, material sizes range from silt and clay to large boulders. There is little soil in the MA, except in small areas where the soil wasn't completely stripped off or covered (e.g., the hill above the Adit Pit).

Active water management facilities within the MA include a surface impoundment for collection of seep and storm water (the PCP), three seep collection pumpback systems, several buildings containing pump equipment, holding tanks for seep water, and the WTP.

Physical dimensions, including the footprint area of the stockpiles, the volume of material excavated or placed, thicknesses, side slopes, and height were estimated for surface materials. These physical dimensions were estimated using the AutoCAD Land Development software and hand calculations. The estimates were prepared using base maps provided by SMI in electronic format that included the pre- and post-mine topography. The estimated quantities are summarized in Tables 4-1, 4-2, and 4-3.

An aerial photograph provided by BLM dated November 22, 1989, was used to interpret the features shown on the topographic maps, where necessary. The following sections describe the physical characteristics of the major features in the MA. The discussion starts by summarizing mining activity that led to the current configuration of the MA.

4.1.1 Sequence of Mining Activities

The general sequence of mining activities at the site was investigated by Peters (1999a). Historical aerial photographs of the mine site taken between 1950 and 1982 and maps of the mine site were examined to determine the sequence of mining and construction of waste dumps and ore stockpiles that currently remain on the site.

Mining began at the Adit Pit in 1955. By June 1957, four pits (Adit Pit, Pit 2, Pit 6, and the Boyd Pit) were in operation. Extensive development of mine roads and exploration drilling were conducted during this time. The East Haul Road was constructed between 1960 and 1962.

A 1962 mine map shows several ore piles that were subsequently buried by waste rock (the High Lime pile, Boyd pile, Boyd 2 pile, Pit 2 pile, and a pile at the north end of Pit 6). The locations of these buried piles (except the Pit 6 pile) are shown on Figure 4-1.

The mine was shut down from late 1965 through early 1969 because of the end of the ore purchase contract between DMC and the AEC. Significant exploration activity occurred during this period, with roads and drill pads visible to the east and northeast of Pit 6 and north to the top of the Northwest Ridge above the current Pit 4.

Aerial photography from August 1970 showed the mine after it was restarted. Mining occurred in the Boyd Pits, but no mining occurred in Pit 2, Pit 2 East, or Pit 6 during this period. New exploration drill pads were seen on the Northwest Ridge and east and northeast of the MA.

Aerial photography from July 1974 showed renewed mining in the Adit Pit and Boyd 2 Pit. Pit 3 North was beginning to be mined at this time. A new pit, referred to as Pit 2 on a 1976 site map, was developed between Old Pit 2 and the Boyd Pit.

Photographs from September and November 1977 showed that the rate of mining increased during this time period, as shown by considerably increased amounts of equipment on site. Mining of Pit 4 began sometime between 1974 and 1977. The November photographs show areas of slope failure on the face of the South Spoils. Piles of waste rock were placed along the toe of the dump (buttressing wedge) to stabilize the face and stop further movement of the face. The continued failure is visible on photographs that show waste rock that had moved downhill, covering over the buttressing wedge. Tension cracks were now clearly visible on the top of the South Spoils and had encroached on a large ore stockpile, causing some of it to sink. The East Dump area was being prepared to receive waste rock by topsoil stripping and removal of trees. Exploration drilling was conducted on the north side of the Northwest Ridge and Spokane Mountain during this time by Western Nuclear.

Photographs taken in July and October 1978 show mining activity alternating between Pit 4 and Pit 3 North. The PCP, which was excavated during this time at the base of the buttressing wedge in the Central Drainage, appeared to be about half full.

Photographs from November 1979 show that, at that time, mining in Pit 4 and waste rock dumping on the Hillside Dump had been completed. Pit 3 had consumed what remained of Boyd East Pit, Pit 3 North, and Pit 6. Pit 4 began filling with water at this time and showed a large highwall failure on the eastern side of the pit. This highwall failure may have hindered operations in the pit. Diversion ditches were cut along the top and bottom sides of the Hillside Dump and the western side of Pit 4.

Photographs from July 1980 show Pit 3 being mined at full capacity. The last mining in Pit 4, from the north end of the pit and on the saddle above it on the Northwest Ridge, was completed early in 1980. The water level in Pit 4 was high, with no signs of seeps on the pit walls. Water from Pit 4 was being sprayed at several locations north and east of Pit 4 in an effort to evaporate the water. The PCP and Blood Pool both contained red water at this time. The North Topsoil piles were placed during this time, apparently from soil stripped from the Western Drainage in 1979 prior to dumping waste rock there. The pit wall failure in Pit 4 had mostly collapsed into the pit pond by July 1980.

Photographs from July 5, 1981, show the mine during a day without mining operations. All haulage equipment was parked and no activity was observed. Pit 3 North was completely consumed by Pit 3. The water level in Pit 4 was higher, and a new spraying area was set up near the southwest corner of the pit. Pit 3 was beginning to develop a pond. The Western Drainage Seep was visible, and the Western Drainage had water flowing along its entire length. Seeps were visible above the PCP. The entire south side of the South Spoils had been recontoured.

Photographs from August 1982 show the mine after mining activity ceased in early 1982. All storage trailers, housing trailers, and most mining equipment had been removed from the site.

Most of the north and northwest walls of Pit 3 were wet from seeps, and the water level in the pit was rising. The color of the water in Pit 3 was reddish-brown. The PCP was about half full and a dark green color, and the Blood Pool was filled with bright red water. The East Seep was visible at the base of the East Dump area and appeared to be flowing at a significant rate, and water in Pit 4 was within about 80 feet of the top of the ramp out of the pit.

Ground staining from nonaqueous fluids (such as fuels, hydraulic fluids, and solvents) was noted by Peters (1999a) on historical aerial photographs in several areas of the MA. Areas that appear to be stained in photographs taken over a long period of time were located near the vehicle shop buildings and the areas just to the north of the buildings. Reportedly, a bermed area north of the shop buildings contained up to four fuel tanks during mining and was used as a fueling station for the haul trucks. Stains were visible in this area between 1974 and 1981 (Peters 1999a). Other potentially stained areas include:

- On top of the South Spoils where haul trucks were parked between shifts
- In the East Dump area near the site of the present WTP
- On the east side of Pit 4 on the first hill off the access road to the top of the mine
- Just south of Pit 4 in Area 5
- On the Hillside Dump
- On the west end of the South Spoils in the former Western Drainage area

4.1.2 Open and Backfilled Pits

Two pits (Pits 3 and 4) remain open in the MA. Pit 3 and Pit 4 impound water from groundwater seeps, direct precipitation, and runoff from the pit wall and catchment areas. In addition, Pit 3 receives seep water captured by the Western Drainage, Central Drainage, East Seep, and Blood Pool pumpback systems. The water in Pit 3 and Pit 4 is pumped to the WTP for treatment before being released to a pond at the upper end of the Eastern Drainage.

Physical characteristics of the open pits, including the footprint area, estimated cut volume, side slopes of the pit, maximum dimensions, and the maximum cut and height when compared to pre-mine topography, are summarized in Table 4-1.

The backfilled pit area includes the Boyd Pit, Pit 2 West, Pit 2, and several smaller excavations. The backfilled pit area was progressively backfilled with waste rock during subsequent mining activity, such as excavation of Pit 3. The Adit Pit, which is partially filled with waste rock, occasionally impounds water after a storm; however, the water quickly infiltrates into the backfilled waste rock in the pit.

In preparation for the backfilled pit dewatering test, SMI installed wells in the backfilled pits in 1999 (SMI 1999b and 1999d). The Boyd Pit is the largest backfilled pit. Based on data from

Boyd Pit well GW-54, competent bedrock was encountered at a depth of 130.5 feet, or 2,650 feet above msl. The groundwater elevation was approximately 2690.6 feet above msl. The groundwater level was estimated to be about 16 feet above the projected subsurface outlet of the pit. Groundwater outflow from the backfilled pits moves downgradient in the unconsolidated material, appearing as seeps at the toe of the Gully Waste Dump and the Central Drainage. Estimated plan footprint areas and volumes of the backfilled pits are summarized in Table 4-3.

A monitoring well (GW-53) was drilled in backfilled Pit 2. Bedrock was encountered at a depth of 173 feet, indicating a pit bottom elevation of 2,730 feet above msl. The groundwater elevation measured in February 1999 was 2,758.2 feet above msl (3 feet above the natural pit outlet elevation). Pit 2 West is the smallest of the backfilled pits and was dry in February 1999.

4.1.3 Ore and Protore Stockpiles

Approximately 2.4 million tons of ore and protore containing an estimated 2 million pounds of U_3O_8 remain stockpiled in the MA (SMI 1996). The distinction between ore and protore appears to have been based on a cut-off grade of 0.05 percent U_3O_8 (Peters 1999a). Materials above 0.05 percent were considered to be ore. In some cases lower grade and sub-grade material was stockpiled at the site rather than being sent to the mill. Materials with grades above 0.04 percent stockpiled on site were considered protore, whereas materials with grades below 0.04 percent were considered to be waste rock (Peters 1999a).

At least eight ore/protore stockpiles and two suspected protore stockpiles are present in the MA. These stockpiles were constructed on top of previously deposited waste rock in the South Spoils area, the East Dump area, and an area northwest of Pit 3. In addition, six other suspected ore/protore stockpiles may be present, as indicated by Peters (1999a) from his evaluation of historical photographs of the mine site:

- Four stockpiles (the High Lime pile, Boyd pile, Boyd 2 pile, and Pit 2 pile) which were buried under waste rock as mining proceeded (Figure 4-1)
- One suspected ore/protore stockpile, observed on the 1980 photographs and referred to as the West End pile, which was either removed and hauled to the mill or buried under waste rock (Peters 1999a)
- One remnant pile of possible ore or protore near the mine office area (Figure 4-1)

Physical characteristics of the ore and protore stockpiles, including the footprint area, the estimated volume of material in the stockpile, side slopes, maximum thickness, and ore grade, are summarized in Table 4-2.

4.1.4 Mine Waste Rock

An estimated 33 million tons of waste rock remain on site (SMI 1996). While waste rock from the mining operations was deposited at various locations in the MA, the majority is in the South Spoils and the Hillside Dump. Tables 4-1, 4-2, and 4-3 summarize volumes of pits and stockpiles on the site. In addition, waste rock was placed or used in the following areas:

- Some of the waste rock from Pit 3 was used to backfill Pit 2, Boyd Pit, and most of the other pits mined earlier in the development of the mine

- Waste rock from Pit 4 was deposited along the axis of the old Western Drainage, in an area just south of the current Pit 4 called Waste Rock Area 5, to the east of Pit 4 in Pit 4 Dump (also Detail Area 4) along the current access road, and in the Hillside Dump (Figure 2-2)

- Waste rock was used to construct haul roads in various sections of the mine, as well as portions of the East Haul Road

Peters (1999a) provides an extensive discussion of the development of the waste rock piles and the sequence of mining at the site, as determined from analysis of historical aerial photographs. Physical characteristics of the waste rock piles, including the footprint area, the estimated volume of material, side slopes, and maximum thickness, are summarized in Table 4-3.

4.1.5 Topsoil Stockpiles

Topsoil stockpiles are present in the western portion of the MA, as shown on Figure 2-2:

- Two topsoil stockpiles are located north of the mine office area. The source of these stockpiles was likely the soil and alluvium removed from the Hillside Dump area and Western Drainage prior to disposal of waste rock in these areas. Vegetation has been established on the stockpiles.

- Topsoil stripped from the area beneath and west of the PCP was stockpiled along the West Haul Road, south of the mine office area. Some of this topsoil was used to resurface the south- and west-facing slopes of the South Spoils in 1982. Several remnants of the original topsoil stockpile remain in this area.

- Other stockpiles mentioned in Peters (1999a) may exist.

Table 4-4 summarizes the physical characteristics of the topsoil stockpiles.

4.1.6 Pollution Control Pond

The PCP is located at the base of the South Spoils and just north of the existing Central Drainage pumpback system (Figure 2-2). The PCP covers approximately 0.9 acre (E&E 1998). It was constructed in 1978 and enlarged in 1979. Peters (1999a) reported that the PCP was built to impound seeps that appeared at the base of the South Spoils. However, Peters also states that a smaller version of the PCP was used during 1978 as a holding pond for water pumped from the Boyd 2 East Pit. The report further discusses that the pond was lined only with fine-grained sediments, and that seepage from the base of the PCP embankment in the Central Drainage first appeared in 1982.

Currently, the pumpback systems from the Western and Central Drainages deliver seep water to the PCP for temporary storage. The PCP also receives water from several seeps from the upgradient South Spoils (including the Pump House Seep) and from stormwater from a large portion of the MA. The stormwater is routed from the top of the South Spoils to the PCP via a 6-inch plastic pipe. Table 4-5 summarizes the physical characteristics of the PCP.

4.1.7 Blood Pool

The Blood Pool is an unlined natural depression located in the southeastern portion of the MA (Figure 2-2). It covers a surface area of 800 square feet and has a maximum depth of 3 feet, and was named for the bright red water that periodically accumulates there. The pool appears to be dry for much of the year. It intermittently collects seep water and a limited quantity of surface water runoff from the area near the WTP. The quantity of water within the pool varies directly with precipitation levels (E&E 1998).

Historically, the Blood Pool apparently discharged into the Eastern Drainage through a ditch approximately 900 feet long (E&E 1998). Currently, most of the water in the ditch draining the Blood Pool is collected by a sump located approximately 400 feet downgradient of the pool and is pumped directly to Pit 3.

4.1.8 Pit Wall Seeps and MA Waste Rock Pile Seeps

Numerous seeps are present along the north and east walls of Pit 3 and along the north wall of Pit 4. These seeps discharge from the contact between the Togo Formation and the quartz monzonite and from relict bedding plane surfaces in the calc-silicate portion of the Togo Formation that is exposed on the east pit walls.

A single MA seep is present at the base of the Hillside Dump. This seep first appeared in 1980 and remains active (Peters 1999a). The aerial photograph reviewed by Peters shows the seep emerging from the toe of the dump and then infiltrating into the surface material a short distance

away. Other waste rock seeps are located at the foot of the South Spoils and are described as PIA features in Section 4.2.

4.1.9 Mine Buildings/Structures

An office building, maintenance facilities and storage sheds for samples and cores were located in the western portion of the MA (Figure 2-2). After cessation of mining activity, a WTP was constructed in the eastern portion of the MA.

Water control structures include seep discharge collection and pumpback systems in the Western, Central and Eastern Drainages and the Blood Pool. The PCP, located south of the South Spoils, holds water from the Western and Central seep collection and the South Spoils. Water in the PCP is pumped to Pit 3 and eventually is treated at the WTP and discharged to the Eastern Drainage.

4.2 PHYSICAL CHARACTERISTICS OF THE POTENTIALLY IMPACTED AREA

The PIA includes those portions of the study area that, while not directly disturbed by mining, could be affected by transport of COPCs from the MA. COPCs may be transported by surface water or groundwater flowing to areas hydraulically downgradient of the MA. They also may be transported by wind or mechanical means from the MA.

4.2.1 Surface Water Drainages

There are eight surface water drainages in the PIA that may receive surface water runoff or groundwater discharge from the MA (Figure 4-2):

- Western, Central, and Eastern Drainages, which receive direct runoff from portions of the South Spoils and groundwater that flows from beneath the South Spoils
- Northeastern Drainage (the portion of the Eastern Drainage above the East Haul Road)
- Northern, Far West, and Southwestern Drainages, which receive less runoff from the MA than the other drainages
- Blue Creek, which receives surface water flow from the combined Eastern, Western, and Central Drainages and the Northern and Southwestern Drainages

Blue Creek, which originates at Turtle Lake, also receives water and sediments from Oyachen Creek, southwest of the MA, and several smaller unnamed tributaries. Blue Creek flows to the Spokane River Arm of Franklin D. Roosevelt Lake, approximately 3.5 miles downgradient from the site.

Western Drainage

The Western Drainage currently emerges at the toe of the South Spoils and then flows approximately 2,700 feet southeast, where it joins the Eastern Drainage (Figure 4-2). Prior to mining and placement of South Spoils waste rock in the channel, the Western Drainage flowed unobstructed through the MA and collected surface runoff from areas upslope of the South Spoils. The drainage channel is a relatively broad feature until close to the confluence with the Eastern Drainage. Near the confluence, the channel narrows and is approximately 3 feet wide with heavily vegetated banks approximately 5 feet high. Sediments are present throughout the length of the channel and consist of light brown silt with some clay, sand, and cobbles.

Surface and groundwater contributions to the drainage include:

- Seeps located along the South Spoils waste rock (the Western Drainage and Western Drainage Junior seeps)
- Springs located along the channel south of an access road that crosses the drainage
- Stormwater from a ditch extending along the western and southwestern edge of the South Spoils
- Direct runoff from the central portion of the South Spoils
- Shallow groundwater flow from the MA

Surface water flow from the Western Drainage Seeps is captured and pumped to the PCP. Except during thunderstorms and spring runoff, surface water flow in the drainage is largely fed by groundwater starting about halfway between the seep collection system and the confluence with the Eastern Drainage. Currently, shallow groundwater flow within the Western Drainage is not captured.

Central Drainage

The Central Drainage starts just south of the PCP dam and continues in a southerly direction for about 1,800 feet, to where it joins the Eastern Drainage (Figure 4-2). The upper portion of the

drainage has two forks, the East Fork and the West Fork. The West Fork occupies a broad U-shaped depression without a defined channel in its upper reach. Near the confluence with the Eastern Drainage, the Central Drainage is approximately 3 feet wide and 2 feet high with heavily vegetated banks. Sediments are present throughout the length of the drainage channel and typically consist of light brown silts with cobbles. Prior to mining, the Central Drainage flowed unobstructed through the MA and collected runoff from areas above the PCP and South Spoils.

Surface water contributions to the drainage channel include:

- Seeps along the South Spoils waste rock (the Central Drainage [Dam Toe] Seep)
- Springs located along the southern reach of the drainage
- Direct runoff from the surrounding land surface
- Shallow groundwater flow from the MA

Currently, the seep water is partially captured by a collection system and pumped to the PCP. Some of the water from these seeps bypasses the collection system as shallow groundwater flow. The drainage channel is typically dry from below the seep collection system to just above the confluence with the Eastern Drainage.

Northeastern Drainage

The Northeastern Drainage is located east of the northern portion of the MA (Figure 4-2). The upper portion of the drainage has three forks: the East Fork, Middle Fork, and West Fork. Surface water entering the drainage is conveyed southward to the NPDES outfall pond. The drainage is often dry above the outfall pond except for several small seep areas.

Surface and groundwater contributions to the drainage include:

- East Fork - Collects surface water from a small area east of the MA

- Middle Fork - Collects MA surface water from areas east of Pit 4, including runoff from waste rock deposited at the top of the drainage (Detail Area 4 on Figure 2-2)

- West Fork - Collects MA runoff from a bedrock ridge on the east side of Pit 3 and from an area of fill between Pits 3 and 4

Eastern Drainage

The Eastern Drainage is a continuation of the Northeastern Drainage. It runs along the east side of the MA (Figure 4-2). The main channel of the Eastern Drainage extends from the NPDES

outfall pond approximately 6,700 feet south to the confluence with Blue Creek. The stream occupies a well-defined channel approximately 2 to 8 feet wide with heavily vegetated banks. Sediments consist of dark brown silt, sand, and small cobbles. The Eastern Drainage includes three tributary drainages that collect surface water from the MA: the East Dump Fork, East Seep Fork, and Lower Fork.

Surface water and groundwater contributions to the drainage include:

- Groundwater seeps along the drainage channel, particularly in lower reaches
- The East Seep and an intermittent seep identified by DMC at the base of the East Dump in spring 2002
- Flow to the Eastern Drainage from the Northeastern, Western, and Central Drainages
- Midnite Mine water treatment system discharges
- Runoff from waste rock in the southeast MA

The Eastern Drainage typically has surface water flow for most of the year, partially due to the WTP discharge. The East Seep and East Dump Seep are captured and pumped to the PCP.

Northern Drainage

The Northern Drainage drains areas east of the MA outside the drainage basin where most of the MA is located (Figure 4-2). In its upper reach, a short segment drains the small portion of the MA north of Pit 4. This ephemeral drainage occupies a poorly-defined channel approximately 2 feet wide with 6-inch-high vegetated banks. Sediment consists of light brown silts with cobbles and woody debris.

Surface water or groundwater contributions to the drainage from disturbed areas include:

- Runoff from the area of the MA north of Pit 4
- Runoff and sediments from the East Haul Road to where it crosses the Northern Drainage

The Northern Drainage is typically dry for most of its length except during thunderstorms or spring snowmelt.

Far West Drainage

The Far West Drainage drains areas west of the MA and a small area of the MA that falls outside the drainage basin where the MA is located (Figure 4-2). The drainage area is sparsely forested with brushy understory or riparian vegetation. Unlike the other PIA drainages, the Far West Drainage does not enter Blue Creek but flows directly to Franklin D. Roosevelt Lake. Near the MA, the drainage is typically dry.

Possible MA surface water or groundwater contributions to the drainage include:

- Surface water runoff and potentially groundwater from areas of the MA outside the drainage basin. These areas include the North and the South Topsoil areas, the mine office, core shacks, vehicle shop, and a remnant pile of waste rock.

- Surface water diverted from above the Hillside Dump and a small area of disturbed ground near the south end of Pit 4.

Southwestern Drainage

The Southwestern Drainage is located southwest of the MA (Figure 4-2). The main stem is an ephemeral drainage that occupies a U-shaped depression with a poorly defined channel approximately 2 feet wide with 6-inch-high vegetated banks. The Southwestern Drainage flows south to Blue Creek and is typically dry. Sediment within the drainage consists of light brown silts with small cobbles and possibly ash material.

Potential MA surface water or groundwater contributions to the drainage include:

- Runoff and groundwater from a small area of the MA outside the drainage basin, where topsoil is located

- Runoff from the West Haul Road

Blue Creek

Blue Creek is a perennial stream fed by springs, stormwater drainage, groundwater discharge, and flow from Turtle Lake (Figure 4-2). It flows in a southwesterly direction to the Spokane River Arm of Franklin D. Roosevelt Lake, approximately 3.5 miles from the Eastern Drainage.

Blue Creek occupies a well-defined channel from 6 to 18 feet wide, with vegetated banks from 3 to 5 feet high. Blue Creek ponds at several locations due to beaver dams and the construction of log and rock weirs along the channel in 1992. Sediments consist of brown coarse to medium

sand with some clay. The Blue Creek corridor is heavily vegetated and contains extensive riparian habitat.

Blue Creek drains a surface area of 19.6 square miles. The total stream length from Turtle Lake to Franklin D. Roosevelt Lake is about 6.7 miles. Annual runoff from the watershed is approximately 3,660 acre-feet, and the base flow in late summer is about 0.1 to 1.0 cubic feet per second (cfs) (Peone et al. 1993). USGS records indicate that the mean monthly discharge ranges from approximately 0.1 cfs in August to 10.3 cfs in April. Streambed elevations of Blue Creek range from 2,454 feet above msl at Turtle Lake to 1,289 feet above msl at the confluence with the Spokane River Arm.

4.2.2 Seeps in the Potentially Impacted Area

Seeps are small springs where groundwater discharges at the land surface. Seeps are of concern because they may transport contaminants in groundwater to the surface. Several seeps located at the base of waste rock piles are collected to reduce surface water impacts. Some seeps occur further downstream but may carry groundwater from the MA.

Waste Rock Seeps

A number of seeps exist along the south-facing slopes of the South Spoils. These seeps are located in areas where pre-existing drainages are overlain by the South Spoils waste rock pile. The largest of the seeps is the Western Drainage Seep. This seep flows from several channels that discharge from the base of the South Spoils, at the head of the Western Drainage. This seep first appeared in 1981 and has flowed continuously since that time (Peters 1999a). The seep water is collected by a concrete weir structure and piped to a pump house. It is subsequently pumped to Pit 3 and held in storage prior to being pumped to the WTP for treatment. It is likely that some of the water flowing from the Western Drainage Seep bypasses the collection system and flows down the drainage. A smaller seep (the Western Drainage Junior Seep) is located a short distance away; it is captured as well. Stormwater that is conveyed by the modified Western Drainage along the western side of the South Spoils is routed around the seep collection system through a plastic pipe.

In 1981 and 1982, several seeps appeared near the base of the slope of the South Spoils above the PCP (Peters 1999a). The Pump House Seep and some smaller seeps in areas where waste rock now covers the Central Drainage are collected in the PCP.

The East Seep (also called the Boyd Seep) appeared at the base of the East Dump area in 1981. This seep originally generated sufficient discharge to flow over a dirt road into a drainage (Peters 1999a). A system to capture the seep discharge was built in 1987. The captured water is pumped directly to Pit 3 for treatment. As is the case for the Western and Central Drainage

seeps, some of the seep water may bypass the collection system. An additional seep was identified in 2002 at the East Dump.

Seepage from the base of the PCP embankment began in 1982 (Peters 1999a). Presently, the Central Drainage Seep (also called the Dam Toe Seep) occurs as a series of small seeps that are collected and piped to a buried 55-gallon drum and then conveyed to a pump house for pumping to the PCP. Wet areas were present adjacent to the collection system in 1999 and 2000, indicating that some seepage flows past the collection system and down the Central Drainage.

Drainage Seeps

Further south of the MA, SMI mapped other seep areas in the Eastern, Central, Western, and Northeastern Drainages and Blue Creek (SMI 1999c). Six seeps (ED-2 through ED-7) were identified in the Eastern Drainage. Another seep (ED-1) is located in the West Fork of the Northeastern Drainage above the NPDES outfall pond. Seep ED-1 discharge was measured at 0.93 gpm and the combined flow from the seeps in the Eastern Drainage was measured at about 9 gpm in November 1998. Some of the seeps along the Eastern Drainage may represent shallow groundwater interflow moving along the creek (SMI 1999c).

Two seeps (SW-12 and CDAC) were identified in the lower reach of the Central Drainage. One seep (WD-1) was identified in the Western Drainage. During the base flow periods, this seep is the source of the water that flows in the Western Drainage at surface water sampling location WDAC (SMI 1999c).

Four seeps (BC-1 through BC-4) were identified along Blue Creek. These seeps are shown on Figure 3-2. SMI (1999c) later determined that seep location BC-1 represents shallow groundwater interflow moving along the creek channel. The small flows from the other three seeps along Blue Creek could not be measured.

4.2.3 Downwind Areas

Meteorological data indicate that the primary downwind directions from the MA are southwest and northeast of the MA (Figures 2-4 and 3-3). These downwind areas were considered the most likely to have been affected by windblown dust or airborne transport of COPCs from the MA. During mine operations, dust generation was related to blasting, earthmoving, dumping, and hauling. Current dust sources include unvegetated areas of the site.

Southwest Downwind Area

The Southwest Downwind Area (Figure 3-3) contains few access roads and was not physically disturbed by mining operations. Part of the Far West Drainage runs through the area. The area

generally slopes gently toward the southwest and consists of grassy open forest with occasional areas of bushes and a variable layer of needles, moss, and other organic debris. Surface materials in the Southwest Downwind Area are described as light brown to tan organic silts with occasional gravel and root debris.

Northeast Downwind Area

The Northeast Downwind Area (Figure 3-3) generally slopes moderately toward the southeast and consists of open to dense forest with brushes, grasses, and an absent-to-thick layer (up to 4 inches) of needles, moss, and other organic debris. Portions of the area have been logged recently. Surface materials in the Northeast Downwind Area are described as light brown to gray organic silts and clays with occasional gravel.

4.2.4 Haul Roads

There are two unpaved haul roads leading from the MA to the paved Ford-Wellpinit Road, as shown on Figure 2-1. Both haul roads have been resurfaced periodically with gravel by DMC. The source of the gravel is Suspected Protore Stockpile #1 (Figure 2-2). This material is mineralized calc-silicate rock from the east side of Pit 3. Soils and other media located near haul roads may be affected by movement of materials from the roads and spills in transporting ore or sludge. Figure 4-3 shows locations sampled on and adjacent to the haul roads.

West Haul Road

The West Haul Road extends a distance of approximately 2,300 feet from the MA boundary. The West Haul Road was used during the early days of mining as the main ore hauling road to the mill in Ford, 16 miles away. The West Haul Road is approximately 15 feet wide.

East Haul Road

The East Haul Road is approximately 9,700 feet long and 30 feet wide. It was the main ore hauling road to the DMC mill in Ford for most of the life of the mine. It is currently used to haul sludge from the WTP to the mill for disposal in TDA 4.

4.3 SITE HYDROLOGY

Available surface water data, site surface water features, and flow patterns within the MA and PIA are described in the Phase I Hydrologic Modeling for Midnite Mine RI/FS technical memorandum (URS 2002a). Mining operations have significantly changed the natural surface water drainage patterns in the MA and the immediate surrounding areas. The natural drainage channels present before mining began probably supported only ephemeral flows. Parts of these

drainages were covered by fill materials created by the mining excavations. Excavations for ore retrieval, such as Pit 3 and Pit 4, and waste rock dumps and stockpiles now form the most prominent topographic features in the MA. There are now three perennial water bodies in the MA, all of which were all created during the mining operations: Pit 3, Pit 4, and the PCP.

Several facilities constructed for mine water management modified the surface water drainage pattern. These facilities include the PCP, seep water collection systems, pipes and culverts that route surface water to the storage areas, and ditches that divert un-impacted surface water around the MA to existing natural drainage channels. Site grading and compaction of surfaces in some areas of the MA, such as on the haul roads and mine haul truck staging areas, reduced the ground surface permeability, which facilitates increased stormwater runoff and causes surface water to become channelized in some areas. Conversely, much of the waste rock and stockpiled ore and protore are unconsolidated and coarse-grained, resulting in high infiltration rates.

4.3.1 Surface Water

The surface water flow in the MA and PIA is described for eight sub-basins in the Hydrologic Technical Memorandum (Figure 2-2 in Appendix B). The sub-basins were delineated based on the topography in combination with diversion structures such as ditches and the seep pumpback conveyance systems. Two of the sub-basins are considered "closed" because there is no surface water runoff from them. Detailed descriptions of the surface water conditions in the sub-basins are provided in Appendix B.

Much of the surface water runoff from the Northwest Ridge above the Hillside Dump is diverted and routed along the west side of the MA via diversion ditches. Runoff from the western portion of the South Spoils also flows into the diversion ditch west of the South Spoils, bypasses the Western Drainage seep collection system, enters the Western Drainage, and eventually discharges into Blue Creek.

Surface water measurements were conducted in PIA drainages south of the MA in September 1999 and in March and April 2000. The flow measurements are presented in Table 4-6. Measurements recorded in mid-September 1999 were taken during a several-week period of no precipitation. In March 2000, measurements were taken in the Eastern Drainage between days of light rainfall (approximately 0.5 inch). In early April 2000, measurements were conducted several days after a moderate rainfall event at the end of March (approximately 1 inch).

Based on additional site observations, the majority of the drainages in the study area are ephemeral. The Eastern Drainage is the only drainage with perennial flow, but the flow is partially due to the WTP discharge, particularly in the dry season. During September 1999, flow in the Eastern Drainage ranged from over 500 gpm south of the WTP outfall pond to approximately 300 gpm south of the confluence of the Western and Eastern Drainages. During

April 2000, prior to startup of seasonal WTP operations, flows ranged from 13 to 136 gpm at those locations.

Approximately 1,500 feet south of the South Spoils and further downstream, the Eastern, Central, and Western Drainages gain flow from groundwater discharge. Small seeps are present near surface water sampling locations SW-12 and WDAC in the Central and Western Drainages, respectively.

Available data indicate that the highest flow rates occur in the spring during periods of increased rainfall and snowmelt. Subsequently, flow rates decline and flows are absent or minimal during dry summer months and in frozen periods during the winter. This trend may be slightly modified by periodic summer thunderstorms. Also, within the Eastern Drainage, flow rates are largely governed by discharge rates from the WTP effluent.

4.3.2 Groundwater

The Phase I Hydrologic Technical Memorandum in Appendix B provides a detailed discussion of groundwater flows at the site. This section provides an overview of groundwater flow through the various media. A conceptual model was developed from the available groundwater data to describe the groundwater flow system, including the groundwater flow patterns and hydraulic properties (Figure 4-4). Additional information on the site hydrology and the model that was developed is presented in the hydrologic modeling work plan and the Phase I hydrologic modeling report (URS 2001b, 2002a).

4.3.2.1 Summary of the Conceptual Groundwater Flow Model

Using the available data for the Midnite Mine, a conceptual model of the groundwater flow system has been prepared to describe the movement of water throughout the site. Figure 4-4 illustrates the major features of the groundwater flow system.

Precipitation that falls on the site is subject to evaporation, evapotranspiration, runoff, or percolation. Recharge to the groundwater flow system is from percolation of precipitation. In areas surrounding the MA where bedrock is exposed at the ground surface or underlies thin soils with natural vegetation, the amount of water entering the groundwater flow system is about 10 percent of precipitation or less. In the MA, groundwater recharge rates are much higher, possibly as much as 80 percent of precipitation because of the coarse texture, high porosity, and large hydraulic conductivity of the waste rock and the relatively sparse vegetation cover.

Unconsolidated materials in the site area include surficial deposits such as alluvium, colluvium, and glacial deposits, as well as waste rock from mining activities. Weathered bedrock and fractured more competent bedrock underlie the unconsolidated deposits. On the western side of

the MA, the bedrock is generally composed of a complex of igneous rocks, which is predominantly porphyritic quartz monzonite. Generally, on the eastern side of the MA, the bedrock consists of the Togo Formation, which is primarily phyllite schist and calc-silicate rocks, including marble, quartzite, and hornfels. Along the contact between the Togo Formation and the quartz monzonite, hydrothermal alteration of the rocks created ore deposits of metallic minerals, including uranium.

Within the MA, a large portion of the infiltrating precipitation moves within unconsolidated materials as interflow at depths above the water table. These coarse-grained materials have hydraulic characteristics that allow rapid movement of water. After major precipitation events and during spring snowmelt events, interflow moves quickly downward and tends to accumulate along the top of the bedrock. Much of this interflow flows down the slope of the bedrock surfaces and converges into buried drainages and bedrock depressions excavated by mining. Most of the interflow emerges as seeps at the toe of the South Spoils and East Dump. Because most of this infiltration water moves as interflow quickly out of the unconsolidated materials to surface discharge points, only a relatively small portion of water infiltrating within the MA recharges the underlying fractured bedrock. Nevertheless, the bedrock does receive recharge in the higher elevation portions of the MA.

The available hydrogeologic data show that the groundwater flow system in the Midnite Mine vicinity exhibits the key features of a topographically-driven flow system. In such flow systems, groundwater circulates through the subsurface along pathways from upland areas of recharge to lowland areas of discharge, typically stream valleys and drainages. A large amount of topographic relief increases the influence of surface topography on flow directions and accentuates groundwater flow. In the MA, the undulating topography and major groundwater sinks created by mining (e.g., Pit 3 and Pit 4) reflect superposition of local and intermediate flow systems. In addition to the lateral flow from higher to lower elevations across the site area, there are strong downward components of flow in recharge areas and strong upward flow components in discharge areas. Site-specific groundwater level data show that locations having upward and downward hydraulic gradients are consistent with the areal trends typically seen in a topographically-driven groundwater flow system. Downward gradients are present in the recharge areas in the higher elevation areas along the Northwest Ridge and other parts of the northern MA. Upward gradients are found in the lower elevations of the site.

Groundwater flow within the bedrock at the site and the surrounding area is through a continuum of interconnected fractures. Fractures are pervasive throughout the bedrock and are observed in most areas to have relatively close spacing, small apertures, and wide variation in orientations. These fracture characteristics, together with the strong correlation between topographic elevation and groundwater elevation, indicate that fracture networks in the bedrock provide sufficient hydraulic connection for the flow system to be modeled as a granular porous medium. Hydraulic conductivity in the more intensely fractured portions of the weathered bedrock is generally

higher than that in the deeper unweathered bedrock. An increased density of fracturing has been observed in the northern highwalls of the open pits along the contact zone between the Togo Formation and the quartz monzonite, which likely causes a zone of higher hydraulic conductivity that trends north-south between the pits. Additional zones of higher hydraulic conductivity may exist in the bedrock that is generally aligned with the surface water drainage channels, both natural and buried, because such channels develop through geologic time due to preferential erosion of structural weaknesses in the rock.

Recharge to the backfilled pits occurs by infiltration of precipitation, interflow along the bedrock surface, and groundwater inflow from the surrounding bedrock. Groundwater flow within this area is consistent with the conceptual model for the site as a whole, in that the flow directions are controlled primarily by topography. Groundwater moves into the backfilled pits in areal patterns similar to those of surface water running into the open pits. Groundwater flows southward from the backfilled pits through the surrounding bedrock and over the lowest elevations of the buried bedrock rims of the pits, across the bedrock surface. Overflow from the Boyd Pit may contribute to flow from the Pump House and Central Drainage seeps.

Currently, most of the seep flows and some of the surface water runoff from the South Spoils is captured by collection systems and pumped to the PCP. However, before the implementation of this pumpback system, seep flow and surface water runoff entered the drainages south of the MA. A substantial portion of this flow percolated downward into the alluvial deposits and recharged the shallow groundwater system. After installation of the seep collection systems and for current conditions, the alluvium receives recharge from direct infiltration of surface water from snowmelt and runoff generated by occasional, intense rainfall. In areas having upward gradients, the alluvium also receives upward flow from the bedrock groundwater that converges laterally toward the drainages.

For the flow system as a whole, under long-term steady-state conditions, the recharge rate should approximate the amount of combined discharge from the system. Groundwater leaves the watershed in which the MA is located via:

- Evaporation from the ground surface, seeps, and open water bodies in Pit 3, Pit 4, and the PCP
- Transpiration by local vegetation in the drainages south of the MA
- Groundwater discharge to surface water drainage channels downgradient of the MA, which eventually lead to Blue Creek

Except during storm events or snowmelt, little surface water flows from the MA southward beyond the seep collection systems located along the southern MA boundary. Although

groundwater discharges into the drainages south of the MA, the rate of this seepage does not sustain stream flow in the majority of the drainages during rainless periods. Nonetheless, groundwater discharge causes a small but steady base flow of seepage to the drainages south of surface water sampling locations SW-12 (Central Drainage) and WDAC (Western Drainage). In the Eastern Drainage near well MW-5 and southward, there is an upward gradient and the groundwater table rises to groundwater surface, which indicates groundwater seepage. These groundwater discharge areas probably reflect the terminus of flow lines in the groundwater flow system that originates in the northern high-elevation areas of the MA.

4.3.2.2 Hydrogeologic Units

Groundwater occurs in three principal geologic material types at the Midnite Mine—regolith, waste rock, and fractured bedrock.

Regolith

This unconsolidated material hydrogeologic unit consists primarily of alluvium, but also includes colluvium, weathered bedrock, and glacial outwash deposits. In upland stream drainages within the watershed, alluvium is present as a thin veneer or is absent due to the steeper topographic relief. Alluvium also is present in the drainages south of the MA, effectively pinching-out south of the confluence of the Western Drainage and Eastern Drainage (SMI 1995).

Waste Rock

Waste rock from the mining operations was deposited across the northern extensions of the Western, Central, and Northeastern Drainages in the MA. Although waste rock varies in thickness, the saturated thickness of the waste rock is generally less than 2 feet in the buried drainages in the MA. In areas that were excavated below the local water table, such as the backfilled pits, saturated thicknesses of the waste rock range from approximately 15 to 30 feet. Outside these areas, however, the base of the waste rock is generally above the water table.

A geophysical survey conducted by the BOM (Williams et al. 1996) identified several possible preferential flow paths from the MA to the Western Drainage Seep that were attributed to former buried haul roads. The decreased hydraulic conductivity along these buried haul roads is the result of crushing and compacting of the waste rock by vehicle traffic during mining operations.

Fractured Bedrock

The bedrock consists of unweathered meta-sedimentary rocks of the Precambrian Togo Formation, quartz monzonite, and various igneous dikes. Groundwater flow within the bedrock at the site is through secondary porosity features, which are primarily fractures. Fracturing is

pervasive throughout the quartz monzonite and igneous dikes. Fractures in the meta-sedimentary rock are less pervasive but are commonly present along bedding planes, cleavage planes, foliation, and other zones of weakness. The fractures are typically heterogeneous in spacing, orientation, size, and degree of interconnection. The fractures have a relatively high density and vary widely in orientation (Williams et al. 1996). Fracture apertures are typically less than ¼ inch. Generally, fractures are most prevalent near the land surface and are assumed to decrease in number and size with depth due to increasing confining pressure.

The intensely-fractured and altered contact zone between the meta-sedimentary rocks and quartz monzonite appears to channel water from Pit 4 to Pit 3. Clay materials are present in portions of the rock mass that have been sheared and faulted. Seeps are associated with this contact zone on the north highwall of Pit 3. In addition, water-bearing dacite and aplite dikes were encountered in several monitoring well boreholes.

4.3.2.3 Hydraulic Properties of Site Materials

Slug and pump test data were compiled from multiple field efforts conducted by SMI, BOM, and URS. Table 4-7 summarizes hydraulic conductivities estimated from these tests, which were conducted in unconsolidated materials, alluvium, waste rock, and bedrock wells at varying depths. The hydraulic conductivity values vary with the type of hydraulic test, the test duration, and the lithology intersected by the well screen. Hydraulic parameters obtained from pump tests typically provide better estimates of hydraulic aquifer properties than a short-term slug test. While the various site materials and their hydraulic properties are discussed separately, the occurrence and movement of groundwater in unconsolidated material at the site acts as a single system providing recharge bedrock fractures, surface water in the open pits and seep flows.

Regolith

The hydraulic properties of the alluvium is highly variable. Based on slug test data, values of hydraulic conductivity calculated for the alluvium range from 0.035 to 35.26 feet/day, with a geometric mean of 4.98 feet/day. The geometric mean represents average hydraulic conductivity because of the large variation in measured values (Fetter 1994). Some of these values appear to be low for typical alluvium, which may indicate that portions of the alluvial material are indurated with fine materials such as silts and clays.

Waste Rock

Waste rock conductivity also is highly variable. Based on the available data from slug and pump tests in wells, values of hydraulic conductivity calculated for the waste rock range from 0.092 to 4,422 feet/day, with a geometric mean of 14.12 feet/day. This mean value may be low because it was calculated from data that included some wells that were completed in waste rock altered by

mechanical or geochemical processes. (For example, low hydraulic conductivities of 0.64 and 0.092 foot/day estimated from slug tests of wells GW-47 and GW-42, respectively, may be due to the proximity of the wells to former buried haul roads where the waste rock was crushed and compacted. Also, the hydraulic conductivity of 24.4 feet/day at well GW-53 may be lower than anticipated because of large amounts of chemical precipitates clogging the well screen [SMI 2001]). Based on the pump tests in other wells, including the Unnamed Well and GW-54, the hydraulic conductivity of the waste rock material that is unaffected by haul roads or chemical precipitates is more likely to be on the order of 103 feet/day.

Bedrock

Bedrock conductivity also is highly variable. Typically, the hydraulic conductivity of granitic and metamorphic rock ranges from 10^{-5} to 10^{-8} feet/day, but jointing and fracturing can increase this permeability by up to five orders of magnitude (Freeze and Cherry 1979, Gale 1982). Bedrock at this site has a relatively high density of fracturing, and the fractures vary widely in orientation and spacing. More than three orders of magnitude of variation of hydraulic conductivity measurements is expected in the site area, with the greatest permeability below the drainages and tributary channels. All of the available data for hydraulic conductivity in the quartz monzonite were derived from slug tests, with the exception of a pump test conducted on well GW-51. Hydraulic conductivity values for the quartz monzonite range from 0.001 to 4.72 feet/day, with a geometric mean of 0.09 foot/day.

A visual reconnaissance of the three main bedrock rock types on the mine site was conducted to characterize the relative fracturing and jointing of these geologic units (Williams et al. 1996). Quartz monzonite exhibits fracture densities ranging from intensely fractured (< 3 inch spacing) to moderately fractured (6 inch to 3 foot spacing); the phyllite schist exhibits fracture densities ranging from closely fractured (3 to 6 inch spacing) to moderately fractured (6 inch to 3 foot spacing); and the calc-silicate exhibits fracture densities ranging from closely fractured (3 to 6 inch spacing) to widely fractured (primarily 3 to 6 foot spacing, but some wider).

Numerous closely-spaced fractures form a continuous network of intersecting secondary porosity features. Based on the observed fracture densities, the variability of the hydraulic characteristics of the bedrock reflected by the pump test and slug test data is mainly due to small-scale heterogeneity in the interconnected fracture network. The field data presented in Appendix E are consistent with the findings of Williams et al. (1996), who concluded that based on fracture density, width, and orientation, the calc-silicate rocks have the lowest relative hydraulic conductivity and the quartz monzonite the highest. In general, the phyllite schist appears to have a lower hydraulic conductivity than the quartz monzonite and higher conductivity than the calc-silicate schist. Intrusive dikes (e.g., aplite dikes) within the phyllite, where intensely fractured and weathered, are likely to have higher hydraulic conductivities than the phyllite itself.

4.3.2.4 Evaluation of Backfilled Pit Dewatering Data

The backfilled Boyd Pit groundwater pumping test (backfilled pit dewatering [BPD] test) provided a basis for estimating the large-scale hydraulic conductivity of the bedrock surrounding the backfilled pits. The results of the test also provided information of hydraulic properties of the waste rock in the pit. Prior to conducting the test, groundwater levels in waste rock monitoring wells had similar elevations indicating very small hydraulic gradients in the backfilled material. During the test, groundwater level data were obtained from bedrock well GW-57 and an adjacent waste rock well, referred to as the Unnamed Well.

In the early months of conducting the pumping test, water levels in Boyd Pit were lowered to near the bedrock/waste rock interface (approximately 2,656 feet above msl) and were maintained at this level between February 13 and March 1, 2000, by a steady pumping rate of approximately 7 gpm. Following the pumping period, groundwater inflow was approximately 5 gpm based on water level recovery data provided by SMI. The inflow rate may include some interflow and delayed yield contribution as well as bedrock flow. Therefore, the bedrock inflow is probably less than 5 gpm.

Using the pumping test data, time-drawdown curves were developed for well GW-57 and the Unnamed Well. The drawdown curve of GW-57 was a subdued replica of the curve for the Unnamed Well indicating a hydraulic connection exists between the pit material and bedrock fractures and that the bedrock fractures have lower permeability. Both well responses exhibited components of well-bore storage and drainage. Hydraulic conductivities calculated from other hydraulic tests (e.g., slug tests) in quartz monzonite are comparable to the hydraulic conductivity values estimated from the BPD bedrock test data (Table 4-7).

The data reviewed support the concept that both the backfill and the bedrock units may be modeled as a granular porous medium at the scale of the area hydraulically stressed during the BPD test. For example, drawdown in GW-57 began soon after pumping started and followed a temporal pattern that is typical for granular-porosity aquifers during the test, as opposed to typical patterns for discrete fracture flow systems or dual-porosity systems.

4.3.2.5 Groundwater Recharge

The groundwater flow system in the site area is recharged by infiltration of local precipitation. In areas surrounding the MA where bedrock is exposed at the ground surface or underlies thin soils with natural vegetation, the amount of water entering the groundwater flow system is only a small fraction of precipitation. The large-scale recharge rate in areas unaffected by the mining was estimated using a chloride mass-balance analysis and assumptions consistent with Dettinger (1989). The infiltration rate is estimated to be 1.67 inches per year, approximately 9 percent of

the average annual rainfall. This estimate probably represents the high end of groundwater recharge rates in undisturbed areas surrounding the MA.

Under current conditions, groundwater recharge rates are much higher in the MA because of the coarse texture, high porosity, and high hydraulic conductivity of the waste rock and relatively sparse vegetation cover. The Hydrologic Evaluation of Landfill Performance (HELP) model mass balance calculations (URS 2002a) indicate that infiltration rates in some areas of the MA may be as much as 80 percent of precipitation.

4.3.2.6 Groundwater Levels and Flow Directions

Water levels in all new and existing monitoring wells at the site were measured in October 1999, April 2000, October 2000, and August 2001 (Appendix G). Groundwater generally flows from north to south beneath the site, converging toward the buried drainages within the MA that flow southward toward Blue Creek. Under current conditions, groundwater also flows into Pit 3 and Pit 4. Pit 3 appears to create a hydraulic sink on all sides and Pit 4 appears to create a similar hydraulic sink, except on the south side of the pit. Groundwater flow in the Northeastern Drainage migrates toward the Eastern Drainage and then toward Blue Creek. Groundwater levels are about 130 feet bgs proximal to Northwest Ridge, decreasing to depths of only a few feet in many of the downgradient areas.

A series of linear regression analyses found a strong correlation between site area topographic elevations and hydraulic head elevations. The correlation between topography and groundwater levels was developed using sets of water level data that were measured contemporaneously during April 2000, October 2000, and April 2001. Water levels measured during October 1999 were not included in the regression because these data were collected immediately following monitoring well installation and development.

A linear regression analysis of PIA and background area water level data shows a close correlation between the water level elevations and ground surface elevations measured at the same locations ($R^2 \geq 0.99$). Departures of individual head measurements from the regression line were within 2 percent of the topographic difference. This correlation is as strong as any observed at other fractured rock sites and is actually better than exists for many granular-porosity aquifers at sites that are known to be part of a topographically-driven groundwater system. The correlation demonstrates that hydraulic heads, and hence hydraulic gradients and groundwater flow directions, are controlled primarily by the ground surface topography. In addition, the strong linear trend of the data on the correlation plot suggests pervasive hydraulic interconnectivity of the fractures on a large scale and indicates that the fractured bedrock flow system may behave as a continuum for groundwater flow.

Groundwater level data and borehole logs for wells in the MA indicate that waste rock piles lie above the phreatic surface (i.e., the water table potentiometric surface), except in areas that have been excavated for mining and later backfilled (e.g., Pit 2, Pit 2 West, and Boyd Pit). Groundwater levels in the Hillside Dump and the South Spoils areas, which were not excavated for mining, are at or below the interface between the waste rock and bedrock surface. Data from wells within the buried Western Drainage (BOM-11, BOM-16, and GW-44) and in the buried Northeastern Drainage (BOM-1) reveal that groundwater flow converges toward the buried drainages within the MA and flows to the south. These data also indicate that groundwater flow is controlled by the post-mining land surface that underlies the waste rock materials.

4.3.2.7 Groundwater Discharge

Flow rates at the seeps along the southern perimeter of the MA (Figure 3-4) show a seasonal trend similar to surface water flow in the PIA drainages and in the surrounding unaffected areas. Peak flows occur in early to mid-March, in direct response to spring snowmelt. Subsequently, the flow rates decline to base flow conditions. For example, flow rates at the Western Drainage Seep decline from a peak of about 500 gpm to 10 to 20 gpm within about 3 months. Western Drainage Junior Seep exhibits peak flow rates in March ranging from 20 to 40 gpm, which then decline to approximately 5 gpm during the following months. Flow rates and timing for the various seeps were provided by URS (2002a).

Summer thunderstorms cause little change, if any, to the longer-term summer trend of declining flow. The higher seep flows are caused by spring snowmelt moving along preferred pathways such as the buried drainage channels beneath the South Spoils. Base flows from the seeps are maintained during the drier months by delayed drainage from the finer-grained portions of the waste rock piles and migration from areas further from the buried channels in the southern MA.

The source of the water to these seeps is best characterized as interflow, which typically occurs as shallow subsurface flow on hillslopes within permeable soils overlying low-permeability material. Interflow may occur in the subsurface of the MA in unconsolidated waste rock overlying 1) bedrock, 2) crushed and compacted waste rock (e.g., buried haul roads), and 3) saturated waste rock having lower hydraulic conductivity. Interflow becomes more significant where large thicknesses of high-permeability material overlie a much lower permeability surface. The buried drainages within the MA promote this method of groundwater movement.

For remedial purposes it is important to understand the hydrogeologic processes that cause the seep flows and the relationships between the seep flows, interflow, and the backfilled pits. Groundwater level data from well GW-52 indicate the steady-state water table is below the bedrock surface at the base of Pit 2 West.

The data appear to indicate that the seep flows are caused by the convergence of interflow from within a larger area of unconsolidated waste rock and that the water flows along the top of the bedrock, which slopes toward the seeps. Groundwater levels and saturated thickness of waste rock in GW-43 were relatively unaffected by the dewatering of Boyd Pit.

Much further south, Blue Creek receives groundwater discharge during periods not influenced by snowmelt or direct storm runoff. The dry season streamflow in Blue Creek is characterized by relatively steady flows that slowly recede in a linear fashion during the summer. This sustained stream base flow during the fall and winter is fed by groundwater discharge from the regional flow system and discharge from Turtle Lake.

4.3.2.8 Vertical Hydraulic Gradients and Flow

Under natural conditions, upland areas are typically groundwater recharge areas and lowland areas are discharge areas. Such conditions also exist at this site, based on the hydraulic gradient data. However, mining activities have modified the natural flow system and created local groundwater sinks at Pit 3 and Pit 4.

Data for vertical hydraulic gradients are useful to assess and delineate the areal distribution of recharge and discharge areas (Thorne and Gascoyne 1993). Such data also are useful for evaluating the fate of contaminants in the groundwater and the degree of interaction between flow within the alluvial aquifer and underlying bedrock.

Water level data from adjacent paired wells, where one well is screened at or near the water table and one is screened substantially below the water table, were used to evaluate the vertical hydraulic gradients. Apparent vertical gradients between the well pairs were calculated by dividing the difference in measured hydraulic heads by the distance between the midpoints of the well screens. Table 4-8 presents vertical gradients calculated for 16 well pairs within the PIA and seven well pairs in the MA. Downward gradients at some well pairs (e.g., BOM-11S/BOM-11D) are located relatively short distances from other well pairs showing consistently upward gradients (e.g., BOM-16S/BOM-16D). These data reflect the influence of the steep topography of the buried drainages, which causes local variations in the vertical components of groundwater flow.

Other broader-scale trends are evident. Outside the MA, 13 of the 16 well pairs provide data showing vertical gradients between the alluvium and the bedrock. For each of these well pairs, one well is screened in alluvium or across the alluvium/bedrock contact, and the other well is screened in bedrock. The majority of these well pairs show downward gradients, indicating flow is from the alluvium to the bedrock, with the exception of well pairs GW-19/MWCD-02, MWED-10/MWED-11, MWFW-01/MWFW-02, and MW-5/MWED-03.

Upward gradients, as found in well pairs MWFW-01/MWFW-02 and MW-5/MWED-03, indicate localized areas of upward flow, which result from the steep topography, but the uppermost hydraulic head is substantially below the ground surface. Several locations exhibit upward gradients with hydraulic heads higher than the stream elevations. These locations lie along the Western and Central Drainages south of wells GW-50 and GW-51, thus indicating these are groundwater discharge areas.

Within the MA, five well pairs (GW-54/GW-57; BOM-11S/BOM-11D; BOM-16S/BOM-16D; BOM-12S/BOM-12D; and BOM-8S/MWP4-02) provide data to characterize vertical hydraulic gradients between the waste rock and the bedrock. Each of these well pairs consist of one well completed in the waste rock, either in the backfilled pits or in buried drainages, and the second well completed in the underlying bedrock. Under long-term steady-state conditions, the upward gradients observed in well pairs BOM-12S/BOM-12D and GW-54/GW-57 demonstrate that backfilled pits Pit 2 and Boyd Pit are partial hydraulic sinks that receive groundwater flow from the north and discharge groundwater to the south. Also, during the nonsteady-state conditions created during the BPD Test, the hydraulic gradients show a pattern similar to that during steady-state conditions, except that the hydraulic gradients within the waste rock reverse in direction in the area immediately south of the backfilled pits.

4.4 EXISTING PUMPBACK SYSTEMS AND WATER TREATMENT PLANT

The PCP was constructed in late 1979 (Peters 1999a) to capture seeps that appeared on the face of the South Spoils. Beginning in 1979, DMC constructed a water capture system at the mine in response to the appearance of seeps at the south end of the South Spoils waste rock pile and as an early step in the reclamation of the mine site. The capacity of the PCP proved inadequate to contain all the collected seep water. In 1987, DMC constructed a seep collection and pumpback system. During the next two years, the DMC water capture system was expanded and a water treatment system was constructed to allow discharge to the Eastern Drainage pursuant to an NPDES permit. The PCP is currently used to capture the seep water that discharges from the face of the South Spoils plus water that is pumped from the Western Drainage Seep, Central Drainage Seep, and East Seep collection systems. In addition, the PCP receives stormwater routed from a large portion of the MA. Water in the PCP is pumped to Pit 3 via two pumpback lines. Pit 3 serves as an equalization pond for the water that is sent to the WTP. Pit 3 also receives stormwater runoff from a large portion of the MA, direct precipitation, water pumped from the Blood Pool, and groundwater from a series of seeps along the north and east highwalls.

Currently, a concrete containment structure that is approximately 5 feet wide by 15 feet long captures the Western Drainage Seep water, which flows from several channels that emerge from the base of the South Spoils. The water collected in the structure is delivered by an 8-inch plastic pipe to a pump house and subsequently pumped to the PCP via three lines. Stormwater in

the Western Drainage bypasses the pumpback system and is routed back to the Western Drainage. The Western Drainage Seep collection system appears to collect all of the seeps observed in the area, including the Western Drainage Junior Seep. However, the system does not collect shallow groundwater that flows from the base of the South Spoils in this area. The water level in alluvial well MW-1, located near the collection system, is only about 1 foot bgs.

The Central Drainage Seep (Dam Toe Seep) collection system consists of a buried 55-gallon drum that collects seep water from a series of plastic pipes. The seeps emerge from the base of the embankment constructed for the PCP, which is presumably the source of the seep water. The collected water flows to a small pump house and then is pumped to the PCP. Wet areas were noted near the seep collection drum during field activities in 1999 and 2000. In addition, riparian vegetation is present downgradient from the collection system. These observations suggest that the collection system is only partially capable of collecting the water and that some portion of the seep water continues down the Central Drainage.

The East Seep (Boyd Seep) collection system is similar to the Central Drainage system and collects seep water that emerges on the south slopes of the East Dump area. The source of the seeps is not visible; therefore, the effectiveness of the collection system is unknown. Collected water is pumped to the PCP.

The Western Drainage Shunt captures surface water flowing down the Western Drainage from above the seep collection and pumpback area. The water is diverted (dammed and shunted through a large pipe on a raised wooden structure) to the channel of the drainage below the seep collection and pumpback area to allow collection of water seeping in the channel segment adjacent to this area (E. Hale, personal communication).

The Blood Pool pumpback intermittently contains water that occasionally overflows the pool and flows down a ditch to a drop inlet. The water is then pumped directly to Pit 3 from a small pump house located near the eastern edge of the MA.

Table 4-9 summarizes the pumpback volumes for the Western Drainage to the PCP, from the PCP to Pit 3, and from the Blood Pool to Pit 3 for the period November 17, 1998, to May 30, 2001. Pumpback volumes from the Central Drainage Seep and East Seep collection systems were not monitored.

The WTP was constructed on the eastern side of the MA beginning in August 1988 and was completed in April 1989. The WTP began operations in October 1992. Typically, water from Pit 3 is pumped to the WTP for treatment beginning in April until the water depth is reduced to 3 feet above the upper bench. From 1992 to 2000, water was typically pumped from Pit 3 until November of each year. Since 2001, the volume of water treated has decreased, and pumping from Pit 3 has ended as early as July. Water from Pit 4 is also pumped to the treatment plant for

treatment. The WTP uses a treatment sequence consisting of the addition of barium chloride to precipitate radium, the addition of hydrated lime to raise the pH of the water to the range of 10 to 11 to precipitate uranium and metals, clarification, filtration, and reacidification. The sludge produced by the WTP is thickened and dewatered by centrifuge and consists of about 15 percent solids and 85 percent water with smaller amounts of the principal site contaminants (SMI 1996). The uranium content of the sludge is about 0.17 percent (SMI 1996). The sludge is transported by truck to the DMC mill in Ford and disposed of directly into tailings impoundment TDA 4.

The WTP is capable of treating 500 gpm of influent water. The effluent is discharged to an outfall pond located just north of the East Haul Road and is regulated under NPDES Discharge Permit WA 002572-1. Discharge limits for uranium (2 mg/L), radium (3 pCi/L), manganese (3 mg/L), zinc (0.5 mg/L), cadmium (0.005 mg/L), and copper (0.055 mg/L) were established by the NPDES permit. The effluent water from the outfall pond moves through a rock drain under the East Haul Road to the Eastern Drainage and ultimately discharges to Blue Creek. Table 4-10 provides a summary of the WTP operations for the period March 18, 1995, to June 1, 2001, including the number of days in operation, volumes of water pumped from Pits 3 and 4, and the total and average daily discharge.

4.5 SITE HABITAT

This section summarizes the ecological information presented in the Ecological Characterization of Midnite Mine technical memorandum (URS 2000d). It contains brief descriptions of habitat types found in both the MA and PIA and describes the plants and animals using the various habitats. Threatened species, endangered species, and species of concern potentially occurring on site also are listed.

The ecological characterization addressed an area that extends approximately ¼ mile outside the MA boundary and ¼ mile on each side of Blue Creek and other PIA drainages (Figure 2-1; the ¼ mile buffer is too small to render on map). The extent of this study area was defined for the purpose of ecological interpretation, not for the purpose of contamination assessment.

The following sections describe the four primary habitat types (upland, riparian and wetland, riverine, and lacustrine) that occur within the project area and the plants and animals generally associated with each of these habitats, and present site-specific information on the habitats and plants and animals observed in the MA, PIA, and Blue Creek corridor.

4.5.1 Upland Habitat

Upland habitat occurs outside the zone of immediate influence of surface water bodies (e.g., creeks, ponds, or seeps). Extensive upland habitat is found within the MA, PIA, and Blue Creek

corridor. A variety of subhabitat types occur in the uplands including forested, grassland, open, and steep subhabitats. The geomorphological and topographical features of the site (e.g., aspect, slope, elevation, soil characteristics) largely influence the distribution and diversity of these habitats. These habitats and their associated plant diversity provide food and cover for a variety of wildlife. The quality of the upland habitat has been physically degraded within the MA; however, upland habitat outside the MA is largely physically undisturbed by mining activities.

Upland Plants

The upland habitat at the site is dominated by coniferous forest. The dominant forest cover type in the project area, classified as to the dominant forest tree species, size class, and density, is an overstory of either ponderosa pine or a mixture of ponderosa pine and Douglas-fir of uneven-aged size class with a density ranging from light to full. True ponderosa pine plant communities dominate the warm, dry zones of the reservation (Zamora 1983). In the moister and cooler zones, Douglas-fir plant communities dominate the landscape. Steep habitat is found on the west bank of the middle and lower portions of Blue Creek.

A variety of forest communities are associated with the upland habitat type within the project area. Detailed descriptions of each plant community presented in the Ecological Characterization Report (URS 2000d) include ponderosa pine/bluebunch wheatgrass, ponderosa pine/Idaho fescue, ponderosa pine/bitterbrush, ponderosa pine/snowberry, Douglas-fir/ snowberry, and Douglas-fir/ninebark.

Small isolated stands of remnant coniferous forest occur on apparently undisturbed ground patches within the MA. These small patches are located between the Adit Pit and Protore Stockpile #4, west of Pit 3, and northeast of Pit 4. Several large ponderosa pine and Douglas-fir trees occur within these isolated stands, and grasses and forbs dominate the understory. Forest cover has begun to naturally regenerate in the disturbed portion of the MA along the edge of Pit 4 and the west side of the Eastern Drainage. These areas are characterized by sparse stands of small ponderosa pine and Douglas-fir. Species diversity in the understory is low and dominated by grasses and knapweed.

Vegetation composition surveys conducted in 1999 (SMI 1999f) included vegetation from an area on the South Spoils near the PCP (zone US1) and an area near the ore/protore stockpiles (zone US2) (Figure 4-5). A total of 25 herbaceous species were observed in these two sample areas and those having the greatest mean relative biomass (in descending order) were slender wheatgrass, white sweet-clover, muttongrass, diffuse knapweed, crested wheatgrass, and American vetch.

The 1999 vegetation composition surveys conducted by SMI (1999f) also included PIA vegetation from an area on the ridgetop above the pits (zone US3) and a reference area behind

the ridgetop (zone US4) (Figure 4-5). Nine woody species were observed in these two sample areas, with ponderosa pine, Douglas-fir, and common snowberry having the greatest relative canopy cover. A total of 27 herbaceous species were observed and those with the greatest mean relative biomass (in descending order) were slender wheatgrass, arrowleaf balsamroot, phlox, Idaho fescue, and bluejoint reedgrass.

Revegetation projects have occurred in several areas within the MA. The South Spoils area was revegetated in 1981, and revegetation test plots were established on Ore Stockpile #2 and Protore Stockpile #4 in 1994 and 1995 (SMI 1996). Observations made by ecologists during field sampling in 1999 and 2000 show the South Spoils area to have 80 to 90 percent grass (i.e., bluebunch wheatgrass) and litter cover with some small ponderosa pine trees that probably were planted. Revegetation of the stockpile test plots appeared to be successful, as judged by a relatively dense cover of bluebunch wheatgrass and ponderosa pine.

Associated Environmental Scientists and Engineers (AESE 2000) commented on behalf of the Spokane Tribe of Indians (STI) regarding the revegetation efforts:

- The success of the revegetation plots as well as the South Hill Dump (South Spoils) have not been verified. The South Hill Dump was initially revegetated with bluebunch, wheatgrass, and ponderosa pine. However, only a few ponderosa took hold. This led to a research project conducted by Zamora and Hart. They determined that the pine grew until roots penetrated through the topsoil to the waste rock. As a result, only a few ponderosa and not all grass species survived. Success has not been verified.

- As for the stockpile test plots, it has been noted that weeding of test plots occurred, which invalidates attempts to measure their success.

- Undesirable or noxious weed infestation is widespread across the STI reservation (STI 1996). In 1986, approximately 35 percent of the reservation was infested. Infestations occur in areas disturbed through forestry, fire, and development. The major problem is the knapweed complex that includes yellow star thistle, diffuse knapweed, spotted knapweed, and Russian knapweed. The knapweed complex dominates large portions of the MA. The Tribe has a program of weed control along road rights-of-way that includes application of herbicides (Picloram), biological controls, and management of use and replanting along remote roads.

Upland Wildlife

Tables B-1, B-3, and B-4 of the Ecological Characterization Report (URS 2000d) list the reptile and amphibian, mammal, and bird species, respectively, that may use the upland habitat. Those species are summarized below.

Amphibians found in ponderosa pine forests include the western toad, tiger salamander, long-toed salamander, and Pacific tree frog. The long-toed salamander was the most common amphibian reported in the Douglas-fir ecosystem, but the tiger salamander and Pacific tree frog also are present (Stinson and Gilbert 1985).

The most common small mammals in the upland habitats are the northern red-backed vole, masked shrew, dusky shrew, and deer mouse. The long-tailed vole, vagrant shrew, northern pocket gopher, yellow pine chipmunk, and red squirrel also are present. Large mammals that utilize the upland habitats include the coyote, mule deer, and white-tailed deer. Skunks and mountain lions utilize the Douglas-fir portions of the upland habitats.

Bird species commonly encountered in the ponderosa pine uplands include the red breasted nuthatch, pygmy nuthatch, and woodpeckers. Larger bird species found here include the common nighthawk, mourning dove, black-billed magpie, red-tailed hawk, and great horned owl. Seasonal visitors feeding on pine cones include flocks of evening grosbeak, red crossbill, and pine siskin. Species found near sources of water in upland areas include the black-chinned hummingbird, robin, house wren, white breasted nuthatch, and flycatcher species. In the Douglas-fir uplands, bird species commonly encountered include the red-breasted nuthatch, dark-eyed junco, mountain chickadee, black-capped chickadee, and gray jay. Woodpeckers, which are primary cavity-nesting species, include the hairy, three-toed, northern black-backed, and pileated woodpeckers. American goldfinch, red crossbill, and pygmy nuthatch may frequently be found in feeding flocks. Larger birds frequently seen are ruffed grouse and ravens.

A winter range mitigation project has been established around Blue Creek (STI 1996) with the goal of protecting and enhancing big game winter range and riparian shrub habitat (BPA, STI, and BIA 1994). The most important game species considered was the white-tailed deer. Recent survey data show that the mule deer to white-tailed deer ratio of the reservation is about 1:2. Rocky Mountain elk have been sighted occasionally near Blue Creek. In 1990, 49 elk were introduced into the Sand Creek Drainage. These elk currently use Sand Creek and parts of Blue Creek as winter range. The area offers good habitat for a variety of bird species and supports nesting populations of raptors including goshawk, American kestrel, Cooper's hawk, red-tailed hawk, osprey, golden eagle, and upland game birds such as ruffed grouse, Merriam's turkey, and California quail (BPA, STI, and BIA 1994).

The physically disturbed upland habitat in the MA is generally of poor quality for wildlife use. Anecdotal reports by field staff indicate that wildlife (e.g., deer, elk, moose, coyote, turkey, bear) have been observed in the study area and animal signs (i.e., scat and tracks) are commonly observed. Several bird species were observed on the MA (e.g., swifts, swallows, bluebirds). Pocket gopher diggings were observed in the remnant forest areas.

No surveys were found that specifically characterize wildlife of the PIA and Blue Creek corridor. However, anecdotal observations by field staff suggest that a variety of wildlife may use this upland habitat. Large wildlife likely to occur in this habitat include turkey, ruffed grouse, blue grouse, deer, moose, elk, black bear, coyote, bobcat, and mountain lion.

4.5.2 Riparian and Wetland Habitat

Riparian ecosystems are riverine floodplains and streambank ecosystems (Stinson and Gilbert 1985). The riparian zone is the transitional area between the aquatic riverine environment and the terrestrial upland environment. Wetlands occur within the zone of influence of surface water bodies (e.g., creeks, ponds, seeps) and/or groundwater and are typified by plant species associated with saturated soil conditions during the growing season (e.g., cattails, sedges, rushes).

Riparian and wetland habitats constitute less than 2 percent of the surface area of the reservation (Zamora 1983; Stinson and Gilbert 1985). However, they are the most biologically productive and important wildlife habitats, providing food, cover, and travel routes for a great diversity of wildlife groups (Stinson and Gilbert 1985). All riparian and wetland habitats have been identified as crucial resources on the reservation (STI 1996).

For the purposes of this ecological characterization, the riparian and wetland habitats are grouped together, and the banks and low-lying areas bordering the Western Drainage, Central Drainage, Eastern Drainage, and Blue Creek are considered to be riparian or wetland habitat. The National Wetlands Inventory (NWI) conducted by the U.S. Fish and Wildlife Service (USFWS) showed that palustrine forested wetlands were present in the Eastern Drainage (E&E 1998). During a 1999 site visit, palustrine forested wetlands were observed along the Eastern Drainage from the location of the NPDES outfall pond to the confluence of the Eastern Drainage with Blue Creek. Ecologists did not observe any distinct wetlands along Blue Creek downstream of the confluence with the Eastern Drainage during field sampling in 1999 and 2000. There were small areas of riparian vegetation bordering Blue Creek and ponded water behind existing beaver ponds.

Riparian and Wetland Plants

Plants associated with riparian and wetland habitats are identified in Table B-5 of the Ecological Characterization Report (URS 2000d). Small creeks on the reservation typically have low herbs

and deciduous shrubs and small trees beneath a canopy of conifers (Stinson and Gilbert 1985). Larger creeks have a greater cover of shrubs and small trees, and the canopy may be absent from the riparian zone. Characteristic species include quaking aspen, narrowleaf cottonwood, rock spirea, redstem ceanothus, alder, and various marsh grasses and sedges (STI 1996). In bottomland areas containing a high water table, water-tolerant grasses, sedges, rushes, and forbs may comprise the dominant vegetation (Stinson and Gilbert 1985). These may include reed canary grass, tufted hairgrass, redtop, sedge, lupine, and yarrow.

Vegetation along the Eastern Drainage was characterized as consisting predominantly of grasses, cattail, bulrush, and dogwood (E&E 1998). SMI conducted a plant survey of six stations in the Western, Central, and Eastern Drainages in 1999 (Figure 4-5) (SMI 1999f). Of the 18 woody species observed, those with the greatest mean relative canopy cover (in descending order) were red alder, Rocky Mountain maple, and black hawthorn. Of the 34 herbaceous species observed, those with the greatest mean relative biomass (in descending order) were muttongrass, slender wheatgrass, and stinging nettle.

Riparian habitat and its vegetation are confined to narrow bands along the streambanks of Blue Creek (Dames and Moore 1976). The riparian vegetation is a nearly impenetrable tangle of shrubs and herbs, dominated by the spiny, black hawthorn. Red-osier dogwood and mountain alder also are found, especially at permanently-flowing creek sites. A medium and low shrub layer of snowberry, pearhip rose, serviceberry, and creeping forms, such as wild strawberry and kinnikinnick, contribute to the dense creek bottom cover (Dames and Moore 1976).

SMI (1999f) surveyed riparian vegetation composition at six sampling locations on Blue Creek: three locations upstream from the confluence with the Eastern Drainage, and three locations downstream from the confluence. Twelve woody species were observed in the upstream locations and 17 in the downstream locations. The dominant perennial woody species (those having the greatest mean relative canopy cover) in the upstream and downstream locations were red alder, European bittersweet, and common snowberry. Mountain maple and Douglas-fir also were dominant in the downstream locations. Twenty-four herbaceous species were observed in the upper locations, and 17 species were observed in the downstream locations. Dominant herbaceous species (those having the greatest mean relative biomass) in the upstream locations were creeping bentgrass, spike bentgrass, and blue wildrye. Dominant herbaceous species in the downstream locations were stout horsetail, stinging nettle, and prickly lettuce.

Riparian and Wetland Wildlife

The riparian habitat provides an abundance of food, cover, and water for wildlife. Tables B-1 to B-4 of the Ecological Characterization Report (URS 2000d) identify wildlife species associated with the riparian and wetland habitats. There may be over 150 species on the reservation that use

riparian habitat, a majority of which may find it suitable for both feeding and reproduction (Stinson and Gilbert 1985).

Amphibians are commonly found near water, which they require for breeding. Greater numbers of insects and high vegetative productivity make riparian habitat good for insectivorous (shrews) and herbivorous (voles and mice) small mammals. The presence of fish and concentrations of amphibians, birds, and small mammals attract predators such as mink, raccoons, weasels, and coyotes. Creeks and associated riparian habitat are essential to beavers, which modify the habitat through the creation of ponds.

Survey data characterizing wildlife use of the riparian and wetland habitats along the drainages south of the MA and Blue Creek were not found. However, deer, rabbit, squirrel, ermine, flicker, turkey, and various unidentified small birds have been observed along the drainages (R.E. Nelson, personal communication). Also, bear, deer, elk, and turkey have been commonly observed by field staff. A beaver dam was noted near the Blue Creek surface water sampling station at the confluence with Oyachen Creek.

The most commonly encountered birds in field surveys of the riparian habitat were red crossbill, black-capped chickadee, red-breasted nuthatch, robin, northern flicker, cedar waxwing, and evening grosbeak (Stinson and Gilbert 1985). Six species of warbler and three species of woodpecker were encountered. Larger birds included the common nighthawk, mallard, and red-tailed hawk.

Numerous species such as the ruffed grouse, red-eyed vireo, cedar waxwing, American redstart, and northern waterthrush are mainly associated with shrubs or deciduous trees of riparian habitats (Hutto and Young 1999). This fact takes on special meaning when one considers that the riparian cover type makes up a disproportionately small percentage of the total cover type.

4.5.3 Riverine Habitat

Three principal PIA drainages flow south from the MA. The Central and Western Drainages extend from the base of the South Spoils and join the Eastern Drainage, which flows into Blue Creek. Riverine habitat can be found in all four streams. The Eastern Drainage receives outfall discharge water from the NPDES-permitted water treatment facility. All of these drainages ultimately join Blue Creek, which flows into Franklin D. Roosevelt Lake.

Creeks and associated riparian zones are important to wildlife and the ecological integrity of the forest and steppe ecosystems (Stinson and Gilbert 1985). All surface water bodies occurring on the reservation are considered crucial resources by the Tribe (STI 1996).

On October 25, 2001, several Biological Technical Assistance Group (BTAG) members, including EPA, URS, USFWS, and technical staff from the Tribal Resources Department, performed a reconnaissance of several PIA drainages. The group identified aquatic habitat in portions of the Northern Drainage (specifically, the middle branch Northern Drainage) and in the West Fork of the Northeastern Drainage (Figure 4-2). A culvert in the Lower East Drainage that is not passable by fish drains water from the combined Eastern, Western, and Central Drainages into Blue Creek. The outlet of the culvert is approximately 3 feet higher than Blue Creek, preventing upstream migration of fish into the Eastern Drainage. Therefore, the Eastern Drainage and its tributaries do not provide aquatic habitat for fish. However, amphibians and benthic macroinvertebrates, as well as terrestrial/riparian receptors, could be supported by the aquatic habitat found in portions of these drainages. The group confirmed that the Far West and Southwestern Drainages do not provide aquatic habitat. The group also agreed that the Middle and East forks of the Northeastern Drainage do not provide aquatic habitat and that the East Fork of the Northern Drainage does not drain the disturbed area (EPA 2001a).

Riverine Plants

No aquatic plant surveys have been conducted in the PIA drainages. The instream flora of most creeks is limited to filamentous algae firmly attached to the substrate, diatoms growing as crustose masses covered by mucus secretions, and mosses such as Fontinalis (Stinson and Gilbert 1985). The lower reaches of creeks with slow-moving water may contain shallow-water plant communities composed of floating-leaved vegetation such as water lilies, duckweed, and pondweeds such as Sagittaria, Najas, and Potamogeton. Emergent vegetation can occur in the shallowest water and includes sedges and cattails.

Riverine Biota

A series of benthic invertebrate and fish studies were performed by Plotnikoff et al. (1988), Cairns et al. (1988), Scholz et al. (1988), and Barber et al. (1988). All of these studies were performed before installation of the WTP and stream modifications (log and rock weirs) of Blue Creek in 1992. The results of these studies are presented below.

Plotnikoff et al. (1988) collected benthic macroinvertebrates on four separate dates in 1986 from one station on the Eastern Drainage immediately upstream from its confluence with Blue Creek. Cairns et al. (1988) collected benthic macroinvertebrates from the same station on five dates during 1987. Both found substantially lower mean densities of benthic invertebrates at this Eastern Drainage station as compared with any Blue Creek station or the Oyachen Creek reference site. Species richness also was less than half that observed in Blue Creek upstream of its confluence with the Eastern Drainage.

Plotnikoff et al. (1988) and Cairns et al. (1988) divided Blue Creek into three regions: a pre-impact zone upstream of the confluence of the Eastern Drainage with Blue Creek, an impact zone downstream of the Eastern Drainage but upstream of Oyachen Creek, and a recovery zone downstream of Oyachen Creek. Two sampling stations were located in each of the three regions. The mean benthic macroinvertebrate annual density and species richness in the three regions of Blue Creek in 1988, prior to construction of the WTP and Blue Creek stream channel modifications, are shown below.

Blue Creek Region	Mean Annual Density (organisms/m^2)	Species Richness (number of species)
Pre-Impact	6,318	40
Impact	2,582	35-40
Recovery Zone	8,270	35-40

Sources: Plotnikoff et al. (1988); Cairns et al. (1988)

Both resident and migratory rainbow trout occur in Blue Creek (Scholz et al. 1988). Rainbow trout were found to constitute 99 percent of the individuals sampled. Other fish species collected from Blue Creek include brown trout, cutthroat trout, Paiute sculpin, and largescale sucker. With respect to rainbow trout, Barber et al. (1988) concluded that trout spawning habitat and adult trout habitat were the limiting features for rainbow trout.

Barber et al. (1988) concluded from their in-stream flow incremental methodology (IFIM) study of fish habitat that habitat differences within Blue Creek could not account for the lower fish abundance observed by Scholz et al. (1988) in the portion of Blue Creek between its confluence with the Eastern Drainage and its confluence with Oyachen Creek. Scholz et al. (1988) concluded that the most likely cause of the observed reduction in fish abundance downstream of the Eastern Drainage was a change in water quality conditions within Blue Creek.

Fish species potentially present in Blue Creek are listed in Table B-2 of the Ecological Characterization Report (URS 2000d). No fish surveys have been found of the Western, Central, or Eastern Drainages. The lack of good fish passage to/from Blue Creek makes it unlikely that fish are present in the creek.

The Confederated Tribes of the Colville Reservation performed fish surveys of Blue Creek in various years during the 1990s. A summary of the data collected is presented in Lake Roosevelt Rainbow Trout Habitat/Passage Improvement Project – Annual Report January 1999 – December 1999 (Jones 2000). The latest data presented for Blue Creek are from 1996. Because rainbow trout were the focus of the trapping and electrofishing efforts, only limited information is presented for other species. Fish species other than rainbow trout anecdotally reported for Blue Creek in the 1990s include sculpins, brook trout, kokanee (a.k.a., sockeye salmon), and

suckers. Population estimates presented for rainbow trout in Jones (2000) may not be accurate because of sampling irregularities (B. Crossley, personal communication).

Many wildlife species associated with the upland and riparian habitats (see Tables B-1 to B-4 in the Ecological Characterization Report [URS 2000d]) also use the riverine habitat as a source of drinking water and food. Animals such as beaver and muskrat, waterfowl, and wading birds are obligatory users of aquatic habitats.

Wildlife access to the Eastern, Central, and Western Drainages is unrestricted. No site survey data were available to characterize wildlife that potentially use the riverine habitat. However, wildlife may visit the drainages to drink or forage. Many of the wildlife species that use the upland and riparian habitat of the PIA also may use the riverine habitat of the drainages. Blue Creek is an important Tribal resource and wildlife area.

4.5.4 Special-Status Species

Special-status species include federal- and state-listed species, game species, species with scientific interest, and species of particular cultural importance to the Tribe. The federal and state regulatory status of each species that potentially occurs within the project area is provided in Tables B-1 to B-5 of the Ecological Characterization Report (URS 2000d). These species are of special concern to the resource agencies and public because of limitations to their populations and/or habitats. Specific studies or surveys have not been conducted to assess the likelihood for these federal- and state-listed species to be present in the project area.

In 1996, the Tribe reported that the only federally-listed threatened or endangered species identified by the USFWS as occurring within the boundary of the reservation was the bald eagle (STI 1996). The bald eagle is known to over-winter along the boundary waters of the Spokane and Columbia rivers. In 2001, the USFWS (2001) reported five additional threatened or endangered species that may occur within the project area: gray wolf (also listed as state endangered), bull trout, Canada lynx, grizzly bear (also listed as state endangered), and Ute ladies'-tresses.

The USFWS (2001) also listed 25 plants and animals as species of concern: crenulate, stalked, and two-spiked moonwort; Columbia pebble snail; Columbia spotted frog; northern sagebrush lizard; black tern; Columbian sharp-tailed grouse; loggerhead shrike; northern goshawk; olive-sided flycatcher; western burrowing owl; California bighorn sheep; Pacific fisher; potholes meadow vole; wolverine; fringed, long-eared, long-legged, small-footed, and Yuma myotis and pale Townsend's big-eared bats; interior redband and westslope cutthroat trout; and California floater (mussel).

It was previously reported that four additional vertebrate species on the state-endangered species lists have geographic ranges overlapping the reservation: American white pelican, peregrine falcon, sandhill crane, and upland sandpiper (STI 1996). Other vertebrate species on the state-endangered species list that may be present in the project area include northern leopard frog, Oregon spotted frog, fisher, pygmy rabbit, and woodland caribou (URS 2000d).

Several species of fish, mammals, and birds are important game species and food sources for the Tribe, including white-tailed jackrabbit, mule deer, chukar, turkey, fisher, mink, blue grouse, wood duck, lake whitefish, rainbow trout, and walleye.

4.6 BACKGROUND EVALUATION

Evaluation of site background began by selecting background reference areas, developing DQOs, developing sample collection procedures, and selecting statistical procedures to analyze the data obtained. This process was presented in the QAPP and SAP. The approach to statistical analysis was presented in a separate technical memorandum (EPA 2002a). Existing reports on the Midnite Mine and surrounding area were reviewed to determine the quality of historic data and to help understand site conditions relative to background. This review was summarized in the Midnite Mine Focused Historical Data Assessment (EPA 2000a). The NURE report, which investigated the use of geochemical indicators in detecting uranium mineralization in the Midnite Trend, was reviewed and summarized in a separate technical memorandum (EPA 2001b).

The available information on the mine indicates a high degree of site disturbance and a lack of comprehensive pre-mining chemical concentration data sets. The lack of pre-mining information on site conditions precludes determining the actual pre-mining concentrations of likely contaminants for use in the RI/FS. Depending on the ore-forming processes at work, emplacement of ore bodies, like the uranium deposit at Midnite Mine, involves the introduction or mobilization of many different metals. Without being able to establish actual pre-mining site conditions, pre-mining background for the Midnite Mine can only be approximated using nearby reference areas with similar geology, mineralization, and topography.

Estimating site background using data gathered in the reference areas was a reasonable approach to approximate the natural, pre-mining conditions (background) at this site. Data collected in the Midnite Mine reference areas were sufficient to estimate background appropriate for use in the RI/FS.

Uncertainties in Determining Background

Prior to mining, the spatial distribution of naturally-occurring metals and radionuclides in surface water, groundwater, sediments, surface materials, plants, and air were not quantitatively assessed

at Midnite Mine or in downgradient environmental media. The RI/FS characterized the MA and PIA, as well as nearby areas EPA considers unaffected by mining and which have similar hydrogeologic and geochemical conditions. For remediation purposes, conditions in these background areas represent the range of conditions at and near Midnite Mine.

Background levels can be used to delineate the nature and extent of contamination, identify COPCs for a site, define exposure areas for risk assessment, and in some cases to estimate areas and cleanup levels for remediation. Estimates of background are of particular importance at mining sites, where the COCs were present prior to mining, but as a result of mining activities were exposed, mobilized, or concentrated at higher rates than those that occur under natural conditions. As with any study, sample data can only approximate the actual distribution of concentrations in site and background media. Where concentrations are naturally variable, the distribution of concentrations in the sample data may not encompass the true range of conditions.

To define areas potentially needing cleanup with a relatively high confidence, EPA compared site data to an upper statistical threshold of the data from the background areas. The comparison relied on a statistical approach intended to balance the chance of overestimating impacts (where an unaffected area appears affected) against the chance of underestimating impacts (where an affected area appears unaffected). Generally, however, near the edges of a contaminated area site conditions approach background conditions, increasing the uncertainty in comparing the two. EPA may have thus underestimated areas near Midnite Mine where concentrations of metals increased due to mining.

Selection of different areas to represent site background conditions, collection of additional or different samples in the area used, and use of different statistical thresholds for assessing changes in conditions caused by mining could result in different but similarly valid conclusions. As required by CERCLA, EPA is focusing on areas where, despite natural variability, the data demonstrate that mining impacts have occurred and that the associated risks to human health and the environment warrant response actions.

EPA reviewed data from the area around Midnite Mine to select background sample locations, which were identified in sampling and analysis plans. The data were evaluated statistically and EPA considers them reasonably representative of background conditions for remediation purposes. EPA used a sample-by-sample comparison between site data and background data to identify potentially impacted locations, applying knowledge of site characteristics, mining practices, and professional judgment in determining mining affected areas. This sample-by-sample approach was followed by a population comparison. Both comparisons demonstrate that the MA concentrations are markedly higher than background, while concentrations further from the source become increasingly harder to distinguish from those in nearby unaffected areas.

Background Indicator Parameters

The background characterization (and site characterization) was streamlined by using chemical indicator parameters for each medium. The indicator parameters were based on a statistical analysis and other criteria by which groups of analytes could be represented by a single indicator. Depending on the medium, 10 to 12 analytes were selected for characterizing the site.

This indicator parameter selection process was described in two technical memoranda entitled "Preliminary Background Limits, Midnite Mine RI/FS" (URS 2000e), and "Background Statistics for Midnite Mine RI/FS" (EPA 2002a) and is summarized by medium in the following chart. The technical memoranda present a detailed discussion of how issues such as non-detect values, confidence limits, and the process for selection of indicator parameters was addressed. The indicator parameter selection process identified a reduced set of analytes sufficient to identify mining impacts at the site. Use of the indicator parameters reduces the effort and cost of determining the nature and extent of site contamination. Consequently, the discussion of background in the RI is limited to the indicator parameters.

List of Indicator Analytes by Medium

Analyte	Surface Water	Sediment	Groundwater	Surface Material
Aluminum			◘	●
Arsenic				●
Antimony	◘		◘	
Cadmium	◘	●		●
Chromium	◘	●	◘	●
Cobalt		●	◘	
Copper				●
Iron			◘	
Lead		●		●
$Lead^{210}$				●
Manganese		●	◘	●
Nickel	◘	●	◘	
$Polonium^{210}$		●		
$Radium^{226}$	●	●		●
Selenium				●
$Uranium^{234}$			●	
$Uranium^{238}$	●	●		●
Vanadium	◘			
Zinc	◘		◘	●
Nitrate	●			
Sulfate	●	●	●	

Notes: ◘ = Analysis for dissolved analyte
● = Analysis for total analyte

The background data collected were used to estimate a background limit (BL) and a retest background limit (RBL). The methods for estimating the BLs and RBLs are presented in the technical memorandum "Background Statistics for the Midnite Mine RI/FS (EPA 2002a). Screening of site data using a combination of the BL and RBL reduced the potential of identifying an area of the site as exceeding background when it doesn't (false positive) or not exceeding background when it does. The comparison of the BLs and RBLs to site data is presented in Section 5. The comparisons are summarized as a series of "wagon wheel" map plots where each spoke of the wheel represents an indicator parameter (EPA 2002b). In addition to BLs and RBLs, Table 5-129 in Section 5 presents the concentration data for indicator parameters from samples collected in the background reference areas, MA, and PIA. Table 5-129 also identifies concentrations of indicator parameters that exceed the 95% upper tolerance limit (UTL) selected for use in the Human Health Risk Assessment.

Background plays a key role in risk evaluation, identification of COPCs, preliminary remediation goals, and determination of remedial action objectives. The remainder of this section reviews the background estimates and discusses how the data collected for each medium represent the likely pre-mining conditions in the MA and PIA. The discussion uses the estimated 95% UTL for making comparisons between groupings of the background data and data presented in the NURE report (Bendix 1981). Where warranted, the ratio of the geometric means was estimated to help in making comparisons.

4.6.1 Surface Materials Background

Surface material is the product of rock types present in the study area, which include meta-sedimentary rocks of the Togo Formation, granitic rocks of the Loon Lake Batholith, and glacial Lake Missoula terrace deposits along the shore of Lake Roosevelt. These rocks are described in Section 2 and discussed in detail in the NURE report (Bendix 1981), EPA's evaluation of the NURE data with respect to selection of background locations (EPA 2001b), and other geologic reports referenced in Section 2 of the RI.

Surface material, as defined for the site, consists of soil, haul roads, waste rock, ore, protore, pit backfill, rock outcrops, and the weathering products produced as rock breaks down over time. The weathering products generally consist of the larger rock fragments that collect on the sides and base of outcrops (colluvium) and the finer-grained material produced as the rock outcrops or fragments continue to weather, breaking down and mixing with organic materials to produce soils.

The NURE investigators conducted three soil surveys that evaluated geochemical signatures or patterns of metals in soils that were most likely to indicate the presence of uranium ore deposits along the Midnite Trend. The study used the mean plus 2 to 3 standard deviations to identify anomalous concentrations of metals. In most cases, the anomalies identified as exceeding the

NURE thresholds were naturally occurring and not indicative of mining impacts, except as noted near the Midnite Mine in the NURE report.

The detailed (161 samples) and intermediate (41 samples) soil surveys were smaller and centered over an area of contact dominated rock where subsurface uranium mineralization is present. The third survey was sub-regional, encompassing a broader area containing mostly contact dominated rock (328 samples). The NURE samples were sieved using a 100 mesh screen that removed the larger material. Table 4-11 summarizes NURE data, where available, for the RI indicator parameters.

The NURE survey data were compiled in series of metal anomaly maps (SYMAPs). To create the maps, sample data were segregated based on underlying lithology (or rock type), and the mean, standard deviation, and Z-score (the number of standard deviations a concentration is from its mean) were calculated. The Z-scores were plotted on the SYMAPs with areas identified where Z-scores exceeded the NURE anomalous threshold. As stated in the NURE report, "Although the overall geochemistry of the different lithologies in the Spokane project area do not show a significant contrast, minor differences were observed between the raw and normalized SYMAPs of the subregional survey" (Bendix 1981). The SYMAPS provided a uniform approach to interpretation of the metal anomalies.

The NURE investigators found it useful when conducting their study to sample and evaluate conditions in the region (which includes the Midnite Mine) using geographic areas based on mineralization and rock type. These are referred to as the:

- Metasediment dominated area
- Pluton dominated area
- Contact dominated area

The rock types present in each NURE area are shown on Figure 4-6. The following reason was given in the NURE report for using the division.

> "…… due to the differences between the background element contents of the granitic pluton, the metasediments, and the contact rocks; this is necessary in the recognition of geochemical anomalies. Furthermore, streams flowing through these areas of different rock lithologies should contain different chemistry and element background, typical of the material they are draining." (Bendix 1981, p 68)

The NURE areas are useful for the RI because the MA (Figure 4-6) and most of the PIA (above the confluence of Blue Creek and the Southwestern Drainage) are within the contact dominated area (Figure 4-6). The remainder of the PIA falls within the NURE area of less mineralized

pluton dominated rock. This grouping helps differentiate areas of the site where mineralization along the Midnite Trend is more likely to have altered and/or mineralized the rocks present.

Two reference areas were identified for use in evaluating surface material background. The areas are referred to as Background Area A (contact dominated) and Background Area B (pluton dominated).

4.6.1.1 Selection of Surface Material Background Areas Sampled

Background surface material samples were collected in Background Areas A and B. As discussed in the QAPP, prior to mining, surface conditions in the MA and PIA were likely to have been similar to Background Areas A and B (URS 2000a).

Background Area A (Contact Dominated Area Containing a Mixture of Togo and Granitic Rocks)

The northeastern slope of Spokane Mountain (Figure 2-1) was selected as the first surface materials reference area. Its relative proximity to Midnite Mine (about 4,400 feet northeast), presence of uranium ore deposits at depth, and similarity of rock types (a mixture of granite and Togo) and geologic structure was the basis of the selection. Geologic and geochemical information available for making this selection included work conducted for the NURE study and geologic investigations of the mine and surrounding area, as discussed in Section 2. These reports indicated the presence of an un-mined uranium deposit north of Spokane Mountain hosted within and along the granite-Togo contact and documented the similarity between the Midnite Mine and the Spokane Mountain area. Background Area A lies within the contact dominated area described in the NURE report (Bendix 1981).

Background Area B (Pluton Dominated Area Containing Granite Rock)

An area located approximately 8,700 feet east-northeast of the MA (Figure 4-6) was selected as the second surface materials reference area. Its lack of identified uranium mineralization and presence of granitic rock were the bases for its selection. Background Area B lies within the pluton dominated area described in the NURE report (Bendix 1981).

4.6.1.2 Surface and Subsurface Sample Collection

Samples collected in the 0–5 cm interval were assigned a matrix type of “SS” while samples collected in the 5–20 cm interval were assigned an “SB” prefix. As discussed in the SAP, each composite sample was composed of five individual samples located at the center and each corner of a square with a 140-foot diagonal. Creating 20 composite samples in a reference area required collecting and combining 100 discrete samples.

A total of twenty composite samples were collected from a depth of 0–5 cm in each reference area. Sampling locations in each reference area were randomly selected. At eight of the locations in each reference area, composite samples were collected from a depth of 5–20 cm. Samples collected were screened using a 10-mesh sieve (0.065 inch or 1.65 millimeters) to remove coarse sand and gravel. Sample locations are shown on Figure 4-6.

4.6.1.3 Physical Conditions of Background Areas A and B

Differences in weathering of the rock types was evident from the coarseness of rock debris encountered in Area A (Togo and granite) versus the finer-grained material appearing more uniform in its composition and weathering in Area B (granite). While the Togo Formation generally appears more resistant to weathering, it can weather to finer-grained material that is likely to erode and eventually contribute to sediment load. Appendix A provides more detail on the sampling effort.

Background Area A (Contact Dominated)

Background Area A appeared undisturbed and not visibly impacted by mining. The area sampled on the northeast slope of Spokane Mountain was very steep with moderate to heavy vegetation. Generally, the material sampled consisted of organic, silty sand, with some gravel and minor clay. Colluvium present consisted of larger rock fragments several inches in diameter.

Background Area B (Pluton Dominated)

Background Area B, located about one mile east of the MA, appeared undisturbed (except for logging activity) and not visibly impacted by mining. The area had less topographic relief than Area A and limited forest cover. Surface material was gravelly, lacking the larger rock fragments observed in Background Area A. Material sampled was characterized as organic, silty sand and clay, with minor amounts of gravel and thin seams of sand.

4.6.1.4 Data Analysis

The Background Statistics for Midnite Mine RI/FS technical memorandum presents the results of the surface materials statistical background analysis (EPA 2002a). As described in the technical memorandum, the data were combined for statistical analysis. Composite sample data from the 0–5 cm depth interval from Background Areas A and B were pooled for analysis, and composite data from the 5–20 cm depth interval from Areas A and B were pooled for analysis.

The results of statistical analysis and the BL and RBL for each indicator parameter are listed in Table 4-12. The sample statistics generated included the mean, variance, coefficient of variation, and type of distribution (normal, log-normal, or non-parametric) (Table 4-11). The statistical

results for the indicator parameters, along with other relevant information, are summarized in the background technical memorandum (EPA 2002a).

Data exploration using an analysis of variation (ANOVA) was performed to evaluate whether the SS (0–5 cm) and SB (5–20 cm) data were statistically different. Testing indicated that the SS and SB data were statistically different and separate background statistics were estimated. The analysis further indicated that there was sufficient correlation between the co-located SS and SB samples to not allow pooling of the SS and SB data. The reasonableness of the background data was evaluated by performing supplemental analysis and comparing the data to the NURE report.

4.6.1.5 Supplemental Analysis of Surface Materials Data

The following two factors were evaluated to assess the effects of combining rock types from different areas in estimating the RI/FS background:

- Reasonableness of using pooled surface material data from Background Areas A and B for BL and RBL statistical estimates
- Reasonableness of using the 95% UTL for an upper statistical estimate of the background distribution as used in the Human Health Risk Assessment

To compare differences between the pooled and un-pooled data results, the supplemental analysis used statistical estimates of the 95% UTL, mean, and ratio of the geometric means from the 0–5 cm depth interval data from Area A and from Area B (Table 4-11). For comparison, Table 4-11 also includes anomalous thresholds (mean plus 2 standard deviations) used in the NURE study (Bendix 1981). As shown in the table, the NURE threshold values are based on a substantial number of samples.

The ratio of the geometric mean was used as an alternate approach to evaluating differences in the “average” metal concentrations present in Area A (contact dominated) and Area B (pluton dominated). The ratio of the geometric means provides a quantitative measure of the differences. The ratio represents the relative difference between two values (estimated geometric mean concentrations), i.e., “value x is 2 times greater than value y,” thus allowing a direct comparison between the estimated ratios of the geometric means for indicator parameters.

The basis of estimating the ratio of the geometric means is described in Appendix E. The ratio of geometric means is interpreted in much the same way as a simple arithmetic ratio, with the difference that both the low (5%) and high (95%) estimated values must be above or below a ratio of 1 (at an alpha = 0.1) for there to be a statistically significant difference. The ratios are interpreted as follows:

- When the estimated ratios at the 5% and 95% confidence limits are both less than 1, the geometric mean concentration of an indicator parameter in Area A (contact dominated) is higher

- When the estimated ratios at the 5% and 95% confidence limits are both greater than 1, the geometric mean concentration of an indicator parameter in Area B (pluton dominated) is higher

- If 1 falls between the estimated ratios at the 5% and 95% confidence limits, there is no statistically significant difference between the geometric mean concentrations of an indicator parameter in Area A and Area B

Findings of the NURE Report

The NURE study identifies anomalous metal concentrations in both contact and pluton dominated areas. The concentrations exceeded what NURE considered to be in the upper range of the natural background (the mean metal concentration plus 2 to 3 times the standard deviations). The anomalies identified in the NURE report were undisturbed and naturally occurring. The RI/FS treats these anomalous areas, if undisturbed, as part of the naturally occurring surface material natural background.

As an example, uranium anomalies were identified in both contact dominated rock and pluton dominated rock. The anomalies identified in plutonic rocks are located about 4,000 to 10,000 feet east and southeast of the MA, including portions of Oyachen Creek. While anomalies in the contact dominated area were generally viewed as potentially indicating uranium ore, the anomalies in the pluton dominated area were not considered a good indicator because this area does not fit the geologic model for uranium deposits in the Midnite Trend.

Arsenic, copper, lead, manganese, and uranium are the indicator parameters that were focused on in the NURE report. A review of the SYMAPs indicates that:

- Arsenic anomalies are prevalent in rocks of the Togo

- Copper, lead, manganese, and uranium show elevated concentrations and anomalous areas in both the Togo Formation and granitic rocks

Use of RI Pooled Surface Material Data

Comparing metal concentrations found in Area A (contact dominated) and Area B (pluton dominated) provides a method of evaluating whether substantial differences exist between the two areas. Table 4-11 shows that with respect to the two areas:

- The geometric means for aluminum, arsenic, cadmium, chromium, copper, and lead are higher in the contact dominated rocks. The geometric mean of uranium^{238} is higher in pluton dominated rocks. The ratios of the geometric means for manganese, radium^{226}, selenium, and zinc do not show a statistically significant difference between the two areas.

- Uranium and arsenic had the greatest differences in metal concentrations between contact dominated and pluton dominated rocks. The mean concentration of uranium in granite dominated rocks was about 1 to 2 times greater than in contact dominated rocks. The mean concentration of arsenic in contact dominated rocks was about 12 to 33 times higher than in pluton dominated rocks.

- Arsenic and uranium have the highest coefficients of variation (CVs) with the remaining indicator parameters showing low CVs (this measure represents the standard deviation as a proportion of the mean concentration).

- Comparing the pooled SS (0–5 cm samples) data to the pooled SB (5–20 cm samples) data does not indicate a consistent pattern of metal enrichment.

Conclusions for Using Pooling Data from Area A and Area B

The differences observed in metal concentrations between Area A (contact dominated) and Area B (pluton dominated) were expected and reflect the general metallization and greater range of values of the contact dominated rocks in proximity to uranium ore deposits within the Midnite Trend. Regarding the effects of pooling of the data, the following conclusions are made:

- The RI background reference areas contained the predominant rock types observed at the site. Based on observations during sampling activity, the physical conditions in the areas selected for background sample collection are likely to have been generally similar to the physical conditions found at the site prior to mining.

- The differences observed in calculated means and UTLs for the contact dominated versus pluton dominated rock are moderated by pooling the data. The 95% UTLs calculated from pooled data appear more consistent with the NURE background estimates.

- A consistent pattern of elevated mean metal concentrations in the 0–5 cm samples compared to the 5–20 cm samples collected in the background reference areas was not apparent in the data. The presence of such a pattern would be a potential

indicator that the reference areas were impacted by mining-related wind blown dust.

- The detailed NURE soil survey was conducted over un-mined uranium mineralization in the contact dominated rock northeast of Spokane Mountain, a setting similar to the Midnite Mine ore body, but deeper in the mineralized zone. The NURE survey identified the presence of individual metal anomalies of varying areal extent. The process of ore emplacement at the site is likely to have resulted in a range of metal concentrations and geographic variability similar to the results found in the NURE survey. The areas selected for surface materials background include a mixture of contact dominated rock and pluton dominated rock which, when pooled, provide a reasonable estimate of the likely range of metal concentrations and geographic variability for background on the site.

- Arsenic in the SS sample (0–5 cm) was found to be much higher in the contact dominated rocks. Consequently, it may be of limited value as an indicator for determination of nature and extent of mining impacts on surface materials in the MA and PIA. The screening of site data to evaluate the extent of mining impacts, however, relies on 12 separate indicator parameters, which includes arsenic. Thus, it is unlikely that a high screening value for 1 of the 12 surface material indicator parameters will alter conclusions as to the extent of mining impacts.

Use of the 95% UTL

The 95% UTL is used for screening data for the Human Health Risk Assessment. Comparing the 95% UTL values for pooled and un-pooled data and the NURE thresholds the following conclusions are made:

- Where data are available, the 95% UTLs for SS pooled data compare well with the NURE sub-regional soil threshold for anomalous metal concentrations, except for arsenic, selenium, and uranium (the maximum concentrations detected were used instead of the 95% UTL because of the non-parametric distribution).

- The 95% UTLs for arsenic and uranium estimated from the RI pooled data may provide high estimates of background for the pluton dominated rock. This is due in part to using the maximum concentration to represent the 95% upper confidence limit (UCL) when the sample distribution is non-parametric.

4.6.2 Sediment Screening Background

The volume and grain size of sediment in a stream depends on the erosion of soils in the watershed and their transport to and within the stream channel system. The amount of sediment moving in a stream at a given time is a function of a complicated set of active and passive forces acting on the land surface of the watershed and throughout the channel system upstream from a point of interest in the channel (USGS 1970). At a single location and point in time, sediment in a stream system reflects the cumulative processes at work (running water being the most important) and the physical and chemical characteristics of the sediment, water, and underlying lithology.

Sediments conveyed by stream channels in the MA, PIA, and surrounding areas are produced from both pluton and contact dominated areas. The pluton dominated areas, as characterized in the NURE report, generally have a low level of enrichment in uranium (which may have been the source material for uranium deposits). The contact dominated areas, however, contain the uranium ore bodies that were mined at the Midnite Mine. The contact dominated areas generally have anomalous metals present in the broad areas of altered rock and soil that were affected by the emplacement of uranium deposits (halo effects). A reasonable estimate of pre-mining sediment background will separate metal inputs from both the contact and pluton dominated areas, including the weathering of near-surface uranium deposits in the MA, from the mining-related impacts that accelerated the release of metals to sediments in the stream system.

The approach used in the RI/FS to develop sediment background values included review of available studies of the site, including historic sample data. As part of the RI, 22 background sediment sample locations were selected, and both grab and composite samples were collected. The description of the DQOs, sampling and analytical procedures, and statistical approaches are contained in the documents referenced in the surface material discussion in Section 4.6.1.

This section discusses the background estimates made using the RI/FS sample data and evaluates how those estimates reflect the hydrologic and geologic conditions at the site. The RI background data was evaluated by comparing it to data in the NURE report. The NURE study investigated geochemical signatures or patterns of metals in sediments that were most likely to indicate the presence of uranium ore deposits along the Midnite Trend. The study used the mean plus 1 to 2 standard deviations to identify anomalous concentrations of metals. Sediments in streams tend to mix different sediment inputs and consequently have less variability than soils, which is the likely reason the NURE threshold used was lower than the soil threshold. In most cases, the anomalies identified as exceeding the NURE thresholds were naturally occurring and not indicative of mining impacts, except as noted near the Midnite Mine in the NURE report.

4.6.2.1 Physical Site Conditions and Sediment Contribution

The majority of potentially impacted sediments are located in the Blue Creek watershed (Figure 4-7), including the mine drainages and Blue Creek channel. A small area west of the MA also may contain impacted sediments. As shown on Figure 4-7, the Blue Creek watershed encompasses approximately 5,600 acres. Of that acreage, approximately 2,070 acres are identified as part of the NURE contact dominated area and 3,520 acres are identified as part of the NURE pluton dominated area (the locations of NURE areas for contact and pluton dominated rocks were visually estimated using the NURE report maps and transferred to RI project maps). Of the contact dominated rock, approximately 861 acres are mapped as Togo rock and 1,210 acres mapped as granitic rocks. Of the pluton dominated rock, 3,520 acres are mapped as granitic rock (i.e., all of the pluton dominated rock is granitic).

As shown on Figure 4-7, drainages in the PIA that convey sediment from the MA to Blue Creek are located in the area of contact dominated rock. This distinction is important given the metallization associated with ore emplacement that affected both the Togo and granitic rocks in the contact dominated area. Topographic gradients in these drainages tend to be steep. From the northern boundary of the MA to the southern boundary of the MA at the Southwest Creek, the gradient is approximately 746 feet/mile (straight line distance). The Southwestern Drainage between the MA and Blue Creek has a gradient of 422 feet/river mile.

Upper Blue Creek, from the Blue Creek watershed boundary to the Eastern Drainage, is 14,862 feet long with a gradient of 142 feet/river mile. Middle Blue Creek from the confluence with the Eastern Drainage to the confluence with Oyachen Creek is approximately 11,158 feet long with a gradient of 265 feet/river mile. Upper and Middle Blue Creek are underlain by granitic rock. The topographic gradient in Blue Creek is less than in the MA and the immediate down-gradient drainages. Limited development of flood plain deposits associated with the stream channel and sediment transport reflects the steepness in gradient and, to some extent, the effects of underlying bedrock on channel geometry. The sediments present in the lower reach of Upper Blue Creek and all of Middle Blue Creek were generated from a drainage area consisting of both contact dominated and pluton dominated rocks with surface areas of 2,071 acres and 3,522 acres, respectively (Figure 4-6).

The reach of Blue Creek below the confluence with Oyachen Creek (Lower Blue Creek) is approximately 7,100 feet long with a gradient of 149 feet/river mile. Lower Blue Creek is underlain by granitic rock and glacial deposits and receives sediment inputs from Middle Blue Creek, Oyachen Creek, and areas adjacent to Lower Blue Creek. As with Middle Blue Creek, the reach is narrow with limited flood plain development. Lower Blue Creek terminates at Lake Roosevelt. Where the creek discharges to the lake, there is a widening of the flood plain and increased sediment deposition forming deltaic deposits that extend into the lake.

4.6.2.2 Background Sediment Sample Locations

Areas that are geologically similar to the MA and unaffected by mine operations were identified in the QAPP as Sand Creek and its tributaries, and areas east and west of the MA and PIA. Figure 4-7 shows the background sediment sample locations. Because the existing data downstream of the MA were from both discrete and composite sampling, both types of samples were collected at each RI background sampling location.

The Sand Creek watershed is almost entirely located in the area of contact dominated rock. It is underlain by a combination of Togo and granitic rocks. Sand Creek drains several areas, including portions of Spokane Mountain containing buried uranium ore deposits and the headwater area of Sand Creek, which lacks ore deposits. Tributaries have gradients similar to the drainages immediately below the MA. Eighteen sediment samples were collected in the Sand Creek watershed. As shown on Figure 4-7, eight samples were collected in areas underlain by granitic rock and ten samples were collected in areas underlain by Togo rock. In addition to the Sand Creek watershed, four background sediment samples were collected in the granitic rocks at locations east and west of the PIA.

A total of 22 background sediment samples were collected. Of the 22 samples, 18 samples are in the contact dominated area (which includes both Togo and granitic rocks) and four samples are in the pluton dominated area.

4.6.2.3 Supplemental Analysis of Sediment Background Sample Data

A major consideration in establishing sediment background is how the data collected represent sediment conditions in different areas of the site. The Sand Creek watershed and drainages adjacent to the MA collect runoff and sediments from a mixture of granite and Togo rock in the contact dominated area, whereas Middle and Lower Blue Creek collect runoff and sediment from both contact dominated rock and pluton dominated rock (granite and glacial deposits).

This section provides supplemental information on how well the background sediment data reasonably approximate pre-mining background in the MA and PIA. Comparisons are made between RI background data separated by rock type and the NURE data. The comparisons use the composite sample data (which are assumed to have less variability), and the mean, 95% UTL, and the geometric mean, as appropriate. Because the background data were collected in the contact dominated area, this supplemental evaluation focuses on Blue Creek, which is mostly in the pluton (underlain by granite) dominated area.

4.6.2.4 Contact Dominated Rock, Mean Concentrations and Variability

The majority of background sediment data were collected in the contact dominated area. Four samples collected in the pluton dominated area are included with the contact dominated samples and are expected to have a negligible effect on the evaluation. At each background sampling location both grab and composite samples were collected. Table 4-13 and Figures 4-8, 4-9, and 4-10 summarize the results of testing the variability of selected subgroups. To evaluate whether separate backgrounds are needed for the Togo and granitic rock, the data were grouped as follows:

- Grab sample (ES) data separated by rock type: granite or Togo
- Composite sample (CS) data separated by rock type: granite or Togo
- Grab sample (ES) data that pools both the granite and Togo rock types
- Composite sample (CS) data that pools both the granite and Togo rock types

Table 4-11 presents the mean concentrations and corresponding standard deviations and standard errors for composite sediment sample data grouped by the underlying rock type (granite or Togo). The data indicate that arsenic, chromium, cobalt, and nickel have moderately higher mean concentrations in the Togo Formation, while uranium has a moderately higher mean concentration in the granite. Mean concentrations for cadmium, chromium, lead, manganese, polonium^{210}, radium, and sulfate fall within the range of the standard errors and are concluded to be "not different."

The results of statistical testing in Table 4-14 show that, except for arsenic, samples grouped by rock type have similar variability (i.e., the null hypothesis that the groupings have the same variability cannot be rejected). Thus to increase the statistical power of the comparison to site data it is acceptable to pool the data, thereby increasing the sample number. The pooled background data represent a reasonable "blending" of both rock types.

4.6.2.5 Blue Creek Sediment

According to the NURE report, the eastern and southwestern portions of the Blue Creek watershed fall within the pluton dominated area (Figure 4-7). The majority of the RI background sediment sampling locations are in the Sand Creek watershed, which is mostly in the contact dominated area. RI sediment background data were evaluated to assess whether they provide a reasonable estimate of background for the pluton dominated areas, specifically Middle and Lower Blue Creek.

Figure 4-7 shows that weathering products from both pluton and contact dominated areas are sources of sediments entering Middle Blue Creek. Data are not available to estimate the relative volumes of the sediment contributed by each source. However, the geologic literature for the

area provides some discussion of general weathering characteristics for rock types in the area, which play a role in sediment generation.

The granitic rock tends to weather deeply, producing fine-grained soils that contribute silt and clay to drainage channels and streams. Along the contact with granitic rock the Togo tends to form higher ridges, indicating more resistance to weathering than observed in the granite. However, the pronounced drainage patterns observed on topographic mapping of the area show that surface weathering and transport of sediment occurred prior to mining. The combination of faults and fractures along the Midnite Trend and hydrothermal alteration weakened the rock structure and likely favored the formation of drainage channels (erosion) and increased soil and sediment production. The steep pre-mining topography in the contact dominated area also favored erosion and transport of sediment. Thus, under pre-mining conditions it is likely that both the granite and Togo Formation in the MA and PIA were contributing sediment to Middle Blue Creek.

Sediment contributions from the different source areas are important in evaluating a reasonable pre-mining background. Although Middle Blue Creek overlays granitic rock and receives weathering products from the pluton dominated area, it also received sediment contributions from the metal-enriched contact dominated area prior to mining.

Establishing sediment background requires simplifying assumptions. For the RI/FS, the primary assumption is Sand Creek represents a reasonable analog to Blue Creek, and that it is appropriate to consider the weathering products from various types of rocks in the Togo Formation and granitic rocks as a single mixture of sediment in the drainages.

Although the proportions may be different, all of the rock types, rock alteration types, and surficial deposits present in the PIA are reflected in the drainage area for Sand Creek, except for the glacial deposits (Lake Missoula flood sediments) located in the lower part of the Blue Creek drainage area. While not identical, the Sand Creek system presents multiple sediment inputs from both mineralized and non-mineralized areas and from granitic and Togo rocks. The limitation of using the Sand Creek stream system is the lack of sediment input from a strictly pluton dominated area.

Applicability of Sand Creek Background Data to Middle Blue Creek

To further evaluate whether the Sand Creek data are a reasonable approximation of the pre-mining sediments in Middle Blue Creek, the NURE sediment mean concentrations and anomalous thresholds were compared to the RI composite sediment sample means and 95% UCLs, respectively. Table 4-14 presents summary statistics for RI background sediment data and corresponding NURE data where available. Comparing the NURE pluton dominated

sediment data to the RI background sediment data (collected over granitic rocks in the contact dominated area) shows that:

- There is no statistical difference between cobalt and uranium mean sediment concentrations (means fall within the range of standard errors).
- The mean sediment concentrations of arsenic and nickel are slightly higher in the pluton dominated area, while molybdenum is slightly lower in the pluton dominated area.
- The cobalt and nickel 95% UTLs for the RI data (composite sample granite) are reasonably close to the corresponding NURE pluton dominated thresholds (mean plus two standard deviations). Arsenic and uranium are higher than the NURE thresholds and molybdenum is not compared because of a low sample count (four).
- The 95% UTLs for the composite sediment data (Togo and granitic rocks) and the NURE threshold for contact dominated rock shows that cobalt and nickel are slightly higher and arsenic and uranium are significantly higher in the composite sediment data.

Conclusions Regarding RI Background Applied to Middle Blue Creek

The mean metal concentrations (95% UCL) calculated from the RI background data compare reasonably well with the NURE pluton dominated thresholds. While arsenic and uranium were higher than NURE estimates, the differences do not warrant development of a separate sediment background for Middle Blue Creek for the purposes of the RI/FS.

The variability in the sampling data affects statistical estimates such as the 95% UTL. When a high confidence level (i.e. 95%) is used to estimate a UTL using data with a high degree of variability like arsenic, the resulting estimate will need a sufficiently high value to include coverage of the likely range of values. As discussed earlier, arsenic is one of several indicators used to determine potential site impacts.

Applicability of RI Background to Lower Blue Creek

The beds and banks of Lower Blue Creek are composed of, or underlain by, granite and glacial deposits (Figure 4-7). The NURE report does not include information on glacial material in Lower Blue Creek, so a comparison using NURE data, as done for Middle Blue Creek, was not possible. However, a comparison was possible between Lower Blue Creek tributary data; Lower Blue Creek channel data, and RI background sediment data.

To make these comparisons, confidence limits on the ratio of the geometric means of the concentrations were estimated, as was done for surface materials. The geometric means, which assume a lognormal distribution, provide a more conservative estimate of the sample mean. The Lower Blue Creek tributary data, while limited in number, should indicate metal concentrations in sediment contributed from the granitic and glacial material present in Lower Blue Creek. For the analysis, seven tributary samples and five Lower Blue Creek Channel samples were used. Not all samples were analyzed for polonium^{210} and sulfate.

Table 4-15 presents the geometric means and interpretation of the ratios. The interpretation uses the value of 1 as the criterion for statistical significance (at an alpha = 0.1), as discussed in the surface material section. The following observations are made about the confidence limits on the ratios of the geometric means presented in Table 4-15:

- Arsenic, chromium, cobalt, and manganese do not have statistically significant differences in concentrations when comparing Lower Blue Creek tributaries, Lower Blue Creek channel, and RI background samples from Sand Creek

- The concentrations of cadmium, polonium^{210}, radium^{226}, sulfate, and uranium^{238} in the Lower Blue Creek tributaries are lower than the RI background data

- Except for zinc, there is no statistically significant difference for the indicator parameters between the Lower Blue Creek channel concentrations and the RI background concentrations

- Zinc in the Lower Blue Creek channel is higher than the RI background, but there is no statistically significant difference between the tributary concentrations and the channel

In addition to evaluating the confidence limits on the geometric means, the average of the geometric means (50%) for the indicator parameters was used to compare the Lower Blue Creek tributaries and the Lower Blue Creek channel to the RI background. Sulfate, the only non-metal indicator parameter, was excluded in this comparison. The averages of the geometric means for the indicator parameters in Table 4-15 indicate that:

- The Lower Blue Creek tributaries are about 76% of the RI background geometric mean (about equal)

- The Lower Blue Creek channel is about 86% of the RI background geometric mean (about equal)

- The Lower Blue Creek channel is about 106% of the Lower Blue Creek tributaries geometric mean (about equal)

The evaluation of Lower Blue Creek data indicates that pre-mining sediment contaminant concentrations are likely to be lower than the RI Sand Creek background data. The observed differences in the geometric means were estimated from small data sets, which inherently have a higher level of uncertainty. However, the data do not indicate that there is a significant difference between the Lower Blue Creek tributaries and the Lower Blue Creek channel sediments (excluding sulfate). So it appears that current metal concentrations in the Lower Blue Creek channel are very similar to tributary channel sediments that have not been impacted by mining.

4.6.2.6 Conclusions Regarding Applicability of RI Background Sediment Data

Based on the supplemental evaluation of the data, the RI background data obtained for sediment are a reasonable and appropriate approximation for pre-mining concentrations of indicator parameters in sediments within the contact dominated areas (such as the three mine drainages directly south of the MA). The BLs and RBLs for sediment are summarized in Table 4-12.

When applied to evaluation of mining impacts in sediments underlain by plutonic rocks, the background values are less conservative. However, based on the supplemental analysis, the RI background sediment data can be used to assess mining impacts in Middle and Lower Blue Creek. In Middle Blue Creek pre-mining weathering of contact dominated rocks in the PIA and MA is likely to have contributed significant sediments to Middle Blue Creek. The use of a purely pluton dominated background value is not appropriate for screening pre-mining sediment inputs to Middle Blue Creek.

In Lower Blue Creek, sediment concentrations are close to the RI background concentrations and Lower Blue Creek tributary concentrations, indicating that a clear pattern of mining-related sediment impact is not present. Additional characterization of Middle and Lower Blue Creek may result in refinement of the understanding of metal transport, deposition and the range of background metal concentrations.

4.6.3 Groundwater and Surface Water Background

For the purposes of the RI, the Sand Creek watershed was selected as a reasonable reference area, or analog, for estimating groundwater and surface water background concentrations. Groundwater collected from zones of uranium mineralization north of Spokane Mountain combined with groundwater collected from zones without mineralization provide the analog for the pre-mining groundwater conditions at the site. Both the alluvial and bedrock aquifers were

sampled. Surface water sampling locations were selected to cover a range of geologic conditions similar to those found on the site.

The concentrations of metals in groundwater samples from wells drilled in bedrock and from wells drilled in alluvium and weathered rock were not found to be significantly different, as reported in the background statistical technical memorandum (EPA 2002a). Concentrations of metals in groundwater samples from more and less mineralized areas were not significantly different.

The following sections summarize the collection and analysis of background data and further evaluate the use of the data relative to the contact dominated and pluton dominated areas of the site.

4.6.3.1 Groundwater

Twenty background RI wells were installed and sampled in the area of Spokane Mountain (Figure 4-11) where subsurface uranium deposits are present, and in areas reported to have no secondary mineralization (i.e., without hydrothermal mineralization associated with the Midnite Trend). As shown on Figure 4-11, the majority of background wells are located in the NURE-defined contact dominated area, which includes Sand Creek.

However, the background alluvial groundwater data populations may contain substantially different constituent concentrations than that of the background bedrock groundwater ("strata effects"). Also, seasonal differences may exist for some parameters.

To address the issue of strata effects (constituent concentrations in alluvial wells being very different than in bedrock wells), wells were completed in both the bedrock and alluvium. To address potential seasonal variability, groundwater data at each background well was collected three times during a year. Two sets of samples were collected in the fall (1999 and 2000), and one set of samples was collected in the spring (2000).

Statistical Testing of Groundwater Data

The Students t-test (which assumes data are normal or lognormal) and the Wilcoxon Rank Sum test (a nonparametric approach) are used in the evaluation of strata effects (EPA 2002a). A nonparametric method is valid even when the background data do not follow a specific probability distribution (such as normal or lognormal). Where data are normally or lognormally distributed, the parametric Student's t-test is used to test for strata effects; otherwise the nonparametric test is used.

EPA-recommended methods for comparison of multiple populations are used to evaluate seasonal effects (EPA 2002a). The parametric method is called one-way ANOVA and the nonparametric method is called the Kruskal-Wallis test. If the data are normally or lognormally distributed, the parametric method is used to test for seasonal effects; otherwise the nonparametric approach is used.

A summary of the groundwater background data collected and the results of data analysis are provided in the background statistics memorandum (EPA 2002a).

Statistical Results

To evaluate the potential for stratification, the background data was grouped into alluvial samples and bedrock samples for evaluation. Statistical testing used the Mann-Whitney U test and ANOVA methods (EPA 2002a) to determine if background groundwater data could be pooled for calculating BLs and RBLs.

In addition, histogram probability plots and box-and-whisker plots were prepared to evaluate the potential differences between the indicator parameter populations for each season prior to pooling the data. For groundwater data, these plots, the Mann-Whitney U results, and the ANOVA results are included in Appendices GW-4, GW-5, GW-6, and GW-7 of the background statistics memorandum (EPA 2002a).

The side-by-side graphics, the ANOVA, and the Mann-Whitney U test indicated that:

- There are no significant differences between the background groundwater indicator parameter data from samples collected in the fall and spring (Phase 1A, Rounds 1 and 2)

- Data for alluvium and bedrock (AWT and BWT wells) did not show any significant differences, except for one parameter: sulfate

Thus, the data from the different seasonal sampling rounds and from the different depths were pooled together into a single group for estimating BLs and RBLs for comparison to PIA groundwater samples. For sulfate, the maximum measured value (187 mg/L) is essentially the same as the BL calculated with all the background groundwater data pooled. The BLs and RBLs are summarized in Table 4-16.

Supplemental Discussion

The MA is a highly disturbed area with insufficient pre-mining background data. The subsurface pathways and materials through which groundwater flows must be inferred from limited geologic

data such as drill logs. Establishing background for complex natural systems requires simplifying assumptions such as selection of reference areas to approximate the types of rocks and mineralization on the site, similar weathering patterns, similar infiltration rates, etc. In addition, the majority of groundwater from the MA watershed discharges to surface water upstream of Blue Creek. The estimate of groundwater from the MA watershed that discharges directly into the mine drainages that flow into Blue Creek is about 42 gpm (about 50% of the total discharge), and the total discharge to surface water is about 108 gpm (URS 2002a).

Conclusions

The following conclusions as to the adequacy of the background groundwater data to represent site conditions are based on a review of the background data and site conditions:

- The background well locations reasonably represent the variety of geologic conditions and associated groundwater present in the MA and PIA and the variability that was likely present under pre-mining conditions.

- Prior to mining, elevated concentrations of metals in groundwater may have been limited to a confined area along the granite and Togo formation. Open pit mining expanded the surface areas exposed to potential generation of ARD. This in turn may have expanded the area of metal migration to groundwater in the variety of rock types. Chemical reactions under such conditions are complex and are reasonably simplified by using undisturbed reference areas.

4.6.3.2 Surface Water

The primary background reference area selected for surface water is the Sand Creek watershed. Based on the general geologic, climatologic, and hydrologic conditions, surface water runoff in portions of the Sand Creek watershed (not affected by mining) are considered similar to surface water runoff from the MA and PIA that likely existed prior to mining. Tributaries to Sand Creek drain areas of Spokane Mountain underlain by both unmined uranium deposits at depth and relatively unmineralized areas, conditions which are similar to the MA and PIA. The MA and surrounding portion of the PIA and Sand Creek are within the contact dominated area.

The majority of background surface water samples were collected in the Sand Creek watershed. Of the nineteen background surface water sample locations, three were in the Blue Creek watershed (Figure 4-12), or pluton dominated area. To address potential seasonal variations in surface water at the site, samples were collected at each background location three times over the period of a year (at the same time as PIA site samples). The presence of seasonal effects was evaluated by statistically comparing the three data sets as discussed in the background statistics memorandum.

As with the sediment background, the Sand Creek watershed is a good approximation of likely pre-mining geologic conditions in the MA and portions of the PIA that are located within the contact dominated area. However, also as noted earlier for sediments, Middle and Lower Blue Creek are located in the pluton dominated area. Potential mining impacts to surface water in Blue Creek may be caused by continuing releases of COPCs to surface water and groundwater in the MA and downstream drainages and from interaction with contaminated sediments in the PIA drainages. Non-mining sources of metal loads input to Blue Creek include surface water from the Oychen Creek watershed. The NURE study documents elevated metal concentrations in Oychen Creek surface water potentially associated with uranium mineralization south of Turtle Lake.

Statistical Analysis of Background Data

For surface water data, graphical analysis methods, such as box-and-whisker plots and histogram probability plots, were applied to evaluate the potential differences between sub-group populations of indicator parameters for each season. The plots are provided in Appendices SW-4, SW-5, SW-6, and SW-7 of the background statistics memorandum (EPA 2002a).

Even though most of the indicator parameters for surface water had a high number of non-detect values, there were no significant differences between the fall 1999 and fall 2000 data sets. Thus, the two fall background data sets were pooled together. However, using the Mann-Whitney U test, substantial differences for radium^{226} and sulfate were found between the fall data and the spring data. Thus, the data from the fall season sampling rounds were partitioned into a separate group from the data collected in the spring season. Because of the seasonal differences in the surface water data, background data from the fall should be compared only to the fall PIA surface water data. Likewise, surface water data for the spring season samples should only be compared to the spring season PIA surface water data. The surface water BLs and RBLs are summarized in Table 4-16.

Conclusions

The background sample locations reasonably represent the range of geologic, climatic and hydrologic conditions present in the MA and PIA. The fall data appear to lack a clear seasonal pattern between the two fall sampling times. However, the statistical differences observed in the data warrant establishing separate background estimates for the fall and spring data sets.

For the purpose of the RI/FS, the surface water background data are a reasonable representation of likely pre-mining background concentrations for site surface water in the contact dominated area. Additional sampling may reduce the uncertainty in Blue Creek surface water background data for pluton dominated areas.

4.6.4 Radiation Background

For the purposes of the RI/FS, radon was measured in three ways: 1) the activity of radon in ambient air and water at various locations in the MA, PIA, and background area; 2) the rate at which radon emanates from the soils and rocks of the MA and background area, called radon flux; and 3) the radon emanation fraction.

Airborne and water-soluble radon is reported in units of picoCuries per liter (pCi/L), which is a measure of the activity concentrations of the radon in these media (a picoCurie is equivalent to 2.22 atomic disintegrations per second). Radon activity concentrations were measured primarily to support the human health risk assessment. Radon flux is reported in units of picoCuries per square meter per second (pCi/m^{2}s). Measurements of radon flux and radon emanation fraction were made to support the design of potential soil covers of MA materials.

Gamma Radiation Surveying

At each surface and subsurface material background sampling location, measurements of external gamma radiation were obtained using a calibrated Ludlum gamma radiation meter and GPS coordinates. Survey readings were recorded using a Ludlum Model 12 or Model 2220 scaler meter with a 44-2 NaI scintillation probe at 30-meter intervals at a height of one meter above the ground surface. At each location, unshielded gamma radiation was recorded in counts per minute for a one-minute interval for both the starting point of the increment and along a continuous transect along the 30-meter interval. Unshielded gamma radiation measurements were recorded at each surface material subsample location in the background areas. These measurements were recorded at ground level in counts per minute for a one-minute count.

URS conducted radon emanation fraction measurements on the background surface and subsurface material samples using the closed-can gamma radiation assay method. The objective of the radon emanation fraction measurements was to estimate the fraction of radon gas that escapes the samples of surface materials in the background areas.

Radon Flux Measurement

Radon flux measurements were performed in accordance with the project QAPP during the RI field program. The measurements were conducted over a 24-hour period using charcoal canisters. Each charcoal canister was set on the ground surface and recovered approximately 24 hours later for shipment to the laboratory.

Nine radon flux measurements were made in each background surface material sampling grid and were co-located with surface material sampling locations, for a total of 18 background measurements. Each radon flux location was surveyed using a GPS unit.

Additional radon flux measurements were obtained from a subset of the previous radon flux locations in the background sampling areas three times during the field program, in August, September, and October 2001. The locations with the two highest, two lowest, and two closest to the mean values of radon flux measured during the first round of measurements were selected for additional sampling. The radon flux locations with multiple measurements are shown on Figures 3-8 and 3-9.

Airborne Radon Measurement

Airborne radon measurements were performed in accordance with the QAPP. Nine airborne radon measurements were made in each background surface material sampling area and were co-located with the radon flux measurement locations, for a total of 18 background measurements (Figures 3-8 and 3-9).

Airborne radon was measured at each location over a period of approximately 11 months. Three alpha track radon detectors were placed in a shaker jar with the lid taped open at each location at a height of about two meters above the ground. Detectors were placed during early October 2000 and retrieved in mid-August 2001. Of the 34 groups of detectors placed, 32 were recovered.

Statistical Analysis

Airborne radon was measured at a total of 18 locations in the two background surface material sampling areas. At each selected sampling location, airborne radon was measured over a period of approximately 11 months. The background radon measurement locations are shown on Figures 3-8 and 3-9. Tables 5-122 through 5-128 provide the airborne radon data for the background areas, MA, and PIA; and summary statistics for the airborne radon measurements and surface gamma radation.

The range of airborne radon activities measured in the background mineralized area is greater than that measured in the non-mineralized area, even though the mean airborne radon is higher in the non-mineralized area. The 95% UTL for airborne radon was calculated to be 2.03 pCi/L.

Radon flux rates were measured at the same 18 background locations during Phase 2A in the fall of 2000. Additional radon flux measurements were obtained at a subset of the previous background radon flux locations three times during August, September, and October 2001 to evaluate the natural variability of radon flux in the background areas. Table 5-124 presents the radon flux measurements conducted in the background areas and the MA. Table 5-125 provides summary statistics for radon flux. The range of flux rates in the mineralized background area was more than 30 times greater than those in the background non-mineralized area. The maximum relative percent difference (RPDs) between the Phase 2A radon flux measurements

and the three Phase 2B rounds of measurements for the six background locations with multiple measurements was 29–193% for the background mineralized sampling area and 7–48% for the background non-mineralized area. The 95% UTL for radon flux, calculated from the background radon flux data, is 7.02 pCi/m^{2}s.

Supplemental Review of Data

For the RI/FS, background sampling locations were reviewed for the potential effects of air transport of radionuclides from the MA. Elevated radon would indicate such effects. The following chart summarizes airborne radon on site and in the background areas.

Airborne Radon

Area Description	Range (pCi/L)	Mean +/- 2 S.D. (pCi/L)	Geometric Mean (GSD)(1) (pCi/L)
Background Area A	0.32 - 2.13	0.72 +/- 0.14	0.58 (0.06)
Background Area B	0.41 - 1.62	0.94 +/- 0.18	0.85 (0.08)
Mined Area	1.85 - 15.45	6.59 +/- 0.91	5.17 (0.36)
East Haul Road	0.87	NA	NA
West Haul Road	2.48	NA	NA
Downwind Northeast Area	2.27	NA	NA
Downwind Southwest Area	3.52	NA	NA

Notes:
NA = Not Applicable (low sample count)
(1) Geometric Standard Deviation

Considerations

Airborne radon was measured at a total of 18 locations in Background Areas A and B. At each selected sampling location, airborne radon was measured over a period of approximately 11 months. Airborne radon data for the background areas, MA, and PIA are summarized above. Airborne radon mean activity concentrations are seven to nine times greater in the MA than in Background Areas A and B.

The background areas are located downwind of the northeast downwind area. The MA has very high activity concentrations compared to that of the northeast downwind area suggesting limited air transport of material from the MA; which is consistent with the low metal concentrations found in the downwind area. Furthermore, the background areas are located about a mile further downwind and the areal distributions of radionuclides in background sample data are not consistent with hypothetical air transport pathways for radon or its parent radionuclide (radium).

Conclusions

The areal pattern of metals and radionuclide activities in surface materials do not indicate air transport from the MA has impacted Background Areas A and B. The pattern activity concentrations in the two background areas are more closely aligned with mineralization anomalies along the Midnite Trend. The data collected in the background areas are adequate to characterize background airborne radon activity concentrations and radon flux rates.

4.7 SITE LOCATIONS USED FOR BACKGROUND TWO-STEP METHOD

The BLs and RBLs estimated for the RI will be compared to site data using the two-step method to identify exceedances of background. Tables 4-12 and 4-16 summarize the BLs and RBLs for surface materials, soils, surface water, and groundwater. Table 4-17 summarizes sample locations at which data is used in the two-step method. The table identifies whether a BL or BL and RBL comparison was made and which company collected samples at each location. In instances where multiple companies collected data, URS data was used for the two-step comparison, if available. If no URS data was available, then E&E or SMI data was compared using the two-step method.

Table 4-1
SUMMARY OF PHYSICAL CHARACTERISTICS OF THE OPEN PITS

Open Pit	Estimated Plan Footprint Area (acres)	Estimated Cut Volume (cubic yards)	Side Slope Range [1] (Horizontal:Vertical)	Maximum Width East-West (ft)	Maximum Width North-South (ft)	Maximum Depth[2] (ft)
Pit 3	41.7	12,900,000	0.3:1 to 0.8:1	1,200	2,300	457
Pit 4	25.6	3,180,000	0.4:1 to 0.7:1	730	2,040	297
Adit Pit[3]	1.1	78,100	0.6:1 to 1.5:1	280	320	97

[1] The side slopes are based on the open pit slopes measured between benches and access roads when applicable.

[2] Estimated from high point on highwall to pit bottom.

[3] Partially backfilled.

Table 4-2
SUMMARY OF PHYSICAL CHARACTERISTICS OF THE ORE AND PROTORE STOCKPILES

Stockpile Name[1]	Estimated Plan Footprint Area (acres)	Estimated Volume (cubic yards)	Side Slope Range [2] (Horizontal: Vertical)	Maximum Thickness (ft)	Approximate Average U_3O_8 (%) [3]	Notes
Protore Stockpile #1	1.7	45,000	1.4 to 5.7:1	30	0.042	Mainly oxidized material from Pits 3 and 3 North. Built in 1979 and added to in 1980.
Protore Stockpile #2	1.4	40,500	1:01	30	0.077	Mainly unoxidized material from Pits 3 and 3 North Built from 1979 to 1981.
Suspected Protore Stockpile #1	2.5	71,000	1.4 to 6:1	44	N/A	Appears to be light colored calc-silicate minerals mined from the eastern side of Pit 3. Borrow for resurfacing West and East haul roads.
Suspected Protore Stockpile #2	0.5	2,500	1.8 to 12:1	10	N/A	Built concurrently with other piles in the East Dump area. The uranium content is unknown.
Ore Stockpile #3	2.4	72,000	1.3 to 6:1	52	0.079	Low-grade oxidized ore mined from the Boyd Pit during the 1960s and early 1970s. Volume based on assumed interface with South Spoils waste rock area.
Protore Stockpile #4	4.8	250,000	1.3 to 6:1	65	0.043	Low-grade unoxidized ore from Pit 3 and Pit 3 North built between 1978 and 1982. Volume based on assumed interface with South Spoils waste rock area.
Ore and Protore Stockpile #5	2.4	42,000	1.4 to 3.8:1	32	0.057	Low-grade unoxidized ore from Pit 3 North and possibly Pit 3 and Boyd Pit 2 East -- built mid-to-late 1970s. Assumed interface with South Spoils waste.
Ore and Protore Stockpile #6	14	611,000	1.3 to 12:1	57	0.043	Regraded Pit 4 protore over earlier 1979 or 1980 Pit 4 waste rock.
Ore Stockpile #7	2.4	64,000	1 to 8.5:1	34	0.076	Constructed on top of Stockpile #6 during the mid-to-late 1970s. Composed of low-grade ore from Pit 4.
Lime Protore Stockpile #8	6.7	323,000	1.3 to 13:1	60	0.077	Constructed on South Spoils waste rock 1979-1981 from calc-silicate protore mined from Pit 3.
Suspected Ore Stockpile Q2	1	21,000	1 to 6:1	27	N/A	Suspected oxidized ore pile located on the south side of Lime Protore Stockpile #8.

[1] Stockpile locations are shown on Figure 1-2
[2] The side slopes are based on slopes measured between benches and access roads when applicable.
[3] DMC (1981)

Table 4-3
SUMMARY OF PHYSICAL CHARACTERISTICS OF THE WASTE ROCK PILES AND BACKFILLED PITS

Waste Rock Pile	Estimated Plan Footprint Area (acres)	Estimated Volume (cubic yards)	Side Slope Range [1] (Horizontal: Vertical)	Maximum Thickness (ft)	Notes
South Spoils	105.3	9,470,000	1.4 to 2.5:1	215	Built from waste rock excavated from the Adit Pit, Pit 2, Pit 2 West, Boyd Pit, Boyd 2 Pit, Boyd 2 East, Pit 6, Pit 3 North, and Pit 3. Ore and protore placed on top or buried in pile.
East Dump	21	961,000	1.4 to 5:1	88	Eastern side of South Spoils. Oxidized and unoxidized waste rock built mid-1978 through 1979. Subsequent dumping of ore and protore on the waste rock surface.
Hillside Dump	26.7	2,450,000	1.3 to 2.6:1	140	Waste rock from Pit 4 constructed mid-1970s to 1979. Early portions oxidized. Proportion of unoxidized waste increases vertically in the pile.
Pit 4 Dump and Ready-Line Area	10	382,000	1.3 to 2:1	97	Waste rock and overburden from Pit 4. Portion of waste potentially unstable (Detail Area 4)–eroded sediments contributed to Middle Branch of the Northeastern Drainage.
Area 5	34	1,530,000	0.7 to 2:1	104	Pit 4 waste filled Eastern Drainage (West Branch of the Northeastern Drainage) valley. Ore and protore Stockpile #6 and Ore Stockpile #7 constructed over portion of waste.
Backfilled Pit Name					
Boyd Pit	11.7	1,450,000	1.1 to 3:1	156	Unlined pit backfilled with waste rock.
Pit 2	4.6	662,000	1.3 to 7:1	165	Unlined pit backfilled with waste rock.
Pit 2 West	1.2	86,000	1.2 to 1.4:1	84	Unlined pit backfilled with waste rock.
Adit Pit[2]	1.1	11,000	0.6 to 1.5:1	27	Unlined pit backfilled with waste rock.

[1] The side slopes are based on slopes measured between benches and access roads when applicable.
[2] Partially backfilled.

Table 4-4
SUMMARY OF PHYSICAL CHARACTERISTICS OF THE TOPSOIL STOCKPILES

Topsoil Stockpile Area	Estimated Plan Footprint Area (acres)	Estimated Volume (cubic yards)	Side Slope Range (Horizontal: Vertical)	Top Elevation (ft above msl)	Maximum Thickness (ft)	Maximum Heights (ft)
South Topsoil Pile	4	48,000	1.2:1 to 3.3:1	2600	27	36
North Topsoil Piles	3.3	25,000	1.1:1 to 5:1	2785	24	35

Table 4-5
SUMMARY OF PHYSICAL CHARACTERISTICS OF THE POLLUTION CONTROL POND

Bottom Elevation	2,470 feet above msl
Maximum Water Elevation	2,480 feet above msl
Approximate Maximum Volume of Pond [(1)]	9.8 acre-feet
Interior Pond Slope (Horizontal:Vertical)	1.4:1 to 3:1

[(1)] Based on a bottom elevation of 2,470 feet amsl.

Table 4-6
MEASURED SURFACE WATER FLOWS IN THE PIA
(gpm)

Station ID	Sep-99	Mar-00	Apr-00
SWED-01	423	NM	102
SWED-02	345	246	121
ED-2A	419	112	40.8
ED-4A	369	NM	78.1
OF01SW	NM	NM	NM
SW-2	520	NM	13.4
SW-6	342	346	136
SW-12	2.25	NM	19.30
SWCD-01	DRY	NM	DRY
SWWD-01	DRY	NM	DRY
WDAC	2.70	NM	1.80
SWFW-01	DRY	NM	2.69
SWND-01	DRY	NM	DRY
SWNE-01	DRY	NM	0
SWNE-02	DRY	NM	DRY
SWSW-01	DRY	NM	DRY

Notes:
gpm - gallons per minute
NM - not measured
0 - water present but no measurable flow

Table 4-7
SUMMARY OF HYDRAULIC CONDUCTIVITY ESTIMATES

Well ID	Screen Interval Lithology	Date of Slug/ Pump Test	Data Source	Hydraulic Conductivity (ft/day) [1, 2]
GW-46	Alluvium	Jan-99	SMI 1999a	2.89
MW-1	Alluvium	25-Sep-00	URS	19.82[1]
MW-4	Alluvium	27-Sep-00	URS	17.52[1]
MW-5	Alluvium	27-Sep-00	URS	8.41[1]
MWED-10	Alluvium	27-Sep-00	URS	7.20[1]
MWNE-05	Alluvium	27-Sep-00	URS	35.26[1]
GW-45	Alluvium	Jan-99	SMI 1999a	0.035
GW-49	Alluvium	Jan-99	SMI 1999a	1.22
GW-35A	Alluvium	26-Sep-00	URS	26.56[1]
GW-36A	Alluvium	26-Sep-00	URS	3.90[1]
Unnamed Well	Waste Rock	Jan-99	SMI 1999a	231[4]
GW-54	Waste Rock	Jan-99	SMI 1999a	4422 [3]
GW-42	Waste Rock/Alluvium	Jan-99	SMI 1999a	0.092
GW-47	Waste Rock	Jan-99	SMI 1999a	0.638
GW-53	Waste Rock	Jan-99	SMI 1999a	24.38[4]
BOM-12S	Waste Rock	1994	SMI 1996	24.38
GW-43	Quartz Monzonite/Waste Rock	Jan-99	SMI 1999a	0.026
GW-48	Quartz Monzonite/Waste Rock	Jan-99	SMI 1999a	0.023
GW-50	Quartz Monzonite	Jan-99	SMI 1999a	9.21E-04
GW-51	Quartz Monzonite	Jan-99	SMI 1999a	0.098 [4]
GW-19	Quartz Monzonite	26-Sep-00	URS	1.44[1]
BOM-4D	Quartz Monzonite	Sep-95	SMI 1996	9.01E-03
BOM-5D	Quartz Monzonite	1994	SMI 1999a	3.15E-03
BOM-6D	Quartz Monzonite	Sep-95	SMI 1996	4.72
BOM-7D	Quartz Monzonite/Calc-Silicate	Sep-95	SMI 1996	0.90
BOM-9D	Quartz Monzonite	Sep-95	SMI 1996	0.45
BOM-10D	Quartz Monzonite	Sep-95	SMI 1996	1.35
BOM-12D	Quartz Monzonite	1994	SMI 1996	0.033
BOM-8D	Intrusive Dike w/in Calc-Silicate	1994	SMI 1996	0.094

Notes:

[1] Value reported is the geometric mean of multiple analyses. Hydraulic conductivity values frequently vary by more than two orders of magnitude within the same hydrogeologic unit. An arithmetic mean of a sample population tends to give more weight to the more permeable values; hence a geometric mean is considered more representative of the average hydraulic conductivity of thehydrogeologic unit by minimizing the effects of the positively skewed data (Fetter 1994).

[2] Slug test using Bower and Rice analytical method unless otherwise noted.

[3] Pump test. Hydraulic conductivity estimated from calculated specific capacity.

[4] Pump Test

ft/day - feet per day

Table 4-8
SUMMARY OF VERTICAL GRADIENTS CALCULATED FROM WELL PAIRS

Well ID	Location	Water Level (ft above msl)	Screen Interval (ft bgs)	Screen Interval Lithology	Hydraulic Gradient (ft/ft)[1]
MWP3-01	MA - Pit 3	2664.90	107 - 127	Calc-Silicate/Hornfels	0.0001
MWP3-02		2664.92	269 -289	Calc-Silicate/Hornfels	
GW-19	PIA - Central Drainage	2311.67	18 -20	Alluvium	0.06
MWCD-02		2316.05	78 - 98	Quartz Monzonite	
MWSW-01	PIA - Southwest Drainage	2430.99	10.0 - 15.0	Alluvium/Qtz. Monz.	-0.05
MWSW-02		2425.83	102 - 122	Quartz Monzonite	
MW-1	PIA - Western Drainage	2401.91	2.0 - 12.0	Alluvium	-0.01
MWWD-01		2401.31	73.4 - 93.4	Quartz Monzonite	
GW-35A	PIA - Western Drainage	2351.8[2]	7.4 - 11.7	Alluvium	-0.07
GW-50		2348.20	49.8 - 70.2	Quartz Monzonite	
GW-36A	PIA - Central Drainage	2349.73[2]	14.4 - 18.7	Alluvium	-0.15
GW-51		2342.00	59.9 - 74.3	Quartz Monzonite	
MW-2	PIA - Central Drainage	2426.86	7.0 -17.0	Alluvium	-0.01
MWCD-01		2426.37	95 - 115	Quartz Monzonite	
MWFW-01	PIA - Far West Drainage	2511.42	15 - 30	Alluvium	0.05
MWFW-02		2515.47	101.9 - 121.9	Quartz Monzonite	
GW-43	MA - Stockpile #5	2629.95	82.6 - 92.9	Qtz. Monz./Waste Rock	-0.14
MWDB-01		2617.38	167-187	Quartz Monzonite	
MWED-10	PIA -Eastern Drainage	2128.31	5.0 - 15.0	Alluvium	0.03
MWED-11		2131.12	87.9 - 107.9	Quartz Monzonite	
MWED-05	PIA -Eastern Drainage	2563.25	9.6 - 24.6	Quartzite/Calc-Silicate	-0.06
MWED-06		2561.75	31 - 51	Calc-Silicate/Hornfels	
MWED-07	PIA -Eastern Drainage	2587.11	20.3 - 40.3	Quartzite	-0.15
MWED-08		2580.59	64.2 - 84.2	Quartzite	
MW-4	PIA -Eastern Drainage	2360.04	10.0 - 20.0	Alluvium	-0.01
MWED-04		2359.10	92.7 - 112.7	Quartz Monzonite	
MW-5	PIA -Eastern Drainage	2455.87	5.0 - 15.0	Alluvium	0.04
MWED-03		2456.99	29.2 - 49.2	Calc-Silicate/Hornfels	
MW-6	PIA -Eastern Drainage	2638.40	12.0 - 22.0	Alluvium	-0.03
MWED-02		2637.25	48 - 68	Calc-Silicate	
GW-54	MA - Boyd Pit	2668.51	88.9 - 129.8	Waste Rock	0.01
GW-57		2669.35	183.7 - 194.1	Quartz Monzonite	
MWNE-01	PIA -Northeastern Drainage	3078.23	39 - 59	Quartz Monzonite	0.03
MWNE-02		3080.62	130.2 - 150.2	Quartzite	
MWNE-03	PIA -Northeastern Drainage	3018.54	116.5 - 136.5	Alluvium/Phyllite Schist	-0.01
MWNE-04		3017.91	217.5 - 237.5	Phyllite Schist	
MWNE-05	PIA -Northeastern Drainage	2633.01	5.0 - 20.0	Alluvium	-0.05
MWNE-06		2629.50	68 - 88	Calc-Silicate	
BOM-11S	MA - W. Drainage (buried)	2697.81	30 - 36	Waste Rock	-0.01
BOM-11D		2697.17	95 -98	Quartz Monzonite	
BOM-12S	MA - Pit 2	2753.16	171 -180	Waste Rock	0.05
BOM-12D		2755.04	200 - 220	Quartz Monzonite	
BOM-16S	MA - W. Drainage (buried)	2654.07	69 -79	Waste Rock	0.05
BOM-16D		2656.94	131 - 141	Quartz Monzonite	
BOM-8S	MA - Pit 4	2983.60	72 - 82	Waste Rock	-0.26
MWP4-02		2961.44	152 - 172	Quartz Monzonite	

Notes:

(1) This column provides the apparent vertical gradient calculated from each well pair. A positive value indicates an upward gradient and a negative value indicates a downward gradient.

(2) Value taken from April 2000 sampling event. All other values measured during August 2001.

ft above msl - feet above mean sea level

ft bgs - feet below ground surface

Table 4-9
WESTERN DRAINAGE SEEP, BLOOD POOL, AND PCP PUMPBACK VOLUMES
(gallons)

Year	Western Drainage to PCP #1 [1]	Western Drainage to PCP #2 [1]	Western Drainage to PCP #3 [1]	PCP to Pit 3 #1 [1]	PCP to Pit 3 #2 [1]	Blood Pool to Pit 3
1998 [2]	2,411,890	21,787	5,352	3,425,148	0	203,610
1999	32,239,381	9,534,994	4,400,616	49,411,626	14,358,505	643,320
2000	31,100,880	7,924,070	2,819,700	39,515,800	12,778,300	617,600
2001 [3]	6,691,300	12,800	0	8,595,200	0	132,700
TOTALS	72,443,451	17,493,651	7,225,668	100,947,774	27,136,805	1,597,230

Notes:
[1] Numbers refer to individual pumpback lines.
[2] Data from 11/17/98 to 12/31/98
[3] Data from 1/1/01 to 5/30/01
PCP - Pollution Control Pond

Table 4-10

SUMMARY OF PIT PUMPING VOLUMES AND WATER TREATMENT PLANT DISCHARGE

Year	Dates of Operation	Number of Days in Operation	Pit 3 Pump Volume (gallons)	Pit 4 Pump Volume (gallons)	Total Discharge (gallons)	Avg Daily Discharge (gallons)
1995	3/18 - 12/14	271	0	15,811,800	152,790,600	563,803
1996	3/18 - 11/22	251	0	13,359,400	145,299,000	578,880
1997	4/8 - 12/10	247	57,521,400	16,611,250	172,841,800	699,764
1998	3/12 - 11/23	257	146,643,566	15,041,498	165,237,300	642,947
1999	4/6 - 11/23	232	137,715,300	14,888,800	152,996,800	659,469
2000	4/7 - 11/22	228	126,039,003	13,003,500	136,409,563	598,288
2001[(1)]	4/16 - 6/1	47	20,032,500	2,128,100	22,344,073	475,406
Totals		**1533**	**487,951,769**	**90,844,348**	**947,919,136**	

Note:

[(1)] Data through June 1, 2001.

Table 4-11
Comparison Statistics for Surface Material Background Values

Indicator Parameter / Data Grouping	95% Upper Tolerance Limit	NURE Threshold	Sample Statistics: Dist.	Mean	SD	CV	SE	N	NDs	Min	Max	Confidence Limit on the Ratio of the GMs: 5%	95%	Interpretation of GM Ratio
Aluminum (mg/kg)														
Pluton Dominated SS Samples from Areas A & B	20,469		n	12,233	3,437	0.28	769	20	0	8,600	21,900	0.59	0.76	Togo Geometric Mean Higher
Contact Dominated SS Samples from Areas A & B	27,026		n	18,112	3,721	0.21	832	20	0	8,230	24,100			
SS (0-5 cm) Samples from Areas A & B Pooled	24,100		np	15,172	4,622	0.30	731	40	0	8,230	24,100			
SB (5-20 cm) Samples from Areas A & B Pooled	**18,453**		n	12,468	2,371	0.19	593	16	0	7,720	16,500			
Arsenic (mg/kg)														
Pluton Dominated SS Samples from Areas A & B	3		n	1.7	0.6	0.38	0.1	20	4	0.5	3	0.03	0.08	Togo Geometric Mean Higher
Contact Dominated SS Samples from Areas A & B	190		n	54.6	56.6	1.04	12.7	20	0	2.4	234			
SS (0-5 cm) Samples from Areas A & B Pooled	234		np	28.1	47.8	1.70	7.6	40	4	0.2	234			
SB (5-20 cm) Samples from Areas A & B Pooled	**86**		np	20.9	29.4	1.41	7.4	16	0	0.8	86			
NURE Detailed Soil		289		113	58.6	0.5	4.6	161						
NURE Intermediate Soil		88		21.5	22.1	1.0	3.5	41						
NURE Sub-Regional Soil		46		11.4	11.6	1.0	0.6	328						
Cadmium (mg/kg)														
Pluton Dominated SS Samples from Areas A & B	0.40		n	0.23	0.07	0.30	0.02	20	0	0.09	0.36	0.68	0.98	Togo Geometric Mean Higher
Contact Dominated SS Samples from Areas A & B	0.50		n	0.29	0.09	0.31	0.02	20	0	0.11	0.45			
SS (0-5 cm) Samples from Areas A & B Pooled	0.44		n	0.26	0.08	0.32	0.01	40	0	0.09	0.45			
SB (5-20 cm) Samples from Areas A & B Pooled	**0.32**		np	0.17	0.08	0.49	0.02	16	16	0.03	0.32			
Chromium (mg/kg)														
Pluton Dominated SS Samples from Areas A & B	14.8		n	7.1	3.2	0.45	0.72	20	0	3.6	15.2	0.47	0.68	Togo Geometric Mean Higher
Contact Dominated SS Samples from Areas A & B	19.1		n	12.0	3.0	0.25	0.67	20	0	6.1	18.2			
SS (0-5 cm) Samples from Areas A & B Pooled	**17.9**		n	9.6	3.9	0.41	0.62	40	0	3.6	18.2			
SB (5-20 cm) Samples from Areas A & B Pooled	21.3		ln	7.7	3.1	0.41	0.78	16	0	2.8	14.9			
Copper (mg/kg)														
Pluton Dominated SS Samples from Areas A & B	15.4		n	7.9	3.1	0.40	0.70	20	0	4.6	18	0.29	0.43	Togo Geometric Mean Higher
Contact Dominated SS Samples from Areas A & B	43.0		n	22.5	8.5	0.38	1.89	20	0	9.0	42			
SS (0-5 cm) Samples from Areas A & B Pooled	**41.8**		np	15.2	9.7	0.64	1.54	40	0	4.6	42			
SB (5-20 cm) Samples from Areas A & B Pooled	56.1		ln	14.5	9.5	0.65	2.36	16	0	4.9	36			
NURE Detailed Soil		39		19.0	6.8	0.36	0.53	161						
NURE Intermediate Soil		37		18.6	6.2	0.33	0.96	41						
NURE Sub-Regional Soil		40		16.5	7.7	0.47	0.43	328						

Table 4-11
Comparison Statistics for Surface Material Background Values

Indicator Parameter / Data Grouping	95% Upper Tolerance Limit	NURE Threshold	Sample Statistics: Dist.	Mean	SD	CV	SE	N	NDs	Min	Max	Confidence Limit on the Ratio of the GMs: 5%	95%	Interpretation of GM Ratio
Lead (mg/kg)														
Pluton Dominated SS Samples from Areas A & B	18.0		ln	11.7	2.1	0.18	0.48	20	0	8.0	16	0.73	0.89	Togo Geometric Mean Higher
Contact Dominated SS Samples from Areas A & B	22.0		ln	14.5	2.6	0.18	0.59	20	0	9.2	21			
SS (0-5 cm) Samples from Areas A & B Pooled	20.3		ln	13.1	2.8	0.21	0.44	40	0	7.4	21			
SB (5-20 cm) Samples from Areas A & B Pooled	**12.8**		ln	10.0	1.0	0.10	0.26	16	0	8.2	12			
NURE Detailed Soil		20		9.5	3.6	0.37	0.28	161						
NURE Intermediate Soil		19		5.1	4.7	0.93	0.74	41						
NURE Sub-Regional Soil		39		10.3	9.6	0.93	0.53	328						
Manganese (mg/kg)														
Pluton Dominated SS Samples from Areas A & B	1,256		n	862	165	0.19	37	20	0	489	1,170	0.87	1.29	No SS Difference
Contact Dominated SS Samples from Areas A & B	1,719		n	880	350	0.40	78	20	0	254	1,640			
SS (0-5 cm) Samples from Areas A & B Pooled	**1,445**		n	871	270	0.31	43	40	0	254	1,640			
SB (5-20 cm) Samples from Areas A & B Pooled	1,448		ln	774	196	0.25	49	16	0	379	1,300			
NURE Intermediate Soil		1,750		718	344	0.48	54	41						
NURE Sub-Regional Soil		1,461		564	299	0.53	17	328						
Radium 226 (pCi/g)														
Pluton Dominated SS Samples from Areas A & B	12.7		ln	2.4	0.6	0.26	0.1	20	0	1.3	3.4	0.78	1.20	No SS Difference
Contact Dominated SS Samples from Areas A & B	7.7		ln	2.8	2.1	0.75	0.5	20	0	1.6	8.9			
SS (0-5 cm) Samples from Areas A & B Pooled	8.9		np	2.6	1.5	0.59	0.2	40	0	1.3	8.9			
SB (5-20 cm) Samples from Areas A & B Pooled	**4.7**		ln	2.3	0.7	0.30	0.2	16	0	1.4	3.9			
Selenium (mg/kg)														
Pluton Dominated SS Samples from Areas A & B	0.40		n	0.30	0.06	0.19	0.01	20	17	0.3	0.52	0.83	1.21	No SS Difference
Contact Dominated SS Samples from Areas A & B	0.70		n	0.35	0.15	0.43	0.03	20	20	0.1	0.79			
SS (0-5 cm) Samples from Areas A & B Pooled	**0.52**		np	0.12	0.09	0.74	0.01	40	37	0.04	0.52			
SB (5-20 cm) Samples from Areas A & B Pooled	0.56		np	0.30	0.09	0.29	0.02	16	13	0.2	0.56			
NURE Detailed Soil		52		27.2	8.2	0.30	0.65	161						

Table 4-11
Comparison Statistics for Surface Material Background Values

Indicator Parameter / Data Grouping	95% Upper Tolerance Limit	NURE Threshold	Sample Statistics									Confidence Limit on the Ratio of the GMs		
			Dist.	Mean	SD	CV	SE	N	NDs	Min	Max	5%	95%	Interpretation of GM Ratio
Uranium 238 (mg/kg)														
Pluton Dominated SS Samples from Areas A & B	34		ln	8.8	9.4	1.07	2.10	20	0	2.5	46	1.15	2.25	Togo Geometric Mean Lower
Contact Dominated SS Samples from Areas A & B	17		ln	5.1	4.7	0.91	1.04	20	0	2.3	22			
SS (0-5 cm) Samples from Areas A & B Pooled	46		np	7.0	7.6	1.08	1.20	40	0	2.3	46			
SB (5-20 cm) Samples from Areas A & B Pooled	**43**		np	7.7	10.2	1.32	2.54	16	0	2.5	43			
NURE Detailed Soil		13		2.7	3.4	1.24	0.27	161						
NURE Intermediate Soil		22		5.6	5.5	0.99	0.86	41						
NURE Sub-Regional Soil		16		3.0	4.3	1.43	0.24	328						
Zinc (mg/kg)														
Pluton Dominated SS Samples from Areas A & B	62		n	44	7.5	0.17	1.68	20	0	28	55	0.87	1.14	No SS Difference
Contact Dominated SS Samples from Areas A & B	73		n	45	11.3	0.25	2.53	20	0	17	62			
SS (0-5 cm) Samples from Areas A & B Pooled	65		n	45	9.5	0.21	1.50	40	0	17	62			
SB (5-20 cm) Samples from Areas A & B Pooled	**51**		n	36	5.7	0.16	1.43	16	0	27	45			

Notes:
UTL: Upper Tolerance Limit (95% coverage with 95% confidence based on distribution)
(If distribution is non-parametric UTL set to maximum concentration)
NURE Threshold: Anomalous concentrations exceed the Mean +3 SDs
Dist: Type of distribution used in the estimates of the UTL and UPL
Mean: Mean Sample Concentration
SD: Standard Deviation

CV: Coefficent of Variation
SE: Standard Error
N: Sample Count
Min: Minimum sample concentration detected
Max: Maximum sample concentration detected
GM: Geometric mean
No SS Difference: No statistical difference in the median values of Granite and Togo

Table 4-12
Background Limits and Retest Background Limits
Summary Statistics for Surface Material and Soils

Draft (12/12/01) Statistical Analysis of Midnite Mine Background Surface Materials (SM) Data (SB and SS)									
Matrix Type	**Parameter**	**N**	**ND**	**Report Min**	**Report Max**	**Distribution**	**BL**	**RBL**	**Units**
SS	Aluminum	40	0	8230	24100	NP	24,100	24,100	mg/kg
SS	Arsenic	40	4	0.1804	234	NP	234	234	mg/kg
SS	Cadmium	40	0	0.09	0.45	NO	0.44	0.47	mg/kg
SS	Chromium	40	0	3.6	18.2	NO	17.90	19.20	mg/kg
SS	Copper	40	0	4.6	41.8	NP	41.80	42	mg/kg
SS	Lead	40	0	7.4	20.9	LN	20.25	21.76	mg/kg
SS	$Lead^{210}$	40	0	1.1	11	LN	7.48	8.56	pCi/g
SS	Manganese	40	0	254	1640	NO	1445	1534	mg/kg
SS	$Radium^{226}$ Calculated	40	0	1.33	8.92	NP	8.92	8.92	pCi/g
SS	Selenium	40	37	0.0433	0.52	NP	0.52	0.52	mg/kg
SS	$Uranium^{238}$	40	0	0.779	15.2	NP	15.2	15.20	pCi/g
SS	Zinc	40	0	17.2	62.4	NO	65	68.03	mg/kg
SB	Aluminum	16	0	7720	16500	NO	18,453	18,830	mg/kg
SB	Arsenic	16	0	0.78	86.1	NP	86	86	mg/kg
SB	Cadmium	16	16	0.03	0.32	NP	0.32	0.32	mg/kg
SB	Chromium	16	0	2.8	14.9	LN	21.32	22.85	mg/kg
SB	Copper	16	0	4.9	35.8	LN	56.07	61	mg/kg
SB	Lead	16	0	8.2	12.3	LN	12.80	13.01	mg/kg
SB	$Lead^{210}$	16	0	1.2	5.1	LN	7.68	8.21	pCi/g
SB	Manganese	16	0	379	1300	LN	1447	1509	mg/kg
SB	$Radium^{226}$ Calculated	16	0	1.4	3.87	LN	4.72	4.94	pCi/g
SB	Selenium	16	13	0.2222	0.56	NP	0.56	0.56	mg/kg
SB	$Uranium^{238}$	16	0	0.834	14.4	NP	14.40	14.40	pCi/g
SB	Zinc	16	0	26.6	44.9	NO	50.58	51	mg/kg

Draft (12/12/01) Statistical Analysis of Midnite Mine Background Sediment (SED) Data (CS and ES)									
Matrix Type	**Parameter**	**N**	**ND**	**Report Min**	**Report Max**	**Distribution**	**BL**	**RBL**	**Units**
ES	Cadmium	22	2	<0.02	0.69	LN	1.01	1.23	mg/kg
ES	Chromium	22	0	1.1	23.1	NO	27.58	29.11	mg/kg
ES	Cobalt	22	0	0.92	13.9	LN	28.57	33.27	mg/kg
ES	Lead	22	0	2.9	20.2	NO	20.72	21.65	mg/kg
ES	Manganese	22	0	97.9	1420	LN	1,704	1976	mg/kg
ES	Nickel	22	0	0.72	25.6	NO	26.60	28.17	mg/kg
ES	$Polonium^{210}$	22	0	0.6	10	LN	17.93	21.39	pCi/g
ES	$Radium^{226}$	22	0	0.952	8.47	LN	20.58	23.39	pCi/g
ES	Sulfate	22	0	0.656	185	LN	333	476	mg/kg
ES	$Uranium^{238}$	22	0	0.975		LN	55.99	71	pCi/g
CS	Cadmium	22	3	<0.02	0.68	LN	1.02	1.24	mg/kg
CS	Chromium	22	0	1.4	22.3	NO	23.22	24.39	mg/kg
CS	Cobalt	22	0	0.91	12.9	NO	14.49	15.21	mg/kg
CS	Lead	22	0	4	21	LN	24.80	26.98	mg/kg
CS	Manganese	22	0	88.6	871	LN	1178	1,323	mg/kg
CS	Nickel	22	0	0.89	23.8	NO	23.45	24.76	mg/kg
CS	$Polonium^{210}$	22	0	0.7	18	LN	17.44	20.81	pCi/g
CS	$Radium^{226}$	22	0	1.36	8.21	LN	13.05	14.56	pCi/g
CS	Sulfate	22	0	1.08	168	LN	290.05	403	mg/kg
CS	$Uranium^{238}$	22	0	0.79	22	LN	31.05	38.32	pCi/g

Notes:

N	Number of samples	ES	Grab Sample
ND	Number of non-detects	<	Less than report minimum
BL	Background Limit (99% upper tolerance limit)	mg/kg	Milligrams per kilogram
RBL	Retest Background Limit (95% upper prediction limit)	pCi/g	PicoCuries per gram
SB	5-20 centimeter sample interval	NP	Non-Parametric
SS	0-5 centimeter sample interval	NO	Normal
CS	Composite Sample	LN	Lognormal

Table 4-13
Comparison of Grab verses Composite Sediment Background Samples

Comparison of Granite ES to Togo ES Sample Data	Arsenic	Cadmium	Cobalt	Lead	Manganese	Nickel	Polonium 210	Radium 226	Sulfate	Uranium 238
Grab (ES) Granite Samples: SD[lnC][1]	2.21	0.94	0.70	0.52	0.76	0.92	0.70	0.73	1.53	1.15
Grab (ES) Togo Samples: SD[lnC][1]	0.49	0.86	0.59	0.35	0.54	0.73	0.82	0.63	1.67	0.69
Ratio of ES Granite to ES Togo Squared	**20.37**	1.21	1.41	2.22	1.99	1.57	0.71	1.36	0.84	2.80
Critical Upper F Value[4]	3.12	3.12	3.12	3.12	3.12	3.12	3.12	4.10	3.12	3.12
Critical Lower F Value	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.30	0.34	0.34

Comparison of Granite CS to Togo CS Sample Data	Arsenic	Cadmium	Cobalt	Lead	Manganese	Nickel	Polonium 210	Radium 226	Sulfate	Uranium 238
Composite (CS) Granite Samples: SD[lnC][1]	1.50	1.07	0.68	0.37	0.60	0.76	0.68	0.57	1.20	0.96
Composite (CS) Togo Samples: SD[lnC][1]	0.64	0.93	0.41	0.35	0.39	0.65	0.88	0.48	1.79	0.70
Ratio of CS Granite to CS Togo Squared	**5.54**	1.31	2.72	1.14	2.38	1.39	0.59	1.44	0.45	1.92
Critical Upper F Value	3.12	3.12	3.12	3.12	3.12	3.12	3.12	4.06	3.12	3.12
Critical Lower F Value	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.31	0.34	0.34

Combined Granitic and Togo Sample Data	Arsenic	Cadmium	Cobalt	Lead	Manganese	Nickel	Polonium 210	Radium 226	Sulfate	Uranium 238
Grab (ES) includes Granite and Togo Samples: SD[lnC][1]	1.80	0.90	0.68	0.45	0.66	0.87	0.78	0.74	1.59	1.11
Number of Samples	22	22	22	22	22	22	22	17	22	22
Number of Non-Detects[6]	2	1	0	0	0	0	0	0	0	0
Composite (CS) includes Granite and Togo Samples: SD[lnC][1]	1.35	1.01	0.60	0.37	0.51	0.76	0.78	0.58	1.46	0.94
Number of Samples	22	22	22	22	22	22	22	18	22	22
Number of Non-Detects	1	3	0	0	0	0	0	0	0	0
Ratio of ES/CS for Granite and Togo Squared[2]	1.80	0.80	1.27	1.44	1.64	1.33	1.01	1.65	1.18	1.41
Upper Critical Values for Null Hypothysis[3]	2.14	2.19	2.09	2.09	2.09	2.09	2.09	2.28	2.09	2.09
Lower Critical Values for Null Hypothysis3	0.47	0.46	0.48	0.48	0.48	0.48	0.48	0.44	0.48	0.48
Reject Null Hypothysis[5]	No	No	No	No	No	No	No	No	No	No

Notes:

1) SD[lnC]: Calculates the standard deviation of the natural log of the concentrations for the identified set of data, i.e Grab (ES) Granite Samples

2) Ratios are a comparison of the variation between the grab samples and composite samples

3) Critical vale is the threshold above which the null yhpothysis can be rejected (Bolded where Threshold is exceeded)

4) Critical Values from Natrella 1966 Table A-5: Sample Counts ES Granite 12, ES Togo 10, CS Granite 12, CS Togo 10; Except for Ra^{226}; ES Granite 10, ES Togo 7, CS Granite 11, CS Togo 7

5) Null Hypothysis assumes that the variation of the two samples compared is the same

6) Non-detects set to 1/2 detection limit

Table 4-14
Comparison of Statistical Estimates of Sediment Background Values

Element and Sample Grouping	95% Upper Tolerance Limit[1]	95% Upper Confidence Limit on the Mean	NURE Threshold[2] Mean + 2SDs	Sample Statistics[4]								
				Dist.	Mean	SD	SE	CV	N	NDs	Min	Max
Arsenic (mg/kg)												
Composite Samples (CS) Granite	312	19.0		ln	11.3	14.9	4.3	1.32	12	1	0.30	52.0
Composite Samples (CS) Togo	110	30.0		ln	22.5	12.8	4.0	0.57	10	0	5.10	47.0
Grab Sample (ES) Togo and Granite	234	29.4		ln	19.2	25.4	5.4	1.32	22	2	0.30	123.0
Composite Sample (CS) Togo and Granite	**181**	**21.8**		**ln**	**15.8**	**14.8**	**3.1**	**0.94**	**22**	**1**	**0.30**	**52.2**
NURE Pluton Dom.		5.9	10.5		5.0	2.8	0.5	0.56	27			
Contact Rock Dom.		18.6	43.6		14.6	14.5	2.4	0.99	37			
NURE Metased. Dom.			21.7		10.4	5.6	0.8	0.54	53			
Cadmium (mg/kg)												
Composite Samples (CS) Granite	1.60	0.20		ln	0.20	0.10	0.03	0.69	12	2	0.02	0.4
Composite Samples (CS) Togo	2.00	0.60		ln	0.20	0.20	0.06	0.85	10	2	0.03	0.7
Grab Sample (ES) Togo and Granite	**1.01**	**0.24**		**ln**	**0.17**	**0.15**	**0.03**	**0.90**	**22**	**3**	**0.02**	**0.7**
Composite Sample (CS) Togo and Granite	1.02	0.20		ln	0.20	0.15	0.03	0.83	22	4	0.02	0.7
Chromium (mg/kg)												
Composite Samples (CS) Granite	21.8	11.6		n	9.2	4.6	1.3	0.50	12	0	1.40	18.8
Composite Samples (CS) Togo	16.7	10.0		n	13.3	3.1	0.9	0.38	12	0	6.00	22.3
Grab Sample (ES) Togo and Granite	27.6	14.2		n	11.4	6.7	1.4	0.59	22	0	1.10	23.1
Composite Sample (CS) Togo and Granite	**23.2**	**13.0**		**n**	**11.1**	**5.2**	**1.1**	**0.48**	**22**	**0**	**1.40**	**22.3**
Cobalt (mg/kg)												
Composite Samples (CS) Granite	14.2	7.5		n	6.0	3.0	0.9	0.50	12	0	0.91	10.1
Composite Samples (CS) Togo	27.3	16.3		n	8.2	3.1	1.0	0.38	10	0	3.90	12.9
Grab Sample (ES) Togo and Granite	28.6	8.5		ln	6.9	4.0	0.9	0.58	22	0	0.92	13.9
Composite Sample (CS) Togo and Granite	**14.5**	**8.2**		**n**	**6.9**	**3.2**	**0.7**	**0.46**	**22**	**0**	**0.91**	**12.9**
NURE Pluton Dom.		7.3	11.0		6.5	2.3	0.4	0.35	27			
Contact Rock Dom.		8.7	16.1		7.5	4.3	0.7	0.57	37			
NURE Metased. Dom.			16.7		9.0	3.8	0.5	0.42	53			
Lead (mg/kg)												
Composite Samples (CS) Granite	25.8	11.5		ln	9.8	3.2	0.9	0.32	12	0	4.00	14.2
Composite Samples (CS) Togo	30.0	15.0		ln	12.4	4.5	1.4	0.36	10	0	6.90	21.0
Grab Sample (ES) Togo and Granite	**20.7**	**12.6**		**n**	**10.8**	**4.1**	**0.9**	**0.38**	**22**	**0**	**2.90**	**20.2**
Composite Sample (CS) Togo and Granite	24.8	12.5		ln	10.9	3.9	0.8	0.36	22	0	4.00	21.0
Maganese (mg/kg)												
Composite Samples (CS) Granite	1,997	555		ln	443	217	62.6	0.49	12	0	88.60	871.0
Composite Samples (CS) Togo	916	421		ln	339	142	44.9	0.42	10	0	181.00	639.0
Grab Sample (ES) Togo and Granite	1,704	557		ln	440	299	63.8	0.68	22	0	97.90	1,420.0
Composite Sample (CS) Togo and Granite	**1,179**	**465**		**ln**	**391**	**187**	**39.9**	**0.48**	**22**	**0**	**88.60**	**871.0**
Molybdenum (mg/kg)[3]												
Grab Sample (ES) Togo and Granite	**10.6**			**n**	**2.4**	**1.6**	**0.8**	**0.67**	**4**	**0**	**0.43**	**3.9**
Composite Sample (CS) Togo and Granite	2,267.6			n	2.9	3.7	1.9	1.29	4	0	0.29	8.4
NURE Pluton Dom.		1.0	2.2		0.8	0.7	0.1	0.94	27			
Contact Rock Dom.		2.8	7.4		2.1	2.7	0.4	1.31	37			
NURE Metased. Dom.			1.7		0.7	0.5	0.1	0.70	53			

Table 4-14
Comparison of Statistical Estimates of Sediment Background Values

Element and Sample Grouping	95% Upper Tolerance Limit[1]	95% Upper Confidence Limit on the Mean	NURE Threshold[2] Mean + 2SDs	Sample Statistics[4]								
				Dist.	Mean	SD	SE	CV	N	NDs	Min	Max
Nickel (mg/kg)												
Composite Samples (CS) Granite	18.0	9.3		n	7.3	3.9	1.1	0.54	12	0	0.89	12.8
Composite Samples (CS) Togo	30.8	16.5		n	12.6	6.6	2.1	0.53	10	0	3.60	23.8
Grab Sample (ES) Togo and Granite	26.6	12.8		n	10.0	6.9	1.5	0.69	22	0	0.72	25.6
Composite Sample (CS) Togo and Granite	**23.5**	**11.9**		**n**	**9.4**	**5.8**	**1.2**	**0.62**	**22**	**0**	**0.89**	**23.8**
NURE Pluton Dom.		11.3	18.8		9.9	4.4	0.9	0.45	27			
Contact Rock Dom.		15.9	28.8		13.8	7.5	1.2	0.55	37			
NURE Metased. Dom.			24.7		13.3	5.7	0.8	0.43	53			
Polonium210 (pCi/g)												
Composite Samples (CS) Granite	21	4.7		ln	3.90	1.70	0.5	0.43	12	0	0.70	6.4
Composite Samples (CS) Togo	25	6.6		ln	3.62	5.17	1.6	1.43	10	0	1.00	18.0
Grab Sample (ES) Togo and Granite	18	4.6		ln	3.6	5.5	1.2	0.69	22	0	0.60	10.0
Composite Sample (CS) Togo and Granite	**17**	**5.1**		**ln**	**3.7**	**3.5**	**0.8**	**0.97**	**22**	**0**	**0.70**	**18.0**
Radium226 (pCi/g)												
Composite Samples (CS) Granite	18	5.7		ln	4.5	2.2	0.7	0.48	11	0	1.54	8.2
Composite Samples (CS) Togo	8	3.5		ln	2.5	1.3	0.5	0.51	7	0	1.36	4.5
Grab Sample (ES) Togo and Granite	21	4.3		ln	4.1	2.6	0.6	0.64	17	0	0.95	8.5
Composite Sample (CS) Togo and Granite	**13**	**3.9**		**ln**	**3.5**	**2.1**	**0.5**	**0.60**	**18**	**0**	**1.36**	**8.2**
Sulfate (mg/kg)												
Composite Samples (CS) Granite	229	24		ln	15.5	15.8	4.6	1.02	12	0	2.16	40.4
Composite Samples (CS) Togo	1,393	70		ln	37.4	56.0	17.7	1.50	10	0	1.08	168.0
Grab Sample (ES) Togo and Granite	334	44		ln	25.7	46.3	9.9	1.80	22	0	0.66	185.0
Composite Sample (CS) Togo and Granite	**290**	**40**		**ln**	**24.7**	**39.2**	**8.4**	**1.59**	**22**	**0**	**1.08**	**168.0**
Uranium 238 (mg/kg) [Calculated]												
Composite Samples (CS) Granite	214	34.3		ln	22.9	21.9	6.3	0.96	12	0	3.52	66.2
Composite Samples (CS) Togo	45	66.8		ln	8.2	5.2	1.6	0.63	10	0	2.38	17.2
Grab Sample (ES) Togo and Granite	56	32.3		ln	22.2	26.2	5.6	1.18	22	0	2.93	107.0
Composite Sample (CS) Togo and Granite	**93**	**22.8**		**ln**	**17.0**	**17.9**	**3.8**	**1.05**	**22**	**0**	**2.38**	**66.2**
NURE Pluton Dom.		20.7	42.6		16.4	13.1	2.5	0.80	27			
Contact Rock Dom.		26.3	79.7		17.7	31.0	5.1	1.75	37			
NURE Metased. Dom.			7.5		2.5	2.5	0.3	0.98	53			

Notes:
1) The Upper Tolerance Limt has 95% coverage with 95% confidence
2) NURE Anomalous Threshold - Anomalous concentrations exceed the Mean concentration Plus 2 SDs
3) Estimate of the population mean with 95% confidence
4) Sample Statistics as follows:
Dist: Type of distribution used in the estimates of the UTL
Mean: Mean Sample Concentration
SD: Standard Deviation
SE: Standard Error - SD/square root of sample count

CV: Coefficent of Variation
N: Sample Count
Max: Maximum sample concentration
ES: Environmental Grab Sample (1 sample collected)
CS: Composite Sample (6 samples collected and combined)
5) Granite and Togo not Estimated due to low sample count
mg/kg: milligrams per kilogram
pCi/l: Pico Curries per liter

Table 4-15
Evaluation of Potential Background Differences in Lower Blue Creek

Indicator Parameter Data Set 1/Data Set 2	Confidence Intervals on the Ratio of the Population Geometric Means 95th	50th	5th	Interpretation of the Ratio of the Geometric Means	Data Ct 1	Data Ct 2	DOF
Arsenic (mg/kg)				**Arsenic**			
LBC Tribs/Background	2.03	1.10	0.60	No SSD between Tribs and Background	7	22	28
LBC Channel/Background	1.33	0.69	0.35	No SSD between LBC Channel and Background	5	22	20
LBC Tribs/LBC Channel	2.93	1.61	0.88	No SSD between LBC Channel and Tribs	7	5	10
Cadmium (mg/kg)				**Cadmium**			
LBC Tribs/Background	**0.94**	0.44	**0.20**	**Tribs Lower Than Background**	7	22	12
LBC Channel/Background	1.86	0.56	0.17	No SSD between LBC Channel and Background	5	22	6
LBC Tribs/LBC Channel	2.69	0.78	0.23	No SSD between LBC Channel and Tribs	7	5	10
Chromium (mg/kg)				**Chromium**			
LBC Tribs/Background	1.32	1.00	0.75	No SSD between Tribs and Background	7	22	28
LBC Channel/Background	1.32	0.76	0.44	No SSD between LBC Channel and Background	5	22	7
LBC Tribs/LBC Channel	2.27	1.31	0.75	No SSD between LBC Channel and Tribs	7	5	10
Cobalt (mg/kg)				**Cobalt**			
LBC Tribs/Background	1.12	0.84	0.63	No SSD between Tribs and Background	7	22	26
LBC Channel/Background	1.16	0.91	0.72	No SSD between LBC Channel and Background	5	22	27
LBC Tribs/LBC Channel	1.15	0.92	0.74	No SSD between LBC Channel and Tribs	7	5	10
Lead (mg/kg)				**Lead**			
LBC Tribs/Background	1.17	0.94	0.76	No SSD between Tribs and Background	7	22	18
LBC Channel/Background	**0.89**	0.72	**0.58**	**LBC Channel Lower Than Background**	5	22	14
LBC Tribs/LBC Channel	**1.67**	1.31	**1.03**	**LBC Channel Lower than Tribs**	7	5	10
Manganese (mg/kg)				**Manganese**			
LBC Tribs/Background	1.30	0.93	0.67	No SSD between Tribs and Background	7	22	15
LBC Channel/Background	2.48	1.50	0.91	No SSD between LBC Channel and Background	5	22	7
LBC Tribs/LBC Channel	1.05	0.62	0.37	No SSD between LBC Channel and Tribs	7	5	10
Nickel (mg/kg)				**Nickel**			
LBC Tribs/Background	1.57	1.07	0.74	No SSD between Tribs and Background	7	22	24
LBC Channel/Background	**2.29**	1.64	**1.18**	**LBC Channel Higher Than Background**	5	22	26
LBC Tribs/LBC Channel	**0.90**	0.65	**0.47**	**LBC Channel higher Than Tribs**	7	5	10
Polonium^{210} (pCi/g)				**Polonium^{210}**			
LBC Tribs/Background	**0.61**	0.44	**0.32**	**Tribs Lower Than Background**	4	22	25
LBC Channel/Background	**0.67**	0.36	**0.19**	**LBC Channel Lower Than Background**	3	22	5
LBC Tribs/LBC Channel	2.78	1.23	0.55	No SSD between LBC Channel and Tribs	4	3	5
Radium^{226} (pCi/g)				**Radium^{226}**			
LBC Tribs/Background	**0.17**	0.08	**0.04**	**Tribs Lower Than Background**	6	9	13
LBC Channel/Background	**0.29**	0.10	**0.03**	**LBC Channel Lower Than Background**	4	9	6
LBC Tribs/LBC Channel	2.48	0.82	0.27	No SSD between LBC Channel and Tribs	6	4	8
Sulfate (mg/Kg)				**Sulfate**			
LBC Tribs/Background	**0.42**	0.22	**0.11**	**Tribs Lower Than Background**	4	22	22
LBC Channel/Background	**576**	25	**1.06**	**LBC Channel Higher Than Background**	3	22	3
LBC Tribs/LBC Channel	**0.19**	0.01	**0.00**	**LBC Channel higher Than Tribs**	4	3	5
Uranium^{238} (pCi/g)				**Uranium^{238}**			
LBC Tribs/Background	**0.38**	0.17	**0.08**	**Tribs Lower Than Background**	7	22	10
LBC Channel/Background	1.41	0.45	0.14	No SSD between LBC Channel and Background	5	22	6
LBC Tribs/LBC Channel	1.28	0.38	0.11	No SSD between LBC Channel and Tribs	7	5	10
Zinc (mg/kg)				**Zinc**			
LBC Tribs/Background	**1.83**	1.39	**1.06**	**Tribs Higher Than Background**	7	22	27
LBC Channel/Background	**2.33**	1.76	**1.33**	**LCB Higher Than Background**	5	22	21
LBC Tribs/LBC Channel	1.03	0.79	0.61	No SSD between LBC Channel and Tribs	7	5	10

Notes:

SSD: Stasticial significant difference

Data Ct 1 - Sample count for data set 1

Data Ct 2 - Sample count for data set 2

DOF: Degrees of Freedom

The average percent the Tribs are of the RI Background median values*: 76%

The average percent the LBC Channel is of the Background median values*: 86%

The average percent the LBC channel is of the Tribs median values*: 106%

* excludes sulfate as a non-metal

9/28/2005

W:\52401\0504.020\FINAL\Table 4-15

Table 4-16
Background Limits and Retest Background Limits
Summary Statistics for Surface Water and Groundwater

Draft (12/12/01) Statistical Analysis of Midnite Mine Background Surface Water (SW) Data

Round	Parameter	N	ND	Statistical Min	Report Min (<)	Report Max	Distribution	BL	RBL	Units
1	Dissolved Antimony	38	34	1.03×10^{-5}	<0.1	1.4	LN	6.1	0.6	µg/l
1	Dissolved Cadmium	38	35	7.7×10^{-8}	<0.2	9.2	NP	9.2	9.2	µg/l
1	Dissolved Chromium	38	37	0.4	<0.4	0.63	NP	0.6	0.6	µg/l
1	Dissolved Nickel	38	38	0.5	<0.5	5	NP	5.0	5.0	µg/l
1	Dissolved Vanadium	38	33	0.0141	<0.5	3.3	LN	3.7	1.4	µg/l
1	Dissolved Zinc	38	28	0.026	<0.3	13.6	NP	13.6	13.6	µg/l
1	Nitrate	38	23	0.0002	0.02	2.98	LN	1.6	0.3	mg/l
1	$Radium^{226}$	18	0	0.0939	0.0939	1.81	NP	1.8	1.8	pCi/l
1	Sulfate	38	0	1.84	1.84	30	LN	38.0	22.0	mg/l
1	$Uranium^{238}$	38	1	0.0485	<0.0485	5.48	LN	11.6	4.4	pCi/l
2	Dissolved Antimony	19	15	1.2883	<2.7	5.8	LN	7.5	5.3	µg/l
2	Dissolved Cadmium	19	19	0.5	<0.5	0.5	NP	0.5	0.5	µg/l
2	Dissolved Chromium	19	12	0.1936	<1.1	3.2	LN	5.1	2.8	µg/l
2	Dissolved Nickel	19	17	0.836	<0.9	1.4	NP	1.4	1.4	µg/l
2	Dissolved Vanadium	19	4	0.515	<1.0	7.6	LN	11.0	6.1	µg/l
2	Dissolved Zinc	19	2	0.3986	<0.4	8.6	LN	18.3	8.9	µg/l
2	Nitrate	17	9	0.0067	<0.03	0.094	LN	0.2	0.1	mg/l
2	$Radium^{226}$	19	0	0.127	0.127	4.36	NP	4.4	4.4	pCi/l
2	Sulfate	19	0	2.44	2.44	8.36	LN	9.4	7.0	mg/l
2	$Uranium^{238}$	19	0	0.0564	0.0564	2.76	LN	9.5	4.1	pCi/l

Draft (12/12/01) Statistical Analysis of Midnite Mine Background Groundwater (GW) Data

	Round Parameter	N	ND	Statistical Min	Report Min	Report Max	Method	BL	RBL	Units
	Dissolved Aluminum	56	25	0.0965	<3.9	3780	LN	14,58	2,76	µg/l
	Dissolved Antimony	56	40	0.0018	<0.1	5.2	LN	8.3	2.0	µg/l
	Dissolved Chromium	56	29	0.0621	<0.4	11.7	LN	19.9	7.8	µg/l
	Dissolved Cobalt	56	47	0.0144	<0.5	7.2	LN	7.8	2.7	µg/l
	Dissolved Iron	56	15	0.4946	<8.4	28300	LN	167,62	19,60	µg/l
	Dissolved Manganese	56	0	1	1.0	1930	NP	1,30	1930	µg/l
	Dissolved Nickel	56	33	0.1558	<0.5	13.9	NP	13.9	13.9	µg/l
	Dissolved Zinc	56	24	0.0889	<0.3	181	NP	181	181	µg/l
	Sulfate	56	0	0.87	0.87	187	LN	193	77	mg/l
	$Uranium^{234}$	56	0	0.112	0.112	37.2	LN	66.2	21.4	pCi/l

Notes:

N Number of samples
ND Number of non-detects
BL Background Limit (99% upper tolerance limit)
RBL Retest Background Limit (95% upper prediction limit)
< Less than report minimum
µg/l Micrograms per liter
pCi/l PicoCuries per liter
mg/l Milligrams per liter
NP Non Parametric
LN Lognormal

Table 4-17
Midnite Mine Summary Sample Counts and Locations Used for Two-Step Process
Matrix: Groundwater

Site	Map Location Number	Northing (ft)	Easting (ft)	Background Limit Initial	Background Limit Retest	Sample Count by Consultant DMC	EcoEnv	SMI	URS	Total
BLUE CREEK										
	MWBC-01	348590.99	2672318.79		X				1	1
CENTRAL DRAINAGE										
	GW-36A	351620.4	2671725.1	X	X	4			2	6
	GW-51	351605.2	2671784	X	X			15	2	17
	MW-2	352346.7	2671737.1	X	X		1	7	3	11
	MWCD-01	352337	2671713	X	X				2	2
	MWCD-02	351135.8	2671877.5	X	X				3	3
	GW-19	351105.8	2671866	X	X	74		10	2	86
	CD SEEP/SDCD-01	352439.6	2671733.9	X	X	100	1	18	3	122
EAST HAUL ROAD-MAIN ROAD USED TO HAUL ORE FROM MINE TO MILL IN FORD.										
	MWBA-01	353115.1	2676245.2	X	X				2	2
EASTERN DRAINAGE										
	EAST SEEP/SDED-05	353815.4	2672668.2	X	X			10	3	13
	MW-4	352039.6	2672973.1	X	X		1		2	3
	MW-5	353175.2	2673113.3	X	X		1		2	3
	MW-6	354957.6	2673651.3	X	X		1		2	3
	MWED-02	354946.3	2673659.6	X	X				2	2
	MWED-03	353160.6	2673201.7	X	X				2	2
	MWED-04	352015.2	2672970.1	X	X				2	2
	MWED-05	354120.2	2673159.1		X				1	1
	MWED-06	354123.9	2673170.7	X	X				2	2
	MWED-07	353816.5	2672683.2	X	X				2	2
	MWED-08	353812.5	2672694.8	X	X				2	2
	MWED-09	354676.3	2673180.5	X	X				2	2
	MWED-10	349407	2672447.4	X	X				2	2
	MWED-11	349389.3	2672496.9	X	X				3	3
FAR WEST DRAINAGE										
	MWFW-01	353042.6	2669249	X	X				2	2
	MWFW-02	353067.7	2669233	X	X				2	2
	MWFW-03	354178.8	2669293.6	X	X				2	2
	MWFW-04	354357.2	2669548	X	X				2	2
	MWFW-05	353959.3	2669518.8	X	X				2	2
MINED AREA										
	GW-42	353741	2671809.1	X	X			12		12
	GW-53	354851.9	2670948	X	X			16		16
	GW-41A	354178.6	2672656.4	X	X			3		3
	MWDB-01	353600.61	2671485.19		X				1	1
	MWP3-01	354273.6	2671858.08		X				1	1
	MWP3-02	354238.3	2671861.98		X				1	1
	MWP4-02	356969.36	2671490.98		X				2	2
	MWHD-01	356217.38	2670182.22		X				1	1
	BOM-14S	353266.81	2672011	X	X			11		11
	1S	354303.5	2672435	X	X			8		8
	BOM-17			X	X			13		13
	GW-43	353612.1	2671469.7	X	X			11		11
	GW-45	355781.4	2670430.3	X	X			6		6

Table 4-17
Midnite Mine Summary Sample Counts and Locations Used for Two-Step Process
Matrix: Groundwater

Site	Map Location Number	Northing (ft)	Easting (ft)	Background Limit Initial	Background Limit Retest	Sample Count by Consultant DMC	EcoEnv	SMI	URS	Total
	GW-46	356395.9	2670769.3	X	X			7		7
	GW-47	356584.6	2671659.4	X	X			12		12
	GW-48	355519.1	2670775.6	X	X			10		10
	GW-49	355819.2	2669823.7	X	X			3		3
	GW-54	354344.3	2671296	X	X			16		16
NORTHEASTERN DRAINAGE										
	MWNE-01	358107.9	2672590.8	X	X				2	2
	MWNE-02	358125.9	2672612.2	X	X				2	2
	MWNE-03	357077.4	2672076.9	X	X				3	3
	MWNE-04	357088.6	2672072.8	X	X				2	2
	MWNE-05	355195.9	2673460.6	X	X				2	2
	MWNE-06	355186.5	2673454.6	X	X				2	2
	MWNE-07	356016.2	2672238.8	X	X				2	2
NORTHERN DRAINAGE										
	MWND-01	358770.9	2672747.2	X	X				2	2
NORTHWEST RIDGE										
	MWNW-07	359168.8	2672016.9	X	X				2	2
SOUTHWEST DRAINAGE										
	MWSW-01	351924.2	2669970.1	X	X				2	2
	MWSW-02	351918.6	2669979.1	X	X				2	2
WESTERN DRAINAGE										
	GW-35A	351703.6	2671090	X	X	4			3	7
	GW-50	351691.9	2671069.7	X	X			11	3	14
	MW-1	352273.4	2670907.4	X	X		1	6	2	9
	MWWD-01	352242.4	2670909.9	X	X				3	3
	WDSEEP/SDWD-01/SW10	352385.3	2670826.9	X	X	130	1	20	3	154

Table 4-17
Midnite Mine Summary Sample Counts and Locations Used for Two-Step Process
Matrix: Sediment

Site	Map Location Number	Northing (ft)	Easting (ft)	Background Limit Initial	Background Limit Retest	Sample Count by Consultant DMC	EcoEnv	SMI	URS	Total
BLUE CREEK										
	BC01SW/BC01SD	338393.6	2661588.6		X		1		1	2
	BC04SW/BC04SD	340359.7	2665683.7		X		1		1	2
	BC05SW/BC05SD	341612.1	2667470.1		X		1		1	2
	BC09SW/BC09SD	348806.8	2672663		X		1		1	2
	BC10SW/BC10SD	349193.8	2673739		X		1		1	2
	SDBC-01/SWBC-01	337693.9	2661296		X				1	1
	SDBC-02/SWBC-02	337235.7	2660882.3		X				1	1
	TR04SD/TR04SW	340195.9	2665449.4		X		1		1	2
	TR05SD/TR05SW	340560.3	2665871.7		X		1		1	2
	TR06SW/TR06SD	340241.7	2667021.5		X		1		2	3
	TR07SD	348483.9	2671312.65		X		1			1
	TR01SD	339009.29	2661860.66		X		1			1
	TR02SD	339528.92	2662585.7		X		1			1
	TR03SD	339697.25	2663559.75		X		1			1
	BC02SW/BC02SD	338789.72	2662029.1		X		1			1
	BC03SW/BC03SD	339463.05	2663684.25		X		1			1
	BC06SW/BC06SD	343984.09	2668812.1		X		1			1
	BC07SW/BC07SD	345233.16	2669516.82		X		1			1
	BC08SW/BC08SD	347441.75	2670878.99		X		1			1
	RSBC-01	348078.42	2671395.86	X	X				2	2
	RSBC-02	346144.12	2670034.91	X	X				2	2
	RSBC-03	343721.19	2668585.61		X				1	1
	RSBC-04	341886.15	2667654.15	X	X				2	2
	RSBC-05	338620.88	2661889.1		X				1	1
CENTRAL DRAINAGE										
	CD SEEP/SDCD-01	352439.6	2671733.9		X		1		1	2
	CD01SD	351827.7	2671710.57		X		1			1
	CD02SD	350646.25	2672258.14		X		1			1
	CD-11	350816.64	2672152.85		X		1			1
	CD03SD	352439.6	2671733.9		X		1			1
	RSCD-01	352143.25	2671697.62	X	X				3	3
	SDCD-02/SW-12	351041	2671917.8		X				1	1
	SDCD-03	351527.1	2671686.3		X				1	1
	RSCD-02	350805.36	2672164.97	X	X				2	2
EAST HAUL ROAD-MAIN ROAD USED TO HAUL ORE FROM MINE TO MILL IN FORD.										
	SWEHR/SDEHR-01	351544.17	2675336.23		X				1	1
EASTERN DRAINAGE										
	EAST SEEP/SDED-05	353815.4	2672668.2		X				1	1
	SW-06/ED01-SD/ED01SW	349401	2672437		X		1		1	2
	SWED-02/SDED-04	350010.7	2672175.1		X				1	1
	SWED-01/SDED-03	350768.6	2672256.1	X	X				2	2
	ED-4A/SDED-02	353226.6	2673130	X	X				2	2
	ED04-SD/ED-2A	353683.6	2673313.7		X				1	1
	SW-02/SDED-6	353951.3	2673453.7	X	X				2	2
	SDED-01	354369.6	2673300.7		X				1	1
	SDED-07	355034.6	2673570.4		X				1	1
	OF01SW/OF01SD	355006	2673470.5		X		1			1

Table 4-17
Midnite Mine Summary Sample Counts and Locations Used for Two-Step Process
Matrix: Sediment

Site	Map Location Number	Northing (ft)	Easting (ft)	Background Limit Initial	Background Limit Retest	Sample Count by Consultant DMC	EcoEnv	SMI	URS	Total
	ED02SW/ED02SD	350123.4	2672230.15		X		1			1
	ED03SW/ED03SD	352752.52	2673093.23		X		1			1
	ED04SW/ED04SD	353358.21	2673228.47		X		1			1
	ED05SW/ED05SD	354402.7	2673538.03		X		1			1
	ES01SP/ES01SD	353408.7	2673201.53		X		1			1
	ES02SP/ES02SD	353477.71	2673248.67		X		1			1
	RSED-01	352970.41	2673128.29		X				1	1
	RSED-02	351264.83	2672669.55		X				1	1
	RSED-03	349372.39	2672462.02	X	X				2	2
	RSED-04	352456.8	2673133.81		X				1	1
	RSED-05	353187.3	2673197.35		X				1	1
FAR WEST DRAINAGE										
	SDFW-01/SWFW-01	353034.3	2669303.1		X				2	2
MINED AREA										
	BP01SW/BP01SD	354796.55	2673054.83		X		1			1
	BP02SW/BP02SD	354806.65	2672990.85		X		1			1
	PP01SW/PP01SD	352701.86	2671808.33		X		1			1
	PP02SW/PP02SD	352592.79	2671664.84		X		1			1
	SWP3-01/SDP3-01	355253.95	2671712.85		X				2	2
	SWP4-01/SDP4-01	357761.29	2671582.9		X				1	1
	P302SW/P302SD	355019.07	2671710.08		X		1			1
	P303SW/P303SD	354781.76	2671659.57		X		1			1
	P401SW/P401SD	357790.24	2671593.75		X		1			1
	P402SW/P402SD	357589.96	2671474.21		X		1			1
	P403SW/P403SD	357398.08	2671487.68		X		1			1
NORTHEASTERN DRAINAGE										
	SDNE-01/SWNE-01	358068.9	2672615.2	X	X				2	2
	SDNE-02/SWNE-02	355142.8	2673527.7	X	X				2	2
NORTHERN DRAINAGE										
	SDND-01/SWND-01	358697.2	2672833.5	X	X				2	2
	SDBK-03/SWBK-03	353368.5	2676636.4		X				2	2
ROOSEVELT LAKE										
	RL01SW/RL01SD				X		1			1
	RL02SW/RL02SD				X		1			1
SOUTHWEST DRAINAGE										
	SDSW-01/SWSW-01	351193.8	2670114.2	X	X				3	3
WESTERN DRAINAGE										
	WDSEEP/SDWD-01/SW10	352385.3	2670826.9		X		1		1	2
	SWWD-01/SDWD-02	351610	2671114.5		X				2	2
	RSWD-02	350898.44	2671580.54		X				2	2
	WDAC/SDWD-03	350041	2671811.4		X				1	1
	RSWD-04	351184.45	2671353.99	X	X				2	2
	WD01SD	351682.96	2671102.78		X		1			1
	WD02SD	352131.63	2670949.3		X		1			1
	RSWD-01	352320.83	2670889.19		X				1	1
	RSWD-03	349933.16	2671930.03	X	X				2	2

Table 4-17
Midnite Mine Summary Sample Counts and Locations Used for Two-Step Process
Matrix: Soil

Site	Map Location Number	Northing (ft)	Easting (ft)	Background Limit Initial	Background Limit Retest	Sample Count by Consultant DMC	EcoEnv	SMI	URS	Total
EAST HAUL ROAD-MAIN ROAD USED TO HAUL ORE FROM MINE TO MILL IN FORD.										
	SMEHR-01	354078.07	2673756.26	X	X				3	3
	SMEHR-02	353373.08	2673773.26	X	X				2	2
	SMEHR-03	352825.09	2674409.25	X	X				2	2
	SMEHR-04	353339.08	2675257.23		X				1	1
	SMEHR-05	353210.09	2675457.22	X	X				2	2
	SMEHR-06	353499.07	2675563.22		X				1	1
	SMEHR-07	353773.07	2675980.21		X				1	1
	SMEHR-08	353003.08	2676469.19	X	X				2	2
	SMEHR-09	351664.11	2676477.2		X				1	1
	SMEHR-10	351460.11	2676925.19	X	X				2	2
	SMEHR-11	351576.11	2677407.18	X	X				3	3
	SMEHR-12	351901.1	2678190.16		X				1	1
	SSEHR-01	354078.07	2673756.26		X				1	1
	SSEHR-02	353373.08	2673773.26		X				1	1
	SSEHR-06	353499.07	2675563.22		X				1	1
	SSEHR-09	351664.11	2676477.2		X				1	1
	SSEHR-11	351576.11	2677407.18		X				2	2
MINED AREA										
	SMMA-04	357590.05	2671122.49		X				1	1
	SMMA-05	357067.06	2670015.52		X				1	1
	SMMA-06	357269.06	2670646.51		X				1	1
	SMMA-07	356946.05	2671631.48		X				1	1
	SMMA-08	357290.05	2671624.48		X				1	1
	SMMA-09	358109.03	2672085.47		X				1	1
	SMMA-10	355032.09	2671230.5		X				1	1
	SMMA-11	354573.1	2671050.5		X				2	2
	SMMA-12	354329.1	2670925.51		X				1	1
	SMMA-13	353572.12	2670649.52		X				1	1
	SMMA-14	353744.11	2671078.5		X				1	1
	SMMA-15	353887.11	2671805.48		X				1	1
	SMMA-16	354613.09	2672774.46		X				1	1
	SMMA-01	354753.1	2669953.53		X				1	1
	SMMA-02	354499.11	2670370.52		X				1	1
	SMMA-03	355364.09	2670427.52		X				1	1
NORTHEASTERN DRAINAGE										
	SMDWNE-01	358332.02	2672878.44	X	X				2	2
	SMDWNE-02	358503.02	2673616.42	X	X				2	2
	SMDWNE-03	358180.02	2673409.43		X				1	1
	SMDWNE-04	357747.03	2673728.42		X				1	1
	SMDWNE-05	357885.03	2673136.44	X	X				2	2
	SMDWNE-06	358509.02	2673615.42		X				1	1
	SMDWNE-07	357438.04	2672756.45	X	X				3	3
	SMDWNE-08	356920.05	2672646.45		X				1	1
	SMDWNE-09	356594.05	2672746.45		X				1	1
	SMDWNE-10	356554.05	2673809.42	X	X				2	2
	SMDWNE-11	356262.05	2674106.42	X	X				2	2
	SMDWNE-12	356067.06	2672615.46		X				1	1

Table 4-17
Midnite Mine Summary Sample Counts and Locations Used for Two-Step Process
Matrix: Soil

Site	Map Location Number	Northing (ft)	Easting (ft)	Background Limit		Sample Count by Consultant				
				Initial	Retest	DMC	EcoEnv	SMI	URS	Total
	SMDWNE-13	355837.07	2672448.46	X	X				2	2
	SMDWNE-14	355392.07	2672736.46	X	X				2	2
	SMDWNE-15	355279.07	2673111.45		X				1	1
	SMDWNE-16	355524.06	2673696.43	X	X				2	2
	SSDWNE-01	358332.02	2672878.44		X				1	1
	SSDWNE-04	357747.03	2673728.42		X				1	1
	SSDWNE-06	358509.02	2673615.42		X				1	1
	SSDWNE-09	356594.05	2672746.45		X				1	1
	SSDWNE-12	356067.06	2672615.46		X				1	1
	SSDWNE-13	355837.07	2672448.46		X				1	1
SOUTHWEST DRAINAGE										
	SMDWSW-01	353594.13	2668511.57		X				1	1
	SMDWSW-02	353199.14	2668872.56		X				1	1
	SMDWSW-03	352948.14	2669020.56		X				1	1
	SMDWSW-04	352496.15	2668443.58		X				1	1
	SMDWSW-05	352701.14	2669633.54		X				2	2
	SMDWSW-06	352718.14	2669831.54		X				1	1
	SMDWSW-07	352222.83	2669240.59		X				1	1
	SMDWSW-09	352063.16	2668502.58		X				1	1
	SMDWSW-10	352169.21	2669973.22		X				1	1
	SMDWSW-11	351971.15	2669563.55		X				1	1
	SMDWSW-12	351610.17	2667934.59		X				1	1
	SMDWSW-13	351669.17	2668500.58		X				1	1
	SMDWSW-14	351344.17	2668982.56		X				1	1
	SMDWSW-15	351387.17	2668923.57		X				1	1
	SMDWSW-16	350814.18	2668364.58		X				1	1
	SMDWSW-08	352414.14	2670082.53		X				1	1
	SSDWSW-02	353199.14	2668872.56		X				1	1
	SSDWSW-05	352701.14	2669633.54		X				2	2
	SSDWSW-07	352222.83	2669240.59		X				1	1
	SSDWSW-09	352063.16	2668502.58		X				1	1
	SSDWSW-11	351971.15	2669563.55		X				1	1
	SSDWSW-13	351669.17	2668500.58		X				1	1
WEST HAUL ROAD, MINING GENERATED CRUSHED WASTE ROCK										
	SMWHR-01	351838.13	2670004.36	X	X				2	2
	SMWHR-02	352013.12	2670259.35		X				1	1
	SMWHR-03	351520.13	2669849.36		X				1	1
	SMWHR-04	351126.14	2670193.35		X				2	2
	SSWHR-03	351520.13	2669849.36		X				1	1

Table 4-17
Midnite Mine Summary Sample Counts and Locations Used for Two-Step Process
Matrix: Surface Water

Site	Map Location Number	Northing (ft)	Easting (ft)	Background Limit Initial	Background Limit Retest	Sample Count by Consultant DMC	EcoEnv	SMI	URS	Total
BLUE CREEK										
	BC01SW/BC01SD	338393.6	2661588.6		X		1		3	4
	BC04SW/BC04SD	340359.7	2665683.7		X		1		2	3
	BC05SW/BC05SD	341612.1	2667470.1		X		1		2	3
	BC09SW/BC09SD	348806.8	2672663		X		1		2	3
	BC10SW/BC10SD	349193.8	2673739		X		1		2	3
	TR06SW/TR06SD	340241.7	2667021.5		X		1		2	3
CENTRAL DRAINAGE										
	SDCD-02/SW-12	351041	2671917.8		X	30		18	2	50
EAST HAUL ROAD-MAIN ROAD USED TO HAUL ORE FROM MINE TO MILL IN FORD.										
	SWEHR/SDEHR-01	351544.17	2675336.23		X				1	1
EASTERN DRAINAGE										
	SW-06/ED01-SD/ED01SW	349401	2672437		X	129	1	10	4	144
	SWED-02/SDED-04	350010.7	2672175.1		X				4	4
	SWED-01/SDED-03	350768.6	2672256.1		X				2	2
	ED-4A/SDED-02	353226.6	2673130		X				2	2
	ED04-SD/ED-2A	353683.6	2673313.7		X				3	3
	SW-02/SDED-6	353951.3	2673453.7		X	66		10	2	78
	OF01SW/OF01SD	355006	2673470.5		X		1		2	3
MINED AREA										
	SWP3-01/SDP3-01	355253.95	2671712.85		X				2	2
	SWP4-01/SDP4-01	357761.29	2671582.9		X				1	1
WESTERN DRAINAGE										
	WDAC/SDWD-03	350041	2671811.4		X	21		18	2	41

5.0 NATURE AND EXTENT OF CONTAMINATION

This section characterizes the nature and extent of contamination resulting from historical mining activities at the site. The land surface in the MA is highly disturbed, with two remaining large open pits (including pit lakes), a WTP, many surface and subsurface waste/protore piles, and roads. The extensive surface disturbance, exposed rock surfaces, waste rock/protore piles, and buried waste rock in the MA are the primary sources of continuing releases of site contaminants. This differs from the surrounding areas in the PIA which, except for contaminated haul roads, have little surface disturbance from mining.

The physical and chemical breakdown of surface and subsurface material in the MA continues to release metals and radionuclides and produce ARD, which impacts surface water, groundwater, and sediment. Contaminants are transported away from the MA and into the PIA via overland surface water flow, sediment migration, interflow (shallow groundwater flow) in unconsolidated waste rock piles and subsurface material, and in groundwater flow through deeper rock fractures. The drainage areas surrounding the MA receive the contaminated surface water, groundwater, and sediment.

Once contaminated material enters the drainage channels, surface water flow is the primary mechanism by which the material and contaminants are transported. Contaminated groundwater contributes to surface water flow in the drainage channels as seep discharges. Consequently, sediments and water present in the PIA drainage channels south and east of the MA show some of the greatest mining impacts. As contaminants are transported downstream, the sediment and surface water interact, changing the balance of contaminant concentrations (increasing variability) in the two media.

Seasonal variations in temperature and precipitation produce some of the high variability observed in the surface water and groundwater data. For example, during winter months, stream flows are low and mostly sustained by groundwater discharge. During high periods of precipitation and melting snow in the spring, high stream flows are sustained by overland flow, which interacts in the MA with much of the exposed surface material prior to entering the adjoining drainages. The high variability complicates identifying the extent of contaminants at the site, such as downgradient of the MA where contaminant levels approach background levels.

Figures 5-1, 5-2, and 5-3 show the maximum concentrations of uranium detected in surface water, groundwater, and sediment. Conclusions as to whether areas downgradient of the MA are contaminated are based on the suite of indicator parameters selected in the RI. The indicator parameter uranium was selected here to illustrate the extent of contaminant migration in the different media. As shown on Figure 5-1, concentrations of uranium^{238} in surface water are very high in the MA and drainage channels east and south of the MA. Outside of these areas, the

concentrations of uranium in surface water drop off considerably. Background sampling north of the MA in the Sand Creek watershed showed some of the natural variability present in the general area.

Figure 5-2 shows that maximum concentrations of uranium^{234} in groundwater have a similar pattern to surface water. (Uranium^{234} is used as an indicator parameter but is generally proportional to uranium^{238}.) The groundwater that underlies both the MA and drainage channels south and east of the MA is highly impacted. Shallow groundwater discharges to surface water (as seeps) in the drainages channels close to the MA. Concentrations of uranium^{234} in groundwater lessen to below background prior to reaching Blue Creek.

Figure 5-3 shows the extent of maximum concentrations of uranium^{238} detected in sediment samples. The movement of sediment away from the MA is evident by the high concentrations detected in the drainage channels south and east of the MA. As impacted sediments are transported downstream, they mix with additional sediment inputs from un-impacted areas, potentially diluting the uranium^{238} (and other COPC) concentrations. In addition, interaction with surface water affects the concentrations of uranium in surface water and sediment. As sediments continue to be transported downstream further from the source of contamination, the COPC concentrations are likely to be present at or near the natural background concentrations.

Section 5 presents conclusions regarding the nature and extent of site contamination. Section 5.1 discusses the primary controls for releasing contaminants, including ARD and radiological processes. Section 5.2 summarizes the selection of indicator parameters, and describes methods used to compare background to site data to support documentation of site impacts (two-step and ratio methods). Section 5.3 is an overall summary of impacted areas and a discussion of indicator parameter exceedances by media. Sections 5.4 through 5.9 discuss in detail exceedances of background for surface water, sediments, surface and subsurface materials, groundwater, and air.

5.1 PROCESSES CONTROLLING THE RELEASE OF CONTAMINANTS

ARD and radiological processes are key issues in the mobilization and migration of contaminants in and from the MA to the surface water, groundwater, sediments, and surface materials in the PIA (which surrounds the MA). This section provides a brief overview of these processes, which are discussed in more detail in Section 6. The COPCs include metals, radionuclides, and inorganic compounds.

5.1.1 Acid-Rock Drainage and Metals Leaching

ARD is a term used to describe acidic leachate, seepage, or drainage that results from the weathering of sulfide minerals exposed to water and air. This process occurs naturally at or near the Earth's surface, as shown by the common presence of yellow-orange stains or deposits around the edges of hot springs or marshy sediments. Some hot spring waters have a pH as low as 2 because of this process. ARD also is generated at many mining sites because of excavation or atmospheric exposure of rocks containing metal-sulfide minerals such as pyrite and pyrrhotite. Excavation or exposure of these rocks increases the available surface area of the sulfide minerals to react with air and water. At the Midnite Mine, waste rock piles, ore and protore stockpiles, and the walls of the open pits are potential sources of ARD.

The primary factors that influence acid generation include:

- Presence, type, and distribution of sulfide minerals
- Water and oxygen flux through the acid-generating materials
- Particle size and exposed surface area of sulfide minerals
- Amount and species of bacteria present
- Presence of rocks or sediments with neutralizing capacity, which may increase the alkalinity and buffering capacity of the water

When the neutralizing capacity (buffering) of the aqueous environment is exceeded, acidity increases and pH decreases. The acid water, which usually contains high levels of sulfate, has the potential to mobilize metals because most metals are more soluble in low-pH water. Heavy metals associated with ARD commonly include iron, copper, aluminum, manganese, zinc, and nickel. At some sites, such as Midnite Mine, metals that are present at elevated concentrations, likely as a result of mineralization (such as cadmium, chromium, cobalt, and uranium), are also mobilized by ARD. Based on a preliminary comparison of estimated background concentrations to site data, lead, arsenic, vanadium, and thallium appeared to be much less mobile than other metals or radionuclides.

Geochemical characterization studies were performed on waste rock samples taken from the Hillside and South Spoils waste rock dumps in 1992 and 1994 by BOM (Altringer and Froisland 1993 and Moore et al. 1996). During the RI, EPA reviewed and further evaluated the data (EPA 2000a), and also performed basic statistical analyses, described the waste rock geochemistry, and performed multivariate pattern analysis and ANOVA. In addition, results of the Humidity Cell Testing (HCT) were subjected to time-series evaluation.

Waste rock paste pH for the combined data sets ranges from approximately 4.1 to 10.4, with a mean of 7.4. Within the context of a generally calcareous waste rock matrix, measurements of pH < 6.0 are considered to be evidence of net acid generation by pyritic waste materials and/or dissociated metals such as aluminum and iron. Approximately 10 percent of South Spoils waste rock samples indicate a pH < 6.0. The distribution of acid-producing materials is predominantly limited to mid-level to deep depths (50 to 145 feet bgs) within the South Spoils pile, although acidity was also detected in several upper horizon samples (0 to 40 feet). Measurements of pH in Hillside Dump samples are also variable (from 4.6 to 8.3), with about 16 percent of the samples indicating a pH < 6.0. Low-pH materials are distributed across all depths within the Hillside Dump.

The combined 1992 and 1994 analyses confirm that approximately 16 percent of the South Spoils waste rock samples are net acid generating, whereas <1 percent of the Hillside Dump materials are confirmed to have net acid generation potential. Although the majority (>99 percent) of Hillside Dump materials are classified as having uncertain net acid generation potential, 16 percent of the rock has already generated acidity (paste pH <6.0). For the South Spoils, 51 percent of the samples show net neutralizing potential, with the remaining samples classified as having uncertain net acid generation potential. Approximately 10 percent of these "uncertain" materials show evidence of actual acid generation (paste pH < 6.0).

Graphical analyses of both data sets indicate higher average concentrations of aluminum in Hillside Dump samples relative to South Spoils samples. Conversely, mean concentrations of total calcium, cadmium, magnesium, manganese, and zinc are higher in South Spoils waste rock. Both copper and uranium concentrations are higher in South Spoil materials.

Measurements of cell drainage pH and estimates of base metal sulfate ratios indicate both actual and potential acid generation in South Spoils and Hillside Dump samples. Time-series analysis of change in concentrations of all dissolved constituents generally shows strong evidence of buildup and flushing of weathering/oxidation products over time. Initially high dissolved sulfate concentrations and their inverse correlation with drainage pH suggest progressive sulfide oxidation and rapid removal of soluble oxidation products when flushed. This is evident in the high concentrations of sulfate found in media at the site. The occurrence of sulfate is an indicator of how far from source materials persistent mining related effects may be identified. However, the presence of sulfate without other indicator parameters exceedances may not indicate the need for mitigation.

5.1.2 Radiological Processes

Radiological processes that control the release of contaminants include radiological decay and radon emanation.

Radiological Decay and Decay Products

Radioactivity refers to the processes by which nuclei of unstable atoms spontaneously decay or disintegrate by one or more transmutations until a stable state is reached. Certain elements are unstable as they occur in nature and are called natural radionuclides. Decay of radionuclides occurs by the emission of alpha particles (a combination of two protons and two neutrons) and beta particles (negatively charged high-speed electrons). Decay of many radionuclides is accompanied by emission of gamma rays.

The first radionuclide on the decay chain is called the parent compound, and specific products result from the decay of each parent. The parent radionuclides of importance at the Midnite Mine are unranium^{238}, uranium^{235}, and thorium^{232}. These parent radionuclides each yield radioactive decay products.

Chemical factors that influence the mobility of radionuclides in water include valence state, solubility, and redox conditions. Low-pH waters tend to carry more dissolved heavy radionuclides than high-pH waters. Thorium in the +4 valence state (Th[IV]) is highly immobile in all aqueous environments, whereas radium in the +2 valence state (Ra[II]) is often mobile. Uranium behaves entirely differently in oxidizing and reducing waters because of its two valence states (U[IV] and U[VI]). In the reduced state, uranium is relatively immobile. In the oxidized state, uranium readily forms highly soluble complexes such as UO2 (CO3)22- (McKelvey et al. 1955), which is very mobile in most natural surface water and shallow groundwater environments.

Tables 5-1 through 5-3 list the radionuclides analyzed in samples of groundwater, surface water, sediments, and surface materials in the MA, PIA, and background area organized by decay series. Several radionuclides not listed in the tables have relatively short half-lives and/or low dose factors. The relative activity concentrations of these radionuclides can be calculated from the activity concentrations of the other radionuclides in the series that were directly measured. Further discussion of the radionuclides measured is presented in the Phase 1A QAPP (URS 1999) and the technical memorandum Radioactive Equilibrium Evaluation for Midnite Mine RI/FS (URS 2002b).

Radon

Radon^{222} is an alpha-emitting noble gas produced directly from the decay of radium^{226}, one of the decay products of uranium^{238}. The Earth's crust contains an average of 3 to 4 parts per million (ppm) uranium, and nearly all soils and rocks contain some uranium and radium. Thus, radon^{222} emanates continuously from these materials. Exposed rocks and soils in mineralized areas such as the Midnite Mine, and other nearby unmined uranium deposits, are likely to release more radon per unit area into the air than unmineralized areas.

Radon gas diffuses readily through soils, with the rate of diffusion dependent on the characteristics of the source material and the thickness of cover material over the source. Radon gas is soluble in groundwater, where it often is present at activity concentrations that appear substantial in comparison with those of dissolved radium^{226}. The radon in the water is derived mostly from decay of radium contained in solids within the aquifer. Not all of the radon produced by decay of radium is released to the air. Some of the radon does not escape the soil particles. The percentage of the radon produced by decay of radium^{226} that escapes from the solid materials into the air is called the radon emanation fraction. Factors that control the release of radon from soils and rocks into the air include the activity concentration and distribution of radium^{226} in the soil, the soil type, porosity, moisture content, and meteorological conditions.

Three aspects of radon were measured for the RI/FS: (1) the activity of radon in ambient air and water at various locations in the MA, PIA, and background area; (2) the rate at which radon is released to the air in the MA and background area, called radon flux; and (3) the radon emanation fraction. Radon flux and radon emanation fraction were measured to support the design of potential soil covers of MA materials.

5.2 SELECTION OF INDICATOR PARAMETERS AND COMPARISON OF SITE DATA TO BACKGROUND

A selected set of indicator parameters (analytes) for each media is used to determine the nature and extent of mining impacts at the site. The indicator parameters include metals typically found at uranium sites. Many of the indicator parameters represent one or more other analytes, which are likely to behave in a similar manner geochemically. For example, cobalt as an indicator parameter for sediment also represents beryllium and copper. Sulfate in surface water also represents calcium, magnesium, potassium, sodium, and chloride.

To identify analytes with similar characteristics, a statistical correlation matrix was constructed for each medium. Each matrix included chemical data from the MA and PIA for a particular medium. Background data were not used in the correlation matrices. In each matrix, a high degree of correlation between analytes (greater than 0.84) was interpreted as indicating similar environmental transport characteristics. For such cases, a single analyte was selected to represent other, similar analytes. Correlations between analytes are summarized by medium in Appendices GW-4, SW-4, SD-4, and SM-4 of the Background Statistics technical memorandum (Appendix B). The final set of indicator parameters was selected based on the correlation matrices and professional judgment. Indicator parameters by media are presented in Section 4.6. Section 4.6 also discusses uncertainties associated with determining background.

The use of indicator parameters reduces the volume of data analysis needed to identify mining impacts in the MA and PIA. It does not limit site cleanup to the indicators. Depending on the

type of remedial action used to contain sources, a reduction in the concentration of one indicator parameter usually corresponds to a reduction in other correlated parameters. Additional information regarding indicator parameter selection is available in the Background Statistics Technical Memorandum (Appendix B).

5.2.1 Statistical Methods Used for Comparison of Site Data

Two complementary methods, the two-step method and the ratio method, were used to assess whether groundwater, surface water, sediments, or surface materials are impacted on the site. The two-step method used a two-step statistical testing strategy to compare individual sample values with background limits (described in detail below). Tables 4-15 and 4-16 summarize the BLs and RBLs by media. The results of the two-step method are presented in a series of wagon wheel diagrams in Background Statistics for Midnite Mine RI/FS (EPA 2002a).

The two-step method was applied to site data collected during the RI and existing data as summarized in Table 4-17. As shown in Table 4-17, sampling was conducted by URS, E&E and SMI (for Dawn Mining Company) at the site. The two-step method requires collecting verification samples, if possible, from the location first sampled. The two-step method was applied to the site media as follows:

- Groundwater: Applied to MA and PIA samples collected by URS, E&E and SMI.
- Sediments: Applied in the MA to compare sediment samples collected from Pits 3 and 4. Applied to PIA samples collected by URS, E&E and SMI.
- Surface Materials: Not applied in MA given the level of disturbance. Applied to PIA samples (including samples on and adjacent to haul roads).
- Surface Water: Applied only to samples collected from Pits 3 and 4 in fall 1999 and spring 2000. Applied to the PIA samples collected by URS, E&E and SMI.

In instances where precise sample location data were not available to allow resampling of a non-URS location, the data were compared to RBLs from the two-step method during evaluation of the nature and extent of site contamination. In cases where non-EPA data were collected at depth intervals different than the RI background data, the data were not comparable.

The ratio method compared PIA and background populations (Appendix E) using ratios of the geometric means calculated at different confidence levels. The ratio method quantitatively compares the geometric mean of background population to the geometric mean of selected areas of the PIA by medium. This comparison allowed for discussion of the magnitude of background exceedances by area.

A conclusion as to whether a sample or area is mine-impacted was based on the results of both the two-step method interpreted in the context of the geology and other available information about the site. The site data were evaluated with respect to contaminant sources and locations, spatial trends in concentrations, number and magnitude of parameter exceedances of background limits, geochemical mobility of the contaminants, physical transport processes, site features, and site history. The ratio method provided an overall indication of how, on average, areas were different from background. This provided an additional line of evidence for concluding whether or not an area was impacted.

5.2.1.1 Two-Step Statistical Testing Method

To balance the potential false-positive and potential false-negative error in defining mine-affected locations, a two-step statistical testing strategy described by the EPA (1989) was used. The two-step method involved calculation of background limits and statistical testing of site data against these limits. To check that the background limits represented single populations, an ANOVA and an evaluation of graphical representations of the data (histograms, box-and-whisker plots, and probability plots) were performed for each medium. Factors such as seasonal variations in water quality, hydrologic conditions, sampling method, and rock type were evaluated. As many of the background data as possible were grouped to increase the statistical power of comparisons to site data, as long as the group consisted of a single population.

For groundwater, all background sample results (for bedrock and alluvial wells during both the fall and spring sampling events) were grouped together, because significant differences were not found between data compared by season and by hydrologic unit. However, for surface water, significant differences were noted between fall and spring sample results for some parameters; therefore, surface water data were grouped by season and background limits calculated for each season.

For sediments, both composite and grab samples were collected in background areas, and background limits were calculated for each of the two sample types. The composite sediment sample data collected for the RI in the PIA and MA were compared to composite sediment background limits. Grab sediment sample data collected by E&E in 1998 were compared with the grab sediment background limits.

For surface material, samples were collected at two depths in background areas and the PIA. Graphical data comparisons and ANOVA tests showed that the data sets for several indicator parameters appeared to be statistically different for the two depths. Therefore, separate sets of background limits were calculated for each of the two sampled depths.

This two-step process is consistent with EPA guidance for statistical analysis of groundwater monitoring data at Resource Conservation and Recovery Act (RCRA) facilities (EPA 1989). In

this process, the first sample is compared with the BL (95% confident, 99% UTL) and a second (verification) resample is compared with the RBL (95% upper prediction limit [UPL]) for each indicator parameter. To reduce false-positive errors, each indicator parameter must exceed both the BL and the RBL to be considered an exceedance of the background limit. For example, groundwater samples were collected twice in the PIA, in the fall of 1999 and the spring of 2000. Groundwater samples collected in the fall were compared with the BL, and those collected in the spring as verification resamples were compared with the RBL. When this two-step process was not possible (for instance, at site locations where only one sample was available), the more conservative RBL (the background concentrations of the RBLs are lower than or equal to the BLs) was used for the first and only comparison.

To reduce the chance of false negatives and false positives, especially at locations not having verification resamples, professional judgment was used to assess the presence of actual mine effects. This assessment began by plotting the results of the sample comparison process on a series of wheel-like graphics (exceedance wheels). The exceedance wheels (Appendix H) provide a standardized visual presentation of the data-comparison results in which the "rim" of the wheel represents the BL and RBL values, unitized for each indicator parameter. Each "spoke" of the wheel represents one analyte in the sample data as a ratio of the BL or RBL value. Spokes that extend through the rim of the wheel indicate exceedances of the BL or RBL.

Exceedance wheels for RI sampling locations were plotted on site maps to aid in identifying mine-related effects. If an indicator parameter for a given sample exceeded both the background limits using the methodology described above, that sampling location was provisionally considered to be affected by the mine. Using a Monte Carlo simulation approach described by EPA (1989), the RI calculated estimates of the probabilities for false-positive and false-negative errors that would occur in comparing site data to the BL values for each medium. These error rate probabilities, which are listed in Table 5-4, are calculated using the actual number of background samples and samples collected for each medium, the number of indicator parameters, and the expected coverage of the UTL (BL) and the confidence level of the UPL (RBL).

The background statistics and comparison process are described further in Appendices B and E. Appendix D presents site data and the corresponding BL and RBL for each analyte.

5.2.1.2 Ratio Method

The ratio method was used to confirm the results of the two-step method and quantify the magnitude of exceedances of background for affected areas. Comparisons were made between background samples and site data (e.g., the MA, Northeast Downwind Area, and Southwest Downwind Area). To compare two populations, the ratio (R) of the geometric mean

concentrations of the two populations was estimated. R reflects the natural variability inherent in the true populations sampled and statistical uncertainty inherent in the sample data.

For the ratio method, all background sample results for groundwater were pooled, consistent with the two-step process. Other data were handled differently from the two-step method as described below:

- Surface water background data were pooled. This differed from the two-step process where data were grouped by season. Given that radium^{226} and sulfate were the only two indicators found to vary by season, the ratio method pooled all surface water data to increase the number of samples used to estimate R.

- For sediments, composite and grab samples were combined into a weighted average, thus weighting the single grab sample relative to the 5 samples collected for a composite sample.

- Sample data for surface materials and subsurface materials were pooled. Because correlation exists between the surface and subsurface data, the pooling will overestimate the effective number of independent sample points for co-located sample locations.

The ratio method relies on an estimate of the confidence limits on the true R. The ratio represents the true geometric means of any two populations (in this case, background and potentially affected areas). This approach provided estimates of lower and upper confidence limits (LCLs and UCLs) on true (R at 1-alpha) confidence levels. R is also the estimated ratio of the medians when the concentrations are lognormally distributed. Statistically, geometric mean estimates have minimum sensitivity to sample volume effects, including variations in sample composites. Mathematical details and comments on the ratio analyses are presented in Appendix E.

Two useful aspects of the ratio method in understanding exceedances of background at the site are:

- The ratio is “scale invariant” so chemicals that have different ranges of concentrations, from fractional parts per billion (ppb) (e.g., cadmium) to thousands of ppm (e.g., aluminum), can be compared. For example, R=2 for cadmium has the same meaning as R=2 for aluminum. R also provides an approximate measure of relative human health and environmental risk because risk is determined using mean chemical concentrations. Thus, if R=2, the risk is also about twice the background risk. Estimating R assumes equal coefficient of variations in both populations.

- The ratio method can be used to test the sensitivity of the extent of mining impacts to changes in background values. This has been done by using the Southwest Downwind Area surface material data and lowering the background concentrations for a broad set of analytes (including indicator parameters) by 10, 20, and 30 percent. The effects of reducing background values on the ratios are presented in Table 5-5. As shown in the table, using the RI background values (5%), 2 of the 21 analytes had a 95% LCL on R that exceeds a value of one. This indicates that only 2 of 21 of the surface material concentrations are statistically different from background at the 95% confidence level (95% LCL on R>1). A 10% decrease in the background values increases the number of analytes above background to 9 out of 21. For a 20% and 30% decrease in the background, the number of analytes above background increases to 15 out of 21 and 16 out of 21, respectively. While the number of analytes increases at a lower background, the ratios are below a value of two. Thus, while it appears that the moderate decreases in background values would increase the number of exceedances, even a 30% decrease in background does not substantially increase the ratio, or the "average" magnitude of the exceedance of background.

5.3 SUMMARY OF BACKGROUND EXCEEDANCES

The following sections discuss the results of the two-step comparison of RI samples to background limits for indicator parameters. (See Section 4.6 regarding the background evaluation and uncertainties in determining background.) For purposes of the RI, mining-impacted areas are those areas where ecological and human health risk assessment may determine a need for remediation. Un-impacted areas are those areas where mining impacts are not at levels of concern from the remedial standpoint, based on existing data.

This section summarizes the mining-impacted areas and non-impacted areas by media. Sections 5.4 through 5.9 discuss background exceedances in detail, by media (surface water, sediments, groundwater, surface materials, subsurface materials, and air). Tables 5-6 through 5-128 identify site data analytes (EPA, E & E and Shepard Miller) that exceed the BL or RBL. Table 5-129 presents the 95% UTLs for the indicator parameters (95% UTLs are used for screening in the Human Health Risk Assessment). Table 5-130 lists the analytical data for indicator parameters and identifies exceedances of the 95% UTLs.

Table 5-131 presents, by area, summary statistics that aggregate the available data for each media (surface water, sediment, groundwater, surface material) under an indicator parameter. These statistics use the data collected for the RI, as well as E&E and SMI sampling data (presented in Appendix D) to present a unified overview of the number of locations, minimum and maximum concentrations, number of samples, average concentrations and standard

deviations. This table presents information on the sampling density and the average concentrations in the areas discussed in Sections 5.4 to 5.9. The average concentrations provide a measure of relative differences when compared with background concentrations. The average as presented in this table is not used to make a statistical or quantitative judgment as to whether an area is impacted. That is the purpose of the two-step and ratio methods.

The following sections summarize exceedances of background identified by using the two-step method. As appropriate, ratios are used to support the two-step process and provide limited discussion on the magnitude of exceedances for indicator parameters. Table 5-132 summarizes impacted and non-impacted areas for surface water, sediment, groundwater, surface and subsurface materials, and air. The summary of impacted areas is based on a detailed discussion of indicator parameter exceedances presented in Section 5.4.

5.3.1 Surface Water

Findings

Substantial mining impacts to surface water in the MA and PIA were identified for individual drainages and impoundments. Surface water impacts were the highest in the MA and drainages directly south of the MA. Exceedances of the indicator parameters were much lower in Blue Creek. Sulfate is the most areally extensive indicator of mining-related surface water effects.

Two-Step Method. Pits 3 and 4 and other surface impoundments were found to contain concentrations of indicator parameters that exceed background limits, as shown on Figure 5-4. The Western, Central, and Eastern Drainages contain elevated concentrations and activity concentrations of numerous surface water indicator parameters exceeding background, notably sulfate, uranium, cadmium, chromium, and nickel. Although concentrations of these constituents were highest near the MA, chromium, nickel, sulfate, and uranium concentrations were still above background in Middle and Lower Blue Creek. The Far West Drainage exceeded background for sulfate only.

Ratio Method. The ratio of the geometric means for MA pit water (Pits 3 and 4) show the following exceedances of background (Table 5-23):

- Radium^{226}: 13 to 26 times higher
- Sulfate: 244 to 358 times higher
- Uranium^{238}: 3,000 to 6,500 times higher

Surface water in the combined impacted drainages south and east of the MA (Far West Drainage not included because sulfate was the only exceedance) shows the following exceedances of background (Table 5-24):

- Sulfate: 105 to 154 times higher
- Uranium^{238}: 51 to 73 times higher

Surface water in combined Middle and Lower Blue Creek show the following exceedances of background (Table 5-25):

- Sulfate: 60 to 73 times higher
- Uranium^{238}: 12 to 17 times higher

Conclusions

Based on the results of both methods, surface water is impacted (Figure 5-4) in the following areas:

- Pit 3 Pit 4, the PCP, the Blood Pool, and the Outfall Pond
- Drainages downgradient from the MA including the Far West, Western, Central, Northeastern, Upper Eastern, and Lower Eastern Drainages
- Middle and Lower Blue Creek

Upper Blue Creek (upstream of the confluence with the Eastern Drainage), the Northern Drainage, Southwestern Drainage, and Franklin D. Roosevelt Lake are not impacted.

5.3.2 Sediments

Findings

Mining-impacted sediments in the MA and PIA are shown on Figure 5-5. The figure lists indicator parameters that exceed background of grab and composite sediment samples, based on the two-step method. Sediments were sampled in the Northeast Drainage, Upper and Lower Eastern Drainage, Central Drainage, Western Drainage, Far Western Drainage, and PCP for petroleum hydrocarbons. No exceedances of Washington Cleanup Standards were identified from the analytical results.

Two-Step Method. Sulfate is the most areally extensive indicator of mining impacts in sediments. When surface water containing elevated concentrations of sulfate comes into contact

with sediments, some sulfate precipitation and adsorption onto the sediment occurs. Thus, sediments sampled in Pits 3 and 4, the Blood Pool, and the PCP have sulfate concentrations well above background. Downstream of the MA, sediments in the drainages and Blue Creek exceed background for sulfate.

Sediment samples from the MA and the Western, Central, and Eastern Drainages contain concentrations of metals and radionuclides exceeding background. The elevated constituents are similar to those for impacted surface water, except for radium^{226}, which in some drainages is elevated in sediment but not in surface water.

Further downstream from the MA, concentrations of cadmium, manganese, nickel, uranium^{238}, and sulfate in Blue Creek sediment still exceed background, but the average concentrations are lower. Indicator parameters for the two sediment samples collected by E&E in Franklin D. Roosevelt Lake in April 1998 are below background.

Ratio Method. Combined drainages south and east of the MA (Far West Drainage not included because sulfate was the only exceedance) have sulfate concentrations between 50 and 144 times higher than background. Sulfate is an indicator for mining impacts and interaction with mining-impacted surface water. Other indicator parameters for sediment were above background in the mine drainages (Table 5-69). Exceedances included:

- Cadmium: 6 to 11 times higher
- Cobalt: 3 to 4 times higher
- Manganese: 6 to 10 times higher
- Nickel: 4 to 7 times higher
- Uranium^{238}: 6 to 12 times higher
- Zinc: 3 to 4 times higher

Indicator parameters in Blue Creek sediments downstream of the confluence with the Eastern Drainage are also above background (Table 5-70), although to a lesser degree. Background exceedances in Blue Creek include:

- Cadmium: 1 to 3 times higher
- Manganese: 3 to 5 times higher
- Nickel: 2 to 3 times higher
- Sulfate: 36 to 132 times higher

Conclusions

Sediments in the following areas are impacted:

- Pits 3, Pit 4, the Blood Pool, the PCP, and the Outfall Pond
- Drainages downgradient of the MA including the Far West, Western, Central, Upper Eastern and Lower Eastern Drainages
- Middle and Lower Blue Creek

Sediments in the Southwestern Drainage are not impacted. Regarding the Blue Creek Delta, the limited number of sample results available was not adequate to confirm that indicator parameters in the delta do not exceed background.

5.3.3 Groundwater

Findings

Mining-impacted areas of groundwater in the PIA and MA are shown on Figures 5-6 and 5-7. The figures show that several indicator parameters in both unconsolidated material and bedrock exceed background limits based on the two-step method. Within the MA very high concentrations of sulfate were detected in alluvial and bedrock groundwater. Outside and downgradient of the MA, areas underlying the principal surface water drainages had high concentrations of sulfate in both alluvial and bedrock groundwater. Sulfate concentrations decreased away from the MA, in the downgradient direction.

Two-Step Method. Concentrations of indicator parameters in groundwater underlying the MA, Western Drainage, Central Drainage, and Eastern Drainage exceeded background. The background exceedances in the MA included aluminum, cobalt, manganese, nickel, zinc, sulfate, and uranium^{234}. The background exceedances in the drainages included cobalt, manganese, nickel, zinc, sulfate, and uranium^{234}. Further downgradient, samples from Blue Creek well MWBC-01 show that alluvial groundwater beneath Blue Creek contains elevated sulfate, but no other indicator parameters are elevated above background.

Ratio Method. The aereal distribution of wells on the site made it difficult to identify subareas with an adequate number of wells and data for estimate ratios. Combining the alluvial and bedrock groundwater sample locations in the MA and PIA into two groups, however, allowed a general comparison to be made between impacted and un-impacted groundwater using the ratio method. The first group included groundwater sample results locations with multiple indicators exceeding background based on the exceedance wheel diagrams developed using RI and SMI

site data (EPA 2002b). The second group included groundwater sample locations with few or no exceedances of background. Groundwater seeps were not used in the ratio method analysis.

Of the indicator parameters, only iron, manganese, sulfate, and uranium^{234} for alluvial groundwater could be compared using the ratio method because of the number of values below detection limits (Tables 5-97 and 5-98). Of the indicator parameters, only manganese, sulfate, and uranium^{234} for bedrock groundwater could be compared because of the number of values below detection limits (Tables 5-99 and 5-100).

Data from highly-impacted alluvial groundwater group in the MA and PIA exceeded background for the following indicator parameters:

- Manganese: 38 to 194 times higher
- Sulfate: 199 to 321 times higher
- Uranium^{238}: 160 to 521 times higher

Data from the highly-impacted bedrock groundwater had the following background exceedances:

- Manganese: not statistically different than background
- Sulfate: 39 to 72 times higher
- Uranium^{234}: 16 to 45 times higher

Data from the alluvial groundwater grouped in the no-exceedance to low-exceedance group show the following indicators exceeding background:

- Sulfate: 3 to 11 times higher
- Uranium^{234}: 2 to 8 times higher

Data from the bedrock groundwater grouped in the no-exceedance to low-exceedance group show the following indicators exceeding background:

- Sulfate: 3 to 5 times higher
- Uranium^{234}: 1 to 6 times higher

As the ratios demonstrate, alluvial groundwater is the most impacted. The impacts observed in the alluvial groundwater extend into the deeper bedrock fractures underlying the site. The ratios indicate that highly impacted alluvial and bedrock groundwater in the MA and downgradient drainages have severe impacts. Given that most un-impacted wells not in the downgradient areas are located within approximately 1,000 feet of the MA boundary, groundwater contamination is likely to be limited in other than the downgradient direction.

Conclusions

Alluvial groundwater in the following areas is impacted:

- MA areas downgradient from Pit 4, except for a small area along the western potion of the MA
- Eastern, Central, and Western Drainages
- The area of Middle Blue Creek at the confluence with the Eastern Drainage

Bedrock groundwater in the following areas is impacted:

- Pit 4 and MA areas downgradient from Pit 4, excluding a small area along the western portion of the MA
- Portions of the Western, Central and Eastern Drainage (East Dump Fork and East Seep Fork)

Based on the results of the two-step and ratio methods, historical mining activity has not impacted alluvial or bedrock groundwater in the Far West, Southwestern, Northeastern, or Northern Drainages, or bedrock groundwater in portions of the Eastern Drainage.

5.3.4 Surface Materials

Findings

Mining-impacted surface materials were initially identified using the two-step method. Areas of impacted surface material are shown on Figure 5-8. Indicator parameters exceeding background limits are listed for each mining-impacted area. The ratio method was used to confirm findings and quantify exceedances in the mining-impacted areas (using the 0–5 cm depth interval data).

Two-Step Method. Surface materials in the MA and on and adjacent to the East and West Haul Roads exceed background limits to varying degrees. While no samples were collected from mine roads leading to the Western Drainage and Central Drainage seep collection systems, based on measurements of gamma radiation conducted on the roads and the characteristics of the protore material used to surface the roads, these roads also are considered mining impacted.

The Southwest Downwind Area was not found to be mining-impacted. In the Northeast Downwind Area aluminum (two of 6 sample), chromium (3 of 6 samples), and manganese (1 of 6 samples) exceeded background. Given the sporadic nature of the exceedances, the proximity

to mineralized rock in Pit 4, using best professional judgment, the Northeast Downwind Area was concluded to not be impacted.

Ratio Method. The ratio method was used to compare the geometric means of surface materials in the MA to background. Using the ratio method, several indicator parameters exceeded background by the following magnitudes (Table 5-111):

- Chromium, copper, lead, and zinc: between 1 and 2 times higher
- Arsenic: 3 to 9 times higher
- Lead^{210}: 11 to 24 times higher
- Radium^{226}: 9 to 15 times higher
- Uranium^{238}: 11 to 23 times higher

The remaining indicator parameters were between 1 and 2 times lower than background except for manganese, which was not statistically different from background. The results compare well with the findings of the two-step process, confirming mining impacts in the MA.

Using the ratio method for the combined haul roads data, the East and West Haul Roads were also found to be mining impacted. Several indicator parameters were estimated to exceed background by the following magnitudes (Table 5-112):

- Chromium and zinc: 1 and 2 times higher
- Lead^{210}: 2 to 4 times higher
- Radium^{226}: 4 to 8 times higher
- Uranium^{228}: 3 to 8 times higher

Manganese and selenium were between 1 and 2 times lower than background.

The results of the ratio method for surface materials from the Southwest and Northeast Downwind Areas are presented in Tables 5-113 and 5-114, respectively.

As shown in Table 5-113, none of the indicator parameters had a geometric mean greater than the geometric mean of background in the Southwest Downwind Area. Arsenic, cadmium, lead^{210}, manganese, radium^{226}, and selenium were between 1 and 3 times lower than background. This result generally agrees with the findings of the two-step method.

The evaluation of geometric means in the Northeast Downwind Area (Table 5-114) excluded samples collected from locations along the MA boundary, which were considered part of the MA, and two samples (NE503 and NE505) collected in the Northeastern Drainage, which were considered sediment samples (not 0–5 cm surface material samples). Exclusion of the data was

based on a review of the data, maps, and professional judgment. The estimated geometric means of several indicator parameters were found to exceed background by the following magnitudes:

- Aluminum, cadmium, chromium, copper, lead, lead^{210}, and zinc were found to be between 1 and 2 times higher than background
- Arsenic, manganese, radium^{226}, and uranium^{238} were not statistically different than background

While the ratios are higher than found in the Southwest Downwind Area, none of the indicator parameters in the Northeast Downwind Area were greater than 2 times background. This is consistent with the two-step method, which found sporadic exceedances of background in the Northeast Downwind Area. As discussed for the two-step method, the Northeast Downwind Area is not mining-impacted.

Conclusions

Surface materials in the following areas are impacted:

- MA (waste rock, ore, and protore)
- East Haul Road and adjacent area
- West Haul Road and adjacent areas
- Central and Western Drainage seep collection access roads

The surface materials in the Southwest and Northeast Downwind Areas are not considered mining-impacted for the purposes of the RI/FS.

5.3.5 Subsurface Materials

Findings

Two-Step Method. Areas of affected subsurface materials in the MA and PIA are illustrated on Figure 5-8, which also lists the indicator parameters exceeding background limits for each mine-affected area based on the two-step method. The majority of subsurface data in the MA was collected by SMI. However, the SMI data were not collected at the same depth interval as the RI background data, so a direct comparison to background was not made. Based on a qualitative comparison of data collected by SMI in the MA, subsurface materials within the MA exceed background for indicator parameters.

Subsurface materials were found to be impacted along the East and West Haul Roads, indicating that mining materials were likely used for road base. This finding is consistent with impacts found for surface materials on the haul roads.

Ratio Method. Ratios were not calculated for the subsurface data because of the difference between the SMI sample depths and background sample depths.

Conclusions

Subsurface materials in the following areas are mining-impacted:

- MA
- East and West Haul Roads and adjacent areas
- Pumphouse Access Roads
- Seep Collection Roads

Subsurface materials in the Southwest and Northeast Downwind Areas are not considered mining-impacted for the purposes of the RI/FS.

5.3.6 Air (Airborne Radon/Radon Flux/Gamma Radiation)

This section summarizes the findings of radon measurements in air and gamma radiation measurements of surface materials at the site.

Findings

Mined Area. Airborne radon activity concentrations and radon flux rates in the MA exceed background. The highest activities were in the areas of the Hillside Dump, Backfilled Pits, west side of the South Spoils, and near Ore Stockpile #3. The findings are consistent with surface materials in the MA, which were found to exceed background. Gamma radiation surveys conducted by SMI (Figure 5-9) and BOM indicate that exposure rates exceed background with the highest exposures in the vicinity of the ore and protore stockpiles. The radiation levels drop to below background within a few hundred feet of the MA boundary. The gamma measurements indicate that contaminant sources in the MA are substantial and support the background exceedances of radon activity concentrations and fluxes measured in air.

Potentially Impacted Area. One airborne radon flux measurement was made in each PIA downwind sampling area. The measurements slightly exceeded background. Gamma radiation measurements made at surface material sample locations in each downwind area did not exceed background. The measurements do not support the presence of mining-impacts in the downwind areas.

Gamma radiation measurements were taken along the East Haul Road, West Haul Road, Pit Access Roads, and Seep Collection Roads. All the areas measured exceeded background. The measurements indicate that surface materials on the roads are mining-impacted.

Conclusions

Based on the combination of air (radon) measurements and surface material measurement (gamma) the following areas are mining-impacted:

- Entire MA (radon and gamma)
- East Haul Road (gamma)
- West Haul Roads (gamma)
- Pit Access Roads (gamma)

The Southwest and Northeast Downwind Areas are unaffected.

5.4 SURFACE WATER BACKGROUND EXCEEDANCES

Substantial exceedances of background were identified in surface water at the site. The greatest impacts are in the MA and drainages immediately downgradient of the MA. Petroleum hydrocarbons were analyzed for in surface water and found not to exceed relevant state levels (Table 5-132).

5.4.1 Areas of Mining-Impacted Surface Water

This section summarizes the analytical results and discusses the nature and extent of contamination for surface water in the mine-affected areas. The following areas were identified for analyses using the two-step method:

- Middle and Lower Blue Creek
- Northeastern, Upper Eastern, Lower Eastern, Central, Western, and Far West Drainages
- Pits 3 and 4
- PCP
- WTP

- Outfall Pond
- Blood Pool

These areas, along with exceedances of indicator parameters, are shown on Figure 5-4.

As discussed in Sections 3.1 and 3.3.1.1and Table 3-1, surface water samples were collected for the RI (fall 1999, spring and fall 2000) in the MA and PIA and by SMI and E&E in the PIA, MA, and Franklin D. Roosevelt Lake. Concentrations (dissolved or total) measured in URS, SMI, and E&E samples were compared to the background values (Table 5-6) for surface water. In general, a review of the data in Appendix D shows the SMI and E&E data to be in general agreement with the RI analytical results.

Middle Blue Creek Surface Water

Blue Creek (Figure 5-4) is separated from the Eastern Drainage by a culvert that drops water from the Eastern Drainage into Blue Creek from a height of about 3 feet. This culvert forms a natural barrier to fish migration into the Eastern Drainage from Blue Creek. The available data also show significant differences in the concentrations of indicator parameters for samples collected along Blue Creek from above and below Oyachen Creek. Therefore, for the purposes of characterizing the nature and extent of contamination, the mine-affected portion of Blue Creek has been divided into Middle and Lower segments.

Table 5-7 summarizes the analytical results for the Middle Blue Creek surface water samples collected by the three investigations. Indicator parameters in samples collected during the RI that exceed background limits for either the fall or spring season are dissolved chromium and nickel; nitrate; sulfate; and uranium^{238}. Other parameters that exceed background limits are shown in bold on Table 5-7, and include uranium^{234} and uranium^{235}.

Lower Blue Creek Surface Water

Table 5-8 summarizes the analytical results for surface water samples collected on the main stem of Lower Blue Creek. Indicator parameters in samples collected during the RI that exceed background limits for either season are dissolved chromium and nickel, nitrate, sulfate, and uranium^{238}. Sampling conducted on Oyachen Creek (TR06SW) indicates the presence of metals and uranium above background. Thus, the exceedances in lower Blue Creek may not be attributable solely to releases from the Midnite Mine.

Northeastern Drainage Surface Water

During the RI, one surface water sample was collected from a sediment retention basin at the head of the middle fork of the Northeastern Drainage in spring 2000. Table 5-9 presents the analytical results for this surface water sample. The indicator parameters radium^{226} and uranium^{228} exceed background limits. However, a review of the data showed unusual concentration differences between dissolved and total metal analysis, possibly from turbid sample conditions during laboratory analysis. Given the uncertainty of the data, the drainage is included as provisionally mine-impacted.

Upper Eastern Drainage Surface Water

The Upper Eastern Drainage covers the reach from the NPDES outfall pond (OF01SW) to the confluence with the Central Drainage. Data from a total of 30 surface water samples (much of the outfall sample data was collected by SMI) were used to evaluate the Upper Eastern Drainage. Table 5-10 compares the analytical results for the surface water samples to the fall and spring background limits. The complete analytical results for these samples are provided in Appendix D.

Indicator parameters and the maximum concentration exceeding background limits for either season for URS samples are dissolved antimony, chromium, and nickel; nitrate; sulfate; and uranium^{238}. Table 5-133 shows that the average concentrations of indicator parameters in the drainage area, in many cases, were well above the background mean concentrations. In fall of 1999, four samples were collected and analyzed for diesel-range total petroleum hydrocarbons (TPH). Petroleum hydrocarbons were not detected (Table 5-134).

Lower Eastern Drainage Surface Water

The Lower Eastern Drainage covers the reach from the confluence with the Central Drainage to Blue Creek. URS, SMI, and E&E collected a total of 17 surface water samples from a total of three locations in the Lower Eastern Drainage. Indicator parameters that exceed background limits for either season for the URS samples are dissolved cadmium, chromium, nickel, zinc, nitrate, sulfate, and uranium^{238}. Table 5-11 summarizes the analytical results for surface water samples collected by the three investigations. Diesel-range TPH was not detected in two URS samples collected during the fall of 1999. The complete analytical results for these samples are provided in Appendix D and summarized in Table 5-134. Table 5-133 summarizes the average concentrations for indicator parameters. Comparing the average concentrations of the indicators for surface water in the Upper and Lower Eastern Drainage shows cadmium and nickel are higher in the Lower Eastern Drainage. The higher concentrations of indicator parameters are likely due in part to surface water discharge from the Western and Central Drainages.

Central Drainage Surface Water

Table 5-12 summarizes the analytical results for the surface water samples collected by URS and by SMI at sampling location SW-12. Diesel-range TPH was analyzed for in the fall 1999 RI sample and was not detected (Table 5-134).

Indicator parameters that exceed background limits for either season for the samples are dissolved cadmium, chromium, nickel, vanadium, zinc, nitrate, sulfate, and uranium^{238}. Table 5-133 shows that the average concentrations for most indicator parameters are well above (in some cases hundreds of times higher) the background average concentrations.

Western Drainage Surface Water

Table 5-13 summarizes the analytical results and exceedances of the background limits for the surface water samples collected at sampling location WDAC. Semivolatiles and diesel-range TPH were not detected in the one RI sample collected during the fall of 1999 (Table 5-134).

Indicator parameters that exceed background limits for either season for the RI samples are dissolved cadmium, chromium, nickel, vanadium, zinc, sulfate, and uranium^{238}. Table 5-133 shows the concentrations of indicator parameters compared to the average background concentrations. The average concentrations of most indicators are lower than the average background concentrations observed in the Central Drainage, but still well above the background average concentrations.

Far West Drainage Surface Water

Table 5-14 presents the analytical results for a single surface water sample collected by URS. Sulfate, which had a concentration of 16.6 mg/l, is the only indicator parameter exceeding background limits for the single sample in the Far West Drainage.

Pit 3 Surface Water

Indicator parameters that exceed background limits for the URS sample collected from Pit 3 are dissolved cadmium, chromium, nickel, zinc, nitrate, radium^{226}, sulfate, and uranium^{238}.

Table 5-15 summarizes the analytical results for surface water samples collected in Pit 3 by the three investigations. Table 5-133 provides information on average concentrations in Pit 3.

Pit 3 has the highest concentrations and activity concentrations of several parameters in surface water at the site, including dissolved cadmium, cobalt, iron, lead, manganese, lead^{210}, radium^{226}, and uranium^{235}. Sulfate concentration ranges from 2,310 to 3,406 mg/L in Pit 3, and the pH ranges from approximately 4 to 4.5. These results indicate the effects of ARD on the pit water

quality. The poor water quality is likely caused by a combination of several inputs, including the pumping and storage of captured seep water to the pit, groundwater, pit wall seeps, and precipitation reacting with rock on the exposed pit walls. The water quality also may reflect the effects of storing water from the backfilled pits as a result of an extended pumping test. Of the various inputs, the pumpback system is likely to have the greatest effect on water quality in Pit 3.

Pit 4 Surface Water

Table 5-16 summarizes the analytical results for surface water samples collected in Pit 4 by the three investigations. Indicator parameters that exceed background limits are radium^{226}, sulfate, and uranium^{238}. Compared to Pit 3, Pit 4 water contains much lower concentrations of sulfate and metals and lower activities of radionuclides. Sulfate ranges from 110 to 330 mg/L, and the pH ranges from approximately 6.8 to 7.5. These values indicate relatively little contribution from ARD sources to the pit. Pit 4 is also located in the northern portion of the MA, upgradient from most ore, protore, and waste stockpiles.

Pollution Control Pond Surface Water

Table 5-17 summarizes the analytical results for the PCP surface water samples collected by E&E and SMI. The SMI samples were collected 13 times from one location, including through the winter months. To avoid limiting comparisons to only samples whose collection dates correspond to the RI fall and spring background limits the analytical results were compared to the lowest background limit available, or RBL. Compared in this manner, the concentrations of chloride, nitrate, sulfate, most metals, and nearly all radionuclides exceed the background limits. Similar results are obtained from a comparison of the two samples collected by E&E in April 1998 with the spring season RBLs.

Given that the water in the PCP consists largely of seep water, poor water quality would be expected. Water samples from the PCP were found to have the highest concentrations of sulfate and dissolved aluminum, beryllium, magnesium, nickel, sodium, and zinc, and the highest activity concentrations of polonium^{210}, radon^{222}, thorium^{230}, thorium^{232}, uranium^{234}, and uranium^{238} in surface water at the site. Sulfate concentrations ranged from 2,780 to 4,110 mg/L, and the pH ranges from approximately 4 to 4.7, indicating the effects of ARD on the water quality in the PCP. The maximum concentrations in the PCP are similar to maximum concentrations of indicator parameters in Pit 3 water. Table 5-133 presents the average concentrations of PCP sample data. The table shows that the average concentrations of indicator parameters in Pit 3 surface water are much lower compared to the concentrations of indicator parameters in the PCP.

WTP Outfall Pond Surface Water

Table 5-18 summarizes the analytical results for outfall pond surface water samples collected by URS and E&E. Indicator parameters that exceed background limits for the URS sample (are dissolved chromium, nitrate, sulfate, and uranium^{238}. Diesel-range TPH was not detected in the URS sample analyzed (Table 5-134). While not an indicator parameter, the highest concentration of calcium in surface water at the site is in the outfall pond. The likely source of the calcium is the lime used in the treatment process.

The pH is variable in the outfall pond, ranging from approximately 4.5 in the fall to 6.2 in the spring. No comparison could be made between the outfall pond water quality and upstream drainages, because the drainages are dry most of the year. Comparing the background exceedances and maximum concentrations in outfall pond samples and the Upper Eastern Drainage samples, it is likely that the WTP is providing a large portion of the surface water flow and metals and radionuclides detected in the pond. Many analytes were detected at higher concentrations downstream of the pond, indicating potential contributions of metals and radionuclides below the outfall pond.

Blood Pool Surface Water

Table 5-19 summarizes the analytical results for surface water samples collected by the SMI and E&E investigations. SMI samples were collected for five consecutive months throughout the winter. To avoid limiting comparisons to only samples whose collection dates correspond to the fall and spring background limits calculated from the RI background surface water data, the analytical results were compared to the lowest background limit available. Compared in this manner, the concentrations of chloride, nitrate, sulfate, nearly all metals, and the activity concentrations of radionuclides exceed the background limits. Similar results are obtained from a comparison of the two samples collected by E&E in April 1998 with the spring season RBLs.

Table 5-133 presents that average concentrations of the Blood Pool sampling. Water usually is present only in winter months. Water flowing from the Blood Pool is captured approximately 400 downgradient and pumped to Pit 3.

5.4.2 Areas of Un-impacted Surface Water

This section summarizes the analytical results for surface water in areas not affected by the mine, based on the two-step method of comparing indicator parameters to background limits. The following areas were found to be un-impacted by mining:

- Northern Drainage
- Upper Blue Creek

- Middle Blue Creek Tributaries
- Lower Blue Creek Tributaries
- Spokane Arm of Franklin D. Roosevelt Lake

Northern Drainage Surface Water

The Northern Drainage extends from near the top of the MA to Blue Creek. The drainage originates near the most northerly portion of the MA. The small portion of the MA, drained by the Northern Drainage consists of exposed bedrock with no waste rock piles.

Appendix D and Table 5-20 present the analytical results for the surface water sample collected during by URS. Nitrate, phosphate, total aluminum, total chromium, total zinc, dissolved vanadium, lead^{210}, radium^{228}, uranium^{234}, and uranium^{238} exceed background limits for the sample collected in the Northern Drainage. However, the suspended solids for this sample were high (339 mg/L), and all dissolved metals (except vanadium) were below the background limits or not detected at levels above the background limits. In addition, sediments from the same location and at two other upgradient locations in the Northern Drainage do not exceed background limits. Based on these data and observations, surface water in the Northern Drainage is not considered mining impacted.

Upper Blue Creek Surface Water Between the Northern Drainage and the Confluence With the Eastern Drainage

Table 5-21 summarizes the analytical results of RI (two samples at one location), SMI (nine samples at one location) and E&E (one sample) samples. Indicator parameters antimony and chromium slightly exceed the background limits in the RI samples collected in the spring of 2000. However, all other parameters measured in the RI samples do not exceed background limits. Although the SMI results indicate slightly elevated sulfate, nitrate, and uranium concentrations, the geographic location well east of the MA, lack of drainage from the MA, and small number of exceedances make it unlikely that Upper Blue Creek is mining impacted.

Middle and Lower Blue Creek Tributaries

RI samples collected in the fall from tributary location TR06SW (Oyachen Creek) exceeded background for sulfate and uranium isotopes. A single sample collected in the spring of 2000 exceeded background for phosphate and sulfate. These exceedances were not confirmed by E&E sampling conducted in April 1998. A single sample collected at tributary location TR04SW exceeded background for nitrate. The background exceedances noted in tributary sampling indicate input of metals and uranium isotopes in Blue Creek not attributable solely to Midnite Mine.

Franklin D. Roosevelt Lake Surface Water

Table 5-22 summarizes the analytical results for the two surface water samples collected in the Spokane Arm by E&E. Total copper (10.2 µg/L) was found to slightly exceed the 6.68 µg/L RBL while total zinc (58 µg/L) exceeded the 8.87 µg/L RBL. However, surface water and sediment samples collected in Blue Creek during the RI and by E&E do not exceed background limits for these metals. Given the low level of RBL exceedance, the likelihood for multiple sources impacting water quality in the lake and the non-exceedance of the two metals in Lower Blue Creek, water quality in Franklin D. Roosevelt Lake is not considered impacted by the Midnite Mine. Activities of all radionuclides were reported to be below detection limits for these samples.

5.5 SEDIMENT BACKGROUND EXCEEDANCES

This section summarizes the analytical results for sediment samples collected during the RI in the background area, MA, and PIA, and those collected by SMI and E&E in the PIA, MA, and Franklin D. Roosevelt Lake area. Sections 3.1 and 3.3.1.1 and Table 3-1 provide an overview of the sampling. Indicator parameters that exceeded background are shown, by area, on Figure 5-5. Sample concentrations for composite and grab samples were compared to the corresponding background values for sediment, as shown in Tables 5-27 and 5-28. Tables 5-32 and 5-33 do not include sample data for the tributaries. Table 5-133 provides a qualitative comparison of average indicator concentrations to background. Samples collected by E&E and SMI did not always include all indicator parameters analytes, such as polonium^{210} and sulfate for grab samples. Petroleum hydrocarbons were for in surface water and found not to exceed relevant state levels (Table 5-132).

5.5.1 Areas of Mining-Impacted Sediments

The following areas were identified as mining-impacted using the two-step method:

- Middle and Lower Blue Creek
- Northeastern, Northern, Upper Eastern, Lower Eastern, Central, Western, and Far West Drainages
- WTP Outfall Pond
- Pits 3 and 4

- PCP
- Blood Pool

The Southwestern Drainage, Upper Blue Creek and Franklin D. Roosevelt were found to not be impacted. In general, sediment deposited in drainages, detention structures, or in ponds was found to be highly impacted.

Middle Blue Creek Sediments

Table 5-29 summarizes the analytical results for the composite stream sediment samples and Table 5-30 presents the results for the grab sediment samples. Indicator parameters exceeding background limits for the two URS samples collected are cadmium, manganese, nickel, and sulfate. No parameters other than the four indicator analytes exceeded the background limits for the composite samples collected by URS and by SMI. For the grab sediment samples collected by E&E and SMI, the indicator parameters exceeding background are chromium, cobalt, manganese, nickel, zinc, and uranium^{238}.

The seven riparian sediment samples collected during the RI along Middle Blue Creek show indicator parameter exceedances of background limits for manganese, nickel, and sulfate (Table 5-31).

Lower Blue Creek Sediments and Delta

Indicator parameters that exceed background limits in Lower Blue Creek are cadmium, manganese, nickel, and sulfate. These are the same indicators that exceeded background in Middle Blue Creek. Table 5-32 summarizes the analytical results for composite stream sediment samples and Table 5-33 presents the summary for the grab sediment samples collected in Lower Blue Creek. Table 5-133 presents the composite sample means for the indicator parameters.

Table 5-34 provides the analytical results for the single riparian sediment sample. No indicators exceeded background in this sample.

One sediment sample was collected from sediments near the mouth of Blue Creek. The single sample was insufficient to conclude that delta sediments are not impacted. Consequently delta sediments are included delta as “provisionally impacted” sediments.

Northeastern Drainage Sediments

Four sediment samples at two locations were collected in the Northeastern Drainage. The indicator parameters that exceed background limits for a single sample (SDNE-01) collected near

the start of the Northeastern Drainage are chromium, cobalt, nickel, polonium^{210}, radium^{226}, and uranium^{238}. The only indicator parameter exceeding background limits for the sample collected just north of the outfall pond (SDNE-02) was radium^{226}. Table 5-35 summarizes the analytical results for RI composite sediment samples collected in the Northeastern Drainage.

The sample collected at location SDNE-02 was analyzed for TPH and diesel-range TPH. It was found to have a concentration of 24,000 µg/kg of TPH. The source of the TPH is likely truck maintenance activities and fuel spills from the Pit 4 ready-line area (Peters 1999a). Concentrations detected were below cleanup standards for Washington State.

WTP Outfall Pond Sediments

Table 5-38 presents the analytical results for the RI composite sediment sample and Table 5-39 presents the results for the grab sample collected by E&E in the outfall pond. The complete analytical results are provided in Appendix D.

One composite sediment sample was collected during the RI and one grab sediment sample was collected from the NPDES outfall pond by E&E. The composite and grab sediment samples collected at this location have widely varying results. Sulfate was the only indicator parameter exceeding background in the composite sample collected during the RI. Sodium and thorium^{230} exceeded background limits, although they are not indicator parameters. Diesel-range TPH also was detected in this sample at 37,000 µg/kg, which is below Washington cleanup standards. The source of the TPH is likely truck maintenance activities conducted in the East Dump area (Peters 1999a).

In contrast to the RI sample results, the E&E grab sample results show most metals and radionuclides exceeding the background limits. The difference may be explained by sampling variability in the pond with discharge from the treatment plant. The E&E sample was collected in April close to the start of plant operations for the season, while the RI sample was collected in September. Because the background exceedances of the E&E results, the outfall pond is included as mining impacted.

Upper Eastern Drainage Sediments

In this stream reach, a total of 12 samples from five channel and four riparian sediment sample locations were collected during the RI. Table 5-40 summarizes the analytical results for composite stream sediment samples, Table 5-41 presents the results for grab sediment samples, and Table 5-42 summarizes the analytical results for the RI riparian sediment samples collected in the Upper Eastern Drainage. Table 5-133 presents the average concentrations of indicator parameters for both sample results in the reach and background.

Indicator parameters exceeding background limits in stream channel sediments were cadmium, chromium, cobalt, manganese, nickel, polonium^{210}, radium^{226}, sulfate, and uranium^{238}. Indicator parameters that exceed background limits for the riparian sediments are chromium, lead, manganese, nickel, and sulfate.

One composite sediment sample was collected from sediments near the East Seep. Indicator parameters that exceed background limits for the East Seep sediment samples are cobalt, lead, manganese, nickel, sulfate, and uranium^{238}. Diesel-range TPH was detected in the sample at 110,000 µg/kg. The source of the TPH is likely truck maintenance activities conducted in the East Dump area (Peters 1999a). This concentration is higher than other areas in the drainage but does not exceed Washington cleanup standards. Table 5-43 presents the analytical results for this sample.

Five composite stream sediment samples were analyzed for TPH. Diesel-range TPH was detected at concentrations ranging from 15,000 to 44,000 µg/kg in these samples. The detected concentrations are below the Washington cleanup standards. The source of the TPH is likely truck maintenance activities conducted in the East Dump area (Peters 1999a).

Lower Eastern Drainage Sediments

During the RI, four samples from two channel and one riparian sediment sampling locations were collected. Table 5-44 summarizes the analytical results for composite stream sediment samples, Table 5-45 presents the results for the grab sediment samples, and Table 5-46 presents the analytical results for the RI riparian sediment sample collected in the Lower Eastern Drainage. Table 5-133 presents the average concentrations of indicator parameters for both sample results.

Indicator parameters exceeding background limits for stream sediments in this reach were cadmium, chromium, cobalt, manganese, nickel, radium^{226}, sulfate, and uranium^{238}. Indicator parameters that exceed background limits for the riparian sediments are cadmium, cobalt, manganese, nickel, radium^{226}, and uranium^{238}. Table 5-133 shows that the average concentrations of sediments generally are higher in the Lower Eastern Drainage than in the Upper Eastern Drainage. This likely reflects additional sediment contributions from the Central and Western Drainages.

Two composite stream sediment samples were analyzed for TPH. Diesel-range TPH was detected at 49,000 and 17,000 µg/kg in the two samples. The detected concentrations were below the Washington cleanup standard. The source of the TPH is likely truck maintenance activities conducted in the East Dump area (Peters 1999a).

Central Drainage Sediments

During the RI, a total of seven sediment samples were collected at five sampling locations in the drainage. Table 5-47 summarizes the analytical results for the composite stream sediment samples, Table 5-48 presents the results for the grab sediment samples collected, and Table 5-49 summarizes the analytical results for the RI riparian sediment samples collected. Table 5-50 presents the analytical results for the composite sediment sample and Table 5-51 presents the results for the single grab sample collected near the Central Drainage Seep. Table 5-133 presents the average concentrations of indicator parameters for both sample results in the drainage and background.

Indicator parameters exceeding background limits for the stream sediments are cadmium, chromium, cobalt, lead, manganese, nickel, polonium^{210}, radium^{226}, sulfate, and uranium^{238}. Indicator parameters exceeding background limits for the riparian sediments are cadmium, cobalt, manganese, nickel, polonium^{210}, radium^{226}, and uranium^{238}. All indicator parameters exceed background limits for the seep sediment sample. As shown in Table 5-133, the average concentrations are in most cases many times higher than the background averages.

Two of the composite stream sediment samples were analyzed for TPH. Diesel-range TPH was detected at 100,000 and 150,000 µg/kg in the two samples. These values represent the highest concentrations of TPH measured at the site. Based on the Washington Model Toxics Control Act, however, these values would not warrant further sampling during site remediation. The TPH measured in the sediments in the Central Drainage probably originated from truck maintenance performed on the top of the South Spoils waste rock pile. Peters (1999a) reported that aerial photography of the site from 1981 and 1982 shows a maintenance area directly above the PCP with abundant stains, presumably caused by spills of fuels and/or lubricating fluids. The TPH measured in the sediments likely represents the weathered residues from these spills. The composite sediment sample collected near the seep was analyzed for TPH. Diesel-range TPH was detected at 55,000 µg/kg.

Western Drainage Sediments

During the RI, a total of eight samples from five sediment samples locations in the Western Drainage were collected. Table 5-52 summarizes the analytical results for composite stream sediment samples, Table 5-53 summarizes the results for the grab sediment samples, and Table 5-54 summarizes the analytical results for the riparian composite sediment samples. Table 5-55 presents the analytical results for the composite sediment sample and Table 5-56 presents the results for the grab sample collected from the Western Drainage Seep.

Indicator parameters exceeding background limits for the stream sediments are cadmium, cobalt, manganese, nickel, sulfate, and uranium^{238}. Indicator parameters exceeding background limits

for the riparian sediments are polonium^{210}, radium^{226}, sulfate, and uranium^{238}. Indicator parameters that exceed background limits for the seep sediments are cobalt, sulfate, and uranium^{238}. As shown on Table 5-133, channel samples generally have higher average concentrations than the riparian samples. Overall, the Western Drainage is highly impacted, but appears to have lower average concentrations than the Central Drainage.

Two composite stream sediment samples were analyzed for TPH and semivolatiles. Diesel-range TPH was detected at 19,000 and 43,000 µg/kg, and naphthalene was detected at 36 and 46 µg/kg in the two samples. The detected concentrations are below the Washington Cleanup standards. The source of the TPH is likely truck maintenance and fueling activities on the South Spoils or near the Vehicle Maintenance Buildings (Peters 1999a). Semivolatile compounds were not detected, except for bis(2-ethylhexyl)phthalate at 17 µg/kg in one sample. This compound is a common laboratory contaminant.

The composite seep sediment sample was analyzed for TPH and semivolatiles. Diesel-range TPH was detected at 17,000 µg/kg. Semivolatile compounds were not detected, except for bis(2-ethylhexyl)phthalate at 13 µg/kg.

Far West Drainage Sediments

Table 5-57 presents the analytical results for the single composite sediment sample collected in the Far West Drainage. Indicator parameters that exceed background limits for the stream sediments in the Far West Drainage are polonium^{210}, radium^{226}, and uranium^{238}. The Far West Drainage receives surface water from the southwestern portion of the MA and South Spoils pile and areas. The source of the radionuclide contamination in these sediments is likely the ore materials placed on the former housing trailer pads and the remnant ore pile in the Mine Buildings and Vehicle Maintenance Area. Ore was stockpiled in this area in the early years of mining (Peters 1999a).

The Far West Drainage sediment sample was analyzed for TPH and semivolatiles. Diesel-range TPH was detected at 26,000 µg/kg. The source of the TPH is likely truck maintenance and fueling activities conducted near the mine buildings (Peters 1999a). Semivolatile compounds were not detected, except for bis(2-ethylhexyl)phthalate at 11 µg/kg. These levels fall below the Washington cleanup standards.

Pit 3 Sediments

One composite sediment sample was collected by SMI and two grab sediment samples were collected by E&E. Tables 5-58 and 5-59 summarize the analytical results and background exceedances for the composite and grab sediment samples, respectively. Except for chromium, all indicator parameters for the composite sample exceed background limits. Except for

cadmium and chromium, indicator parameters in the grab samples exceed background. (Polonium^{210} and sulfate were not part of the analysis.)

Pit 4 Sediments

One composite sediment sample was collected by SMI and three grab sediment samples were collected by E&E. Tables 5-60 and 5-61 summarize the analytical results and background exceedances for the composite and grab sediment samples, respectively. Except for cadmium, all indicator parameters exceed background. (Polonium^{210} and sulfate were not part of grab sample analysis.) Compared to sample results from Pit 3, Pit 4 generally has lower sulfate concentrations, lower metals concentrations, and lower radionuclide activity concentrations than those measured in samples from Pit 3.

Pollution Control Pond Sediments

Two grab samples were collected by E&E. Table 5-62 summarizes the analytical results and background exceedances for the grab sediment samples. Except for radium^{226}, all indicator parameters exceeded background. (Polonium^{210} and sulfate were not part of the grab sample analysis.) A review of the analytical results in Appendix D shows that the two samples collected had widely varying metals concentrations and radionuclide activity concentrations. This may have been due to varying conditions in the pond at the time of sampling.

Blood Pool Sediments

Two grab sediment samples were collected by E&E. Table 5-63 summarizes the analytical results for the samples. Except for cadmium and cobalt, all indicator parameters exceeded background. (Polonium^{210} and sulfate were not part of the grab sample analysis.)

5.5.2 Areas of Un-impacted Sediments

This section summarizes the analytical results for sediment in areas not affected by the mine, based on use of the two-step method of comparing indicator parameters to background limits.

Southwestern Drainage Sediments

Two composite sediment samples were collected during the RI and one grab sediment sample was collected by E&E. Tables 5-64 and 5-65 summarize the analytical results for the composite and grab sediment samples, respectively. All indicator parameters were below background, indicating the Southwestern Drainage is not mining impacted.

Upper Blue Creek Sediments

One composite sediment sample was collected during the RI and seven composite sediment samples were collected by SMI. One grab sediment sample was collected by E&E and four grab sediment samples by SMI. Table 5-66 and 5-67 summarize the analytical results for the composite and grab sediment samples, respectively. All indicator parameters were below background, indicating this reach of Blue Creek (upstream from the confluence with the Eastern Drainage) is not mining impacted.

Northern Drainage Sediments

During the RI, five samples were collected at three locations in the drainage. Table 5-36 and 5-37 summarize the analytical results for the composite and grab sediment samples, respectively. No indicator parameters exceed background, indicating that the drainage is not mining impacted.

Spokane Arm of Franklin D. Roosevelt Lake Sediments

Two grab samples of lake sediments were collected by E&E. Table 5-68 summarizes the analytical results for the samples. No indicator parameters exceed background limits for these samples. However, given the likely deposition of sediments at the mouth of Blue Creek and the low number of samples collected, concluding no mining impacts carries a fair degree of uncertainty.

5.6 GROUNDWATER BACKGROUND EXCEEDANCES

This section summarizes the nature and extent of contamination in groundwater at the site using the two-step method for comparison to background. As discussed in Section 5.1, groundwater undergoes many complex changes as it interacts with the various subsurface materials on site, including the unconsolidated materials (waste rock piles, protore piles, etc.), alluvial deposits, and bedrock. The groundwater quality is degraded as it flows under the site, interacting with contaminated subsurface materials. This degradation results in increasing background exceedances of groundwater indicator parameters from the northern to the southern portion of the site. Water samples were collected in areas of the site where groundwater discharges at the surface (seeps). These samples are representative of groundwater quality at the discharge point and the analytical results are discussed in this section.

To summarize mining impacts, groundwater sampling locations and background exceedances of indicator parameters were plotted on wagon wheel maps. (See map GW-9 in Appendix H.) Analytical data for URS and SMI samples included in the 2-step method for groundwater

analysis is presented in Appendix D. Table 5-135 further summarizes the exceedances shown on the wagon wheel map in a condensed table format grouped by general site areas.

As shown on map GW-9, the groundwater between the northern end of Pit 4 and the southern end of the Eastern, Central and Western Drainages is highly impacted by mining. The wagon wheels show background exceedances are variable across the MA, likely due to seasonality and differences in rock composition and fracture patterns. However, groundwater underlying the MA represents a major source of contamination at the site, which also contributes to surface water as seep discharge.

This large portion of the site also has the highest degree of surface disturbance from mining (excluding Pit 4 and the Hillside Dump). In this area of the site, five of the 10 indicator parameters for groundwater generally exceed background: manganese, nickel, zinc, uranium^{234}, and sulfate. The remaining indicators are elevated to varying degrees. Alluvial groundwater shows the greatest impacts from mining. Groundwater in deep bedrock fractures exceeds background but to a lesser degree than the alluvial groundwater.

Groundwater under the South Spoils pile is highly impacted, as are the spring discharges that occur in the Eastern, Central, and Western Drainages below the South Spoils pile. Shallow and deep groundwater in the drainages is impacted; however, close to the confluence with Blue Creek, indicator parameters exceeding background are limited to nickel and sulfate.

Few indicator parameters in groundwater exceed background outside the highly disturbed areas of the site to the west, north and east. This is consistent with a general groundwater flow in a southerly direction for transport of metals and radionuclides.

A comparison of background sample concentrations to background screening levels is summarized in Table 5-71. Mine-affected areas and indicator parameters that exceed background are shown on Figures 5-6 and 5-7. Petroleum hydrocarbons were for in surface water and found not to exceed relevant state levels (Table 5-134).

5.6.1 Areas of Mining-Impacted Groundwater

This section summarizes the analytical results and discusses the nature and extent of contamination in groundwater at the site. Section 3.3.1.3 and Table 3-1 detail the groundwater field investigations conducted during the RI. The following discussion is limited to background exceedances of the groundwater indicator parameters. Tables 5-85 and 5-86 summarize the groundwater data from the three investigations of the MA, aggregated by unconsolidated material groundwater and bedrock groundwater, respectively. Table 5-87 summarizes the analytical results for samples at the Pumphouse Seep. Figures 5-6 and 5-7 show the locations of

monitoring wells and groundwater impacts for unconsolidated and bedrock aquifers, respectively. The following areas were found to be mining impacted:

- MA
- Western and Central Drainages
- Eastern Drainage (including tributaries)
- Middle Blue Creek

Mined Area Groundwater

The exceedances of indicator parameters for groundwater are summarized in Table 5-133. The following discussion uses "exceeds background" to indicate that the indicator parameter discussed exceeded the BL or RBL. Background exceedances in the MA are described from the northern end of the MA southward, or in the general direction of groundwater flow at the site. As discussed below, the exceedances of indicator parameters in groundwater increase from north to south in the MA. In general, 5 of the ten (manganese, nickel, zinc, uranium^{234} and sulfate) indicator parameters are consistently elevated from above Pit 3 through the South Spoils pile. Groundwater sampled along the eastern, northern, and western boundaries of the MA have few exceedances of background. These are limited to cobalt, nickel, and chrome.

As shown in Table 5-135, the four northernmost wells in the MA had few exceedances of background. These wells are located upgradient or east of Pit 4. Of the four wells, groundwater collected from deep bedrock in MWNE-02 exceeded background for chromium and nickel.

The northernmost prominent mine feature in the MA is Pit 4. Four monitoring wells are located south (GW47, MWP4-02) and east (MWNE-03, MWNE-04) of Pit 4. Exceedances of background in the bedrock water table and deep bedrock south of Pit 4 include cobalt, manganese, nickel, sulfate, and uranium^{234}. Groundwater samples from the two wells east of Pit 4 exceed background for and chromium and nickel in the alluvial water table and cobalt in the deep bedrock.

The Hillside Dump is the other prominent surface feature in the northern portion of the MA. Five wells are located south (generally downgradient) of the dump. Groundwater from well GW-46 (alluvial water table) located close to the base of the dump exceeds background for manganese, nickel, zinc and sulfate. Well MWHD-01 (bedrock water table) also located close to the base of Hillside Dump, exceeds background for sulfate. Two wells, GW-49 and GW-45 (both completed at the alluvial water table), are located 800 to 1,000 feet southwest of the Hillside Dump. Groundwater at these locations did not exceed background for indicator parameters. The fifth monitoring well is GW-48 (bedrock water table). This well is located just south of the ore and protore stockpile # 6. Groundwater at this location exceeds background for nickel, sulfate and uranium^{234}.

The Vehicle Maintenance Area, mine office buildings, and storage are located along the central western boundary of the MA. Three wells are located west of the Vehicle Maintenance Area in the upper end of the Far Western Drainage. All three wells (MWFW-03, 04, and 05) are completed at the bedrock water table. No indicator parameters exceed background in these wells.

The backfilled pits located west of Pit 3 represent a large volume of buried waste rock in contact with groundwater in the MA. These pits were excavated during early phases of mining at the site and subsequently backfilled as mining progressed in a northeasterly direction with the deep excavation in Pit 3. Water in the backfilled pits provides recharge to groundwater south of the pits. Two monitoring wells were completed in the backfilled pits—GW-53 (alluvial water table) and GW-54 (bedrock water table). Groundwater samples collected from the wells exceed background for aluminum, cobalt, manganese, nickel, zinc, sulfate, and uranium^{234} in the alluvial water table and bedrock water table. Iron was above background in the deeper bedrock water table.

The central portion of the MA is dominated by Pit 3. This large, deep open pit has high walls with multiple benches of rock exposed to surface weathering. A pit lake, present in the bottom of Pit 3, is maintained at a fairly constant level by withdrawal of water and treatment at the WTP. Seep water collected at the site is pumped into Pit 3 for storage. Pit 3 can act as a hydraulic sink for shallow groundwater that discharges to the land surface above the pit lake level (i.e. seeps on pit walls). Pit 3 also provides recharge to deeper groundwater present south of the pit. Ore, protore and lime stockpiles are present south of Pit 3. These conditions make it difficult to separate contaminant contributions from the different sources in the area south of Pit 3. Therefore, it is assumed that background exceedances in groundwater are an aggregate effect of multiple sources of contamination.

Monitoring wells MWP3-01 (bedrock water table) and MWP3-02 (deep bedrock) are located closest to the southern end of Pit 3. Groundwater at the bedrock water table exceeded background for cobalt and sulfate, while groundwater in the deep bedrock exceeded background for sulfate. Monitoring wells GW-42 (bedrock water table), GW-43 (bedrock water table), and MWDB-01 (deep bedrock) are located about 400 to 700 feet south of MWP3-01. Groundwater at the bedrock water table exceeded background for sulfate and uranium^{234}. Groundwater from the deep bedrock exceeded background for aluminum, chromium, cobalt, manganese, nickel, zinc, sulfate and uranium^{234}.

The South Spoils pile is a major waste rock dump located at the south end of the mined area. Three monitoring wells were completed in the South Spoils pile at the alluvial water table: BOM-1S, BOM-14, and BOM-17. Groundwater samples collected from the wells exceed background for antimony, manganese, nickel, zinc, sulfate and uranium^{234}.

East and southeast of Pit 3, surface mine features include the WTP, Blood Pool, and protore stockpiles. Well GW-41A (bedrock water table) is located south of Stockpile # 2. Groundwater at this location did not exceed background. Seep sample location 1S is located about 250 feet northwest of GW-41A. The groundwater at this location did not exceed background.

The Pumphouse Seep is located above the PCP at the toe of the South Spoils pile. Samples collected from the seep exceed background for dissolved aluminum, antimony, cobalt, manganese, nickel, and zinc; sulfate; and uranium^{234}.

Western Drainage Groundwater

Table 5-72 summarizes the analytical results for the samples collected by the three investigations for the Western Drainage Seep. Tables 5-83 and 5-84 summarize the analytical results for the groundwater samples collected by the three investigations for the alluvial and bedrock wells, respectively. Table 5-133 summarizes the exceedances shown on wagon wheel map GW-9 (Appendix H).

The northernmost sample in the Western Drainage is a seep sample (WDSeep) collected close to the toe of the South Spoils pile. Approximately 150 feet south of the seep sample, two wells are located close to the axis of the drainage channel: MW-1 (alluvial water table) and MWWD-01 (deep bedrock). Approximately 600 feet south of MW-1, two additional wells are located close to the axis of the drainage channel, GW-35A (alluvial water table) and GW-50 (bedrock water table).

The seep sample results indicate that groundwater discharging in the Western Drainage exceeds background for cobalt, manganese, nickel, zinc, sulfate and uranium^{234}. One sample collected during the RI from the seep was analyzed for semivolatiles and total petroleum hydrocarbons; none were present at or above the detection limit.

The two alluvial monitoring wells (GW-35A and MW-1) exceed background for cobalt, manganese, nickel, zinc, sulfate, and uranium^{234}. Sulfate was the only exceedance of background in groundwater samples from the bedrock wells (GW-50 and MWWD-01).

The background exceedances show that groundwater contamination is most substantial close to the South Spoils pile. Groundwater in the drainage has considerable exceedances of background in the unconsolidated (alluvial water table) materials. Groundwater in the deeper bedrock is less impacted, with only sulfate exceeding background.

Central Drainage Groundwater

Table 5-73 summarizes the analytical results for the samples collected by the three investigations for the Central Drainage Seep. Tables 5-81 and 5-82 summarize the analytical results for the groundwater samples collected by the three investigations for the alluvial and bedrock wells, respectively. Table 5-135 summarizes the exceedances shown on wagon wheel map GW-9 (Appendix H).

The northernmost sample in the Central Drainage is a seep sample (CD Seep) collected close to the toe of the South Spoils pile. Approximately 100 feet south of the seep sample, two wells are located close to the axis of the drainage channel: MWCD-01 (deep bedrock) and MW-2 (alluvial water table). Approximately 700 feet south of MW-2, two additional wells are located close to the axis of the drainage channel: GW-36A (alluvial water table) and GW-51 (bedrock water table). Approximately 500 feet downgradient of GW-51, two wells are located close to the axis of the drainage channel.

The seep sample results (CD Seep) indicate that groundwater discharging in the Central Drainage exceeds background for cobalt, manganese, nickel, zinc, sulfate and uranium^{234}. One sample collected during the RI from the seep was analyzed for semivolatiles; none were present at or above the detection limit.

Groundwater samples collected from three alluvial monitoring wells (GW-19, GW-36A, and MW-2) exceed background for dissolved cobalt, manganese, nickel, zinc, sulfate, and uranium^{234}. Groundwater in the bedrock water table and deep bedrock had few exceedances of background. Well GW-51 exceeded background for sulfate and well MWCD-01 exceeded background for uranium^{234}. Groundwater samples from well MWCD-02 did not exceed background.

Based on the exceedances of background, contaminants are mostly being transported in the shallow groundwater below the drainage. Deeper groundwater in the lower portion of the drainage does not appear to be substantially impacted, except for the sulfate.

Eastern Drainage Groundwater

Table 5-74 summarizes the analytical results for the samples collected by the three investigations for the Eastern Drainage Seep. Tables 5-79 and 5-80 summarize the analytical results for the groundwater samples collected by the three investigations for the alluvial and bedrock wells, respectively. Table 5-135 summarizes the exceedances shown on wagon wheel map GW-9 (Appendix H). The following paragraphs discuss exceedances of background generally from upstream to downstream.

Four monitoring wells are located close to the NPDES Outfall Pond in the Eastern Drainage. The two wells upgradient of the outfall pond are MWNE-06 (deep bedrock) and MWNE-05 (alluvial water table). The two downgradient wells are MW-6 (alluvial water table) and MWED-02 (deep bedrock). There were no exceedances of background in groundwater samples collected from the four wells.

Samples from nine wells along the Eastern Drainage were analyzed for TPH; neither fraction (diesel and gasoline) was detected except for TPH-diesel in the sample collected from well MWED-02 in October 1999 at a concentration of 1,900 μg/L. This well is not downgradient from the MA but rather is located adjacent to the East Haul Road near the WTP outfall pond (Figure 2-2). One sample from this well was analyzed for semivolatile organic compounds and no compounds were present at or above the detection limits.

Tributaries to the Eastern Drainage. About 1,200 feet downstream of the outfall pond in the Eastern Drainage is the confluence with the East Dump Fork. The East Dump Fork drains a small area below the East Dump. Two wells are located at the toe of the East Dump: MWNE-05 (alluvial water table) and MWNE-06 (deep bedrock). The groundwater sample from the shallow alluvial water table exceeds background for dissolved aluminum, cobalt, manganese, nickel, zinc, sulfate, and uranium^{234}. The deeper bedrock well exceeds background for dissolved manganese, nickel, and zinc; sulfate; and uranium^{234}. One sample from well MWED-06 was analyzed for TPH; no hydrocarbon fractions (diesel and gasoline) were present at or above the detection limit. Table 5-77 provides a summary of the analytical results for the East Dump Fork alluvial water table groundwater sample and Table 5-78 provides the summary for the deep bedrock samples.

Approximately 750 feet downstream of the East Dump Fork confluence is the confluence of the Eastern Drainage and the East Seep Fork. Two wells and one seep sample location are located on the East Seep Fork just below the toe of the East Dump. Two wells also are located close to the confluence of the East Seep Fork and the Eastern Drainage.

Groundwater samples from the East Seep (East Seep SDED-05) exceed background for aluminum, cobalt, manganese, nickel, zinc, sulfate, and uranium^{234}. Table 5-74 provides a summary of the analytical results for the East Seep samples. One groundwater sample from the East Seep was analyzed for total petroleum hydrocarbons; neither of the hydrocarbon fractions (diesel and gasoline) was present at or above the detection limit.

The groundwater samples from MWED-07 (bedrock water table) and MWED-08 (deep bedrock), located close to the seep sample exceed background for only sulfate. The two wells located at the confluence of the Eastern Drainage and the East Seep Fork, MWED-03 (deep bedrock) and MW-05 (alluvial water table), exceed background only for sulfate. One sample from well MWED-07 was analyzed for TPH: neither hydrocarbon fraction (diesel and gasoline)

were detected at or above the detection limits. Table 5-76 provides a summary of the analytical results for the East Seep Fork bedrock groundwater samples.

Based on the exceedances of background, groundwater flowing under the drainages from the East Dump substantially exceeds background. However, the East Seep collection and pump-back system appears to be effective in preventing downgradient migration of site contaminants in groundwater.

Lower Reach of Eastern Drainage. Two wells (MWED-10 (alluvial water table) and MWED-11 (deep bedrock) are located in the lower reach of the Eastern Drainage above the confluence with Blue Creek. The wells are also situated below where the Western and Central Drainages join the Eastern Drainage. Groundwater from the alluvial water table aquifer exceeds background for nickel and sulfate. Groundwater in the deep bedrock well did not exceed background.

Middle Blue Creek Groundwater

One well (MWBC-01) is located in Middle Blue Creek just below the confluence with the Eastern Drainage. The only indicator parameter exceeding background in groundwater sample collected was sulfate. Appendix D and Table 5-75 present the analytical results for the groundwater sample collected in Middle Blue Creek.

5.6.2 Areas of Un-impacted Groundwater

This section summarizes the analytical results for groundwater in areas not affected by mining, based on use of the two-step method of comparing indicator parameters to background limits.

Far West Drainage Groundwater

Five wells are present in the Far West Drainage. Three of the wells (also discussed in the MA section) are located just west of the vehicle shop and maintenance area (MWFW-03, MWFW-04, and MWFW-05). These three wells are screened at the bedrock water table. Indicator parameters in samples collected from the wells do not exceed background.

Two additional wells are located in the drainage about 1,100 feet downstream (south) of the shop area. One well is completed in the water table aquifer and the second well is completed in the deep bedrock. Tables 5-88 and 5-89 summarize the analytical results for the alluvial and bedrock groundwater samples collected during the RI in the Far West Drainage. Dissolved nickel and chromium are the indicator parameters exceeding background limits in two samples collected in these wells. However, the exceedances were not confirmed by subsequent verification sampling of the wells.

Northern Drainage Groundwater

Two wells are located in the Northern Drainage. Well MWBA-01, located adjacent to the Eastern Haul Road, is completed in the water table aquifer. Well MWND-01 is completed in the bedrock water table.

Indicator parameters in the groundwater samples from the wells are below background limits. Tables 5-90 and 5-91 summarize the analytical results for the alluvial and bedrock groundwater samples.

Northeastern Drainage Groundwater

Two sets of wells of wells are located in the Northeastern Drainage. MWNE-01 (bedrock water table) and MWNE-02 (deep bedrock) are located along the drainage channel close to the MA boundary. MWNE-03 (alluvial water table) and MWNE-04 (deep bedrock) are located close to the MA boundary about 1,200 southwest of MWNE-01. Indicator parameters in the two northern wells (MWNE 1 and 2) do not exceed background. The two southern wells (MWNE 3 and 4) exceed background for chromium and/or nickel. These exceedances were not confirmed by the verification resample. Therefore, all four wells do not exceed background for the indicator parameters.

A fifth well (MWED-07) present in the drainage is located close to the MA boundary (on the eastern edge of Pit 3) at the head of the West Fork of the Eastern Drainage. This well is completed in the bedrock water table. Sulfate is the only indicator parameter exceeding background in this well. Because the well is located very close to the open pit, the sulfate exceedance is likely related to metal oxidation occurring on the pit walls. This well should be grouped with water quality in the MA, not the Eastern Drainage, a conclusion supported by the lack of indicator exceedances further downgradient in the drainage near the WTP. Tables 5-92 and 5-93 summarize the analytical results for the alluvial and bedrock groundwater.

Southwestern Drainage Groundwater

Two wells are located in the Southwestern Drainage: MWSW-01 (alluvial water table) and MWSW-02 (deep bedrock). Tables 5-94 and 5-95 summarize the analytical results for the alluvial and bedrock groundwater samples collected. Indicator parameters in groundwater samples from both wells were below background.

Northwest Ridge Groundwater

One well (MWNW-01) is located on the Northwest Ridge at the northern end of the MA. No indictor parameters exceeded background. Table 5-96 summarizes the analytical results for the groundwater samples collected.

5.7 SURFACE MATERIALS BACKGROUND EXCEEDANCES

This section summarizes the analytical results for surface material samples collected for the RI in the MA and limited portions of the PIA, by SMI in the PIA and MA, and by E&E in the MA. Sections 3.1 and 3.3.1.2 and Table 3-1 provide an overview of the sampling. RI data were compared to the background using the two-step method, as shown on Tables 5-101 and 5-102. While the SMI data are not directly comparable to the RI background data, a qualitative comparison is useful and is included in Appendix D.

5.7.1 Areas of Mining-Impacted Surface Materials

Based on the results of the two-step method, surface materials in the following areas are mining-impacted:

- MA
- East and West Haul Roads and adjacent areas

Based on gamma measurements, surface materials in the following areas are mining-impacted:

- Western and Central Drainage access roads

The impacted haul roads were surfaced during mining at the site using waste rock or other materials from the mining operation. The material on and adjacent to the roads could have varied in composition, depending on the type of material available at the time when haul roads were constructed or repaired. The gamma radiation measurements taken on the haul roads and adjacent areas were used to estimate the radium^{226} activity in the soils according to the correlation established between gamma radiation and radium^{226} activities (SMI 1999h). As discussed in the Phase 2A/1B QAPP, 6,200 counts per minute of gamma activity is the background count calculated as equivalent to 8.92 pCi/g of radium^{226} (URS 2001a).

Mined Area Surface Materials

During the RI, URS collected 16 composite surface material samples in the MA, as described in Section 3.31.2. Sampling locations are shown on Figure 3-3. SMI and E&E sampled surface materials in the MA during previous studies included:

- SMI collected 92 grab surface material samples from the radiological grid established in the MA and analyzed these samples for isotopes of radium, thorium, and uranium only. SMI collected 20 composite surface material samples from three upland soil zones within the MA and analyzed these samples for metals and isotopes of radium, thorium, and uranium.

- E&E collected six grab samples of ore/protore and five grab samples of waste rock in April 1998.

Table 5-105 provides summary statistics for the composite surface material samples and Table 5-106 summarizes the grab surface material samples collected in the MA by URS, E&E, and SMI. The samples collected by E&E and SMI have coverage in the MA very similar to those collected by URS. To provide a direct comparison to the RI background limits, only samples collected by URS were used for the two-step method (this avoids differences in sampling depths). Appendix D provides the complete analytical results for URS, E&E, and SMI samples.

Nine indicator parameters exceed background in the URS composite surface material samples collected in the MA: cadmium, chromium, copper, lead, manganese, lead^{210}, radium^{226}, uranium^{238}, and zinc. Other parameters that exceed background limits are shown in bold on Tables 5-105 and 5-106. A qualitative review of the SMI and E&E analytical results in Appendix D indicate that many of the concentrations of metals and activity concentrations of radionuclides in the MA also exceed background.

In addition to collecting surface material samples, SMI measured gamma radiation at intervals along the surface material sampling transects (SMI 1999i). Using the site-specific correlation between gamma radiation and exposure rates, SMI prepared an exposure rate contour map for surface materials in the MA and surrounding areas of the PIA, based on unshielded gamma radiation measurements (Figure 5-9). Figure 5-9 shows that elevated gamma radiation extends for a maximum of a few hundred feet into the PIA from the MA in most areas. Much of this radiation originates from the exposed and disturbed mineralized rock in the MA. Table 5-110 summarizes the background surface material samples collected by SMI.

Surface Materials on the East and West Haul Roads

Table 5-103 summarizes the data for surface material samples collected on the two haul roads. Indicator parameters that exceed background for the haul road material are lead^{210}, radium^{226}, and uranium^{238}. Other parameters that exceed background are shown in bold on Table 5-103. Gamma radiation measured on the haul roads also exceeds the background for the site.

Surface Materials in Areas Adjacent to the East and West Haul Roads

Table 5-104 summarizes the analytical results for the surface material samples collected adjacent to the haul roads. Indicator parameters that exceed background for the surface materials adjacent to the haul roads are cadmium, chromium, lead, lead^{210}, radium^{226}, uranium^{238}, and zinc. Other parameters that exceed background limits are shown in bold on Table 5-104.

The distribution of exceedances is erratic, with five of 16 sampling locations (SMEHR-04, SMEHR-06, SMEHR-07, SMEHR-09, and SMWHR-02 (Figure 3-5) showing no exceedances of indicator parameters. The single exceedance of lead is from sample SMEHR-12, which was taken from a location near the intersection of the East Haul Road and the paved Ford-Wellpinit Road. Because only one of the samples shows an elevated lead concentration, and because this sample was taken near a major road, this exceedance may be attributable to vehicle exhaust deposition along the Ford-Wellpinit Road.

The erratic nature of the exceedances may be partly explained by road maintenance practices that occurred over many years of mine operation. Mine material available to resurface and maintain roads likely varied in its residual metal content, with earlier waste rock likely to be higher in metal concentrations. During initial road building this material would have had the widest footprint covering the existing ground surface (spread on areas adjacent to the actual road surfaces). Repairs done to small sections of the roads may have incorporated surface material from different sources in the MA. As a result, the sporadic sampling results do not appear unusual.

To provide an estimate of the extent of the surface material contamination adjacent to the road, a gamma radiation survey was performed during the RI along traverses perpendicular to the road at surface sampling locations exceeding background, as described in Section 3.3.1.4. The surface material contamination adjacent to the haul roads has likely resulted from erosion and deposition of materials used to resurface the roads downgradient from the roads, and possibly from spills of material from haul trucks that use the roads. Based on the results of the RI gamma radiation transect measurements, the affected areas extend approximately 10 to 185 feet from the roads, primarily in the downslope directions, as shown on Figure 5-8.

Surface Materials on the Western Drainage and Central Drainage Access Roads

Gravel roads that lead to the Western and Central Drainage seep collection systems are suspected to have been surfaced (and constructed) with the same material used in resurfacing the East and West Haul Roads. Surface material samples were not collected on these roads. However, a gamma radiation survey was performed along the roads at 100-foot intervals, as described in Section 3.3.1.4. The gamma radiation levels measured on these roads are similar to those measured along the East and West Haul Roads. Based on the gamma radiation surveys, these roads are likely to have similar exceedances of metal concentrations and radionuclide activity concentrations. Because the roads are not used by haul trucks, the potential air and mechanical transport is less than the haul roads, and the extent of contaminated surface materials adjacent to the road are probably limited to within a few feet of the roads.

5.7.2 Areas of Un-impacted Surface Materials

This section summarizes the analytical results for surface materials in the areas not impacted by mining, based on the comparison of indicator parameters to background limits and professional judgment. As described in the following sections, the following areas did not exceed background (with minor exceptions) and are not considered impacted by mining at the site.

- Southwest Downwind Area
- Northeast Downwind Area

During the RI, 16 composite samples, consisting of 5 surface material sub-samples, were collected in two areas adjacent to the MA in the primary and secondary downwind directions, as described in Section 3.3.1.2. Prior to the RI, SMI collected surface material samples along 20 traverses extending from the MA in all directions, as well as several other soil samples collected to assess plant uptake. For analyses using the two-step method, the data were divided into Southwest and Northeast Downwind Areas.

Southwest Downwind Area Surface Materials

Table 5-107 summarizes the analytical results for the Southwest Downwind Area surface material samples. One indicator parameter for one sample (selenium in sample SMDWSW-04) exceeds background. A review of the data indicates that samples collected closer to the MA do not exceed background for selenium or any other indicator parameter. Given the very isolated exceedance of background and, in particular, the lack of activities of radionuclides above background in the downwind area, downwind transport of contaminants into the Southwest Downwind Area by mining activity (i.e. blasting and truck dust) is not indicated. This is consistent with the results of URS gamma measurement that were below background in the Southwest Downwind Area, as discussed in Section 5.9.2.

Northeast Downwind Area Surface Materials

Table 5-108 summarizes the analytical results for the surface material samples collected from the Northeast Downwind Area. Indicator parameters exceeding background at one or more sampling locations include aluminum, cadmium, chromium, lead, manganese, and zinc. The only radionuclides that exceed background limits are lead^{210} at three locations (SMDWNE-08, 09, and 16).

The Northeast Downwind Area shows exceedances of background; however, the exceedances are difficult to relate to mining activity at the site. The indicators that exceed background could be associated with mining impacts. However, lack of consistent areal distribution of the exceedances (air transport would likely result in a more uniform pattern of deposition) and the lack of uranium isotopes above background provide evidence that the exceedances are likely anomalous metal concentrations associated with the contact dominated rock and alteration halos. This conclusion is consistent with the NURE study that identified such anomalies as potential indicators of mineralization.

In addition, 16 RI samples of MA surface material exceed background for uranium^{238} and radium^{226}. By contrast, all samples from the Northeast Downwind Area are below background for these two indicator parameters. This inconsistency and the potential presence of alteration halos is sufficient to conclude that exceedances in the downwind area are not likely the result of mining impacts via air transport (i.e. blasting or truck dust).

5.8 SUBSURFACE MATERIALS BACKGROUND EXCEEDANCES

This section summarizes the analytical results for subsurface material samples collected during the RI in the background area and portions of the PIA, collected by SMI in the PIA and MA, and collected by the BOM in the MA. Concentrations of indicator parameters in samples collected by URS were compared to background using the two-step method to identify exceedances. Background values for subsurface materials used in the two-step method are presented in Tables 5-115 and 5-116.

Based on evaluation of the data collected during the RI, the following areas of subsurface materials are mining-impacted:

- Underlying the East and West Haul Roads
- Adjacent to the East and West Haul Roads

Subsurface materials in forested areas in the primary and secondary downwind directions from the MA are not affected. Impacted subsurface material areas in the PIA are illustrated on Figure 5-8, which lists the indicators that exceed background in each mining-impacted area.

5.8.1 Areas of Mining-Impacted Subsurface Materials

This section summarizes the analytical results and discusses the nature and extent of contamination in subsurface materials in the mining-impacted areas. The characterization includes data collected during the RI and data collected during investigations conducted by SMI and BOM. Sections 3.1 and 3.3.1.2 and Table 3-1 provide an overview of the samples collected for each investigation.

Mined Area Subsurface Materials

SMI collected 19 subsurface material samples from three upland soil areas (most of the MA is covered by waste rock). Complete analytical results for these samples are provided in Appendix D, and a summary of the results is presented in Table 5-118. The depths from which these samples were collected are not the same as the depths of the background subsurface samples collected during the RI; therefore, these samples are not directly comparable to the background limits calculated from the RI background subsurface material data. Nonetheless, the concentrations of all metals (except arsenic and cobalt) and the activity concentrations of the uranium isotopes at the sampled locations exceed the RBLs.

Subsurface Materials Adjacent to the East and West Haul Roads

As part of the RI, 13 subsurface material samples were collected from grid cells adjacent to the East and West Haul Roads. Indicator parameters that exceed background limits for the subsurface materials adjacent to the haul roads are aluminum, chromium, lead, lead^{210}, radium^{226}, uranium^{238}, and zinc. Table 5-117 summarizes the analytical results for the subsurface material samples collected adjacent to the haul roads. Other parameters exceeding background are shown in bold on the table.

5.8.2 Areas of Un-impacted Subsurface Materials

This section summarizes the analytical results for subsurface materials in areas not affected by the mining, based on the comparison of indicator parameters to background limits and professional judgment.

Southwest Downwind Area Subsurface Materials

Six composite subsurface material samples were collected in the Southwest Downwind Area (Figure 3-3). Table 5-119 summarizes the analytical results for the Southwest Downwind Area subsurface material samples. Appendix D presents the complete analytical results for these samples. Lead is the only indicator in a single sample that exceeds background in the downwind area (SSDWSW-09 at 12.5 mg/kg). Based on the isolated nature of the exceedance and the lack of other background exceedances, subsurface materials in the Southwest Downwind Area do not appear to be impacted by mining.

Northeast Downwind Area Subsurface Materials

During the RI, 16 composite subsurface samples were collected in the Northeast Downwind Area. Sample locations are shown on Figure 3-3. Table 5-120 provides a summary of the analytical results for the Northeast Downwind Area subsurface samples. Appendix D presents the complete analytical results for these samples.

The indicator parameters aluminum, chromium, and manganese exceed background limits for one or more samples. All radionuclide indicators are below the background limits for these samples. As discussed for surface materials in the Southwest Downwind Area, the exceedances are sporadic and lack radionuclides. If these materials were derived from the MA by erosion or wind deposition, then radionuclides would be expected to exceed background limits in one or more samples. While exceedances of background are present, the lack of a coherent pattern that can be attributed to air transport and deposition is not evident. Consequently, subsurface materials in the Northeast Downwind Area do not appear to be impacted by mining activity at the site.

Subsurface Materials in Other PIA Sampling Areas

SMI collected 25 subsurface samples along the 20 transects that extend from the MA into the PIA (SMI 1999oo). These samples were analyzed for radium^{226}. Eight of the samples were also analyzed for thorium^{230}, uranium^{234}, uranium^{235}, and uranium^{238}. The complete analytical results are provided in Appendix D.

Table 5-121 summarizes results of the SMI subsurface transect samples. Fourteen of the 25 sample results for radium^{226} exceed the background limits calculated for the RI background subsurface materials. However, SMI collected grab samples from 0.5 to 1 foot in depth, whereas the RI background samples are composite samples collected from 0.16 to 0.66 foot in depth. Therefore, the SMI data are not directly comparable to the background limits calculated using the RI background data. Nevertheless, where exceedances of the RI background do exist, the

SMI data provide useful general information for characterizing the nature of mining-affected subsurface materials.

Eight subsurface samples from the SMI transects exceed the RBL for radium^{226} (8.92 pCi/g). For six of these samples, radium^{226} activity concentrations in the surface material samples collected at the same locations also exceed the background limits. As described for surface materials, four of the six samples were collected from locations on the haul roads (TG175, TH225, TI400, and TM250), one is at the MA boundary (TD000), and one is from the sediments in the Northeastern Drainage below Detail Area 4 (TC050). The remaining two sampling locations (TB000 and TT000) are located at the boundary between the MA and PIA and may represent MA conditions (waste rock, exposed bedrock, etc.). Thorium^{230} and uranium isotopes in the samples collected on the haul roads and in Detail Area 4 also exceed background limits. These same parameters also exceed background (indicating mining impacts) for the transect sample collected at TE312, which is located in the bottom of the Northeastern Drainage. Thus, with the exception of the sample collected below Detail Area 4 and the sample collected in the Northeastern Drainage, the results do not indicate mining impacts forested areas of the PIA surveyed. The data do indicate the presence of mining impacts immediately adjacent to the East and West Haul Roads.

5.9 AIR BACKGROUND EXCEEDANCES (AIRBORNE RADON/RADON FLUX/SURFACE MATERIAL GAMMA RADIATION)

This section summarizes the measurements of airborne radon, radon flux, and the external gamma radiation measurements surface material conducted in the MA and PIA. These measurements were compared to background limits to evaluate whether the activities in and near the MA exceed background limits using the two-step method. The radon emanation fraction measurements conducted during the RI for the background and MA surface materials are discussed (not evaluated using the two-step method). The ratio method was not applied to these measurements.

5.9.1 Areas of Mining-Impacted Air and Gamma Radiation

This section summarizes the measurements and discusses the activity concentrations of airborne radon (Tables 5-122 and 5-123), radon flux (Tables 5-124 and 5-125), and external gamma radiation in the MA and PIA. Two kinds of gamma radiation surveys were performed during the RI. Transect surveys of unshielded gamma radiation were conducted along the East and West Haul Roads, the roads leading into Pits 3 and 4, the Western Drainage and Central Drainage access roads, and the West Spur Road. Section 3.3.1.4 and Table 3-1 summarize the measurements conducted. Unshielded gamma radiation was measured at all surface material sampling locations in the PIA and MA. SMI conducted a gamma survey at 408 grid points in the

MA and at intervals along 20 traverses (transects) leading from the MA into the PIA (SMI 1999oo). The BOM also conducted a less-extensive gamma radiation survey in the MA. The raw data collected by URS and discussion of the measurement methods are provided in Appendix A, Attachment 6.

The following areas were found to be mining-impacted:

- MA
- East and West Haul Roads
- Pit access roads
- Western and Central Drainage seep collection roads
- West Spur Road

Mined Area (Air and Radiation)

Airborne Radon Flux. Airborne radon activity concentrations in the MA range from 1.85 to 15.45 pCi/L, with a mean of 6.59 ± 0.91 pCi/L and a geometric mean of 5.17 ± 0.36 pCi/L. All but two of the locations measured in the MA have concentrations that exceed the background limit for airborne radon activity. The highest activity concentrations are not associated with specific features in the MA. The four locations with airborne radon activity concentrations above 9 pCi/L are on top of the Hillside Dump (ARMA-03), above the backfilled pits (ARMA-08), on the west side of the South Spoils (ARMA-10), and near Ore Stockpile # 3 (ARMA-16). The activity concentration of airborne radon was measured at 7.6 pCi/L in Pit 3, which is close to the mean value for the MA.

Radon Flux Measurements. Radon flux rates in the MA range from 1.7 to 300 pCi/m^{2}s. As expected, radon flux rates for the 18 measurement locations above the stockpiles have the highest mean value—140 pCi/m^{2}s. Waste rock locations have a mean of 32 pCi/m^{2}s, and disturbed ground locations have a mean of 51 pCi/m^{2}s. Table 5-124 presents a summary of the radon flux measurements in background areas and the MA. The maximum RPD between the Phase 2A radon flux measurements and the three Phase 2B rounds of measurements for the MA locations with multiple measurements is 143 percent and 191 percent for the two disturbed ground locations in the MA, 85 to 185 percent for the three stockpile locations, and 194 percent for the one waste rock location. The RPD indicates that the rates can vary considerably due to seasonal changes and weather conditions at the time measurement are taken.

SMI-measured flux rates range from 3.0 to 192.2 pCi/m^{2}s, with a mean of 34.5 pCi/m^{2}s. These values are consistent with the RI measurements for waste rock areas.

Radon Emanation. Radon emanation fraction was measured for the background and MA surface material samples collected during the RI. These measurements were conducted to

determine the fraction of radon gas that escapes the surface materials in the MA and background area. Table 5-126 provides the summary statistics for the emanation fraction measurements. The mean values for the MA and Background Area A are similar, at 0.42 and 0.45, respectively. The mean value for Background Area B is 0.32. These values are slightly higher than many previous measurements of radon emanation from western U.S. uranium ores. The lower mean radon emanation from Background Area B suggests that the high emanation fractions may be characteristic of the mineralization that is associated with the ore bodies at Midnite Mine and Spokane Mountain.

Gamma Radiation. Figure 5-9 shows gamma radiation exposure rate contours for the MA and surrounding PIA based on the data collected by SMI in the MA and along the traverses extending into the PIA. Figure 5-9 shows that gamma radiation exposure rates in the MA range from about 30 µR/hr to more than 200 µR/hr. The highest exposure rates are associated with the ore and protore stockpiles, with the maximum rates measured on top of Ore Stockpile # 3. Gamma radiation exposure rates generally drop to less than background levels within a few hundred feet of the MA boundary. The gamma radiation survey conducted by BOM in 1995 covered the MA at a lesser grid density than the survey performed by SMI, but showed comparable radiation levels. Gamma radiation at 16 surface material sampling locations within the MA was measured. Measurements were taken at five locations and then averaged to create a composite measurement.

Table 5-127 provides the summary statistics for the gamma measurements conducted in the background area and over three types of materials in the MA: disturbed ground, waste rock, and ore/protore by URS. Gamma radiation ranges from 13.1 to 398 µR/hr in the MA. The highest mean gamma radiation (203 µR/hr) was measured above the ore and protore stockpiles, consistent with the results obtained by SMI for the on-site grid sampling conducted in the MA. The mean gamma radiation exposure rates are identical for waste rock and disturbed ground—51 µR/hr. The range of values for the disturbed ground is considerably higher than values for the waste rock likely indicating the presence of "hot spots" compared to the mixing that occurs with the generation and hauling of waste rock.

Potentially Impacted Area

Radon. One airborne radon measurement was made in each PIA downwind sampling area and near the East and West Haul Roads, as shown on Figure 3-5. The activity concentration of airborne radon slightly exceeds the background limit of 2.03 pCi/L for the Northeast Downwind Area sample (measured at 2.27 pCi/L), Southwest Downwind Area sample (3.52 pCi/L), and West Haul Road sample (2.48 pCi/L). Radon flux was not measured in these areas.

East Haul Road (Radiation)

Gamma Measurements. Gamma radiation was recorded at 20 to 22 µR/hr on the East Haul Road near the Ford-Wellpinit Road (Table 5-128) and gradually climbed to about 30 µR/hr by halfway between the Ford-Wellpinit Road and the MA boundary. Gamma radiation along the remainder of the road generally ranged from 30 to 40 µR/hr, with some locally higher values. The range of results was 16.6 to 62.5 µR/hr, with a mean of 31.6 µR/hr. This compares to mineralized and non-mineralized background ranges of 11.3 to 13.9, and 10.6 to 19.2, respectively.

Unshielded gamma radiation was also measured at the 12 composite surface material sampling locations on and adjacent to the East Haul Road. Measurements were made at ground level at each subsampling location and the measurements averaged. The average gamma radiation at the sampling locations ranged from 14.01 to 36.75 µR/hr.

Unshielded gamma radiation was used to estimate the extent of contamination in surface materials adjacent to the road.

West Haul Road (Radiation)

Gamma Measurements. Unshielded gamma radiation was measured at 100-foot intervals along the West Haul Road (Table 5-128). Gamma radiation ranged from 27.4 to 57.8 µR/hr, with a mean of 47.6 µR/hr. Gamma radiation increased from about 40 to 50 µR/hr at the entrance to the MA to almost 60 µR/hr in the center portions of the road. The gamma radiation level was about 50 µR/hr at the intersection with the Ford-Wellpinit Road. This compares to mineralized and non-mineralized background ranges of 11.3 to 13.9, and 10.6 to 19.2, respectively.

Unshielded gamma radiation also was measured at the four composite surface material sampling locations on and adjacent to the West Haul Road. Measurements were made at ground level at each subsampling location and the measurements averaged. The average gamma radiation at the sample locations ranges from 19.63 to 67.67 µR/hr.

Unshielded gamma radiation was also used to estimate the extent of contamination in surface materials adjacent to the road.

Pit Access Roads (Radiation)

Gamma Measurements. Unshielded gamma radiation was measured at 100-foot intervals along the access roads leading into both open pits on site (Table 5-128). For Pit 3, gamma radiation ranges from 33.8 to 138.9 µR/hr, with a mean of 72.2 µR/hr along the access road. Gamma radiation increases from about 100 µR/hr near the top of the road to about 40 µR/hr in the middle

of the road, and then increases back to almost 140 µR/hr near the water in the pit. For Pit 4, gamma radiation ranges from 42.8 to 83.3 µR/hr, with a mean of 57 µR/hr along the access road. Gamma radiation decreases from about 60 µR/hr at the top of the road to about 45 µR/hr in the middle of the road, and then increases back to about 60 to 80 µR/hr near the water in the pit. This compares to mineralized and non-mineralized background ranges of 11.3 to 13.9, and 10.6 to 19.2, respectively.

Other Roads (Radiation)

Gamma Measurements. Unshielded gamma radiation was measured at 100-foot intervals along the access roads leading to the Western Drainage and Central Drainage seep collection systems and a small piece of road that leads off the West Access Road called the West Spur Road (Table 5-128). Gamma radiation ranges from 19.7 to 37.8 µR/hr along the seep collection system access roads, with a mean of 25 µR/hr. Gamma radiation along the West Spur Road ranges from 15.7 to 22.9 µR/hr, with a mean of 18.9 µR/hr. This compares to mineralized and non-mineralized background ranges of 11.3 to 13.9, and 10.6 to 19.2, respectively.

5.9.2 Areas of Un-impacted Air and Radiation

The activity concentration of airborne radon measured on the East Haul Road (0.87 pCi/L) does not exceed the background limit. Radon flux was not measured along the East Haul Road.

Gamma radiation was measured at all surface material subsampling locations in the Northeast and Southwest Downwind Areas. Measurements were made at the five locations and then averaged to create a composite sample. The results are below the background limit for gamma radiation for all sampling locations. Measurements of gamma exposure rates in the Northeast Downwind Area range from 8.97 to 19.76 µR/hr and those in the Southwest Downwind Area range from 10.87 to 17.08 µR/hr.

The gamma radiation levels in the downwind areas confirm that these areas have not been affected by deposition of wind-blown radioactive particles due to mining activities.

Table 5-1
URANIUM-238
DECAY SERIES ANALYSES

Aqueous	Half Life	Analyzed [1]
U238	4.5E+9 y	Analyzed
Th234	24.1 d	Not Analyzed
Pa234	1.17 m	Not Analyzed
U234	2.46E+5 y	Analyzed
Th230	8E+4y	Analyzed
Ra226	1622 y	Analyzed
Rn222	3.8 d	Calculated[2]
Po218	3.05 m	Not Analyzed
Pb214	26.8 m	Not Analyzed
Bi214	19.7 m	Analyzed[2]
Po214	1.5E-4 s	Not Analyzed
Pb210	21 y	Analyzed
Bi210	5 d	Not Analyzed
Po210	138.4 d	Analyzed
Pb206	Stable	Not Analyzed
Non-Aqueous		
U238	4.5E+9 y	Analyzed
Th234	24.1 d	Not Analyzed
Pa234	1.17 m	Not Analyzed
U234	2.46E+5 y	Analyzed
Th230	8E+4y	Analyzed
Ra226	1622 y	Analyzed
Rn222	3.8 d	Not Analyzed
Po218	3.05 m	Not Analyzed
Pb214	26.8 m	Not Analyzed
Bi214	19.7 m	Not Analyzed
Po214	1.5E-4 s	Not Analyzed
Pb210	21 y	Analyzed
Bi210	5 d	Not Analyzed
Po210	138.4 d	Analyzed
Pb206	Stable	Not Analyzed

Notes:
1) Those isotopes listed as not analyzed have relatively short half lives and/or low dose factors and were not directly measured or were not evaluated. However, relative activities can be calculated from the immediately preceding long-lived parent that was measured.
2) Radon-222 activity at the time of sample collection was calculated from two separate gamma spectrometry bismuth-214 measurements taken approximately one month apart.

Definitions:

Ra	Radium	Po	Polonium	d	days
Bi	Bismuth	Rn	Radon	hr	hours
Th	Thorium	Pb	Lead	m	minutes
Pa	Protacinium	U	Uranium	s	seconds
				y	years

Table 5-2
URANIUM-232
DECAY SERIES ANALYSES

Aqueous	Half Life	Analyzed [1]
Th232	1.4 E+10y	Analyzed
Ra228	6.7 y	Analyzed
Ac228	6.13 hr	Not Analyzed
Th228	1.91 y	Analyzed
Ra224	3.64 d	Not Analyzed
Rn220	55 s	Not Analyzed
Po216	0.15 s	Not Analyzed
Pb212	10.64 hr	Not Analyzed
Bi212	60.6 m	Not Analyzed
Po212	3E-7 s	Not Analyzed
Tl208	3.1 m	Not Analyzed
Pb208	Stable	Not Analyzed
Non-Aqueous		
Th232	1.4 E+10y	Analyzed
Ra228	6.7 y	Analyzed
Ac228	6.13 hr	Not Analyzed
Th228	1.91 y	Analyzed
Ra224	3.64 d	Not Analyzed
Rn220	55 s	Not Analyzed
Po216	0.15 s	Not Analyzed
Pb212	10.64 hr	Not Analyzed
Bi212	60.6 m	Not Analyzed
Po212	3E-7 s	Not Analyzed
Tl208	3.1 m	Not Analyzed
Pb208	Stable	Not Analyzed

Notes:

1) Those isotopes listed as not analyzed have relatively short half lives and/or low dose factors and were not directly measured or were not evaluated. However, relative activities can be calculated from the immediately preceding long-lived parent that was measured.

Definitions:

Ac	Actinium	Ra	Radium	d	days
Bi	Bismuth	Rn	Radon	hr	hours
Fr	Francium	Th	Thorium	m	minutes
Pa	Protactinium	Tl	Thallium	s	seconds
Pb	Lead	U	Uranium	y	years
Po	Polonium				

Table 5-3
URANIUM-235
DECAY SERIES ANALYSES

Aqueous	Half Life	Analyzed [1]
U235	7.1E+8 y	Analyzed
Th231	25.5 hr	Not Analyzed
Pa231	3.25E+4 y	Not Analyzed
Ac227	21.6 y	Not Analyzed
Th227	18.2 d	Analyzed
Fr223	22 m	Not Analyzed
Ra223	11.43 d	Not Analyzed
Rn219	4.0 s	Not Analyzed
Po215	1.77E-3 s	Not Analyzed
Pb211	36.1 m	Not Analyzed
Bi211	2.16 m	Not Analyzed
Po211	0.52 s	Not Analyzed
Tl207	4.79 m	Not Analyzed
Pb207	Stable	Not Analyzed
Non-Aqueous		
U235	7.1E+8 y	Analyzed
Th231	25.5 hr	Not Analyzed
Pa231	3.25E+4 y	Analyzed
Ac227	21.6 y	Not Analyzed
Th227	18.2 d	Analyzed
Fr223	22 m	Not Analyzed
Ra223	11.43 d	Not Analyzed
Rn219	4.0 s	Not Analyzed
Po215	1.77E-3 s	Not Analyzed
Pb211	36.1 m	Not Analyzed
Bi211	2.16 m	Not Analyzed
Po211	0.52 s	Not Analyzed
Tl207	4.79 m	Not Analyzed
Pb207	Stable	Not Analyzed

Notes:

1) Those isotopes listed as not analyzed have relatively short half lives and/or low dose factors and were not directly measured or were not evaluated. However, relative activities can be calculated from the immediately preceding long-lived parent that was measured.

Definitions:

Ac	Actinium	Ra	Radium	Pb	Lead	d	days
Bi	Bismuth	Rn	Radon	Po	Polonium	hr	hours
Fr	Francium	Th	Thorium	U	Uranium	m	minutes
Pa	Protactinium	Tl	Thallium	s	seconds	y	years

Table 5-4

ESTIMATED STATISTICAL ERRORS ASSOCIATED WITH COMPARISONS OF SITE DATA TO BACKGROUND LIMITS

Medium	Number of Background Samples	Number of Site Locations	Number of Indicator Parameters	Total Number of Individual Comparisons	Estimated Probability of False Positive Error (For Each Sample Location)	Estimated Probability of False Negative Error (Per Sample Location)
Groundwater	56	63 (1)	10	630	1% w/ verification sample; 40% w/o verification sample	17% w/verification sample; 8% w/o verification sample
Surface Water – Fall Season	38	18 (2)	10	180	40% (no verification samples available)	No verification samples available 8%
Surface Water - Spring Season	19	18 (3)	10	180	1% w/ verification sample; 40% w/o verification sample	24% w/ verification sample; 9% w/o verification sample
Composite Sediments	22	51 (4)	10	510	1% w/ verification sample; 40% w/o verification sample	24% w/ verification sample; 9% w/o verification sample
Grab Sediments	22	45 (2)	10	450	No verification samples available 40%	No verification samples available 9%
Surface Materials	40	64 (5)	12	768	1% w/ verification sample; 46% w/o verification sample	18% w/verification sample; 8% w/o verification sample
Subsurface Materials	16	18 (2)	12	216	No verification samples available 46%	No verification samples available 10%

Notes:
(1) 56 with verification samples, 7 with one sample only
(2) all one sample only, no verification samples
(3) 3 with verification samples, 15 with one sample only
(4) 15 with verification samples, 36 with one sample only
(5) 17 with verification samples, 47 with one sample only

Table 5-5
Effects of Hypothetical Reduction of Background Sample Concentrations on Confidence Levels of Ratio of Median Values—Southwest Downwind Area

5th Percentile Limits on Ratio of Medians M1(SW Downwind Soil) / M2(Background Soil) with 10,%, 20% and 30% Reductions in Background Values				
	5th	**10%**	**20%**	**30%**
Aluminum	0.96	1.07	1.21	1.38
Antimony	0.80	0.89	1.00	1.14
Arsenic	0.44	0.49	0.55	0.62
Cadmium	0.45	0.50	0.56	0.64
Chromium	0.96	1.07	1.20	1.37
Cobalt	0.93	1.03	1.16	1.33
Copper	0.88	0.98	1.10	1.26
Iron	0.80	0.89	1.01	1.15
Lead	0.99	1.10	1.23	1.41
^{210}Lead	0.90	1.00	1.13	1.29
Manganese	0.66	0.73	0.82	0.94
Nickel	0.91	1.02	1.14	1.31
Nitrate	0.16	0.18	0.20	0.23
^{210}Polonium	0.75	0.83	0.94	1.07
^{226}Radium	1.04	1.16	1.30	1.49
Selenium	0.34	0.38	0.43	0.49
Sulfate	1.09	1.21	1.36	1.55
^{234}Uranium	0.88	0.98	1.10	1.26
^{238}Uranium	0.86	0.96	1.08	1.23
Vanadium	0.89	0.99	1.11	1.27
Zinc	0.91	1.01	1.14	1.30

Table 5-6
SUMMARY OF ANALYTICAL RESULTS FOR URS BACKGROUND AREA SURFACE WATER SAMPLES

Parameter	Units	Number of Samples	Number of Detects	Background Limits				Minimum	Maximum Detected Value
				Fall BL (1)	Fall RBL (2)	Spring BL (3)	Spring RBL (4)		
Field Parameters									
Dissolved Oxygen	mg/l	38	38	NA	NA	NA	NA	3.00	16.1
Eh	mV	37	37	NA	NA	NA	NA	-71.00	411
Ferrous Iron	mg/l	38	3	NA	NA	NA	NA	<0.0500	3.00
Field pH	SU	37	37	NA	NA	NA	NA	4.98	8.64
Specific Conductance	uS/cm	37	37	609	414	91,000	91,000	38.0	91,000
Temperature	C	38	38	NA	NA	NA	NA	3.00	15.0
Turbidity	NTU	38	38	NA	NA	NA	NA	0.00	164
Inorganics									
Chloride	mg/l	57	57	4.82	4.82	1.65	1.28	0.525	4.82
Nitrate	mg/l	55	23	1.57	0.324	0.189	0.099	<0.0200	2.98
Nitrite	mg/l	55	0	0.03	0.03	0.02	0.02	<0.0200	<0.0300
Nitrogen, Ammonia	mg/l	57	18	1.21	1.21	0.039	0.026	<0.0100	1.21
Phosphate-P	mg/l	57	56	0.526	0.25	0.189	0.13	<0.0100	0.665
Phosphorus	mg/l	57	56	1.27	0.518	0.347	0.213	<0.0100	0.733
Sulfate	mg/l	57	57	38.4	22.2	9.36	7.03	1.84	30.0
Metals									
Dissolved Aluminum	ug/l	57	55	1,890	708	15,700	7,330	<3.90	6,620
Total Aluminum	ug/l	57	55	25,100	7,270	9,490	7,710	9.40	8,540
Dissolved Antimony	ug/l	57	8	6.07	0.597	7.47	5.33	<0.100	5.80
Total Antimony	ug/l	57	13	3.33	0.602	9.15	6.12	<0.100	5.50
Dissolved Arsenic	ug/l	57	57	38.7	17.9	15.1	8.69	0.360	21.3
Total Arsenic	ug/l	57	57	82.5	34.7	20.5	11.7	0.690	46.1
Dissolved Barium	ug/l	57	57	252	252	129	73.4	1.90	252
Total Barium	ug/l	57	57	413	188	165	165	2.70	274
Dissolved Beryllium	ug/l	57	2	0.1	0.1	0.26	0.26	<0.100	0.26
Total Beryllium	ug/l	57	14	0.23	0.23	0.735	0.466	<0.100	0.5
Dissolved Cadmium	ug/l	57	3	9.2	9.2	0.5	0.5	<0.200	9.20
Total Cadmium	ug/l	57	3	6.2	6.2	0.5	0.5	<0.200	6.20
Dissolved Calcium	ug/l	57	57	63,300	63,300	33,000	18,400	1,550	63,300
Total Calcium	ug/l	57	57	62,800	62,800	34,300	34,300	2,080	62,800
Dissolved Chromium	ug/l	57	8	0.63	0.63	5.15	2.76	<0.400	3.20
Total Chromium	ug/l	57	27	7.71	3.39	5.33	3.66	<0.400	7.20
Dissolved Cobalt	ug/l	57	10	14.4	4.06	1.4	1.4	<0.500	7.30
Total Cobalt	ug/l	57	15	33.8	8.63	3.43	2.06	<0.500	20.2

Table 5-6
SUMMARY OF ANALYTICAL RESULTS FOR URS BACKGROUND AREA SURFACE WATER SAMPLES

Parameter	Units	Number of Samples	Number of Detects	Background Limits				Minimum	Maximum Detected Value
				Fall BL (1)	Fall RBL (2)	Spring BL (3)	Spring RBL (4)		
Dissolved Copper	ug/l	57	15	3.37	1.77	3	3	<0.500	3
Total Copper	ug/l	57	41	29.8	11.1	10.7	6.68	<0.500	17.1
Dissolved Iron	ug/l	57	47	8,620	2,530	11,600	5,290	<8.40	5,030
Total Iron	ug/l	57	55	82,300	19,600	6,040	4,930	<8.40	20,200
Dissolved Lead	ug/l	57	23	1.69	0.729	6.04	3.2	<0.100	4.50
Total Lead	ug/l	57	34	26.1	6.86	5.18	3.57	<0.100	6.30
Dissolved Magnesium	ug/l	57	57	17,900	17,900	8,730	8,730	724	17,900
Total Magnesium	ug/l	57	57	18,500	18,500	9,070	9,070	981	18,500
Dissolved Manganese	ug/l	57	54	2,040	2,040	55.7	32.2	1.10	2,040
Total Manganese	ug/l	57	56	2,230	2,230	74.6	61.8	1.20	2,230
Dissolved Mercury	ug/l	38	1	0.100	0.100	0.1	0.1	<0.100	0.1
Total Mercury	ug/l	38	0	0.200	0.200	0.1	0.1	<0.100	<0.200
Dissolved Molybdenum	ug/l	19	5	16.6	6.84	NC	NC	<1.20	11.4
Total Molybdenum	ug/l	19	1	11.5	11.5	NC	NC	<1.20	11.5
Dissolved Nickel	ug/l	57	2	5.00	5.00	1.4	1.4	<0.500	1.4
Total Nickel	ug/l	57	24	21.1	6.78	5.06	4.17	<0.500	12.9
Dissolved Potassium	ug/l	57	57	8,990	8,990	2,620	2,620	866	8,990
Total Potassium	ug/l	57	57	8,370	5,500	2,460	2,010	854	9,330
Dissolved Selenium	ug/l	57	3	0.330	0.330	1.3	1.3	<0.200	0.33
Total Selenium	ug/l	57	8	0.714	0.466	1.3	1.3	<0.200	0.63
Dissolved Silver	ug/l	57	0	0.900	0.900	1.6	1.6	<0.700	<1.60
Total Silver	ug/l	57	0	0.900	0.900	0.8	0.8	<0.700	<0.900
Dissolved Sodium	ug/l	57	56	10,200	10,200	7,530	6,100	2,640	10,200
Total Sodium	ug/l	57	57	9,620	9,620	8,120	6,450	2,640	9,620
Dissolved Thallium	ug/l	57	0	1.10	1.10	1.8	1.8	<0.100	<1.80
Total Thallium	ug/l	57	0	1.10	1.10	1.2	1.2	<0.100	<1.20
Total Uranium, Calculated	mg/l	57	57	0.033	0.013	0.023	0.011	0.000200	0.0170
Dissolved Vanadium	ug/l	57	20	3.65	1.43	11	6.15	<0.500	7.60
Total Vanadium	ug/l	57	33	46.6	13.2	8.06	6.74	<0.500	21.3
Dissolved Zinc	ug/l	57	27	13.6	13.6	18.4	8.94	<0.300	13.6
Total Zinc	ug/l	57	37	50.9	16.7	10.9	8.87	<0.300	34.3
Other Parameters									
Alkalinity, Total	mg/l	57	57	214	214	126	126	11.4	214
Bicarbonate Alkalinity	mg/l	57	57	214	214	126	126	11.4	214
Carbonate Alkalinity	mg/l	57	0	10.0	10.0	2	2	<2.00	<10.0

Table 5-6
SUMMARY OF ANALYTICAL RESULTS FOR URS BACKGROUND AREA SURFACE WATER SAMPLES

Parameter	Units	Number of Samples	Number of Detects	Background Limits				Minimum	Maximum Detected Value
				Fall BL (1)	Fall RBL (2)	Spring BL (3)	Spring RBL (4)		
Chemical Oxygen Demand	mg/l	57	34	103	42.6	78.4	38	<5.00	44.2
Hardness	mg/l	57	57	233	233	119	119	6.85	233
Hydroxide Alkalinity	mg/l	38	0	2.00	2.00	2	2	<2.00	<2.00
Total Dissolved Solids	mg/l	57	55	341	242	249	204	<10.0	277
Total Suspended Solids	mg/l	57	36	1,130	226	258	99.1	<4.00	483
Radionuclides									
Gross Alpha	pCi/L	38	30	66.8	22.6	83.7	34.1	-0.02	31.1
Gross Beta	pCi/L	38	37	34.3	18.7	37.8	21.6	-0.06	24.5
Lead 210	pCi/L	38	7	2.70	1.97	18	7.56	-1.10	7.40
Polonium 210	pCi/L	38	13	7.39	3.30	10.8	4.07	-0.40	4.30
Radium 226	pCi/L	37	37	1.81	1.81	4.36	4.36	0.0939	4.36
Radium 228	pCi/L	38	13	3.06	1.51	3.94	2.19	<0.0518	1.99
Radon 222, Calculated	pCi/L	50	50	3,373	3,373	20,500	3,810	12.0	3,373
Thorium 227	pCi/L	38	5	0.286	0.286	0.859	0.337	-0.13	0.286
Thorium 228	pCi/L	38	19	5.05	1.62	3.88	1.85	-0.08	3.06
Thorium 230	pCi/L	38	35	5.18	1.39	4.5	1.68	<0.00350	2.40
Thorium 232	pCi/L	38	26	2.18	2.18	1.93	0.732	0.00	2.18
Uranium 234	pCi/L	57	57	14.4	5.88	10.4	4.95	0.0893	7.04
Uranium 235	pCi/L	57	37	1.12	0.456	0.307	0.194	-0.01	1.73
Uranium 238	pCi/L	57	56	11.6	4.4	9.46	4.10	<0.0485	5.48

Notes:
(1) 99% Upper Tolerance Limit for the fall season URS background surface water data set
(2) 95% Upper Prediction Limit for the fall season URS background surface water data set
(3) 99% Upper Tolerance Limit for the spring season URS background surface water data set
(4) 95% Upper Prediction Limit for the spring season URS background surface water data set
NA = Not Applicable
NC = Not calculated; insufficient samples

Table 5-7
SUMMARY OF ANALYTICAL RESULTS FOR MIDDLE BLUE CREEK SURFACE WATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits				Minimum	Maximum Detected Value
				Fall BL (2)	Fall RBL (3)	Spring BL (4)	Spring RBL (5)		
Field Parameters									
Dissolved Oxygen	mg/l	22	22	NA	NA	NA	NA	9.40	16.4
Eh	mV	4	4	NA	NA	NA	NA	121	254
Ferrous Iron	mg/l	22	11	NA	NA	NA	NA	<0.00700	0.210
Field Iron	ug/l	18	13	NA	NA	NA	NA	<7.00	540
Field pH	SU	22	22	NA	NA	NA	NA	6.22	8.02
Specific Conductance	uS/cm	22	22	609	414	91,000	91,000	179	3,810
Temperature	C	22	22	NA	NA	NA	NA	1.70	16.2
Turbidity	NTU	4	4	NA	NA	NA	NA	8.00	185
Inorganics									
Chloride	mg/l	22	22	4.82	4.82	1.65	1.28	0.837	4 (7)
Fluoride	mg/l	18	18	NC	NC	NC	NC	0.100	1.40
Nitrate	mg/l	22	21	1.57	0.324	0.189	0.099	<0.0300	1.74
Nitrate/Nitrite	mg/l	18	18	NC	NC	NC	NC	0.110	2.02
Nitrite	mg/l	22	0	0.03	0.03	0.02	0.02	<0.0200	<0.0500 (6)
Nitrogen, Ammonia	mg/l	4	0	1.21	1.21	0.039	0.026	<0.0100	<0.0100
Nitrogen, Kjeldahl	mg/l	8	0	NC	NC	NC	NC	<0.100	<0.300
Phosphate-P	mg/l	4	4	0.526	0.25	0.189	0.13	0.0165	0.160
Phosphorus	mg/l	22	16	1.27	0.518	0.347	0.213	<0.0100	0.180
Silica	mg/l	18	18	NC	NC	NC	NC	20.8	50.2
Sulfate	mg/l	22	22	38.4	22.2	9.36	7.03	6.48	2,120
Metals									
Dissolved Aluminum	ug/l	22	10	1,890	708	15,700	7,330	<3.90	4,450 (8)
Total Aluminum	ug/l	27	24	25,100	7,270	9,490	7,710	50.0	6,740
Dissolved Antimony	ug/l	4	0	6.07	0.597	7.47	5.33	<2.20	<2.70
Total Antimony	ug/l	9	3	3.33	0.602	9.15	6.12	<2.20	7.30 (7)
Dissolved Arsenic	ug/l	22	6	38.7	17.9	15.1	8.69	0.780	1.4
Total Arsenic	ug/l	27	6	82.5	34.7	20.5	11.7	0.730	1.8
Dissolved Barium	ug/l	22	22	252	252	129	73.4	16.0	60.2
Total Barium	ug/l	27	27	413	188	165	165	17.2	54.0
Dissolved Beryllium	ug/l	22	0	0.1	0.1	0.26	0.26	<0.100	<4.00 (6)
Total Beryllium	ug/l	27	0	0.23	0.23	0.735	0.466	<0.100	<4.00 (6)
Dissolved Cadmium	ug/l	22	0	9.2	9.2	0.5	0.5	<0.200	<1.00
Total Cadmium	ug/l	27	6	6.2	6.2	0.5	0.5	<0.200	2.40 (9)
Dissolved Calcium	ug/l	22	22	63,300	63,300	33,000	18,400	22,900	695,000
Total Calcium	ug/l	9	9	62,800	62,800	34,300	34,300	20,100	683,000
Dissolved Chromium	ug/l	22	11	0.63	0.63	5.15	2.76	<0.400	7.40
Total Chromium	ug/l	27	22	7.71	3.39	5.33	3.66	<0.400	10.6 (9)
Dissolved Cobalt	ug/l	4	0	14.4	4.06	1.4	1.4	<0.500	<2.70
Total Cobalt	ug/l	9	0	33.8	8.63	3.43	2.06	<0.500	<1.20

Table 5-7
SUMMARY OF ANALYTICAL RESULTS FOR MIDDLE BLUE CREEK SURFACE WATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits				Minimum	Maximum Detected Value
				Fall BL (2)	Fall RBL (3)	Spring BL (4)	Spring RBL (5)		
Dissolved Copper	ug/l	22	12	3.37	1.77	3	3	<0.500	37.0 (7)
Total Copper	ug/l	27	21	29.8	11.1	10.7	6.68	<0.500	40.0 (7)
Dissolved Iron	ug/l	22	14	8,620	2,530	11,600	5,290	<8.40	2,600 (8)
Total Iron	ug/l	27	25	82,300	19,600	6,040	4,930	<8.40	4,080
Dissolved Lead	ug/l	22	2	1.69	0.729	6.04	3.2	<0.200	1.10 (7)
Total Lead	ug/l	27	12	26.1	6.86	5.18	3.57	0.300	4.00 (7)
Dissolved Magnesium	ug/l	22	22	17,900	17,900	8,730	8,730	5,830	105,000
Total Magnesium	ug/l	9	9	18,500	18,500	9,070	9,070	5,130	92,400
Dissolved Manganese	ug/l	22	21	2,040	2,040	55.7	32.2	1.80	1,070
Total Manganese	ug/l	27	27	2,230	2,230	74.6	61.8	9.00	1,070
Dissolved Mercury	ug/l	22	0	0.100	0.100	0.1	0.1	<0.100	<0.200 (6)
Total Mercury	ug/l	27	0	0.200	0.200	0.1	0.1	<0.100	<0.200 (6)
Dissolved Nickel	ug/l	22	9	5.00	5.00	1.4	1.4	3.30	30.0
Total Nickel	ug/l	27	12	21.1	6.78	5.06	4.17	<4.50	20.0
Dissolved Potassium	ug/l	22	22	8,990	8,990	2,620	2,620	1,840	5,500 (7)
Total Potassium	ug/l	9	9	8,370	5,500	2,460	2,010	1,740	5,980 (9)
Dissolved Selenium	ug/l	22	0	0.330	0.330	1.3	1.3	<1.00	<1.30
Total Selenium	ug/l	27	1	0.714	0.466	1.3	1.3	<1.00	4.60 (9)
Dissolved Silver	ug/l	22	1	0.900	0.900	1.6	1.6	<0.700	20.0 (7)
Total Silver	ug/l	27	1	0.900	0.900	0.8	0.8	<0.700	7 (7)
Dissolved Sodium	ug/l	22	22	10,200	10,200	7,530	6,100	5,800	40,700
Total Sodium	ug/l	9	9	9,620	9,620	8,120	6,450	5,500	38,000
Dissolved Thallium	ug/l	22	0	1.10	1.10	1.8	1.8	<0.100	<1.20
Total Thallium	ug/l	27	0	1.10	1.10	1.2	1.2	<0.100	<6.00 (6)
Total Uranium, Calculated	mg/l	27	27	0.033	0.013	0.023	0.011	0.00700	0.100
Dissolved Vanadium	ug/l	4	2	3.65	1.43	11	6.15	<0.500	4.2 (8)
Total Vanadium	ug/l	9	2	46.6	13.2	8.06	6.74	<0.500	4.9
Dissolved Zinc	ug/l	22	17	13.6	13.6	18.4	8.94	<3.00	40 (7)
Total Zinc	ug/l	27	17	50.9	16.7	10.9	8.87	3.00	70
Other Parameters									
Alkalinity	mg/l	22	22	214	214	126	126	32.4	65
Bicarbonate Alkalinity	mg/l	22	22	214	214	126	126	32.4	65.0
Carbonate Alkalinity	mg/l	22	0	10.0	10.0	2	2	<2.00	<2.00
Chemical Oxygen Demand	mg/l	4	2	103	42.6	78.4	38	<5.00	60.0
Hardness	mg/l	22	22	233	233	119	119	81.2	2,170
Hydroxide Alkalinity	mg/l	22	0	2.00	2.00	2	2	<2.00	<2.00
Total Dissolved Solids	mg/l	22	22	341	242	249	204	42.0	3,160
Total Inorganic Carbon	mg/l	18	18	NC	NC	NC	NC	8.00	15.0
Total Suspended Solids	mg/l	22	8	1,130	226	258	99.1	<5.00	60.4

Table 5-7
SUMMARY OF ANALYTICAL RESULTS FOR MIDDLE BLUE CREEK SURFACE WATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits				Minimum	Maximum Detected Value
				Fall BL (2)	Fall RBL (3)	Spring BL (4)	Spring RBL (5)		
Radionuclides									
Gross Alpha	pCi/L	26	23	66.8	22.6	83.7	34.1	2.00	36.5
Gross Beta	pCi/L	21	19	34.3	18.7	37.8	21.6	1.00	24.7 (7)
Dissolved Lead 210	pCi/L	2	0	NC	NC	NC	NC	<4.20	<8.30
Total Lead 210	pCi/L	22	12	2.70	1.97	18	7.56	-5.40	17.0 (7)
Dissolved Polonium 210	pCi/L	2	2	NC	NC	NC	NC	1.10	1.75
Total Polonium 210	pCi/L	6	2	7.39	3.30	10.8	4.07	<0.100	1
Dissolved Radium 226	pCi/L	2	2	NC	NC	NC	NC	0.650	0.820 (7)
Total Radium 226	pCi/L	27	22	1.81	1.81	4.36	4.36	0.130	5.10 (7)
Dissolved Radium 228	pCi/L	2	0	NC	NC	NC	NC	<2.20	<2.97
Total Radium 228	pCi/L	27	16	3.06	1.51	3.94	2.19	<0.114	2.00 (7)
Total Radon 222, Calculated	pCi/L	2	2	3,373	3,373	20,500	3,810	18.0	39.0
Total Thorium 227	pCi/L	4	1	0.286	0.286	0.859	0.337	<0.0353	0.075
Total Thorium 228	pCi/L	9	2	5.05	1.62	3.88	1.85	<0.0450	0.785
Dissolved Thorium 230	pCi/L	2	0	NC	NC	NC	NC	<0.200	<0.300
Total Thorium 230	pCi/L	25	10	5.18	1.39	4.5	1.68	<0.0200	1.6 (7)
Total Thorium 232	pCi/L	9	3	2.18	2.18	1.93	0.732	<0.0252	0.234
Dissolved Uranium 234	pCi/L	2	2	NC	NC	NC	NC	8.80	12.0 (7)
Total Uranium 234	pCi/L	27	26	14.4	5.88	10.4	4.95	1.40	46.0
Dissolved Uranium 235	pCi/L	1	1	NC	NC	NC	NC	0.490	0.490 (7)
Total Uranium 235	pCi/L	25	22	1.12	0.456	0.307	0.194	<0.100	9.40
Dissolved Uranium 238	pCi/L	2	2	NC	NC	NC	NC	8.80	10.0 (7)
Total Uranium 238	pCi/L	27	27	11.6	4.4	9.46	4.10	2.42	32.0

Notes:
(1) Parameters in bold exceed background limits for the URS samples
(2) 99% Upper Tolerance Limit for the fall season URS background surface water data set
(3) 95% Upper Prediction Limit for the fall season URS background surface water data set
(4) 99% Upper Tolerance Limit for the spring season URS background surface water data set
(5) 95% Upper Prediction Limit for the spring season URS background surface water data set
(6) The maximum concentration or activity is reported as non-detect value above one or both RBLs
(7) The maximum concentration or activity is reported from SMI samples
(8) The maximum concentration or activity is from a URS sample collected in the spring
(9) The maximum concentration or activity is reported from E&E samples
NA = Not Applicable
NC = Not calculated; parameter not analyzed for URS background samples

Table 5-8
SUMMARY OF ANALYTICAL RESULTS FOR LOWER BLUE CREEK SURFACE WATER SAMPLES

Parameter (1)	Units	No. of Samples	No. of Detects	Background Limits				Minimum	Maximum Detected Value
				Fall BL (2)	Fall RBL (3)	Spring BL (4)	Spring RBL (5)		
Field Parameters									
Dissolved Oxygen	mg/l	4	4	NA	NA	NA	NA	11.2	12.6
Eh	mV	4	4	NA	NA	NA	NA	177	261
Ferrous Iron	mg/l	4	1	NA	NA	NA	NA	<0.0500	0.100
Field pH	SU	4	4	NA	NA	NA	NA	7.23	7.83
Specific Conductance	uS/cm	4	4	609	414	91,000	91,000	174	3,250
Temperature	C	4	4	NA	NA	NA	NA	4.49	9.20
Turbidity	NTU	4	4	NA	NA	NA	NA	0.00	47.0
Inorganics									
Chloride	mg/l	4	4	4.82	4.82	1.65	1.28	0.879	3.04 (7)
Nitrate	mg/l	4	3	1.57	0.324	0.189	0.099	<0.0300	0.817
Nitrite	mg/l	4	0	0.03	0.03	0.02	0.02	<0.0200	<0.0200
Nitrogen, Ammonia	mg/l	4	0	1.21	1.21	0.039	0.026	<0.0100	<0.0195
Phosphate-P	mg/l	4	4	0.526	0.25	0.189	0.13	0.0160	0.180
Phosphorus	mg/l	4	4	1.27	0.518	0.347	0.213	0.0165	0.170
Sulfate	mg/l	4	4	38.4	22.2	9.36	7.03	32.2	1,950
Metals									
Dissolved Aluminum	ug/l	4	2	1,890	708	15,700	7,330	<12.9	3,100 (8)
Total Aluminum	ug/l	8	7	25,100	7,270	9,490	7,710	<63.6	3,980
Dissolved Antimony	ug/l	4	1	6.07	0.597	7.47	5.33	<2.20	2.80 (8)
Total Antimony	ug/l	8	2	3.33	0.602	9.15	6.12	<2.20	8.60 (9)
Dissolved Arsenic	ug/l	4	4	38.7	17.9	15.1	8.69	0.720	1.60
Total Arsenic	ug/l	8	4	82.5	34.7	20.5	11.7	0.770	1.9
Dissolved Barium	ug/l	4	4	252	252	129	73.4	34.5	58.4
Total Barium	ug/l	8	8	413	188	165	165	32.4	61.6
Dissolved Beryllium	ug/l	4	0	0.1	0.1	0.26	0.26	<0.100	<0.260 (6)
Total Beryllium	ug/l	8	0	0.23	0.23	0.735	0.466	<0.100	<1.00 (6)
Dissolved Cadmium	ug/l	4	0	9.2	9.2	0.5	0.5	<0.200	<0.500
Total Cadmium	ug/l	8	4	6.2	6.2	0.5	0.5	<0.200	1.80 (9)
Dissolved Calcium	ug/l	4	4	63,300	63,300	33,000	18,400	19,200	654,000
Total Calcium	ug/l	8	8	62,800	62,800	34,300	34,300	19,300	650,000
Dissolved Chromium	ug/l	4	2	0.63	0.63	5.15	2.76	<0.400	3.70
Total Chromium	ug/l	8	6	7.71	3.39	5.33	3.66	<0.400	13.0 (9)
Dissolved Cobalt	ug/l	4	0	14.4	4.06	1.4	1.4	<0.500	<1.20
Total Cobalt	ug/l	8	2	33.8	8.63	3.43	2.06	<0.500	2.00
Dissolved Copper	ug/l	4	0	3.37	1.77	3	3	<0.500	<4.80 (8)
Total Copper	ug/l	8	6	29.8	11.1	10.7	6.68	<0.500	14.1 (9)

Table 5-8
SUMMARY OF ANALYTICAL RESULTS FOR LOWER BLUE CREEK SURFACE WATER SAMPLES

Parameter (1)	Units	No. of Samples	No. of Detects	Background Limits				Minimum	Maximum Detected Value
				Fall BL (2)	Fall RBL (3)	Spring BL (4)	Spring RBL (5)		
Dissolved Iron	ug/l	4	2	8,620	2,530	11,600	5,290	<8.40	2,090
Total Iron	ug/l	8	8	82,300	19,600	6,040	4,930	37.5	2,870
Dissolved Lead	ug/l	4	1	1.69	0.729	6.04	3.2	<0.900	1.10 (8)
Total Lead	ug/l	8	2	26.1	6.86	5.18	3.57	<0.900	2.50
Dissolved Magnesium	ug/l	4	4	17,900	17,900	8,730	8,730	4,680	79,800
Total Magnesium	ug/l	8	8	18,500	18,500	9,070	9,070	4,790	79,100
Dissolved Manganese	ug/l	4	4	2,040	2,040	55.7	32.2	11.1	36.7
Total Manganese	ug/l	8	8	2,230	2,230	74.6	61.8	26.2	90.3
Dissolved Mercury	ug/l	4	0	0.100	0.100	0.1	0.1	<0.100	<0.100
Total Mercury	ug/l	8	1	0.200	0.200	0.1	0.1	<0.100	0.210 (9)
Dissolved Nickel	ug/l	4	1	5.00	5.00	1.4	1.4	<3.40	4.40
Total Nickel	ug/l	8	5	21.1	6.78	5.06	4.17	2.20	8.30
Dissolved Potassium	ug/l	4	4	8,990	8,990	2,620	2,620	1,840	4,580 (7)
Total Potassium	ug/l	8	8	8,370	5,500	2,460	2,010	1,780	4,680 (7)
Dissolved Selenium	ug/l	4	0	0.330	0.330	1.3	1.3	<1.00	<1.30
Total Selenium	ug/l	8	0	0.714	0.466	1.3	1.3	<1.00	<4.00 (6)
Dissolved Silver	ug/l	4	0	0.900	0.900	1.6	1.6	<0.700	<0.800
Total Silver	ug/l	8	0	0.900	0.900	0.8	0.8	<0.700	<2.00 (6)
Dissolved Sodium	ug/l	4	4	10,200	10,200	7,530	6,100	5,990	34,100
Total Sodium	ug/l	8	8	9,620	9,620	8,120	6,450	5,770	33,900
Dissolved Thallium	ug/l	4	0	1.10	1.10	1.8	1.8	<1.10	<1.20
Total Thallium	ug/l	8	0	1.10	1.10	1.2	1.2	<1.10	<6.00 (6)
Total Uranium, Calculated	mg/l	8	8	0.033	0.013	0.023	0.011	0.00700	0.0270
Dissolved Vanadium	ug/l	4	2	3.65	1.43	11	6.15	<0.500	4.70 (8)
Total Vanadium	ug/l	8	2	46.6	13.2	8.06	6.74	<0.500	4.80 (8)
Dissolved Zinc	ug/l	4	2	13.6	13.6	18.4	8.94	<2.30	6.50
Total Zinc	ug/l	8	8	50.9	16.7	10.9	8.87	1.70	52.2
Other Parameters									
Alkalinity	mg/l	4	4	214	214	126	126	35.4	43.8
Bicarbonate Alkalinity	mg/l	4	4	214	214	126	126	35.4	43.8
Carbonate Alkalinity	mg/l	4	0	10.0	10.0	2	2	<2.00	<2.00
Chemical Oxygen Demand	mg/l	4	2	103	42.6	78.4	38	<5.00	34.3
Hardness	mg/l	4	4	233	233	119	119	67.2	1,946
Hydroxide Alkalinity	mg/l	4	0	2.00	2.00	2	2	<2.00	<2.00
Total Dissolved Solids	mg/l	4	4	341	242	249	204	102	3,040
Total Suspended Solids	mg/l	4	4	1,130	226	258	99.1	4.90	9.30

Table 5-8
SUMMARY OF ANALYTICAL RESULTS FOR LOWER BLUE CREEK SURFACE WATER SAMPLES

Parameter (1)	Units	No. of Samples	No. of Detects	Background Limits				Minimum	Maximum Detected Value
				Fall BL (2)	Fall RBL (3)	Spring BL (4)	Spring RBL (5)		
Radionuclides									
Gross Alpha	pCi/L	8	7	66.8	22.6	83.7	34.1	3.90	20.7
Gross Beta	pCi/L	4	3	34.3	18.7	37.8	21.6	9.25	34.3
Total Lead 210	pCi/L	4	0	2.70	1.97	18	7.56	-0.50	<2.30 (8)
Total Polonium 210	pCi/L	4	1	7.39	3.30	10.8	4.07	0.00	0.500
Total Radium 226	pCi/L	8	4	1.81	1.81	4.36	4.36	0.356	<0.800
Total Radium 228	pCi/L	8	4	3.06	1.51	3.94	2.19	<0.131	3.00 (9)
Total Radon 222, Calculated	pCi/L	2	2	3,373	3,373	20,500	3,810	20.0	23.0
Total Thorium 227	pCi/L	4	1	0.286	0.286	0.859	0.337	<0.00535	0.0813
Total Thorium 228	pCi/L	8	2	5.05	1.62	3.88	1.85	-0.01	0.830
Total Thorium 230	pCi/L	8	4	5.18	1.39	4.5	1.68	0.0455	0.356
Total Thorium 232	pCi/L	8	2	2.18	2.18	1.93	0.732	<0.0132	0.231
Total Uranium 234	pCi/L	8	8	14.4	5.88	10.4	4.95	3.01	9.70
Total Uranium 235	pCi/L	8	5	1.12	0.456	0.307	0.194	0.190	0.724
Total Uranium 238	pCi/L	8	8	11.6	4.4	9.46	4.10	2.33	8.81

Notes:
(1) Parameters in bold exceed background limits for the URS samples
(2) 99% Upper Tolerance Limit for the fall season URS background surface water data set
(3) 95% Upper Prediction Limit for the fall season URS background surface water data set
(4) 99% Upper Tolerance Limit for the spring season URS background surface water data set
(5) 95% Upper Prediction Limit for the spring season URS background surface water data set
(6) The maximum concentration or activity is reported as non-detect value above one or both RBLs
(7) The maximum concentration or activity is from a URS sample collected in the fall
(8) The maximum concentration or activity is from a URS sample collected in the spring
(9) The maximum concentration or activity is reported from E&E samples
NA = Not Applicable

Table 5-9
ANALYTICAL RESULTS FOR THE NORTHEASTERN DRAINAGE SURFACE WATER SAMPLE

Parameter (1)	Units	Background Limits		Result
		Spring BL (2)	Spring RBL (3)	
Field Parameters				
Dissolved Oxygen	mg/l	NA	NA	5.00
Eh	mV	NA	NA	304
Ferrous Iron	mg/l	NA	NA	<0.0500
Field pH	SU	NA	NA	6.29
Specific Conductance	uS/cm	91,000	91,000	87.0
Temperature	C	NA	NA	3.42
Turbidity	NTU	NA	NA	169
Inorganics				
Chloride	mg/l	1.65	1.28	0.680
Nitrate	mg/l	0.189	0.099	<0.0300
Nitrite	mg/l	0.02	0.02	<0.0200
Nitrogen, Ammonia	mg/l	0.039	0.026	0.0110
Phosphate-P	mg/l	0.189	0.13	0.151
Phosphorus	mg/l	0.347	0.213	1.39
Sulfate	mg/l	9.36	7.03	4.19
Metals				
Dissolved Aluminum	ug/l	15,700	7,330	2,700
Total Aluminum	ug/l	9,490	7,710	41,100
Dissolved Antimony	ug/l	7.47	5.33	2.90
Total Antimony	ug/l	9.15	6.12	4.70
Dissolved Arsenic	ug/l	15.1	8.69	1.60
Total Arsenic	ug/l	20.5	11.7	4.20
Dissolved Barium	ug/l	129	73.4	<10.8
Total Barium	ug/l	165	165	145
Dissolved Beryllium	ug/l	0.26	0.26	<0.220
Total Beryllium	ug/l	0.735	0.466	6.60
Dissolved Cadmium	ug/l	0.5	0.5	<0.500
Total Cadmium	ug/l	0.5	0.5	<0.500
Dissolved Calcium	ug/l	33,000	18,400	6,680
Total Calcium	ug/l	34,300	34,300	13,000
Dissolved Chromium	ug/l	5.15	2.76	<1.10
Total Chromium	ug/l	5.33	3.66	33.4
Dissolved Cobalt	ug/l	1.4	1.4	<5.10 (4)
Total Cobalt	ug/l	3.43	2.06	23.3
Dissolved Copper	ug/l	3	3	2.10
Total Copper	ug/l	10.7	6.68	54.9
Dissolved Iron	ug/l	11,600	5,290	2,250
Total Iron	ug/l	6,040	4,930	66,000
Dissolved Lead	ug/l	6.04	3.2	1.20
Total Lead	ug/l	5.18	3.57	23.0
Dissolved Magnesium	ug/l	8,730	8,730	2,100
Total Magnesium	ug/l	9,070	9,070	6,360
Dissolved Manganese	ug/l	55.7	32.2	197
Total Manganese	ug/l	74.6	61.8	654
Dissolved Mercury	ug/l	0.1	0.1	<0.100
Total Mercury	ug/l	0.1	0.1	<0.100
Dissolved Nickel	ug/l	1.4	1.4	<3.70 (4)
Total Nickel	ug/l	5.06	4.17	73.1
Dissolved Potassium	ug/l	2,620	2,620	1,400
Total Potassium	ug/l	2,460	2,010	4,240
Dissolved Selenium	ug/l	1.3	1.3	<1.30
Total Selenium	ug/l	1.3	1.3	<1.30

Table 5-9
ANALYTICAL RESULTS FOR THE NORTHEASTERN DRAINAGE SURFACE WATER SAMPLE

Parameter (1)	Units	Background Limits		Result
		Spring BL (2)	Spring RBL (3)	
Dissolved Silver	ug/l	1.6	1.6	<0.800
Total Silver	ug/l	0.8	0.8	<0.800
Dissolved Sodium	ug/l	7,530	6,100	2,140
Total Sodium	ug/l	8,120	6,450	1,980
Dissolved Thallium	ug/l	1.8	1.8	<1.20
Total Thallium	ug/l	1.2	1.2	<1.20
Total Uranium, Calculated	mg/l	0.023	0.011	1.07
Dissolved Vanadium	ug/l	11	6.15	<2.00
Total Vanadium	ug/l	8.06	6.74	60.7
Dissolved Zinc	ug/l	18.4	8.94	4.60
Total Zinc	ug/l	10.9	8.87	62.9
Other Parameters				
Alkalinity, Total	mg/l	126	126	28.2
Bicarbonate Alkalinity	mg/l	126	126	28.2
Carbonate Alkalinity	mg/l	2	2	<2.00
Chemical Oxygen Demand	mg/l	78.4	38	40.2
Hardness	mg/l	119	119	25.3
Hydroxide Alkalinity	mg/l	2	2	<2.00
Total Dissolved Solids	mg/l	249	204	908
Total Suspended Solids	mg/l	258	99.1	396
Radionuclides				
Gross Alpha	pCi/L	83.7	34.1	1,090
Gross Beta	pCi/L	37.8	21.6	776
Lead 210	pCi/L	18	7.56	200
Polonium 210	pCi/L	10.8	4.07	97.0
Radium 226	pCi/L	4.36	4.36	13.4
Radium 228	pCi/L	3.94	2.19	1.43
Radon 222, Calculated	pCi/L	20,500	3,810	3,936
Thorium 227	pCi/L	0.859	0.337	9.66
Thorium 228	pCi/L	3.88	1.85	12.3
Thorium 230	pCi/L	4.5	1.68	357
Thorium 232	pCi/L	1.93	0.732	10.5
Uranium 234	pCi/L	10.4	4.95	295
Uranium 235	pCi/L	0.307	0.194	19.0
Uranium 238	pCi/L	9.46	4.10	357

Notes:
(1) Parameters in bold exceed background limits for the URS sample
(2) 99% Upper Tolerance Limit for the spring season URS background surface water data set
(3) 95% Upper Prediction Limit for the spring season URS background surface water data set
(4) The result is reported as non-detect value above the RBL
NA = Not Applicable

Table 5-10
SUMMARY OF ANALYTICAL RESULTS FOR UPPER EASTERN DRAINAGE SURFACE WATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits				Minimum	Maximum Detected Value
				Fall BL (2)	Fall RBL (3)	Spring BL (4)	Spring RBL (5)		
Field Parameters									
Dissolved Oxygen	mg/l	27	27	NA	NA	NA	NA	7.70	13.5
Eh	mV	9	9	NA	NA	NA	NA	120	318
Ferrous Iron	mg/l	27	5	NA	NA	NA	NA	<0.00700	0.0800
Field Iron	ug/l	18	3	NA	NA	NA	NA	<7.00	90.0
Field pH	SU	27	27	NA	NA	NA	NA	6.80	8.89
Specific Conductance	uS/cm	27	27	609	414	91,000	91,000	17.0	4,000
Temperature	C	27	27	NA	NA	NA	NA	2.50	18.9
Turbidity	NTU	9	9	NA	NA	NA	NA	0.00	330
Inorganics									
Chloride	mg/l	27	27	4.82	4.82	1.65	1.28	1.31	4.00
Fluoride	mg/l	18	17	NC	NC	NC	NC	<0.100	1.80
Nitrate	mg/l	27	27	1.57	0.324	0.189	0.099	0.158	2.27
Nitrate/Nitrite	mg/l	18	18	NC	NC	NC	NC	0.360	2.59
Nitrite	mg/l	27	0	0.03	0.03	0.02	0.02	<0.0200	<0.100 (6)
Nitrogen, Ammonia	mg/l	9	1	1.21	1.21	0.039	0.026	<0.0100	0.017
Nitrogen, Kjeldahl	mg/l	8	2	NC	NC	NC	NC	<0.100	0.400
Phosphate-P	mg/l	9	9	0.526	0.25	0.189	0.13	0.0104	0.179
Phosphorus	mg/l	27	17	1.27	0.518	0.347	0.213	<0.0100	0.162
Silica	mg/l	18	18	NC	NC	NC	NC	10.4	48.8
Sulfate	mg/l	27	27	38.4	22.2	9.36	7.03	458	2,540
Metals									
Dissolved Aluminum	ug/l	27	10	1,890	708	15,700	7,330	<5.50	790 (7)
Total Aluminum	ug/l	30	27	25,100	7,270	9,490	7,710	<30.0	2,150
Dissolved Antimony	ug/l	9	4	6.07	0.597	7.47	5.33	<2.20	4.10
Total Antimony	ug/l	12	3	3.33	0.602	9.15	6.12	<2.20	4.8
Dissolved Arsenic	ug/l	27	17	38.7	17.9	15.1	8.69	0.850	3.6
Total Arsenic	ug/l	30	17	82.5	34.7	20.5	11.7	0.880	9.3 (9)
Dissolved Barium	ug/l	27	27	252	252	129	73.4	19.0	103 (7)
Total Barium	ug/l	30	30	413	188	165	165	19.0	105
Dissolved Beryllium	ug/l	27	0	0.1	0.1	0.26	0.26	<0.100	<4.00 (6)
Total Beryllium	ug/l	30	0	0.23	0.23	0.735	0.466	<0.100	<4.00 (6)
Dissolved Cadmium	ug/l	27	5	9.2	9.2	0.5	0.5	<0.200	4.00 (7)
Total Cadmium	ug/l	30	3	6.2	6.2	0.5	0.5	<0.200	3.00 (7)
Dissolved Calcium	ug/l	27	27	63,300	63,300	33,000	18,400	185,000	867,000
Total Calcium	ug/l	12	12	62,800	62,800	34,300	34,300	19,100	879,000
Dissolved Chromium	ug/l	27	14	0.63	0.63	5.15	2.76	0.300	8.00
Total Chromium	ug/l	30	15	7.71	3.39	5.33	3.66	<0.400	16.9 (9)
Dissolved Cobalt	ug/l	9	3	14.4	4.06	1.4	1.4	<0.500	2.1
Total Cobalt	ug/l	12	1	33.8	8.63	3.43	2.06	<0.500	2.40 (9)
Dissolved Copper	ug/l	27	15	3.37	1.77	3	3	<0.500	50.0 (7)

Table 5-10
SUMMARY OF ANALYTICAL RESULTS FOR UPPER EASTERN DRAINAGE SURFACE WATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits				Minimum	Maximum Detected Value
				Fall BL (2)	Fall RBL (3)	Spring BL (4)	Spring RBL (5)		
Total Copper	ug/l	30	19	29.8	11.1	10.7	6.68	<0.500	51.0 (7)
Dissolved Iron	ug/l	27	2	8,620	2,530	11,600	5,290	<8.40	10 (7)
Total Iron	ug/l	30	22	82,300	19,600	6,040	4,930	<8.40	3,920
Dissolved Lead	ug/l	27	1	1.69	0.729	6.04	3.2	<0.200	3.20 (8)
Total Lead	ug/l	30	4	26.1	6.86	5.18	3.57	0.300	5.90 (9)
Dissolved Magnesium	ug/l	27	27	17,900	17,900	8,730	8,730	29,600	256,000
Total Magnesium	ug/l	12	12	18,500	18,500	9,070	9,070	28,500	117,000
Dissolved Manganese	ug/l	27	26	2,040	2,040	55.7	32.2	1.30	16,300
Total Manganese	ug/l	30	30	2,230	2,230	74.6	61.8	4.30	15,900
Dissolved Mercury	ug/l	27	0	0.100	0.100	0.1	0.1	<0.100	<0.200 (6)
Total Mercury	ug/l	30	0	0.200	0.200	0.1	0.1	<0.100	<0.200 (6)
Dissolved Nickel	ug/l	27	8	5.00	5.00	1.4	1.4	0.740	340
Total Nickel	ug/l	30	8	21.1	6.78	5.06	4.17	<0.500	320 (7)
Dissolved Potassium	ug/l	27	26	8,990	8,990	2,620	2,620	2,700	12,200
Total Potassium	ug/l	12	12	8,370	5,500	2,460	2,010	2,930	9,350
Dissolved Selenium	ug/l	27	1	0.330	0.330	1.3	1.3	<1.00	1
Total Selenium	ug/l	30	0	0.714	0.466	1.3	1.3	<1.00	<4.00 (6)
Dissolved Silver	ug/l	27	3	0.900	0.900	1.6	1.6	<0.700	30 (7)
Total Silver	ug/l	30	0	0.900	0.900	0.8	0.8	<0.700	<10.0 (6)
Dissolved Sodium	ug/l	27	27	10,200	10,200	7,530	6,100	12,500	43,100
Total Sodium	ug/l	12	12	9,620	9,620	8,120	6,450	12,600	43,300
Dissolved Thallium	ug/l	27	0	1.10	1.10	1.8	1.8	<0.100	<1.20 (6)
Total Thallium	ug/l	30	1	1.10	1.10	1.2	1.2	<0.100	1.5
Total Uranium	ug/l	3	3	NC	NC	NC	NC	42.7	46.0 (7)
Total Uranium, Calculated	mg/l	18	18	0.033	0.013	0.023	0.011	0.0300	0.130
Dissolved Vanadium	ug/l	9	1	3.65	1.43	11	6.15	<0.500	0.77
Total Vanadium	ug/l	12	7	46.6	13.2	8.06	6.74	<0.500	8.20 (7)
Dissolved Zinc	ug/l	27	13	13.6	13.6	18.4	8.94	<0.400	370 (7)
Total Zinc	ug/l	30	12	50.9	16.7	10.9	8.87	<0.400	380 (7)
Organic Compounds									
Total Petroleum Hydrocarbons-Diesel	ug/l	4	0					<1,000	<1,000
Other Parameters									
Alkalinity	mg/l	27	27	214	214	126	126	4.00	161
Bicarbonate Alkalinity	mg/l	27	27	214	214	126	126	4.00	161
Carbonate Alkalinity	mg/l	27	0	10.0	10.0	2	2	<2.00	<2.00
Chemical Oxygen Demand	mg/l	9	5	103	42.6	78.4	38	<5.00	42.1
Hardness	mg/l	27	27	233	233	119	119	587	2,623
Hydroxide Alkalinity	mg/l	27	0	2.00	2.00	2	2	<2.00	<2.00
Total Dissolved Solids	mg/l	27	27	341	242	249	204	938	4,140
Total Inorganic Carbon	mg/l	18	17	NC	NC	NC	NC	<1.00	38.0 (7)
Total Suspended Solids	mg/l	27	10	1,130	226	258	99.1	<4.00	22.0

Table 5-10
SUMMARY OF ANALYTICAL RESULTS FOR UPPER EASTERN DRAINAGE SURFACE WATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits				Minimum	Maximum Detected Value
				Fall BL (2)	Fall RBL (3)	Spring BL (4)	Spring RBL (5)		
Radionuclides									
Gross Alpha	pCi/L	30	27	66.8	22.6	83.7	34.1	<8.40	108
Gross Beta	pCi/L	27	25	34.3	18.7	37.8	21.6	<1.59	47.6
Dissolved Lead 210	pCi/L	2	0	NC	NC	NC	NC	<2.50	<3.90
Total Lead 210	pCi/L	25	10	2.70	1.97	18	7.56	-3.40	14.0 (7)
Dissolved Polonium 210	pCi/L	1	1	NC	NC	NC	NC	0.330	0.330 (7)
Total Polonium 210	pCi/L	11	0	7.39	3.30	10.8	4.07	-0.30	<0.760
Dissolved Radium 226	pCi/L	2	2	NC	NC	NC	NC	1.40	1.99 (7)
Total Radium 226	pCi/L	30	30	1.81	1.81	4.36	4.36	0.360	2.11 (8)
Dissolved Radium 228	pCi/L	2	0	NC	NC	NC	NC	<0.930	<1.50
Total Radium 228	pCi/L	30	16	3.06	1.51	3.94	2.19	<0.0620	4.20 (7)
Total Radon 222, Calculated	pCi/L	8	8	3,373	3,373	20,500	3,810	15.0	257
Total Thorium 227	pCi/L	9	2	0.286	0.286	0.859	0.337	-0.01	0.0952
Total Thorium 228	pCi/L	12	0	5.05	1.62	3.88	1.85	-0.15	<5.30 (6)
Dissolved Thorium 230	pCi/L	2	0	NC	NC	NC	NC	<0.500	<0.500
Total Thorium 230	pCi/L	30	17	5.18	1.39	4.5	1.68	0.0461	2.2 (7)
Total Thorium 232	pCi/L	12	5	2.18	2.18	1.93	0.732	0.00	0.134
Dissolved Uranium 234	pCi/L	2	2	NC	NC	NC	NC	31.0	56.0 (7)
Total Uranium 234	pCi/L	30	29	14.4	5.88	10.4	4.95	7.20	64.0
Dissolved Uranium 235	pCi/L	2	2	NC	NC	NC	NC	5.80	22.0 (7)
Total Uranium 235	pCi/L	28	26	1.12	0.456	0.307	0.194	0.200	2.50
Dissolved Uranium 238	pCi/L	2	2	NC	NC	NC	NC	26.0	27.0 (7)
Total Uranium 238	pCi/L	30	30	11.6	4.4	9.46	4.10	6.50	58.0

Notes:
(1) Parameters in bold exceed background limits for the URS samples
(2) 99% Upper Tolerance Limit for the fall season URS background surface water data set
(3) 95% Upper Prediction Limit for the fall season URS background surface water data set
(4) 99% Upper Tolerance Limit for the spring season URS background surface water data set
(5) 95% Upper Prediction Limit for the spring season URS background surface water data set
(6) The maximum concentration or activity is reported as non-detect value above one or both RBLs
(7) The maximum concentration or activity is reported from SMI samples
(8) The maximum concentration or activity is from a URS sample collected in the spring
(9) The maximum concentration or activity is reported from E&E samples
NA = Not Applicable
NA = Not calculated; parameter not analyzed for URS background samples

Table 5-11
SUMMARY OF ANALYTICAL RESULTS FOR LOWER EASTERN DRAINAGE SURFACE WATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits				Minimum	Maximum Detected Value
				Fall BL (2)	Fall RBL (3)	Spring BL (4)	Spring RBL (5)		
Field Parameters									
Dissolved Oxygen	mg/l	15	15	NA	NA	NA	NA	7.90	13.3
Eh	mV	6	5	NA	NA	NA	NA	157	<365
Ferrous Iron	mg/l	15	5	NA	NA	NA	NA	<0.00700	0.02 (7)
Field Iron	ug/l	9	4	NA	NA	NA	NA	<7.00	40.0
Field pH	SU	15	15	NA	NA	NA	NA	6.77	8.50
Specific Conductance	umhos/cm	15	15	609	414	91,000	91,000	1,059	3,740
Temperature	C	15	15	NA	NA	NA	NA	2.40	18.7
Turbidity	NTU	6	6	NA	NA	NA	NA	2.00	470
Inorganics									
Chloride	mg/l	15	15	4.82	4.82	1.65	1.28	1.77	4.00
Fluoride	mg/l	9	9	NC	NC	NC	NC	0.700	1.60
Nitrate	mg/l	15	15	1.57	0.324	0.189	0.099	0.167	2.02
Nitrate/Nitrite	mg/l	9	9	NC	NC	NC	NC	0.770	2.30
Nitrite	mg/l	15	0	0.03	0.03	0.02	0.02	<0.0200	<0.100 (6)
Nitrogen, Ammonia	mg/l	6	0	1.21	1.21	0.039	0.026	<0.0100	<0.447 (6)
Nitrogen, Kjeldahl	mg/l	4	2	NC	NC	NC	NC	<0.200	0.600
Phosphate-P	mg/l	6	6	0.526	0.25	0.189	0.13	0.0150	0.133 (8)
Phosphorus	mg/l	15	10	1.27	0.518	0.347	0.213	<0.0100	0.118
Silica	mg/l	9	9	NC	NC	NC	NC	16.7	84.3
Sulfate	mg/l	15	15	38.4	22.2	9.36	7.03	649	2,490
Metals									
Dissolved Aluminum	ug/l	15	11	1,890	708	15,700	7,330	39.2	143
Total Aluminum	ug/l	17	14	25,100	7,270	9,490	7,710	<60.0	1,780
Dissolved Antimony	ug/l	6	2	6.07	0.597	7.47	5.33	<2.20	3.00 (8)
Dissolved Arsenic	ug/l	15	7	38.7	17.9	15.1	8.69	1.00	2.6
Total Arsenic	ug/l	17	7	82.5	34.7	20.5	11.7	1.30	3
Dissolved Barium	ug/l	15	15	252	252	129	73.4	16.6	77.0 (7)
Total Barium	ug/l	17	17	413	188	165	165	16.6	77.0
Dissolved Beryllium	ug/l	15	2	0.1	0.1	0.26	0.26	<0.100	0.25
Total Beryllium	ug/l	17	0	0.23	0.23	0.735	0.466	<0.100	<4.00 (6)
Dissolved Cadmium	ug/l	15	10	9.2	9.2	0.5	0.5	<0.200	4.00
Total Cadmium	ug/l	17	12	6.2	6.2	0.5	0.5	0.210	4.40
Dissolved Calcium	ug/l	15	15	63,300	63,300	33,000	18,400	168,000	824,000
Total Calcium	ug/l	8	8	62,800	62,800	34,300	34,300	169,000	843,000
Dissolved Chromium	ug/l	15	4	0.63	0.63	5.15	2.76	<0.200	7.00
Total Chromium	ug/l	17	10	7.71	3.39	5.33	3.66	<0.400	7.30 (9)
Dissolved Cobalt	ug/l	6	4	14.4	4.06	1.4	1.4	<0.500	2.70
Total Cobalt	ug/l	8	2	33.8	8.63	3.43	2.06	<0.500	1.5
Dissolved Copper	ug/l	15	10	3.37	1.77	3	3	<0.500	50.0 (7)

Table 5-11
SUMMARY OF ANALYTICAL RESULTS FOR LOWER EASTERN DRAINAGE SURFACE WATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits				Minimum	Maximum Detected Value
				Fall BL (2)	Fall RBL (3)	Spring BL (4)	Spring RBL (5)		
Total Copper	ug/l	17	9	29.8	11.1	10.7	6.68	<0.500	47.0 (7)
Dissolved Iron	ug/l	15	2	8,620	2,530	11,600	5,290	<8.40	50.0
Total Iron	ug/l	17	13	82,300	19,600	6,040	4,930	<17.6	835
Dissolved Lead	ug/l	15	0	1.69	0.729	6.04	3.2	<0.200	<2.00 (6)
Total Lead	ug/l	17	3	26.1	6.86	5.18	3.57	<0.200	2.70
Dissolved Magnesium	ug/l	15	15	17,900	17,900	8,730	8,730	66,100	131,000
Total Magnesium	ug/l	8	8	18,500	18,500	9,070	9,070	63,200	104,000
Dissolved Manganese	ug/l	15	15	2,040	2,040	55.7	32.2	289	6,010
Total Manganese	ug/l	17	17	2,230	2,230	74.6	61.8	346	5,840
Dissolved Mercury	ug/l	15	0	0.100	0.100	0.1	0.1	<0.100	<0.200 (6)
Total Mercury	ug/l	17	1	0.200	0.200	0.1	0.1	<0.100	0.1
Dissolved Nickel	ug/l	15	11	5.00	5.00	1.4	1.4	7.10	190
Total Nickel	ug/l	17	13	21.1	6.78	5.06	4.17	8.80	137
Dissolved Potassium	ug/l	15	15	8,990	8,990	2,620	2,620	3,280	5,670
Total Potassium	ug/l	8	8	8,370	5,500	2,460	2,010	3,440	5,770
Dissolved Selenium	ug/l	15	0	0.330	0.330	1.3	1.3	<1.00	<2.00 (6)
Total Selenium	ug/l	17	0	0.714	0.466	1.3	1.3	<1.00	<4.00 (6)
Dissolved Silver	ug/l	15	2	0.900	0.900	1.6	1.6	<0.700	30.0 (7)
Total Silver	ug/l	17	1	0.900	0.900	0.8	0.8	<0.700	0.7
Dissolved Sodium	ug/l	15	15	10,200	10,200	7,530	6,100	15,300	41,800
Total Sodium	ug/l	8	8	9,620	9,620	8,120	6,450	15,200	41,500
Dissolved Thallium	ug/l	15	0	1.10	1.10	1.8	1.8	<0.100	<1.20 (6)
Total Thallium	ug/l	17	0	1.10	1.10	1.2	1.2	<0.100	<6.00 (6)
Total Uranium, Calculated	mg/l	8	8	0.033	0.013	0.023	0.011	0.0329	0.0810
Dissolved Vanadium	ug/l	6	1	3.65	1.43	11	6.15	<0.500	0.9
Total Vanadium	ug/l	8	2	46.6	13.2	8.06	6.74	<0.500	1.60
Dissolved Zinc	ug/l	15	13	13.6	13.6	18.4	8.94	<4.00	115
Total Zinc	ug/l	17	16	50.9	16.7	10.9	8.87	4.90	120
Organic Compounds									
Total Petroleum Hydrocarbons-Diesel	ug/l	2	0	–	–	–	–	<1,000	<1,000
Other Parameters									
Alkalinity	mg/l	15	15	214	214	126	126	29.0	113
Bicarbonate Alkalinity	mg/l	15	15	214	214	126	126	29.0	113
Carbonate Alkalinity	mg/l	15	0	10.0	10.0	2	2	<2.00	<2.00
Chemical Oxygen Demand	mg/l	6	3	103	42.6	78.4	38	<5.00	39.3 (10)
Hardness	mg/l	15	15	233	233	119	119	682	3,060
Hydroxide Alkalinity	mg/l	15	0	2.00	2.00	2	2	<2.00	<2.00
Total Dissolved Solids	mg/l	15	15	341	242	249	204	1,100	3,780
Total Inorganic Carbon	mg/l	9	9	NC	NC	NC	NC	7.00	20.0
Total Suspended Solids	mg/l	15	6	1,130	226	258	99.1	<4.00	12.0

Table 5-11
SUMMARY OF ANALYTICAL RESULTS FOR LOWER EASTERN DRAINAGE SURFACE WATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits				Minimum	Maximum Detected Value
				Fall BL (2)	Fall RBL (3)	Spring BL (4)	Spring RBL (5)		
Radionuclides									
Gross Alpha	pCi/L	16	13	66.8	22.6	83.7	34.1	10.0	117
Gross Beta	pCi/L	14	10	34.3	18.7	37.8	21.6	2.60	49.6 (10)
Dissolved Lead 210	pCi/L	1	0	NC	NC	NC	NC	<15.0	<15.0
Total Lead 210	pCi/L	14	5	2.70	1.97	18	7.56	-2.20	8.70 (7)
Dissolved Polonium 210	pCi/L	1	1	NC	NC	NC	NC	0.100	0.100 (7)
Total Polonium 210	pCi/L	7	0	7.39	3.30	10.8	4.07	-0.20	<0.970
Dissolved Radium 226	pCi/L	1	1	NC	NC	NC	NC	0.970	0.970 (7)
Total Radium 226	pCi/L	16	14	1.81	1.81	4.36	4.36	0.120	0.94
Dissolved Radium 228	pCi/L	1	0	NC	NC	NC	NC	<0.590	<0.590
Total Radium 228	pCi/L	16	8	3.06	1.51	3.94	2.19	0.0400	1.8 (7)
Total Radon 222, Calculated	pCi/L	6	6	3,373	3,373	20,500	3,810	11.0	184
Total Thorium 227	pCi/L	6	0	0.286	0.286	0.859	0.337	<0.0108	<0.125
Total Thorium 228	pCi/L	8	0	5.05	1.62	3.88	1.85	-0.04	<0.300
Dissolved Thorium 230	pCi/L	1	0	NC	NC	NC	NC	<0.600	<0.600
Total Thorium 230	pCi/L	17	9	5.18	1.39	4.5	1.68	0.0200	0.510 (7)
Total Thorium 232	pCi/L	8	4	2.18	2.18	1.93	0.732	0.00	0.126
Dissolved Uranium 234	pCi/L	1	1	NC	NC	NC	NC	9.60	9.60 (7)
Total Uranium 234	pCi/L	16	15	14.4	5.88	10.4	4.95	9.70	73.0
Dissolved Uranium 235	pCi/L	1	1	NC	NC	NC	NC	0.340	0.340 (7)
Total Uranium 235	pCi/L	14	13	1.12	0.456	0.307	0.194	0.600	6.50
Dissolved Uranium 238	pCi/L	1	1	NC	NC	NC	NC	9.10	9.10 (7)
Total Uranium 238	pCi/L	16	16	11.6	4.4	9.46	4.10	8.90	72.0

Notes:
(1) Parameters in bold exceed background limits for the URS samples
(2) 99% Upper Tolerance Limit for the fall season URS background surface water data set
(3) 95% Upper Prediction Limit for the fall season URS background surface water data set
(4) 99% Upper Tolerance Limit for the spring season URS background surface water data set
(5) 95% Upper Prediction Limit for the spring season URS background surface water data set
(6) The maximum concentration or activity is reported as non-detect value above one or both RBLs
(7) The maximum concentration or activity is reported from SMI samples
(8) The maximum concentration or activity is from a URS sample collected in the spring
(9) The maximum concentration or activity is reported from E&E samples
(10) The maximum concentration or activity is from a URS verification sample; the associated primary sample did not exceed the BL
NA = Not Applicable
NC = Not calculated; parameter not analyzed for URS background samples

Table 5-12
SUMMARY OF ANALYTICAL RESULTS FOR CENTRAL DRAINAGE SURFACE WATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits				Minimum	Maximum Detected Value
				Fall BL (2)	Fall RBL (3)	Spring BL (4)	Spring RBL (5)		
Field Parameters									
Dissolved Oxygen	mg/l	15	15	NA	NA	NA	NA	7.30	11.8
Eh	mV	4	4	NA	NA	NA	NA	359	454
Ferrous Iron	mg/l	15	5	NA	NA	NA	NA	<0.00700	0.120
Field Iron	ug/l	13	9	NA	NA	NA	NA	<7.00	450
Field pH	SU	15	15	NA	NA	NA	NA	4.62	5.41
Specific Conductance	umhos/cm	15	15	609	414	91,000	91,000	912	3,540
Temperature	C	15	15	NA	NA	NA	NA	5.40	16.8
Turbidity	NTU	3	3	NA	NA	NA	NA	0.520	26.0
Inorganics									
Chloride	mg/l	15	14	4.82	4.82	1.65	1.28	2.00	5.00
Fluoride	mg/l	13	13	NC	NC	NC	NC	0.900	1.20
Nitrate	mg/l	14	14	1.57	0.324	0.189	0.099	0.802	6.33
Nitrate/Nitrite	mg/l	13	13	NC	NC	NC	NC	1.42	6.14
Nitrite	mg/l	13	0	0.03	0.03	0.02	0.02	<0.0100	<0.250 (6)
Nitrogen, Ammonia	mg/l	2	0	1.21	1.21	0.039	0.026	<0.0100	<0.0435 (6)
Nitrogen, Kjeldahl	mg/l	4	4	NC	NC	NC	NC	0.400	0.600
Phosphate-P	mg/l	2	2	0.526	0.25	0.189	0.13	0.0390	0.0444
Phosphorus	mg/l	15	8	1.27	0.518	0.347	0.213	<0.0100	0.0488
Silica	mg/l	13	13	NC	NC	NC	NC	46.5	66.1
Sulfate	mg/l	15	15	38.4	22.2	9.36	7.03	1,400	2,580
Metals									
Dissolved Aluminum	ug/l	15	15	1,890	708	15,700	7,330	1,020	1,800
Total Aluminum	ug/l	15	15	25,100	7,270	9,490	7,710	830	1,720
Dissolved Antimony	ug/l	3	1	6.07	0.597	7.47	5.33	0.400	0.4 (7)
Total Antimony	ug/l	3	0	3.33	0.602	9.15	6.12	<0.500	<2.70 (6)
Dissolved Arsenic	ug/l	15	5	38.7	17.9	15.1	8.69	0.610	1.3 (7)
Total Arsenic	ug/l	15	2	82.5	34.7	20.5	11.7	0.670	0.7
Dissolved Barium	ug/l	15	15	252	252	129	73.4	10.9	18.6
Total Barium	ug/l	15	15	413	188	165	165	2.10	16.5
Dissolved Beryllium	ug/l	15	5	0.1	0.1	0.26	0.26	<2.00	4 (7)
Total Beryllium	ug/l	15	4	0.23	0.23	0.735	0.466	2.80	3.2
Dissolved Cadmium	ug/l	15	15	9.2	9.2	0.5	0.5	28.0	54.0
Total Cadmium	ug/l	15	15	6.2	6.2	0.5	0.5	8.90	53.0
Dissolved Calcium	ug/l	15	15	63,300	63,300	33,000	18,400	214,000	431,000
Total Calcium	ug/l	2	2	62,800	62,800	34,300	34,300	259,000	345,000
Dissolved Chromium	ug/l	15	2	0.63	0.63	5.15	2.76	<0.300	9.40
Total Chromium	ug/l	15	2	7.71	3.39	5.33	3.66	<0.200	8.1
Dissolved Cobalt	ug/l	3	3	14.4	4.06	1.4	1.4	40.7	70.0
Total Cobalt	ug/l	3	3	33.8	8.63	3.43	2.06	41.3	60.0

Table 5-12
SUMMARY OF ANALYTICAL RESULTS FOR CENTRAL DRAINAGE SURFACE WATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits				Minimum	Maximum Detected Value
				Fall BL (2)	Fall RBL (3)	Spring BL (4)	Spring RBL (5)		
Dissolved Copper	ug/l	15	14	3.37	1.77	3	3	1.30	47.0
Total Copper	ug/l	15	13	29.8	11.1	10.7	6.68	1.40	80 (7)
Dissolved Iron	ug/l	15	6	8,620	2,530	11,600	5,290	<8.40	360
Total Iron	ug/l	15	7	82,300	19,600	6,040	4,930	<8.40	450
Dissolved Lead	ug/l	15	1	1.69	0.729	6.04	3.2	0.200	0.2 (7)
Total Lead	ug/l	15	0	26.1	6.86	5.18	3.57	<0.200	<2.00
Dissolved Magnesium	ug/l	15	15	17,900	17,900	8,730	8,730	150,000	304,000
Total Magnesium	ug/l	2	2	18,500	18,500	9,070	9,070	189,000	268,000
Dissolved Manganese	ug/l	15	15	2,040	2,040	55.7	32.2	41,800	94,000
Total Manganese	ug/l	15	15	2,230	2,230	74.6	61.8	40,100	91,200
Dissolved Mercury	ug/l	15	0	0.100	0.100	0.1	0.1	<0.100	<0.200 (6)
Total Mercury	ug/l	15	0	0.200	0.200	0.1	0.1	<0.100	<0.200 (6)
Dissolved Nickel	ug/l	15	15	5.00	5.00	1.4	1.4	730	1,400
Total Nickel	ug/l	15	15	21.1	6.78	5.06	4.17	790	1,350
Dissolved Potassium	ug/l	15	15	8,990	8,990	2,620	2,620	3,300	5,500
Total Potassium	ug/l	2	2	8,370	5,500	2,460	2,010	3,900	5,480
Dissolved Selenium	ug/l	15	0	0.330	0.330	1.3	1.3	<1.00	<2.00 (6)
Total Selenium	ug/l	15	0	0.714	0.466	1.3	1.3	<1.00	<2.00 (6)
Dissolved Silver	ug/l	15	4	0.900	0.900	1.6	1.6	<0.700	12.0
Total Silver	ug/l	15	2	0.900	0.900	0.8	0.8	<0.700	10.0
Dissolved Sodium	ug/l	15	15	10,200	10,200	7,530	6,100	24,600	44,000
Total Sodium	ug/l	2	2	9,620	9,620	8,120	6,450	30,100	40,200
Dissolved Thallium	ug/l	15	1	1.10	1.10	1.8	1.8	0.0700	0.07 (7)
Total Thallium	ug/l	15	0	1.10	1.10	1.2	1.2	<0.100	<1.20 (6)
Total Uranium, Calculated	mg/l	2	2	0.033	0.013	0.023	0.011	0.00500	0.727
Dissolved Vanadium	ug/l	3	1	3.65	1.43	11	6.15	<1.00	2.1
Total Vanadium	ug/l	3	1	46.6	13.2	8.06	6.74	0.510	0.51
Dissolved Zinc	ug/l	15	14	13.6	13.6	18.4	8.94	740	1,480 (7)
Total Zinc	ug/l	15	14	50.9	16.7	10.9	8.87	710	1,390 (7)
Organic Compounds									
Total Petroleum Hydrocarbons-Diesel	ug/l	1	0	NA	NA	NA	NA	<1,000	<1,000
Other Parameters									
Alkalinity	mg/l	15	15	214	214	126	126	<3.00	9.00
Bicarbonate Alkalinity	mg/l	15	14	214	214	126	126	<3.00	9.00
Carbonate Alkalinity	mg/l	15	0	10.0	10.0	2	2	<2.00	<2.00
Chemical Oxygen Demand	mg/l	2	1	103	42.6	78.4	38	<5.00	22.8
Hardness	mg/l	15	15	233	233	119	119	1,150	4,650
Hydroxide Alkalinity	mg/l	15	0	2.00	2.00	2	2	<2.00	<2.00
Total Dissolved Solids	mg/l	15	15	341	242	249	204	2,180	3,650
Total Inorganic Carbon	mg/l	13	9	NC	NC	NC	NC	<1.00	8.00

Table 5-12
SUMMARY OF ANALYTICAL RESULTS FOR CENTRAL DRAINAGE SURFACE WATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits				Minimum	Maximum Detected Value
				Fall BL (2)	Fall RBL (3)	Spring BL (4)	Spring RBL (5)		
Total Suspended Solids	mg/l	15	3	1,130	226	258	99.1	<5.00	18.0
Radionuclides									
Gross Alpha	pCi/L	15	15	66.8	22.6	83.7	34.1	163	1,200
Gross Beta	pCi/L	15	15	34.3	18.7	37.8	21.6	98.0	700
Dissolved Lead 210	pCi/L	1	0	NC	NC	NC	NC	<14.0	<14.0
Total Lead 210	pCi/L	15	9	2.70	1.97	18	7.56	0.00	62.0 (7)
Dissolved Polonium 210	pCi/L	1	1	NC	NC	NC	NC	1.03	1.03 (7)
Total Polonium 210	pCi/L	5	1	7.39	3.30	10.8	4.07	-0.10	2.60
Dissolved Radium 226	pCi/L	1	1	NC	NC	NC	NC	1.35	1.35 (7)
Total Radium 226	pCi/L	15	15	1.81	1.81	4.36	4.36	0.300	1.75
Dissolved Radium 228	pCi/L	1	0	NC	NC	NC	NC	<2.36	<2.36
Total Radium 228	pCi/L	15	11	3.06	1.51	3.94	2.19	<0.238	3.00 (7)
Total Radon 222	pCi/L	1	1	3,373	3,373	20,500	3,810	210	210
Total Radon 222, Calculated	pCi/L	2	2	3,373	3,373	20,500	3,810	1,407	1,600
Total Thorium 227	pCi/L	2	0	0.286	0.286	0.859	0.337	<0.633	<2.25 (6)
Total Thorium 228	pCi/L	3	0	5.05	1.62	3.88	1.85	<0.0400	<2.88 (6)
Dissolved Thorium 230	pCi/L	1	0	NA	NA	NA	NA	<0.700	<0.700
Total Thorium 230	pCi/L	15	9	5.18	1.39	4.5	1.68	<0.0200	1.50 (7)
Total Thorium 232	pCi/L	3	1	2.18	2.18	1.93	0.732	<0.0650	0.11 (7)
Dissolved Uranium 234	pCi/L	1	1	NC	NC	NC	NC	310	310 (7)
Total Uranium 234	pCi/L	15	15	14.4	5.88	10.4	4.95	1.54	360
Dissolved Uranium 235	pCi/L	1	1	NC	NC	NC	NC	18.0	18.0 (7)
Total Uranium 235	pCi/L	15	14	1.12	0.456	0.307	0.194	<0.176	14.0
Dissolved Uranium 238	pCi/L	1	1	NC	NC	NC	NC	300	300 (7)
Total Uranium 238	pCi/L	15	14	11.6	4.4	9.46	4.10	<0.735	360

Notes:
(1) Parameters in bold exceed background limits for the URS samples
(2) 99% Upper Tolerance Limit for the fall season URS background surface water data set
(3) 95% Upper Prediction Limit for the fall season URS background surface water data set
(4) 99% Upper Tolerance Limit for the spring season URS background surface water data set
(5) 95% Upper Prediction Limit for the spring season URS background surface water data set
(6) The maximum concentration or activity is reported as non-detect value above one or both RBLs
(7) The maximum concentration or activity is reported from SMI samples
NA = Not Applicable
NC = Not calculated; parameter not analyzed for URS background samples

Table 5-13
SUMMARY OF ANALYTICAL RESULTS FOR WESTERN DRAINAGE SURFACE WATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits				Minimum	Maximum Detected Value
				Fall BL (2)	Fall RBL (3)	Spring BL (4)	Spring RBL (5)		
Field Parameters									
Dissolved Oxygen	mg/l	15	15	NA	NA	NA	NA	7.70	13.1
Eh	mV	4	4	NA	NA	NA	NA	302	463
Ferrous Iron	mg/l	15	7	NA	NA	NA	NA	<0.00700	0.120
Field Iron	ug/l	13	8	NA	NA	NA	NA	<7.00	510
Field pH	SU	15	15	NA	NA	NA	NA	5.00	6.38
Specific Conductance	umhos/cm	15	15	609	414	91,000	91,000	904	3,370
Temperature	C	15	15	NA	NA	NA	NA	2.50	17.1
Turbidity	NTU	3	3	NA	NA	NA	NA	0.350	52.0
Inorganics									
Chloride	mg/l	15	14	4.82	4.82	1.65	1.28	1.00	4.00
Fluoride	mg/l	13	13	NC	NC	NC	NC	0.400	1.40
Nitrate	mg/l	13	6	1.57	0.324	0.189	0.099	<0.0200	0.300 (7)
Nitrate/Nitrite	mg/l	13	7	NC	NC	NC	NC	<0.0200	0.290
Nitrite	mg/l	13	0	0.03	0.03	0.02	0.02	<0.0100	<0.0500 (6)
Nitrogen, Ammonia	mg/l	2	0	1.21	1.21	0.039	0.026	<0.0100	<0.0439 (6)
Nitrogen, Kjeldahl	mg/l	4	1	NC	NC	NC	NC	<0.200	0.2 (7)
Phosphate-P	mg/l	2	2	0.526	0.25	0.189	0.13	0.0221	0.0411
Phosphorus	mg/l	15	6	1.27	0.518	0.347	0.213	<0.0100	0.110
Silica	mg/l	13	13	NC	NC	NC	NC	14.6	53.1
Sulfate	mg/l	15	15	38.4	22.2	9.36	7.03	640	2,410
Metals									
Dissolved Aluminum	ug/l	15	14	1,890	708	15,700	7,330	<60.0	1,080
Total Aluminum	ug/l	15	15	25,100	7,270	9,490	7,710	170	4,130
Dissolved Antimony	ug/l	3	0	6.07	0.597	7.47	5.33	<0.500	<4.80 (6)
Total Antimony	ug/l	3	0	3.33	0.602	9.15	6.12	<1.00	<2.70 (6)
Dissolved Arsenic	ug/l	15	2	38.7	17.9	15.1	8.69	0.200	0.34
Total Arsenic	ug/l	15	3	82.5	34.7	20.5	11.7	0.320	2 (7)
Dissolved Barium	ug/l	15	15	252	252	129	73.4	14.7	57.0
Total Barium	ug/l	15	14	413	188	165	165	14.5	58 (7)
Dissolved Beryllium	ug/l	15	6	0.1	0.1	0.26	0.26	1.00	5.00
Total Beryllium	ug/l	15	6	0.23	0.23	0.735	0.466	1.20	4.3
Dissolved Cadmium	ug/l	15	12	9.2	9.2	0.5	0.5	0.990	5.2 (7)
Total Cadmium	ug/l	15	12	6.2	6.2	0.5	0.5	<1.00	5.00
Dissolved Calcium	ug/l	15	15	63,300	63,300	33,000	18,400	140,000	767,000
Total Calcium	ug/l	2	2	62,800	62,800	34,300	34,300	159,000	448,000
Dissolved Chromium	ug/l	15	3	0.63	0.63	5.15	2.76	<0.100	2 (7)
Total Chromium	ug/l	15	4	7.71	3.39	5.33	3.66	<0.200	10.0 (7)
Dissolved Cobalt	ug/l	3	1	14.4	4.06	1.4	1.4	<1.20	4
Total Cobalt	ug/l	3	2	33.8	8.63	3.43	2.06	1.30	1.9

Table 5-13
SUMMARY OF ANALYTICAL RESULTS FOR WESTERN DRAINAGE SURFACE WATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits				Minimum	Maximum Detected Value
				Fall BL (2)	Fall RBL (3)	Spring BL (4)	Spring RBL (5)		
Dissolved Copper	ug/l	15	12	3.37	1.77	3	3	<0.900	80.0
Total Copper	ug/l	15	11	29.8	11.1	10.7	6.68	0.810	60 (7)
Dissolved Iron	ug/l	15	10	8,620	2,530	11,600	5,290	<8.40	90.0
Total Iron	ug/l	15	11	82,300	19,600	6,040	4,930	<20.0	3,040
Dissolved Lead	ug/l	15	0	1.69	0.729	6.04	3.2	<0.200	<10.0 (6)
Total Lead	ug/l	15	1	26.1	6.86	5.18	3.57	<0.200	2.50
Dissolved Magnesium	ug/l	15	15	17,900	17,900	8,730	8,730	77,000	270,000
Total Magnesium	ug/l	2	2	18,500	18,500	9,070	9,070	90,500	263,000
Dissolved Manganese	ug/l	15	15	2,040	2,040	55.7	32.2	41.9	17,100
Total Manganese	ug/l	15	15	2,230	2,230	74.6	61.8	99.0	15,900
Dissolved Mercury	ug/l	15	0	0.100	0.100	0.1	0.1	<0.100	<0.200 (6)
Total Mercury	ug/l	15	0	0.200	0.200	0.1	0.1	<0.100	<0.200 (6)
Dissolved Nickel	ug/l	15	14	5.00	5.00	1.4	1.4	<20.0	380
Total Nickel	ug/l	15	14	21.1	6.78	5.06	4.17	<20.0	400
Dissolved Potassium	ug/l	15	15	8,990	8,990	2,620	2,620	3,700	7,900
Total Potassium	ug/l	2	2	8,370	5,500	2,460	2,010	3,690	7,230
Dissolved Selenium	ug/l	15	0	0.330	0.330	1.3	1.3	<1.00	<2.00 (6)
Total Selenium	ug/l	15	0	0.714	0.466	1.3	1.3	<1.00	<2.00 (6)
Dissolved Silver	ug/l	15	2	0.900	0.900	1.6	1.6	<0.800	7 (7)
Total Silver	ug/l	15	0	0.900	0.900	0.8	0.8	<0.700	<50.0 (6)
Dissolved Sodium	ug/l	15	15	10,200	10,200	7,530	6,100	15,100	41,000
Total Sodium	ug/l	2	2	9,620	9,620	8,120	6,450	16,200	36,100
Dissolved Thallium	ug/l	15	0	1.10	1.10	1.8	1.8	<0.100	<5.00 (6)
Total Thallium	ug/l	15	0	1.10	1.10	1.2	1.2	<0.100	<1.20
Total Uranium, Calculated	mg/l	2	2	0.033	0.013	0.023	0.011	0.0970	0.103
Dissolved Vanadium	ug/l	3	0	3.65	1.43	11	6.15	<1.00	<10.0
Total Vanadium	ug/l	3	0	46.6	13.2	8.06	6.74	<0.500	<10.0 (6)
Dissolved Zinc	ug/l	15	15	13.6	13.6	18.4	8.94	30.0	460
Total Zinc	ug/l	15	14	50.9	16.7	10.9	8.87	40.0	500 (7)
Organic Compounds									
Total Petroleum Hydrocarbons-Diesel	ug/l	1	0	NA	NA	NA	NA	<1,000	<1,000
Other Parameters									
Alkalinity	mg/l	15	15	214	214	126	126	3.00	29.0
Bicarbonate Alkalinity	mg/l	15	14	214	214	126	126	3.00	29.0
Carbonate Alkalinity	mg/l	15	0	10.0	10.0	2	2	<2.00	<2.00
Chemical Oxygen Demand	mg/l	2	1	103	42.6	78.4	38	<5.00	27.1
Hardness	mg/l	15	15	233	233	119	119	666	4,170
Hydroxide Alkalinity	mg/l	15	0	2.00	2.00	2	2	<2.00	<2.00
Total Dissolved Solids	mg/l	15	15	341	242	249	204	1,040	3,510
Total Inorganic Carbon	mg/l	13	7	NC	NC	NC	NC	<1.00	48.0

Table 5-13
SUMMARY OF ANALYTICAL RESULTS FOR WESTERN DRAINAGE SURFACE WATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits				Minimum	Maximum Detected Value
				Fall BL (2)	Fall RBL (3)	Spring BL (4)	Spring RBL (5)		
Total Suspended Solids	mg/l	15	7	1,130	226	258	99.1	<5.00	72.0
Radionuclides									
Gross Alpha	pCi/L	15	15	66.8	22.6	83.7	34.1	14.0	72.0
Gross Beta	pCi/L	15	15	34.3	18.7	37.8	21.6	8.00	71.0
Dissolved Lead 210	pCi/L	14	10	NC	NC	NC	NC	-1.30	33.0 (7)
Total Lead 210	pCi/L	1	1	2.70	1.97	18	7.56	0.160	0.160
Dissolved Polonium 210	pCi/L	5	1	NC	NC	NC	NC	<0.100	0.16 (7)
Total Polonium 210	pCi/L	1	1	7.39	3.30	10.8	4.07	1.34	1.34
Dissolved Radium 226	pCi/L	15	15	NC	NC	NC	NC	0.310	2.52 (7)
Total Radium 226	pCi/L	1	0	1.81	1.81	4.36	4.36	<0.850	<0.850
Dissolved Radium 228	pCi/L	1	0	NC	NC	NC	NC	<0.400	<0.85 (7)
Total Radium 228	pCi/L	1	1	3.06	1.51	3.94	2.19	<0.400	2.8 (7)
Total Radon 222, Calculated	pCi/L	2	2	3,373	3,373	20,500	3,810	429	576
Total Thorium 227	pCi/L	2	1	0.286	0.286	0.859	0.337	<0.225	0.905
Total Thorium 228	pCi/L	3	0	5.05	1.62	3.88	1.85	<0.0500	<0.171
Dissolved Thorium 230	pCi/L	1	0	NA	NA	NA	NA	<0.600	<0.600
Total Thorium 230	pCi/L	13	10	5.18	1.39	4.5	1.68	0.00	18.0 (7)
Total Thorium 232	pCi/L	3	2	2.18	2.18	1.93	0.732	0.0200	0.225
Dissolved Uranium 234	pCi/L	1	1	NC	NC	NC	NC	10.0	10.0 (7)
Total Uranium 234	pCi/L	15	14	14.4	5.88	10.4	4.95	2.50	38.1
Dissolved Uranium 235	pCi/L	1	1	NC	NC	NC	NC	0.670	0.670 (7)
Total Uranium 235	pCi/L	13	12	1.12	0.456	0.307	0.194	0.120	18.0
Dissolved Uranium 238	pCi/L	1	1	NC	NC	NC	NC	9.10	9.10 (7)
Total Uranium 238	pCi/L	15	14	11.6	4.4	9.46	4.10	1.60	34.4

Notes:
(1) Parameters in bold exceed background limits for the URS samples
(2) 99% Upper Tolerance Limit for the fall season URS background surface water data set
(3) 95% Upper Prediction Limit for the fall season URS background surface water data set
(4) 99% Upper Tolerance Limit for the spring season URS background surface water data set
(5) 95% Upper Prediction Limit for the spring season URS background surface water data set
(6) The maximum concentration or activity is reported as non-detect value above one or both RBLs
(7) The maximum concentration or activity is reported from SMI samples
NA = Not Applicable
NC = Not calculated; parameter not analyzed for URS background samples

Table 5-14
ANALYTICAL RESULTS FOR THE FAR WEST DRAINAGE SURFACE WATER SAMPLE

Parameter (1)	Units	Background Limits		Result
		Spring BL (2)	Spring RBL (3)	
Field Parameters				
Dissolved Oxygen	mg/l	NA	NA	9.71
Eh	mV	NA	NA	254
Ferrous Iron	mg/l	NA	NA	<0.0500
Field pH	SU	NA	NA	6.73
Specific Conductance	uS/cm	91,000	91,000	150
Temperature	C	NA	NA	7.30
Turbidity	NTU	NA	NA	11.1
Inorganics				
Chloride	mg/l	1.65	1.28	0.431
Nitrate	mg/l	0.189	0.099	0.0860
Nitrite	mg/l	0.02	0.02	<0.0200
Nitrogen, Ammonia	mg/l	0.039	0.026	<0.0100
Phosphate-P	mg/l	0.189	0.13	0.0708
Phosphorus	mg/l	0.347	0.213	0.0933
Sulfate	mg/l	9.36	7.03	16.6
Metals				
Dissolved Aluminum	ug/l	15,700	7,330	1,280
Total Aluminum	ug/l	9,490	7,710	1,620
Dissolved Antimony	ug/l	7.47	5.33	<2.70
Total Antimony	ug/l	9.15	6.12	<2.70
Dissolved Arsenic	ug/l	15.1	8.69	1.40
Total Arsenic	ug/l	20.5	11.7	1.50
Dissolved Barium	ug/l	129	73.4	43.3
Total Barium	ug/l	165	165	53.4
Dissolved Beryllium	ug/l	0.26	0.26	<0.100
Total Beryllium	ug/l	0.735	0.466	0.170
Dissolved Cadmium	ug/l	0.5	0.5	<0.500
Total Cadmium	ug/l	0.5	0.5	<0.500
Dissolved Calcium	ug/l	33,000	18,400	13,000
Total Calcium	ug/l	34,300	34,300	13,400
Dissolved Chromium	ug/l	5.15	2.76	<1.10
Total Chromium	ug/l	5.33	3.66	<1.10
Dissolved Cobalt	ug/l	1.4	1.4	<1.20
Total Cobalt	ug/l	3.43	2.06	<1.20
Dissolved Copper	ug/l	3	3	1.40
Total Copper	ug/l	10.7	6.68	0.900
Dissolved Iron	ug/l	11,600	5,290	815
Total Iron	ug/l	6,040	4,930	1,310
Dissolved Lead	ug/l	6.04	3.2	<0.900
Total Lead	ug/l	5.18	3.57	1.80
Dissolved Magnesium	ug/l	8,730	8,730	3,880
Total Magnesium	ug/l	9,070	9,070	4,090
Dissolved Manganese	ug/l	55.7	32.2	3.70
Total Manganese	ug/l	74.6	61.8	21.1
Dissolved Mercury	ug/l	0.1	0.1	<0.100
Total Mercury	ug/l	0.1	0.1	<0.100
Dissolved Nickel	ug/l	1.4	1.4	<0.920
Total Nickel	ug/l	5.06	4.17	2.20
Dissolved Potassium	ug/l	2,620	2,620	1,420
Total Potassium	ug/l	2,460	2,010	1,390
Dissolved Selenium	ug/l	1.3	1.3	<1.30
Total Selenium	ug/l	1.3	1.3	<1.30

Table 5-14
ANALYTICAL RESULTS FOR THE FAR WEST DRAINAGE SURFACE WATER SAMPLE

Parameter (1)	Units	Background Limits		Result
		Spring BL (2)	Spring RBL (3)	
Dissolved Silver	ug/l	1.6	1.6	<0.800
Total Silver	ug/l	0.8	0.8	<0.800
Dissolved Sodium	ug/l	7,530	6,100	5,880
Total Sodium	ug/l	8,120	6,450	5,630
Dissolved Thallium	ug/l	1.8	1.8	<1.20
Total Thallium	ug/l	1.2	1.2	<1.20
Total Uranium, Calculated	mg/l	0.023	0.011	0.0100
Dissolved Vanadium	ug/l	11	6.15	2.40
Total Vanadium	ug/l	8.06	6.74	4.50
Dissolved Zinc	ug/l	18.4	8.94	3.80
Total Zinc	ug/l	10.9	8.87	5.80
Other Parameters				
Alkalinity, Total	mg/l	126	126	45.6
Bicarbonate Alkalinity	mg/l	126	126	45.6
Carbonate Alkalinity	mg/l	2	2	<2.00
Chemical Oxygen Demand	mg/l	78.4	38	29.3
Hardness	mg/l	119	119	48.4
Hydroxide Alkalinity	mg/l	2	2	<2.00
Total Dissolved Solids	mg/l	249	204	132
Total Suspended Solids	mg/l	258	99.1	15.3
Radionuclides				
Gross Alpha	pCi/L	83.7	34.1	7.75
Gross Beta	pCi/L	37.8	21.6	8.45
Lead 210	pCi/L	18	7.56	<1.50
Polonium 210	pCi/L	10.8	4.07	0.600
Radium 226	pCi/L	4.36	4.36	1.61
Radium 228	pCi/L	3.94	2.19	<0.267
Radon 222, Calculated	pCi/L	20,500	3,810	4,005
Thorium 227	pCi/L	0.859	0.337	<0.222
Thorium 228	pCi/L	3.88	1.85	-0.17
Thorium 230	pCi/L	4.5	1.68	0.472
Thorium 232	pCi/L	1.93	0.732	<0.0323
Uranium 234	pCi/L	10.4	4.95	3.30
Uranium 235	pCi/L	0.307	0.194	0.350
Uranium 238	pCi/L	9.46	4.10	3.25

Notes:
(1) Parameters in bold exceed background limits for the URS sample
(2) 99% Upper Tolerance Limit for the spring season URS background surface water data set
(3) 95% Upper Prediction Limit for the spring season URS background surface water data set
NA = Not Applicable

Table 5-15
SUMMARY OF ANALYTICAL RESULTS FOR PIT 3 SURFACE WATER SAMPLES

Parameter (1)	Units	No. of Samples	No. of Detects	Background Limits				Minimum	Maximum Detected Value
				Fall BL (2)	Fall RBL (3)	Spring BL (4)	Spring RBL (5)		
Field Parameters									
Dissolved Oxygen	mg/l	8	8	NA	NA	NA	NA	7.80	11.8
Eh	mV	1	1	NA	NA	NA	NA	469	469
Ferrous Iron	mg/l	3	3	NA	NA	NA	NA	0.970	1.34
Field Iron	ug/l	8	8	NA	NA	NA	NA	140	2,520
Field pH	SU	8	8	NA	NA	NA	NA	4.04	4.56
Specific Conductance	umhos/cm	8	8	609	414	91,000	91,000	1,470	3,770 (7)
Temperature	C	8	8	NA	NA	NA	NA	4.00	21.5
Turbidity	NTU	1	1	NA	NA	NA	NA	1.65	1.65
Inorganics									
Chloride	mg/l	9	8	4.82	4.82	1.65	1.28	2.00	4.00 (7)
Fluoride	mg/l	8	8	NC	NC	NC	NC	1.00	5.00
Nitrate	mg/l	9	9	1.57	0.324	0.189	0.099	0.940	2.46
Nitrate/Nitrite	mg/l	8	8	NC	NC	NC	NC	0.990	2.62
Nitrite	mg/l	9	0	0.03	0.03	0.02	0.02	<0.0100	<0.0500 (6)
Nitrogen, Ammonia	mg/l	1	1	1.21	1.21	0.039	0.026	0.131	0.131(9)
Nitrogen, Kjeldahl	mg/l	2	2	NC	NC	NC	NC	0.600	1.60
Phosphate-P	mg/l	1	1	0.526	0.25	0.189	0.13	0.0243	0.0243
Phosphorus	mg/l	9	2	1.27	0.518	0.347	0.213	<0.0100	0.0800
Silica	mg/l	8	8	NC	NC	NC	NC	23.1	36.1
Sulfate	mg/l	9	9	38.4	22.2	9.36	7.03	2,310	3,406
Metals									
Dissolved Aluminum	ug/l	9	9	1,890	708	15,700	7,330	48,900	109,000
Total Aluminum	ug/l	12	12	25,100	7,270	9,490	7,710	46,800	109,000
Dissolved Antimony	ug/l	2	1	6.07	0.597	7.47	5.33	0.200	0.2
Total Antimony	ug/l	5	1	3.33	0.602	9.15	6.12	<0.200	2 (7)
Dissolved Arsenic	ug/l	9	5	38.7	17.9	15.1	8.69	2.10	20.0 (7)
Total Arsenic	ug/l	12	8	82.5	34.7	20.5	11.7	2.70	16.3 (8)
Dissolved Barium	ug/l	9	9	252	252	129	73.4	8.00	14.4
Total Barium	ug/l	12	10	413	188	165	165	6.50	48.2 (8)
Dissolved Beryllium	ug/l	9	9	0.1	0.1	0.26	0.26	28.0	55.3
Total Beryllium	ug/l	12	11	0.23	0.23	0.735	0.466	<4.00	55.7
Dissolved Cadmium	ug/l	9	9	9.2	9.2	0.5	0.5	28.0	97.8
Total Cadmium	ug/l	12	12	6.2	6.2	0.5	0.5	26.0	70.0
Dissolved Calcium	ug/l	9	9	63,300	63,300	33,000	18,400	382,000	448,000
Total Calcium	ug/l	4	4	62,800	62,800	34,300	34,300	397,000	454,000
Dissolved Chromium	ug/l	9	5	0.63	0.63	5.15	2.76	0.900	3.1
Total Chromium	ug/l	12	6	7.71	3.39	5.33	3.66	<0.200	34.3
Dissolved Cobalt	ug/l	2	2	14.4	4.06	1.4	1.4	930	1,800
Total Cobalt	ug/l	5	5	33.8	8.63	3.43	2.06	900	1,820
Dissolved Copper	ug/l	9	9	3.37	1.77	3	3	49.0	302
Total Copper	ug/l	12	9	29.8	11.1	10.7	6.68	160	286 (8)

Table 5-15
SUMMARY OF ANALYTICAL RESULTS FOR PIT 3 SURFACE WATER SAMPLES

Parameter (1)	Units	No. of Samples	No. of Detects	Background Limits				Minimum	Maximum Detected Value
				Fall BL (2)	Fall RBL (3)	Spring BL (4)	Spring RBL (5)		
Dissolved Iron	ug/l	9	9	8,620	2,530	11,600	5,290	110	2,890 (7)
Total Iron	ug/l	12	12	82,300	19,600	6,040	4,930	130	5,060 (7)
Dissolved Lead	ug/l	9	7	1.69	0.729	6.04	3.2	<2.00	9.50
Total Lead	ug/l	12	10	26.1	6.86	5.18	3.57	<2.00	39.4
Dissolved Magnesium	ug/l	9	9	17,900	17,900	8,730	8,730	252,000	361,000
Total Magnesium	ug/l	4	4	18,500	18,500	9,070	9,070	300,000	363,000
Dissolved Manganese	ug/l	9	9	2,040	2,040	55.7	32.2	65,800	145,000
Total Manganese	ug/l	12	12	2,230	2,230	74.6	61.8	62,200	137,000
Dissolved Mercury	ug/l	8	0	0.100	0.100	0.1	0.1	<0.200	<0.200 (6)
Total Mercury	ug/l	11	0	0.200	0.200	0.1	0.1	<0.200	<0.200 (6)
Dissolved Molybdenum	ug/l	1	0	16.6	6.84	NC	NC	<1.20	<1.20
Total Molybdenum	ug/l	1	0	11.5	11.5	NC	NC	<1.40	<1.40
Dissolved Nickel	ug/l	9	9	5.00	5.00	1.4	1.4	1,300	2,690
Total Nickel	ug/l	12	11	21.1	6.78	5.06	4.17	<20.0	2,700
Dissolved Potassium	ug/l	9	9	8,990	8,990	2,620	2,620	3,000	5,000 (7)
Total Potassium	ug/l	4	4	8,370	5,500	2,460	2,010	4,560	7,830 (8)
Dissolved Selenium	ug/l	9	2	0.330	0.330	1.3	1.3	<1.00	10.3
Total Selenium	ug/l	12	4	0.714	0.466	1.3	1.3	<1.00	65.3
Dissolved Silver	ug/l	9	0	0.900	0.900	1.6	1.6	<0.900	<30.0 (6)
Total Silver	ug/l	12	2	0.900	0.900	0.8	0.8	<0.900	60.0 (7)
Dissolved Sodium	ug/l	9	9	10,200	10,200	7,530	6,100	29,900	48,000
Total Sodium	ug/l	4	4	9,620	9,620	8,120	6,450	43,000	54,900
Dissolved Thallium	ug/l	9	2	1.10	1.10	1.8	1.8	0.200	0.4 (7)
Total Thallium	ug/l	12	2	1.10	1.10	1.2	1.2	0.200	0.2 (7)
Total Uranium, Calculated	mg/l	12	12	0.033	0.013	0.023	0.011	1.93	28.9
Dissolved Vanadium	ug/l	2	0	3.65	1.43	11	6.15	<0.800	<30.0 (6)
Total Vanadium	ug/l	5	0	46.6	13.2	8.06	6.74	<0.800	<30.0 (6)
Dissolved Zinc	ug/l	9	9	13.6	13.6	18.4	8.94	2,700	5,850
Total Zinc	ug/l	12	12	50.9	16.7	10.9	8.87	2,500	5,950
Other Parameters									
Alkalinity	mg/l	9	0	214	214	126	126	<2.00	<2.00
Bicarbonate Alkalinity	mg/l	9	0	214	214	126	126	<2.00	<10.0
Carbonate Alkalinity	mg/l	9	0	10.0	10.0	2	2	<2.00	<10.0 (6)
Chemical Oxygen Demand	mg/l	1	0	103	42.6	78.4	38	<5.00	<5.00
Hardness	mg/l	9	9	233	233	119	119	1,990	2,533
Hydroxide Alkalinity	mg/l	8	0	2.00	2.00	2	2	<2.00	<2.00
Total Dissolved Solids	mg/l	9	9	341	242	249	204	3,350	4,960
Total Inorganic Carbon	mg/l	8	1	NC	NC	NC	NC	<1.00	51.0
Total Suspended Solids	mg/l	9	3	1,130	226	258	99.1	<5.00	14.0
Radionuclides									
Gross Alpha	pCi/L	12	12	66.8	22.6	83.7	34.1	3,200	16,000

Table 5-15
SUMMARY OF ANALYTICAL RESULTS FOR PIT 3 SURFACE WATER SAMPLES

Parameter (1)	Units	No. of Samples	No. of Detects	Background Limits				Minimum	Maximum Detected Value
				Fall BL (2)	Fall RBL (3)	Spring BL (4)	Spring RBL (5)		
Gross Beta	pCi/L	9	9	34.3	18.7	37.8	21.6	4,200	16,700
Dissolved Lead 210	pCi/L	1	1	NC	NC	NC	NC	25.0	25.0 (7)
Total Lead 210	pCi/L	9	8	2.70	1.97	18	7.56	17.0	56.0
Dissolved Polonium 210	pCi/L	1	1	NC	NC	NC	NC	6.30	6.30 (7)
Total Polonium 210	pCi/L	3	1	7.39	3.30	10.8	4.07	3.40	3.4
Dissolved Radium 226	pCi/L	1	1	NC	NC	NC	NC	67.2	67.2
Total Radium 226	pCi/L	11	11	1.81	1.81	4.36	4.36	23.0	63.2
Dissolved Radium 228	pCi/L	1	1	NC	NC	NC	NC	7.00	7.00 (7)
Total Radium 228	pCi/L	12	11	3.06	1.51	3.94	2.19	2.00	5.60
Total Radon 222, Calculated	pCi/L	2	2	3,373	3,373	20,500	3,810	780	903
Total Thorium 227	pCi/L	1	0	0.286	0.286	0.859	0.337	<50.4	<50.4 (6)
Total Thorium 228	pCi/L	5	1	5.05	1.62	3.88	1.85	-5.08	1.2 (7)
Dissolved Thorium 230	pCi/L	1	1	NA	NA	NA	NA	55.0	55.0 (7)
Total Thorium 230	pCi/L	12	12	5.18	1.39	4.5	1.68	0.300	171
Total Thorium 232	pCi/L	5	3	2.18	2.18	1.93	0.732	-3.45	47.2 (7)
Dissolved Uranium 234	pCi/L	1	1	NC	NC	NC	NC	7,400	7,400 (7)
Total Uranium 234	pCi/L	12	12	14.4	5.88	10.4	4.95	380	9,670
Dissolved Uranium 235	pCi/L	1	1	NC	NC	NC	NC	280	280 (7)
Total Uranium 235	pCi/L	12	11	1.12	0.456	0.307	0.194	18.0	895
Dissolved Uranium 238	pCi/L	1	1	NC	NC	NC	NC	7,400	7,400 (7)
Total Uranium 238	pCi/L	12	12	11.6	4.4	9.46	4.10	670	9,630

Notes:

(1) Parameters in bold exceed background limits for the URS samples

(2) 99% Upper Tolerance Limit for the fall season URS background surface water data set

(3) 95% Upper Prediction Limit for the fall season URS background surface water data set

(4) 99% Upper Tolerance Limit for the spring season URS background surface water data set

(5) 95% Upper Prediction Limit for the spring season URS background surface water data set

(6) The maximum concentration or activity is reported as non-detect value above one or both RBLs

(7) The maximum concentration or activity is reported from SMI samples

(8) The maximum concentration or activity is reported from E&E samples

(9) The maximum concentration or activity is from a URS sample collected in the fall

NA = Not Applicable

NC = Not calculated; parameter not analyzed for URS background samples or insufficient data (molybdenum)

Table 5-16
SUMMARY OF ANALYTICAL RESULTS FOR PIT 4 SURFACE WATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits				Minimum	Maximum Detected Value
				Fall BL (2)	Fall RBL (3)	Spring BL (4)	Spring RBL (5)		
Field Parameters									
Dissolved Oxygen	mg/l	8	8	NA	NA	NA	NA	8.40	12.4
Ferrous Iron	mg/l	8	0	NA	NA	NA	NA	<0.00700	<0.00700
Field Iron	ug/l	8	5	NA	NA	NA	NA	<7.00	60.0
Field pH	SU	8	8	NA	NA	NA	NA	6.85	7.54
Specific Conductance	umhos/cm	8	8	609	414	91,000	91,000	269	759 (7)
Temperature	C	8	8	NA	NA	NA	NA	2.60	20.1
Inorganics									
Chloride	mg/l	9	3	4.82	4.82	1.65	1.28	0.367	2.00 (7)
Fluoride	mg/l	8	8	NC	NC	NC	NC	0.200	0.400
Nitrate	mg/l	9	2	1.57	0.324	0.189	0.099	<0.0200	0.110 (7)
Nitrate/Nitrite	mg/l	8	2	NC	NC	NC	NC	<0.0200	0.110
Nitrite	mg/l	9	0	0.03	0.03	0.02	0.02	<0.0200	<0.0500 (6)
Nitrogen, Ammonia	mg/l	1	0	1.21	1.21	0.039	0.026	<0.0200	<0.0200
Nitrogen, Kjeldahl	mg/l	4	1	NC	NC	NC	NC	<0.100	0.400
Phosphate-P	mg/l	1	1	0.526	0.25	0.189	0.13	0.0103	0.0103
Phosphorus	mg/l	9	1	1.27	0.518	0.347	0.213	<0.0100	0.0100
Silica	mg/l	8	8	NC	NC	NC	NC	20.0	23.0
Sulfate	mg/l	9	9	38.4	22.2	9.36	7.03	110	330
Metals									
Dissolved Aluminum	ug/l	9	4	1,890	708	15,700	7,330	<8.40	40.0
Total Aluminum	ug/l	12	10	25,100	7,270	9,490	7,710	80.0	500
Dissolved Antimony	ug/l	1	0	6.07	0.597	7.47	5.33	<0.100	<0.100
Total Antimony	ug/l	4	0	3.33	0.602	9.15	6.12	<0.110	<5.00 (6)
Dissolved Arsenic	ug/l	9	1	38.7	17.9	15.1	8.69	<1.00	2.2
Total Arsenic	ug/l	12	2	82.5	34.7	20.5	11.7	1.00	2.5
Dissolved Barium	ug/l	9	9	252	252	129	73.4	4.40	6.6
Total Barium	ug/l	12	12	413	188	165	165	4.30	8.00
Dissolved Beryllium	ug/l	9	0	0.1	0.1	0.26	0.26	<0.100	<2.00 (6)
Total Beryllium	ug/l	12	2	0.23	0.23	0.735	0.466	<0.100	14.0 (7)
Dissolved Cadmium	ug/l	9	1	9.2	9.2	0.5	0.5	0.300	0.3 (7)
Total Cadmium	ug/l	12	1	6.2	6.2	0.5	0.5	0.200	0.2 (7)
Dissolved Calcium	ug/l	9	9	63,300	63,300	33,000	18,400	33,700	103,000
Total Calcium	ug/l	4	4	62,800	62,800	34,300	34,300	68,300	108,000
Dissolved Chromium	ug/l	9	0	0.63	0.63	5.15	2.76	<0.100	<4.00 (6)
Total Chromium	ug/l	12	1	7.71	3.39	5.33	3.66	<0.300	2.3 (8)
Dissolved Cobalt	ug/l	1	0	14.4	4.06	1.4	1.4	<1.00	<1.00
Total Cobalt	ug/l	4	2	33.8	8.63	3.43	2.06	<1.00	2.50 (8)
Dissolved Copper	ug/l	9	7	3.37	1.77	3	3	<0.800	8.00 (7)

Table 5-16
SUMMARY OF ANALYTICAL RESULTS FOR PIT 4 SURFACE WATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits				Minimum	Maximum Detected Value
				Fall BL (2)	Fall RBL (3)	Spring BL (4)	Spring RBL (5)		
Total Copper	ug/l	12	8	29.8	11.1	10.7	6.68	0.890	23.1 (8)
Dissolved Iron	ug/l	9	0	8,620	2,530	11,600	5,290	<10.0	<16.2
Total Iron	ug/l	12	10	82,300	19,600	6,040	4,930	60.0	539
Dissolved Lead	ug/l	9	0	1.69	0.729	6.04	3.2	<0.100	<1.00 (6)
Total Lead	ug/l	12	4	26.1	6.86	5.18	3.57	0.180	7.30 (8)
Dissolved Magnesium	ug/l	9	9	17,900	17,900	8,730	8,730	8,700	25,600 (7)
Total Magnesium	ug/l	4	4	18,500	18,500	9,070	9,070	15,700	27,700 (8)
Dissolved Manganese	ug/l	9	9	2,040	2,040	55.7	32.2	203	793 (7)
Total Manganese	ug/l	12	12	2,230	2,230	74.6	61.8	226	840 (8)
Dissolved Mercury	ug/l	8	0	0.100	0.100	0.1	0.1	<0.200	<0.200 (6)
Total Mercury	ug/l	11	0	0.200	0.200	0.1	0.1	<0.200	<0.200 (6)
Dissolved Molybdenum	ug/l	1	1	16.6	6.84	NC	NC	47.9	47.9
Total Molybdenum	ug/l	1	1	11.5	11.5	NC	NC	48.6	48.6
Dissolved Nickel	ug/l	9	6	5.00	5.00	1.4	1.4	3.50	30.0 (7)
Total Nickel	ug/l	12	9	21.1	6.78	5.06	4.17	3.70	660 (7)
Dissolved Potassium	ug/l	9	9	8,990	8,990	2,620	2,620	1,200	2,500
Total Potassium	ug/l	4	4	8,370	5,500	2,460	2,010	1,660	2,110 (8)
Dissolved Selenium	ug/l	9	1	0.330	0.330	1.3	1.3	0.240	0.24
Total Selenium	ug/l	12	2	0.714	0.466	1.3	1.3	0.220	3 (7)
Dissolved Silver	ug/l	9	0	0.900	0.900	1.6	1.6	<0.900	<5.00 (6)
Total Silver	ug/l	12	1	0.900	0.900	0.8	0.8	<0.900	10.0 (7)
Dissolved Sodium	ug/l	9	9	10,200	10,200	7,530	6,100	5,200	13,700 (7)
Total Sodium	ug/l	4	4	9,620	9,620	8,120	6,450	8,610	14,200 (8)
Dissolved Thallium	ug/l	9	0	1.10	1.10	1.8	1.8	<0.100	<0.500
Total Thallium	ug/l	12	0	1.10	1.10	1.2	1.2	<0.100	<6.00 (6)
Total Uranium, Calculated	mg/l	12	12	0.033	0.013	0.023	0.011	1.32	3.30
Dissolved Vanadium	ug/l	1	0	3.65	1.43	11	6.15	<0.800	<0.800
Total Vanadium	ug/l	4	0	46.6	13.2	8.06	6.74	<0.800	<1.00
Dissolved Zinc	ug/l	9	8	13.6	13.6	18.4	8.94	1.60	28 (7)
Total Zinc	ug/l	12	7	50.9	16.7	10.9	8.87	<0.300	60.0 (7)
Other Parameters									
Alkalinity	mg/l	9	9	214	214	126	126	24.0	49.0
Bicarbonate Alkalinity	mg/l	9	9	214	214	126	126	24.0	49.0
Carbonate Alkalinity	mg/l	9	0	10.0	10.0	2	2	<2.00	<10.0 (6)
Chemical Oxygen Demand	mg/l	1	0	103	42.6	78.4	38	<5.00	<5.00
Hardness	mg/l	9	9	233	233	119	119	120	363 (7)
Hydroxide Alkalinity	mg/l	8	0	2.00	2.00	2	2	<2.00	<2.00
Total Dissolved Solids	mg/l	9	9	341	242	249	204	220	550
Total Inorganic Carbon	mg/l	8	8	NC	NC	NC	NC	6.00	11.0
Total Suspended Solids	mg/l	9	0	1,130	226	258	99.1	<4.00	<5.00

Table 5-16
SUMMARY OF ANALYTICAL RESULTS FOR PIT 4 SURFACE WATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits				Minimum	Maximum Detected Value
				Fall BL (2)	Fall RBL (3)	Spring BL (4)	Spring RBL (5)		
Radionuclides									
Gross Alpha	pCi/L	12	12	66.8	22.6	83.7	34.1	960	2,702
Gross Beta	pCi/L	9	9	34.3	18.7	37.8	21.6	320	1,170
Dissolved Lead 210	pCi/L	1	1	NC	NC	NC	NC	31.0	31.0 (7)
Total Lead 210	pCi/L	9	7	2.70	1.97	18	7.56	3.00	24.0
Dissolved Polonium 210	pCi/L	1	1	NC	NC	NC	NC	1.40	1.40 (7)
Total Polonium 210	pCi/L	2	1	7.39	3.30	10.8	4.07	4.30	4.3
Dissolved Radium 226	pCi/L	1	1	NC	NC	NC	NC	1.78	1.78 (7)
Total Radium 226	pCi/L	12	12	1.81	1.81	4.36	4.36	1.83	8.76 (7)
Dissolved Radium 228	pCi/L	1	0	NC	NC	NC	NC	<3.30	<3.30
Total Radium 228	pCi/L	11	5	3.06	1.51	3.94	2.19	<0.250	2 (7)
Total Radon 222, Calculated	pCi/L	1	1	3,373	3,373	20,500	3,810	4,484	4,484
Total Thorium 227	pCi/L	1	0	0.286	0.286	0.859	0.337	<2.66	<2.66 (6)
Total Thorium 228	pCi/L	4	0	5.05	1.62	3.88	1.85	-1.55	<4.40 (6)
Dissolved Thorium 230	pCi/L	1	0	NA	NA	NA	NA	<0.200	<0.200
Total Thorium 230	pCi/L	11	6	5.18	1.39	4.5	1.68	<0.210	12.9 (8)
Total Thorium 232	pCi/L	4	2	2.18	2.18	1.93	0.732	<0.300	3.80 (8)
Dissolved Uranium 234	pCi/L	1	1	NC	NC	NC	NC	1,100	1,100 (7)
Total Uranium 234	pCi/L	12	12	14.4	5.88	10.4	4.95	460	1,400
Dissolved Uranium 235	pCi/L	1	1	NC	NC	NC	NC	31.0	31.0 (7)
Total Uranium 235	pCi/L	12	12	1.12	0.456	0.307	0.194	17.0	66.4
Dissolved Uranium 238	pCi/L	1	1	NC	NC	NC	NC	860	860 (7)
Total Uranium 238	pCi/L	12	12	11.6	4.4	9.46	4.10	440	1,100

Notes:
(1) Parameters in bold exceed background limits for the URS samples
(2) 99% Upper Tolerance Limit for the fall season URS background surface water data set
(3) 95% Upper Prediction Limit for the fall season URS background surface water data set
(4) 99% Upper Tolerance Limit for the spring season URS background surface water data set
(5) 95% Upper Prediction Limit for the spring season URS background surface water data set
(6) The maximum concentration or activity is reported as non-detect value above one or both RBLs
(7) The maximum concentration or activity is reported from SMI samples
(8) The maximum concentration or activity is reported from E&E samples
NA = Not Applicable
NC = Not calculated; parameter not analyzed for URS background samples or insufficient data (molybdenum)

Table 5-17
SUMMARY OF ANALYTICAL RESULTS FOR POLLUTION CONTROL POND SURFACE WATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits				Minimum	Maximum Detected Value
				Fall BL (2)	Fall RBL (3)	Spring BL (4)	Spring RBL (5)		
Field Parameters									
Dissolved Oxygen	mg/l	13	13	NA	NA	NA	NA	4.60	11.3
Eh	mV	2	2	NA	NA	NA	NA	466	593
Ferrous Iron	mg/l	3	3	NA	NA	NA	NA	0.790	3.52
Field Iron	ug/l	13	13	NA	NA	NA	NA	80.0	700
Field pH	SU	13	13	NA	NA	NA	NA	3.96	4.72
Specific Conductance	umhos/cm	13	13	609	414	91,000	91,000	993	4,180
Temperature	C	13	13	NA	NA	NA	NA	1.70	25.8
Turbidity	NTU	1	1	NA	NA	NA	NA	1.90	1.90
Inorganics									
Chloride	mg/l	13	11	4.82	4.82	1.65	1.28	<1.00	3.00
Fluoride	mg/l	13	13	NC	NC	NC	NC	0.300	5.00
Nitrate	mg/l	12	12	1.57	0.324	0.189	0.099	1.17	1.64
Nitrate/Nitrite	mg/l	13	13	NC	NC	NC	NC	1.20	1.74
Nitrite	mg/l	12	0	0.03	0.03	0.02	0.02	<0.0100	<0.250 (6)
Nitrogen, Kjeldahl	mg/l	4	4	NC	NC	NC	NC	0.500	0.800
Phosphorus	mg/l	13	4	1.27	0.518	0.347	0.213	<0.0100	0.0200
Silica	mg/l	13	13	NC	NC	NC	NC	30.6	48.0
Sulfate	mg/l	13	13	38.4	22.2	9.36	7.03	2,780	4,110
Metals									
Dissolved Aluminum	ug/l	13	13	1,890	708	15,700	7,330	27,700	124,000
Total Aluminum	ug/l	15	15	25,100	7,270	9,490	7,710	27,300	120,000
Dissolved Antimony	ug/l	1	0	6.07	0.597	7.47	5.33	<5.00	<5.00 (6)
Total Antimony	ug/l	3	0	3.33	0.602	9.15	6.12	<5.00	<5.00 (6)
Dissolved Arsenic	ug/l	13	7	38.7	17.9	15.1	8.69	3.00	8 (7)
Total Arsenic	ug/l	15	7	82.5	34.7	20.5	11.7	<3.00	17.5 (8)
Dissolved Barium	ug/l	13	12	252	252	129	73.4	7.00	11 (7)
Total Barium	ug/l	15	15	413	188	165	165	2.10	12.1
Dissolved Beryllium	ug/l	13	13	0.1	0.1	0.26	0.26	16.0	60.0
Total Beryllium	ug/l	15	15	0.23	0.23	0.735	0.466	17.0	60.0
Dissolved Cadmium	ug/l	13	13	9.2	9.2	0.5	0.5	29.1	69.0
Total Cadmium	ug/l	15	15	6.2	6.2	0.5	0.5	21.2	70.0
Dissolved Calcium	ug/l	13	13	63,300	63,300	33,000	18,400	389,000	493,000
Total Calcium	ug/l	2	2	62,800	62,800	34,300	34,300	413,000	425,000
Dissolved Chromium	ug/l	13	9	0.63	0.63	5.15	2.76	0.800	7 (7)
Total Chromium	ug/l	15	9	7.71	3.39	5.33	3.66	0.500	32.6
Dissolved Cobalt	ug/l	1	1	14.4	4.06	1.4	1.4	1,240	1,240

Table 5-17
SUMMARY OF ANALYTICAL RESULTS FOR POLLUTION CONTROL POND SURFACE WATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits				Minimum	Maximum Detected Value
				Fall BL (2)	Fall RBL (3)	Spring BL (4)	Spring RBL (5)		
Total Cobalt	ug/l	3	3	33.8	8.63	3.43	2.06	1,000	1,330
Dissolved Copper	ug/l	13	11	3.37	1.77	3	3	<5.00	420 (7)
Total Copper	ug/l	15	14	29.8	11.1	10.7	6.68	96.0	384 (7)
Dissolved Iron	ug/l	13	13	8,620	2,530	11,600	5,290	80.0	960
Total Iron	ug/l	15	15	82,300	19,600	6,040	4,930	90.0	1,590
Dissolved Lead	ug/l	13	8	1.69	0.729	6.04	3.2	1.00	2 (7)
Total Lead	ug/l	15	11	26.1	6.86	5.18	3.57	0.700	31.0
Dissolved Magnesium	ug/l	13	13	17,900	17,900	8,730	8,730	296,000	469,000
Total Magnesium	ug/l	2	2	18,500	18,500	9,070	9,070	400,000	402,000
Dissolved Manganese	ug/l	13	13	2,040	2,040	55.7	32.2	47,800	135,000
Total Manganese	ug/l	15	15	2,230	2,230	74.6	61.8	49,000	142,000
Dissolved Mercury	ug/l	13	0	0.100	0.100	0.1	0.1	<0.200	<0.200 (6)
Total Mercury	ug/l	15	0	0.200	0.200	0.1	0.1	<0.200	<0.200 (6)
Dissolved Nickel	ug/l	13	13	5.00	5.00	1.4	1.4	900	2,690
Total Nickel	ug/l	15	15	21.1	6.78	5.06	4.17	870	2,760
Dissolved Potassium	ug/l	13	13	8,990	8,990	2,620	2,620	5,000	6,300
Total Potassium	ug/l	2	2	8,370	5,500	2,460	2,010	6,630	6,760
Dissolved Selenium	ug/l	13	2	0.330	0.330	1.3	1.3	<1.00	1.00
Total Selenium	ug/l	15	2	0.714	0.466	1.3	1.3	<1.00	71.7
Dissolved Silver	ug/l	13	1	0.900	0.900	1.6	1.6	<5.00	30
Total Silver	ug/l	15	1	0.900	0.900	0.8	0.8	<2.00	5 (7)
Dissolved Sodium	ug/l	13	13	10,200	10,200	7,530	6,100	30,000	42,000
Total Sodium	ug/l	2	2	9,620	9,620	8,120	6,450	42,600	44,400
Dissolved Thallium	ug/l	13	0	1.10	1.10	1.8	1.8	<0.300	<100 (6)
Total Thallium	ug/l	15	0	1.10	1.10	1.2	1.2	<0.100	<6.00 (6)
Total Uranium, Calculated	mg/l	15	15	0.033	0.013	0.023	0.011	7.49	30.0
Dissolved Vanadium	ug/l	1	0	3.65	1.43	11	6.15	<30.0	<30.0 (6)
Total Vanadium	ug/l	3	0	46.6	13.2	8.06	6.74	<1.00	<10.0 (6)
Dissolved Zinc	ug/l	13	13	13.6	13.6	18.4	8.94	1,830	5,930
Total Zinc	ug/l	15	15	50.9	16.7	10.9	8.87	1,700	6,000
Other Parameters									
Alkalinity, Total	mg/l	13	0	214	214	126	126	<2.00	<2.00
Bicarbonate Alkalinity	mg/l	13	0	214	214	126	126	<2.00	<2.00
Carbonate Alkalinity	mg/l	13	0	10.0	10.0	2	2	<2.00	<2.00
Hardness	mg/l	13	13	233	233	119	119	2,260	5,280
Hydroxide Alkalinity	mg/l	13	0	2.00	2.00	2	2	<2.00	<2.00
Total Dissolved Solids	mg/l	13	13	341	242	249	204	3,490	5,890

Table 5-17
SUMMARY OF ANALYTICAL RESULTS FOR POLLUTION CONTROL POND SURFACE WATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits				Minimum	Maximum Detected Value
				Fall BL (2)	Fall RBL (3)	Spring BL (4)	Spring RBL (5)		
Total Inorganic Carbon	mg/l	13	1	NC	NC	NC	NC	<1.00	1 (7)
Total Suspended Solids	mg/l	13	2	1,130	226	258	99.1	<5.00	8.00
Radionuclides									
Gross Alpha	pCi/L	15	15	66.8	22.6	83.7	34.1	4,000	18,584
Gross Beta	pCi/L	13	13	34.3	18.7	37.8	21.6	2,300	8,547
Dissolved Lead 210	pCi/L	1	0	NC	NC	NC	NC	<11.0	<11.0
Total Lead 210	pCi/L	13	8	2.70	1.97	18	7.56	<1.80	13.0
Dissolved Polonium 210	pCi/L	1	1	NC	NC	NC	NC	8.60	8.60 (7)
Total Polonium 210	pCi/L	3	1	7.39	3.30	10.8	4.07	5.90	5.9 (7)
Dissolved Radium 226	pCi/L	1	1	NC	NC	NC	NC	49.0	49.0 (7)
Total Radium 226	pCi/L	15	15	1.81	1.81	4.36	4.36	6.40	49.4
Dissolved Radium 228	pCi/L	1	0	NC	NC	NC	NC	<2.60	<2.60
Total Radium 228	pCi/L	15	14	3.06	1.51	3.94	2.19	0.00	6.30
Total Thorium 228	pCi/L	3	1	5.05	1.62	3.88	1.85	1.90	1.9 (7)
Dissolved Thorium 230	pCi/L	1	1	NA	NA	NA	NA	250	250 (7)
Total Thorium 230	pCi/L	15	15	5.18	1.39	4.5	1.68	17.0	791
Total Thorium 232	pCi/L	3	3	2.18	2.18	1.93	0.732	0.00	112
Dissolved Uranium 234	pCi/L	1	1	NC	NC	NC	NC	11,000	11,000 (7)
Total Uranium 234	pCi/L	15	15	14.4	5.88	10.4	4.95	2,500	9,900
Dissolved Uranium 235	pCi/L	1	1	NC	NC	NC	NC	470	470 (7)
Total Uranium 235	pCi/L	15	14	1.12	0.456	0.307	0.194	100	420
Dissolved Uranium 238	pCi/L	1	1	NC	NC	NC	NC	11,000	11,000 (7)
Total Uranium 238	pCi/L	15	15	11.6	4.4	9.46	4.10	2,500	10,000

Notes:
(1) Concentrations or activities of parameters in bold are greater than one or both RBLs for SMI or E&E samples
(2) 99% Upper Tolerance Limit for the fall season URS background surface water data set
(3) 95% Upper Prediction Limit for the fall season URS background surface water data set
(4) 99% Upper Tolerance Limit for the spring season URS background surface water data set
(5) 95% Upper Prediction Limit for the spring season URS background surface water data set
(6) The maximum concentration or activity is reported as non-detect value above one or both RBLs
(7) The maximum concentration or activity is reported from SMI samples
(8) The maximum concentration or activity is reported from E&E samples
NA = Not Applicable
NC = Not calculated; parameter not analyzed for URS background samples

Table 5-18
SUMMARY OF ANALYTICAL RESULTS FOR OUTFALL POND SURFACE WATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits				Minimum	Maximum Detected Value
				Fall BL (2)	Fall RBL (3)	Spring BL (4)	Spring RBL (5)		
Field Parameters									
Dissolved Oxygen	mg/l	2	2	NA	NA	NA	NA	3.90	11.0
Eh	mV	2	2	NA	NA	NA	NA	302	392
Ferrous Iron	mg/l	2	0	NA	NA	NA	NA	<0.0500	<0.0500
Field pH	SU	2	2	NA	NA	NA	NA	4.48	6.24
Specific Conductance	uS/cm	2	2	609	414	91,000	91,000	2,910	3,790
Temperature	C	2	2	NA	NA	NA	NA	7.29	12.7
Turbidity	NTU	2	2	NA	NA	NA	NA	0.00	10.0
Inorganics									
Chloride	mg/l	2	2	4.82	4.82	1.65	1.28	3.74	4.29
Nitrate	mg/l	2	2	1.57	0.324	0.189	0.099	0.622	1.83
Nitrite	mg/l	2	0	0.03	0.03	0.02	0.02	<0.0200	<0.0200
Nitrogen, Ammonia	mg/l	2	1	1.21	1.21	0.039	0.026	0.0106	0.0106
Phosphate-P	mg/l	2	0	0.526	0.25	0.189	0.13	<0.0100	<0.0100
Phosphorus	mg/l	2	0	1.27	0.518	0.347	0.213	<0.0100	<0.0100
Sulfate	mg/l	2	2	38.4	22.2	9.36	7.03	1,650	2,520
Metals									
Dissolved Aluminum	ug/l	2	1	1,890	708	15,700	7,330	<39.1	86.6
Total Aluminum	ug/l	3	3	25,100	7,270	9,490	7,710	122	451
Dissolved Antimony	ug/l	2	1	6.07	0.597	7.47	5.33	<2.20	4.50 (7)
Total Antimony	ug/l	3	2	3.33	0.602	9.15	6.12	2.40	4
Dissolved Arsenic	ug/l	2	0	38.7	17.9	15.1	8.69	<0.200	<0.320
Total Arsenic	ug/l	3	2	82.5	34.7	20.5	11.7	0.250	0.36
Dissolved Barium	ug/l	2	2	252	252	129	73.4	55.5	64.3
Total Barium	ug/l	3	3	413	188	165	165	56.6	78.1
Dissolved Beryllium	ug/l	2	0	0.1	0.1	0.26	0.26	<0.100	<0.240 (6)
Total Beryllium	ug/l	3	0	0.23	0.23	0.735	0.466	<0.170	<1.40
Dissolved Cadmium	ug/l	2	0	9.2	9.2	0.5	0.5	<0.200	<0.500
Total Cadmium	ug/l	3	1	6.2	6.2	0.5	0.5	0.370	0.37
Dissolved Calcium	ug/l	2	2	63,300	63,300	33,000	18,400	546,000	839,000
Total Calcium	ug/l	3	3	62,800	62,800	34,300	34,300	558,000	837,000
Dissolved Chromium	ug/l	2	2	0.63	0.63	5.15	2.76	0.890	1.90
Total Chromium	ug/l	3	2	7.71	3.39	5.33	3.66	<0.400	2.40
Dissolved Cobalt	ug/l	2	0	14.4	4.06	1.4	1.4	<0.500	<1.40
Total Cobalt	ug/l	3	1	33.8	8.63	3.43	2.06	<1.00	1.8
Dissolved Copper	ug/l	2	0	3.37	1.77	3	3	<0.500	<0.900
Total Copper	ug/l	3	1	29.8	11.1	10.7	6.68	<0.500	8.40 (8)

Table 5-18
SUMMARY OF ANALYTICAL RESULTS FOR OUTFALL POND SURFACE WATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits				Minimum	Maximum Detected Value
				Fall BL (2)	Fall RBL (3)	Spring BL (4)	Spring RBL (5)		
Dissolved Iron	ug/l	2	0	8,620	2,530	11,600	5,290	<8.40	<35.2
Total Iron	ug/l	3	1	82,300	19,600	6,040	4,930	<8.40	122
Dissolved Lead	ug/l	2	0	1.69	0.729	6.04	3.2	<1.00	<4.50 (7)
Total Lead	ug/l	3	0	26.1	6.86	5.18	3.57	<0.900	<2.00
Dissolved Magnesium	ug/l	2	2	17,900	17,900	8,730	8,730	90,700	100,000
Total Magnesium	ug/l	3	3	18,500	18,500	9,070	9,070	83,200	101,000
Dissolved Manganese	ug/l	2	2	2,040	2,040	55.7	32.2	153	253
Total Manganese	ug/l	3	3	2,230	2,230	74.6	61.8	243	369
Dissolved Mercury	ug/l	2	0	0.100	0.100	0.1	0.1	<0.100	<0.100
Total Mercury	ug/l	3	0	0.200	0.200	0.1	0.1	<0.100	<0.200 (6)
Dissolved Nickel	ug/l	2	1	5.00	5.00	1.4	1.4	<2.70	3.40 (8)
Total Nickel	ug/l	3	2	21.1	6.78	5.06	4.17	1.70	3.50
Dissolved Potassium	ug/l	2	2	8,990	8,990	2,620	2,620	4,590	4,670
Total Potassium	ug/l	3	3	8,370	5,500	2,460	2,010	4,480	4,940
Dissolved Selenium	ug/l	2	0	0.330	0.330	1.3	1.3	<2.00	<6.50 (6)
Total Selenium	ug/l	3	0	0.714	0.466	1.3	1.3	<1.30	<4.00 (6)
Dissolved Silver	ug/l	2	0	0.900	0.900	1.6	1.6	<0.700	<0.800
Total Silver	ug/l	3	1	0.900	0.900	0.8	0.8	<0.800	0.9
Dissolved Sodium	ug/l	2	2	10,200	10,200	7,530	6,100	25,600	40,000
Total Sodium	ug/l	3	3	9,620	9,620	8,120	6,450	25,700	41,100
Dissolved Thallium	ug/l	2	0	1.10	1.10	1.8	1.8	<1.10	<1.20
Total Thallium	ug/l	3	0	1.10	1.10	1.2	1.2	<1.20	<6.00 (6)
Total Uranium, Calculated	mg/l	3	3	0.033	0.013	0.023	0.011	0.0630	0.255
Dissolved Vanadium	ug/l	2	0	3.65	1.43	11	6.15	<0.500	<1.00
Total Vanadium	ug/l	3	0	46.6	13.2	8.06	6.74	<0.500	<1.00
Dissolved Zinc	ug/l	2	0	13.6	13.6	18.4	8.94	<0.400	<9.30 (9)
Total Zinc	ug/l	3	2	50.9	16.7	10.9	8.87	<0.400	8.70
Organic Compounds									
Total Petroleum Hydrocarbons-Diesel	ug/l	1	0	NA	NA	NA	NA	<1,000	<1,000
Other Parameters									
Alkalinity, Total	mg/l	2	2	214	214	126	126	9.00	14.2
Bicarbonate Alkalinity	mg/l	2	2	214	214	126	126	9.00	14.2
Carbonate Alkalinity	mg/l	2	0	10.0	10.0	2	2	<2.00	<2.00
Chemical Oxygen Demand	mg/l	2	1	103	42.6	78.4	38	<5.00	6.23
Hardness	mg/l	2	2	233	233	119	119	1,737	2,506
Hydroxide Alkalinity	mg/l	2	0	2.00	2.00	2	2	<2.00	<2.00
Total Dissolved Solids	mg/l	2	2	341	242	249	204	2,670	3,800

Table 5-18
SUMMARY OF ANALYTICAL RESULTS FOR OUTFALL POND SURFACE WATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits				Minimum	Maximum Detected Value
				Fall BL (2)	Fall RBL (3)	Spring BL (4)	Spring RBL (5)		
Total Suspended Solids	mg/l	2	1	1,130	226	258	99.1	<4.00	10.5
Radionuclides									
Gross Alpha	pCi/L	3	2	66.8	22.6	83.7	34.1	<14.6	98.8
Gross Beta	pCi/L	2	2	34.3	18.7	37.8	21.6	39.9	111
Lead 210	pCi/L	2	1	2.70	1.97	18	7.56	-0.90	1.00
Polonium 210	pCi/L	2	0	7.39	3.30	10.8	4.07	<0.100	<0.200
Radium 226	pCi/L	3	2	1.81	1.81	4.36	4.36	0.350	0.447
Radium 228	pCi/L	3	0	3.06	1.51	3.94	2.19	<0.0404	<2.00 (6)
Radon 222, Calculated	pCi/L	2	2	3,373	3,373	20,500	3,810	48.0	108
Thorium 227	pCi/L	2	0	0.286	0.286	0.859	0.337	<0.0407	<0.109
Thorium 228	pCi/L	3	0	5.05	1.62	3.88	1.85	-0.15	<0.400
Thorium 230	pCi/L	3	2	5.18	1.39	4.5	1.68	0.191	0.21
Thorium 232	pCi/L	3	0	2.18	2.18	1.93	0.732	-0.03	<0.300
Uranium 234	pCi/L	3	3	14.4	5.88	10.4	4.95	13.2	92.3
Uranium 235	pCi/L	3	3	1.12	0.456	0.307	0.194	0.700	3.64
Uranium 238	pCi/L	3	3	11.6	4.4	9.46	4.10	12.8	85.1

Notes:
(1) Parameters in bold exceed background limits for the URS samples
(2) 99% Upper Tolerance Limit for the fall season URS background surface water data set
(3) 95% Upper Prediction Limit for the fall season URS background surface water data set
(4) 99% Upper Tolerance Limit for the spring season URS background surface water data set
(5) 95% Upper Prediction Limit for the spring season URS background surface water data set
(6) The maximum concentration or activity is reported as non-detect value above one or both RBLs
(7) The maximum concentration or activity is from a URS sample collected in the spring
(8) The maximum concentration or activity is reported from E&E samples
(9) The maximum concentration or activity is from a URS sample collected in the fall
NA = Not Applicable

Table 5-19
SUMMARY OF ANALYTICAL RESULTS FOR BLOOD POOL SURFACE WATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits				Minimum	Maximum Detected Value
				Fall BL (2)	Fall RBL (3)	Spring BL (4)	Spring RBL (5)		
Field Parameters									
Dissolved Oxygen	mg/l	5	5	NA	NA	NA	NA	8.60	12.2
Ferrous Iron	mg/l	4	4	NA	NA	NA	NA	0.180	7.60
Field Iron	ug/l	5	5	NA	NA	NA	NA	360	17,000
Field pH	SU	5	5	NA	NA	NA	NA	3.29	5.55
Specific Conductance	umhos/cm	5	5	609	414	91,000	91,000	1,277	2,970
Temperature	C	5	5	NA	NA	NA	NA	1.50	16.9
Inorganics									
Chloride	mg/l	5	5	4.82	4.82	1.65	1.28	1.00	2.00
Fluoride	mg/l	5	5	NC	NC	NC	NC	0.500	1.30
Nitrate	mg/l	5	3	1.57	0.324	0.189	0.099	<0.0500	1.73
Nitrate/Nitrite	mg/l	5	4	NC	NC	NC	NC	<0.0200	1.14
Nitrite	mg/l	5	0	0.03	0.03	0.02	0.02	<0.0500	<0.0500 (6)
Nitrogen, Kjeldahl	mg/l	2	1	NC	NC	NC	NC	<0.500	0.600
Phosphorus	mg/l	5	3	1.27	0.518	0.347	0.213	<0.0100	0.0200
Silica	mg/l	5	5	NC	NC	NC	NC	13.2	70.4
Sulfate	mg/l	5	5	38.4	22.2	9.36	7.03	630	2,260
Metals									
Dissolved Aluminum	ug/l	5	5	1,890	708	15,700	7,330	1,720	92,000
Total Aluminum	ug/l	7	7	25,100	7,270	9,490	7,710	4,320	116,000
Total Antimony	ug/l	2	0	6.07	0.597	7.47	5.33	<5.00	<5.00 (6)
Dissolved Arsenic	ug/l	5	0	38.7	17.9	15.1	8.69	<2.00	<10.0 (6)
Total Arsenic	ug/l	7	3	82.5	34.7	20.5	11.7	<5.00	7.1 (7)
Dissolved Barium	ug/l	5	5	252	252	129	73.4	3.20	21.0
Total Barium	ug/l	7	6	413	188	165	165	3.00	22.0
Dissolved Beryllium	ug/l	5	4	0.1	0.1	0.26	0.26	2.00	18.0
Total Beryllium	ug/l	7	6	0.23	0.23	0.735	0.466	3.00	27.8
Dissolved Cadmium	ug/l	5	5	9.2	9.2	0.5	0.5	1.40	9.00
Total Cadmium	ug/l	7	7	6.2	6.2	0.5	0.5	1.20	9.00
Dissolved Calcium	ug/l	5	5	63,300	63,300	33,000	18,400	170,000	554,000
Total Calcium	ug/l	2	2	62,800	62,800	34,300	34,300	496,000	537,000
Dissolved Chromium	ug/l	5	4	0.63	0.63	5.15	2.76	<1.00	26.0
Total Chromium	ug/l	7	7	7.71	3.39	5.33	3.66	1.00	27.4
Total Cobalt	ug/l	2	2	33.8	8.63	3.43	2.06	714	792
Dissolved Copper	ug/l	5	5	3.37	1.77	3	3	58.0	1,030
Total Copper	ug/l	7	7	29.8	11.1	10.7	6.68	67.0	1,190
Dissolved Iron	ug/l	5	5	8,620	2,530	11,600	5,290	160	16,300

Table 5-19
SUMMARY OF ANALYTICAL RESULTS FOR BLOOD POOL SURFACE WATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits				Minimum	Maximum Detected Value
				Fall BL (2)	Fall RBL (3)	Spring BL (4)	Spring RBL (5)		
Total Iron	ug/l	7	7	82,300	19,600	6,040	4,930	610	16,600
Dissolved Lead	ug/l	5	0	1.69	0.729	6.04	3.2	<0.400	<2.00 (6)
Total Lead	ug/l	7	4	26.1	6.86	5.18	3.57	0.800	12.5
Dissolved Magnesium	ug/l	5	5	17,900	17,900	8,730	8,730	36,600	126,000
Total Magnesium	ug/l	2	2	18,500	18,500	9,070	9,070	163,000	183,000
Dissolved Manganese	ug/l	5	5	2,040	2,040	55.7	32.2	3,020	35,800
Total Manganese	ug/l	7	7	2,230	2,230	74.6	61.8	3,560	36,800
Dissolved Mercury	ug/l	5	1	0.100	0.100	0.1	0.1	<0.200	0.500
Total Mercury	ug/l	7	0	0.200	0.200	0.1	0.1	<0.200	<0.200 (6)
Dissolved Nickel	ug/l	5	5	5.00	5.00	1.4	1.4	90.0	1,090
Total Nickel	ug/l	7	7	21.1	6.78	5.06	4.17	110	1,260
Dissolved Potassium	ug/l	5	5	8,990	8,990	2,620	2,620	2,000	8,300
Total Potassium	ug/l	2	2	8,370	5,500	2,460	2,010	6,270	6,980
Dissolved Selenium	ug/l	5	0	0.330	0.330	1.3	1.3	<1.00	<1.00
Total Selenium	ug/l	7	5	0.714	0.466	1.3	1.3	<1.00	27.2
Dissolved Silver	ug/l	5	0	0.900	0.900	1.6	1.6	<5.00	<10.0 (6)
Total Silver	ug/l	7	0	0.900	0.900	0.8	0.8	<2.00	<10.0 (6)
Dissolved Sodium	ug/l	5	5	10,200	10,200	7,530	6,100	7,900	20,300
Total Sodium	ug/l	2	2	9,620	9,620	8,120	6,450	22,600	23,600
Dissolved Thallium	ug/l	5	0	1.10	1.10	1.8	1.8	<0.200	<1.00
Total Thallium	ug/l	7	0	1.10	1.10	1.2	1.2	<0.200	<6.00 (6)
Total Uranium	ug/l	2	2	NC	NC	NC	NC	8,050	8,170
Total Vanadium	ug/l	2	0	46.6	13.2	8.06	6.74	<1.00	<1.00
Dissolved Zinc	ug/l	5	5	13.6	13.6	18.4	8.94	130	970
Total Zinc	ug/l	7	7	50.9	16.7	10.9	8.87	130	1,330
Other Parameters									
Alkalinity, Total	mg/l	5	2	214	214	126	126	<2.00	6.00
Bicarbonate Alkalinity	mg/l	5	2	214	214	126	126	<2.00	6.00
Carbonate Alkalinity	mg/l	5	0	10.0	10.0	2	2	<2.00	<2.00
Hardness	mg/l	5	5	233	233	119	119	575	1,700
Hydroxide Alkalinity	mg/l	5	0	2.00	2.00	2	2	<2.00	<2.00
Total Dissolved Solids	mg/l	5	5	341	242	249	204	930	3,380
Total Inorganic Carbon	mg/l	5	3	NC	NC	NC	NC	<1.00	6.00
Total Suspended Solids	mg/l	5	4	1,130	226	258	99.1	<5.00	30.0
Radionuclides									
Gross Alpha	pCi/L	7	7	66.8	22.6	83.7	34.1	992	5,542
Gross Beta	pCi/L	5	5	34.3	18.7	37.8	21.6	429	1,700

Table 5-19
SUMMARY OF ANALYTICAL RESULTS FOR BLOOD POOL SURFACE WATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits				Minimum	Maximum Detected Value
				Fall BL (2)	Fall RBL (3)	Spring BL (4)	Spring RBL (5)		
Lead 210	pCi/L	5	3	2.70	1.97	18	7.56	-1.74	9.5 (8)
Radium 226	pCi/L	7	7	1.81	1.81	4.36	4.36	1.37	7.30
Radium 228	pCi/L	6	6	3.06	1.51	3.94	2.19	0.120	3.60
Thorium 228	pCi/L	2	0	5.05	1.62	3.88	1.85	<3.20	<3.70 (6)
Thorium 230	pCi/L	7	7	5.18	1.39	4.5	1.68	1.20	99.9
Thorium 232	pCi/L	2	0	2.18	2.18	1.93	0.732	<2.10	<2.20 (6)
Uranium 234	pCi/L	7	7	14.4	5.88	10.4	4.95	660	2,386
Uranium 235	pCi/L	7	7	1.12	0.456	0.307	0.194	25.0	440
Uranium 238	pCi/L	7	7	11.6	4.4	9.46	4.10	660	2,670

Notes:
(1) Concentrations or activities of parameters in bold are greater than one or both RBLs for SMI or E&E samples
(2) 99% Upper Tolerance Limit for the fall season URS background surface water data set
(3) 95% Upper Prediction Limit for the fall season URS background surface water data set
(4) 99% Upper Tolerance Limit for the spring season URS background surface water data set
(5) 95% Upper Prediction Limit for the spring season URS background surface water data set
(6) The maximum concentration or activity is reported as non-detect value above one or both RBLs
(7) The maximum concentration or activity is reported from E&E samples
(8) The maximum concentration or activity is reported from SMI samples
NA = Not Applicable
NC = Not calculated; parameter not analyzed by URS

Table 5-20
ANALYTICAL RESULTS FOR THE NORTHERN DRAINAGE SURFACE WATER SAMPLE

Parameter (1)	Units	Background Limits		Result
		Fall BL (2)	Fall RBL (3)	
Inorganics				
Chloride	mg/l	4.82	4.82	1.18
Nitrate	mg/l	1.57	0.324	0.837
Nitrite	mg/l	0.03	0.03	<0.0200
Nitrogen, Ammonia	mg/l	1.21	1.21	0.0547
Phosphate-P	mg/l	0.526	0.25	0.281
Phosphorus	mg/l	1.27	0.518	0.483
Sulfate	mg/l	38.4	22.2	20.4
Metals				
Dissolved Aluminum	ug/l	1,890	708	267
Total Aluminum	ug/l	25,100	7,270	7,390
Dissolved Antimony	ug/l	6.07	0.597	0.180
Total Antimony	ug/l	3.33	0.602	0.120
Dissolved Arsenic	ug/l	38.7	17.9	1.60
Total Arsenic	ug/l	82.5	34.7	3.10
Dissolved Barium	ug/l	252	252	73.4
Total Barium	ug/l	413	188	137
Dissolved Beryllium	ug/l	0.1	0.1	<0.170 (4)
Total Beryllium	ug/l	0.23	0.23	<0.630 (4)
Dissolved Cadmium	ug/l	9.2	9.2	<0.400
Total Cadmium	ug/l	6.2	6.2	<0.400
Dissolved Calcium	ug/l	63,300	63,300	31,100
Total Calcium	ug/l	62,800	62,800	34,800
Dissolved Chromium	ug/l	0.63	0.63	<1.10 (4)
Total Chromium	ug/l	7.71	3.39	5.80
Dissolved Cobalt	ug/l	14.4	4.06	<1.00
Total Cobalt	ug/l	33.8	8.63	1.80
Dissolved Copper	ug/l	3.37	1.77	1.40
Total Copper	ug/l	29.8	11.1	6.30
Dissolved Iron	ug/l	8,620	2,530	211
Total Iron	ug/l	82,300	19,600	6,960
Dissolved Lead	ug/l	1.69	0.729	0.290
Total Lead	ug/l	26.1	6.86	4.20
Dissolved Magnesium	ug/l	17,900	17,900	6,760
Total Magnesium	ug/l	18,500	18,500	8,090
Dissolved Manganese	ug/l	2,040	2,040	12.6
Total Manganese	ug/l	2,230	2,230	167
Total Molybdenum	ug/l	16.6	6.84	<1.20
Dissolved Molybdenum	ug/l	11.5	11.5	<1.80
Dissolved Nickel	ug/l	5.00	5.00	<1.80
Total Nickel	ug/l	21.1	6.78	<4.80
Dissolved Potassium	ug/l	8,990	8,990	3,010
Total Potassium	ug/l	8,370	5,500	3,690
Dissolved Selenium	ug/l	0.330	0.330	0.280
Total Selenium	ug/l	0.714	0.466	0.360
Dissolved Silver	ug/l	0.900	0.900	<0.900
Total Silver	ug/l	0.900	0.900	<0.900
Dissolved Sodium	ug/l	10,200	10,200	8,430
Total Sodium	ug/l	9,620	9,620	8,850
Dissolved Thallium	ug/l	1.10	1.10	<0.100
Total Thallium	ug/l	1.10	1.10	<0.100
Total Uranium, Calculated	mg/l	0.033	0.013	0.0200
Dissolved Vanadium	ug/l	3.65	1.43	2.50

Table 5-20
ANALYTICAL RESULTS FOR THE NORTHERN DRAINAGE SURFACE WATER SAMPLE

Parameter (1)	Units	Background Limits		Result
		Fall BL (2)	Fall RBL (3)	
Total Vanadium	ug/l	46.6	13.2	11.9
Dissolved Zinc	ug/l	13.6	13.6	<26.3 (4)
Total Zinc	ug/l	50.9	16.7	17.9
Other Parameters				
Alkalinity, Total	mg/l	214	214	110
Bicarbonate Alkalinity	mg/l	214	214	110
Carbonate Alkalinity	mg/l	10.0	10.0	<2.00
Chemical Oxygen Demand	mg/l	103	42.6	40.9
Hardness	mg/l	233	233	105
Total Dissolved Solids	mg/l	341	242	211
Total Suspended Solids	mg/l	1,130	226	339
Radionuclides				
Gross Alpha	pCi/L	66.8	22.6	14.6
Gross Beta	pCi/L	34.3	18.7	15.2
Lead 210	pCi/L	2.70	1.97	3.60
Polonium 210	pCi/L	7.39	3.30	1.70
Radium 226	pCi/L	1.81	1.81	1.79
Radium 228	pCi/L	3.06	1.51	1.89
Radon 222, Calculated	pCi/L	3,373	3,373	998
Thorium 227	pCi/L	0.286	0.286	<0.155
Thorium 228	pCi/L	5.05	1.62	<0.0168
Thorium 230	pCi/L	5.18	1.39	<0.0747
Thorium 232	pCi/L	2.18	2.18	<0.0475
Uranium 234	pCi/L	14.4	5.88	9.32
Uranium 235	pCi/L	1.12	0.456	0.452
Uranium 238	pCi/L	11.6	4.4	6.67

Notes:
(1) Parameters in bold exceed background limits for the URS sample
(2) 99% Upper Tolerance Limit for the fall season URS background surface water data set
(3) 95% Upper Prediction Limit for the fall season URS background surface water data set
(4) The result is reported as non-detect value above the RBL
NC = Not calculated: insufficient background samples for molybdenum

Table 5-21
SUMMARY OF ANALYTICAL RESULTS FOR UPPER BLUE CREEK SURFACE WATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits				Minimum	Maximum Detected Value
				Fall BL (2)	Fall RBL (3)	Spring BL (4)	Spring RBL (5)		
Field Parameters									
Dissolved Oxygen	mg/l	11	11	NA	NA	NA	NA	10.0	16.9
Eh	mV	2	2	NA	NA	NA	NA	233	298
Ferrous Iron	mg/l	11	5	NA	NA	NA	NA	<0.00700	0.04 (7)
Field Iron	ug/l	9	9	NA	NA	NA	NA	50.0	750
Field pH	SU	11	11	NA	NA	NA	NA	6.54	7.85
Specific Conductance	umhos/cm	11	11	609	414	91,000	91,000	76.4	250
Temperature	C	11	11	NA	NA	NA	NA	1.70	15.2
Turbidity	NTU	2	2	NA	NA	NA	NA	3.00	4.40
Inorganics									
Chloride	mg/l	11	8	4.82	4.82	1.65	1.28	0.744	3.00 (7)
Fluoride	mg/l	9	8	NC	NC	NC	NC	<0.100	0.200
Nitrate	mg/l	11	9	1.57	0.324	0.189	0.099	<0.0500	0.340 (7)
Nitrate/Nitrite	mg/l	9	7	NC	NC	NC	NC	<0.0200	0.430
Nitrite	mg/l	11	0	0.03	0.03	0.02	0.02	<0.0200	<0.0500 (6)
Nitrogen, Ammonia	mg/l	2	0	1.21	1.21	0.039	0.026	<0.0100	<0.0769 (6)
Nitrogen, Kjeldahl	mg/l	4	0	NC	NC	NC	NC	<0.100	<0.400
Phosphate-P	mg/l	2	2	0.526	0.25	0.189	0.13	0.0737	0.131
Phosphorus	mg/l	11	10	1.27	0.518	0.347	0.213	<0.0100	0.170
Silica	mg/l	9	9	NC	NC	NC	NC	36.6	53.3
Sulfate	mg/l	11	10	38.4	22.2	9.36	7.03	2.88	70.0 (7)
Metals									
Dissolved Aluminum	ug/l	11	8	1,890	708	15,700	7,330	<30.0	3,980 (8)
Total Aluminum	ug/l	12	12	25,100	7,270	9,490	7,710	240	5,680
Dissolved Antimony	ug/l	2	1	6.07	0.597	7.47	5.33	<2.20	6.20
Total Antimony	ug/l	3	1	3.33	0.602	9.15	6.12	<2.20	5.20 (9)
Dissolved Arsenic	ug/l	11	2	38.7	17.9	15.1	8.69	0.510	1.4
Total Arsenic	ug/l	12	2	82.5	34.7	20.5	11.7	0.570	1.5
Dissolved Barium	ug/l	11	11	252	252	129	73.4	26.0	42.7
Total Barium	ug/l	12	12	413	188	165	165	27.4	49.7
Dissolved Beryllium	ug/l	11	0	0.1	0.1	0.26	0.26	<0.100	<2.00 (6)
Total Beryllium	ug/l	12	0	0.23	0.23	0.735	0.466	<0.100	<2.00 (6)
Dissolved Cadmium	ug/l	11	0	9.2	9.2	0.5	0.5	<0.200	<1.00 (6)
Total Cadmium	ug/l	12	1	6.2	6.2	0.5	0.5	<0.200	1.5 (9)
Dissolved Calcium	ug/l	11	11	63,300	63,300	33,000	18,400	7,790	35,900 (7)
Total Calcium	ug/l	3	3	62,800	62,800	34,300	34,300	7,710	13,100 (9)
Dissolved Chromium	ug/l	11	4	0.63	0.63	5.15	2.76	<0.400	2.90
Total Chromium	ug/l	12	9	7.71	3.39	5.33	3.66	<0.400	3.20
Dissolved Cobalt	ug/l	2	0	14.4	4.06	1.4	1.4	<0.500	<1.20

Table 5-21
SUMMARY OF ANALYTICAL RESULTS FOR UPPER BLUE CREEK SURFACE WATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits				Minimum	Maximum Detected Value
				Fall BL (2)	Fall RBL (3)	Spring BL (4)	Spring RBL (5)		
Total Cobalt	ug/l	3	0	33.8	8.63	3.43	2.06	<0.500	<1.20
Dissolved Copper	ug/l	11	1	3.37	1.77	3	3	<0.500	2 (7)
Total Copper	ug/l	12	5	29.8	11.1	10.7	6.68	<0.500	24.7 (9)
Dissolved Iron	ug/l	11	11	8,620	2,530	11,600	5,290	20.0	2,950 (8)
Total Iron	ug/l	12	12	82,300	19,600	6,040	4,930	220	4,660 (7)
Dissolved Lead	ug/l	11	2	1.69	0.729	6.04	3.2	<0.400	1.30 (7)
Total Lead	ug/l	12	6	26.1	6.86	5.18	3.57	<0.400	9.20 (9)
Dissolved Magnesium	ug/l	11	11	17,900	17,900	8,730	8,730	1,990	6,100
Total Magnesium	ug/l	3	3	18,500	18,500	9,070	9,070	1,980	3,020
Dissolved Manganese	ug/l	11	8	2,040	2,040	55.7	32.2	1.90	20.2
Total Manganese	ug/l	12	9	2,230	2,230	74.6	61.8	3.70	39.8
Dissolved Mercury	ug/l	11	0	0.100	0.100	0.1	0.1	<0.100	<0.200 (6)
Total Mercury	ug/l	12	1	0.200	0.200	0.1	0.1	<0.100	0.300 (7)
Dissolved Nickel	ug/l	11	0	5.00	5.00	1.4	1.4	<0.500	<10.0 (6)
Total Nickel	ug/l	12	2	21.1	6.78	5.06	4.17	0.720	2.1 (9)
Dissolved Potassium	ug/l	11	11	8,990	8,990	2,620	2,620	1,500	2,100
Total Potassium	ug/l	3	3	8,370	5,500	2,460	2,010	1,540	1,690
Dissolved Selenium	ug/l	11	1	0.330	0.330	1.3	1.3	<1.00	2.00 (7)
Total Selenium	ug/l	12	1	0.714	0.466	1.3	1.3	<1.00	2 (7)
Dissolved Silver	ug/l	11	0	0.900	0.900	1.6	1.6	<0.700	<5.00 (6)
Total Silver	ug/l	12	0	0.900	0.900	0.8	0.8	<0.700	<30.0 (6)
Dissolved Sodium	ug/l	11	11	10,200	10,200	7,530	6,100	4,750	7,500 (7)
Total Sodium	ug/l	3	3	9,620	9,620	8,120	6,450	4,640	6,320 (10)
Dissolved Thallium	ug/l	11	0	1.10	1.10	1.8	1.8	<0.100	<1.20
Total Thallium	ug/l	12	0	1.10	1.10	1.2	1.2	<0.100	<6.00 (6)
Total Uranium, Calculated	mg/l	12	12	0.033	0.013	0.023	0.011	0.0015	0.0700 (7)
Dissolved Vanadium	ug/l	2	1	3.65	1.43	11	6.15	<0.790	5.10 (8)
Total Vanadium	ug/l	3	1	46.6	13.2	8.06	6.74	<1.90	4.3 (8)
Dissolved Zinc	ug/l	11	4	13.6	13.6	18.4	8.94	<1.90	30.0 (7)
Total Zinc	ug/l	12	3	50.9	16.7	10.9	8.87	<1.40	60.3 (9)
Other Parameters									
Alkalinity	mg/l	11	11	214	214	126	126	33.2	56.0
Bicarbonate Alkalinity	mg/l	11	11	214	214	126	126	33.2	56.0
Carbonate Alkalinity	mg/l	11	0	10.0	10.0	2	2	<2.00	<2.00
Chemical Oxygen Demand	mg/l	2	1	103	42.6	78.4	38	<5.00	9.93
Hardness	mg/l	11	11	233	233	119	119	27.6	122 (7)
Hydroxide Alkalinity	mg/l	11	0	2.00	2.00	2	2	<2.00	<2.00
Total Dissolved Solids	mg/l	11	11	341	242	249	204	94.0	180
Total Inorganic Carbon	mg/l	9	9	NC	NC	NC	NC	8.00	13.0

Table 5-21
SUMMARY OF ANALYTICAL RESULTS FOR UPPER BLUE CREEK SURFACE WATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits				Minimum	Maximum Detected Value
				Fall BL (2)	Fall RBL (3)	Spring BL (4)	Spring RBL (5)		
Total Suspended Solids	mg/l	11	4	1,130	226	258	99.1	<5.00	10.0
Radionuclides									
Gross Alpha	pCi/L	11	10	66.8	22.6	83.7	34.1	3.20	11.0
Gross Beta	pCi/L	11	10	34.3	18.7	37.8	21.6	1.40	16.9
Dissolved Lead 210	pCi/L	1	0	NC	NC	NC	NC	<6.70	<6.70
Total Lead 210	pCi/L	10	4	2.70	1.97	18	7.56	-5.00	6.1 (7)
Dissolved Polonium 210	pCi/L	1	1	NC	NC	NC	NC	0.380	0.380
Total Polonium 210	pCi/L	3	1	7.39	3.30	10.8	4.07	0.00	0.4
Dissolved Radium 226	pCi/L	1	1	NC	NC	NC	NC	0.130	0.130 (7)
Total Radium 226	pCi/L	12	11	1.81	1.81	4.36	4.36	0.0400	1.30
Dissolved Radium 228	pCi/L	1	0	NC	NC	NC	NC	<0.840	<0.840
Total Radium 228	pCi/L	11	9	3.06	1.51	3.94	2.19	<0.0335	5.16 (7)
Total Radon 222, Calculated	pCi/L	2	2	3,373	3,373	20,500	3,810	23.0	41.0
Total Thorium 227	pCi/L	2	0	0.286	0.286	0.859	0.337	<0.0142	<0.0646
Total Thorium 228	pCi/L	3	2	5.05	1.62	3.88	1.85	0.198	0.828
Dissolved Thorium 230	pCi/L	1	0	NA	NA	NA	NA	<0.600	<0.600
Total Thorium 230	pCi/L	12	6	5.18	1.39	4.5	1.68	<0.0900	0.48 (7)
Total Thorium 232	pCi/L	3	2	2.18	2.18	1.93	0.732	0.0620	0.225
Dissolved Uranium 234	pCi/L	1	1	NC	NC	NC	NC	22.0	22.0 (7)
Total Uranium 234	pCi/L	12	12	14.4	5.88	10.4	4.95	0.700	48.0 (7)
Dissolved Uranium 235	pCi/L	1	1	NC	NC	NC	NC	9.60	9.60 (7)
Total Uranium 235	pCi/L	10	9	1.12	0.456	0.307	0.194	0.0412	14.0 (7)
Dissolved Uranium 238	pCi/L	1	1	NC	NC	NC	NC	4.20	4.20 (7)
Total Uranium 238	pCi/L	12	11	11.6	4.4	9.46	4.10	0.752	23.0 (7)

Notes:
(1) Parameters in bold exceed background limits for the URS samples
(2) 99% Upper Tolerance Limit for the fall season URS background surface water data set
(3) 95% Upper Prediction Limit for the fall season URS background surface water data set
(4) 99% Upper Tolerance Limit for the spring season URS background surface water data set
(5) 95% Upper Prediction Limit for the spring season URS background surface water data set
(6) The maximum concentration or activity is reported as non-detect value above one or both RBLs
(7) The maximum concentration or activity is reported from SMI samples
(8) The maximum concentration or activity is from a URS sample collected in the spring
(9) The maximum concentration or activity is reported from E&E samples
(10) The maximum concentration or activity is from a URS sample collected in the fall
NA = Not Applicable
NC = Not calculated; parameter not analyzed for URS background samples

Table 5-22
SUMMARY OF ANALYTICAL RESULTS FOR ROOSEVELT LAKE SURFACE WATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				Spring BL (2)	Spring RBL (3)		
Metals							
Aluminum	ug/l	2	0	9,490	7,710	<107	<170
Antimony	ug/l	2	0	9.15	6.12	<5.00	<5.00
Arsenic	ug/l	2	0	20.5	11.7	<6.00	<6.00
Barium	ug/l	2	2	165	165	19.5	20.6
Beryllium	ug/l	2	0	0.735	0.466	<1.30	<1.30 (4)
Cadmium	ug/l	2	0	0.5	0.5	<1.00	<1.00 (4)
Calcium	ug/l	2	2	34,300	34,300	10,800	11,500
Chromium	ug/l	2	1	5.33	3.66	<1.00	1.90
Cobalt	ug/l	2	0	3.43	2.06	<1.00	<1.00
Copper	ug/l	2	2	10.7	6.68	8.60	10.2
Iron	ug/l	2	2	6,040	4,930	120	244
Lead	ug/l	2	0	5.18	3.57	<2.00	<2.00
Magnesium	ug/l	2	2	9,070	9,070	3,700	3,980
Manganese	ug/l	2	1	74.6	61.8	<13.4	18.3
Mercury	ug/l	2	0	0.1	0.1	<0.200	<0.200 (4)
Nickel	ug/l	2	0	5.06	4.17	<1.00	<1.40
Potassium	ug/l	2	2	2,460	2,010	660	701
Selenium	ug/l	2	0	1.3	1.3	<4.00	<4.00 (4)
Silver	ug/l	2	0	0.8	0.8	<2.00	<2.00 (4)
Sodium	ug/l	2	2	8,120	6,450	2,330	2,380
Thallium	ug/l	2	0	1.2	1.2	<6.00	<6.00 (4)
Uranium	ug/l	2	0	NC	NC	<1.00	<1.00
Vanadium	ug/l	2	0	8.06	6.74	<1.00	<1.00
Zinc	ug/l	2	2	10.9	8.87	34.6	58.0
Radionuclides, pCi/L							
Gross Alpha	pCi/L	2	0	83.7	34.1	<0.700	<0.700
Radium 226	pCi/L	2	0	4.36	4.36	<1.00	<1.00
Radium 228	pCi/L	2	0	3.94	2.19	<1.60	<1.60
Thorium 228	pCi/L	2	0	3.88	1.85	<0.500	<0.600
Thorium 230	pCi/L	2	0	4.5	1.68	<0.600	<0.600
Thorium 232	pCi/L	2	0	1.93	0.732	<0.400	<0.500
Uranium 234	pCi/L	2	0	10.4	4.95	<0.300	<0.300
Uranium 235	pCi/L	2	0	0.307	0.194	<0.200	<0.200 (4)
Uranium 238	pCi/L	2	0	9.46	4.10	<0.200	<0.200

Notes:
(1) Concentrations of parameters in bold are greater than the RBL
(2) 99% Upper Tolerance Limit for the spring season URS background surface water data set
(3) 95% Upper Prediction Limit for the spring season URS background surface water data set
(4) The maximum concentration or activity is reported as non-detect value above the RBL
NC = Not calculated; parameter not analyzed by URS

Table 5-23
Approximate Confidence Levels on Ratios of Median Values (R=M1/M2)
for
Dissolved Surface Water Data
Impacted Area vs. Background

M1: Impacted Area
M2: Background

	Ratio of Median (M1/M2)								
Analyte	**95th**	**90th**	**50th**	**5th**	**Sample Size 1**	**Sample Size 2**	**dof**	**% NDs 1**	**% NDs 2**
Antimony	**NA**	NA	NA	**NA**	5	57	4	60%	86%
Cadmium	**NA**	NA	NA	**NA**	36	58	40	25%	95%
Chromium	**NA**	NA	NA	**NA**	36	58	42	50%	86%
Nickel	**NA**	NA	NA	**NA**	34	58	36	12%	97%
Nitrate	**NA**	NA	NA	**NA**	81	56	118	12%	59%
^{226}Radium	**26.21**	24.11	18.14	**12.56**	274	27	36	0%	0%
Sulfate	**358.20**	343.26	295.74	**244.17**	254	57	150	0%	2%
^{238}Uranium	**6,538.78**	6,004.04	4,460.53	**3,042.82**	44	52	96	0%	0%
Vanadium	**NA**	NA	NA	**NA**	5	57	4	100%	65%
Zinc	**NA**	NA	NA	**NA**	37	58	45	3%	53%

95th and 5th Confidence Limits (Bolded) Represent 90% Confidence Interval

NA - Not Applicable because of high number of nondetects

Table 5-24
Approximate Confidence Levels on Ratios of Median Values (R=M1/M2)
for
Dissolved Surface Water Data
Affected Drainage Above Blue Creek vs. Background

M1: Affected Drainage Above Blue Creek
M2: Background

	Ratio of Median (M1/M2)								
Analyte	**95th**	**90th**	**50th**	**5th**	**Sample Size 1**	**Sample Size 2**	**dof**	**% NDs 1**	**% NDs 2**
Antimony	**NA**	NA	NA	**NA**	22	57	24	68%	86%
Cadmium	**NA**	NA	NA	**NA**	72	58	99	42%	95%
Chromium	**NA**	NA	NA	**NA**	74	58	122	66%	86%
Nickel	**NA**	NA	NA	**NA**	74	58	89	34%	97%
Nitrate	**NA**	NA	NA	**NA**	146	56	186	6%	59%
^{226}Radium	**2.32**	2.14	1.63	**1.14**	393	27	29	1%	0%
Sulfate	**154.18**	147.74	127.25	**105.02**	360	57	156	0%	2%
^{238}Uranium	**73.14**	67.36	50.54	**34.93**	81	52	114	1%	0%
Vanadium	**NA**	NA	NA	**NA**	23	57	46	83%	65%
Zinc	**NA**	NA	NA	**NA**	74	58	106	26%	53%

95th and 5th Confidence Limits (Bolded) Represent 90% Confidence Interval

NA - Not Applicable because of high number of nondetects

Table 5-25
Approximate Confidence Levels on Ratios of Median Values (R=M1/M2)
for
Dissolved Surface Water Data
Blue Creek (below confluence with the Eastern Drainage) vs. Background

M1: Blue Creek
M2: Background

	Ratio of Median (M1/M2)								
Analyte	**95th**	**90th**	**50th**	**5th**	**Sample Size 1**	**Sample Size 2**	**dof**	**% NDs 1**	**% NDs 2**
Antimony	**NA**	NA	NA	**NA**	8	57	9	88%	86%
Cadmium	**NA**	NA	NA	**NA**	26	58	54	100%	95%
Chromium	**NA**	NA	NA	**NA**	26	58	36	50%	86%
Nickel	**NA**	NA	NA	**NA**	26	58	50	62%	97%
Nitrate	**NA**	NA	NA	**NA**	87	56	142	2%	59%
^{226}Radium	**1.75**	1.61	1.21	**0.84**	222	27	35	8%	0%
Sulfate	**72.86**	69.83	60.19	**49.72**	204	57	145	0%	2%
^{238}Uranium	**16.95**	15.70	12.04	**8.55**	35	52	84	0%	0%
Vanadium	**NA**	NA	NA	**NA**	8	57	8	50%	65%
Zinc	**NA**	NA	NA	**NA**	26	58	52	27%	53%

95th and 5th Confidence Limits (Bolded) Represent 90% Confidence Interval

NA - Not Applicable because of high number of nondetects

Table 5-26
Approximate Confidence Levels on Ratios of Median Values (R=M1/M2)
for
Dissolved Surface Water Data
Non-Mining Tributaries vs. Background

M1: Non-Mining Tributaries
M2: Background

	Ratio of Median (M1/M2)								
Analyte	**95th**	**90th**	**50th**	**5th**	**Sample Size 1**	**Sample Size 2**	**dof**	**% NDs 1**	**% NDs 2**
Antimony	**NA**	NA	NA	**NA**	3	57	5	67%	86%
Cadmium	**NA**	NA	NA	**NA**	3	58	3	100%	95%
Chromium	**NA**	NA	NA	**NA**	3	58	2	67%	86%
Nickel	**NA**	NA	NA	**NA**	3	58	2	100%	97%
Nitrate	**NA**	NA	NA	**NA**	3	56	2	33%	59%
^{226}Radium	**1.30**	1.09	0.66	**0.34**	3	27	7	33%	0%
Sulfate	**28.40**	12.01	2.50	**0.22**	3	57	2	0%	2%
^{238}Uranium	**14.54**	9.50	3.58	**0.88**	4	52	4	0%	0%
Vanadium	**NA**	NA	NA	**NA**	3	57	3	0%	65%
Zinc	**NA**	NA	NA	**NA**	3	58	2	33%	53%

95th and 5th Confidence Limits (Bolded) Represent 90% Confidence Interval

NA - Not Applicable because of high number of nondetects

Table 5-27
SUMMARY OF ANALYTICAL RESULTS FOR BACKGROUND COMPOSITE SEDIMENT SAMPLES

Parameter	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (1)	RBL (2)		
Inorganics							
Chloride	mg/kg	22	22	23.3	11.0	0.459	8.14
Nitrate	mg/kg	22	17	53.2	8.40	<0.0200	5.38
Nitrite	mg/kg	22	11	1.69	0.452	<0.0200	0.656
Nitrogen, Ammonia	mg/kg	22	19	58.3	16.4	0.111	22.7
Phosphate-P	mg/kg	22	22	36.7	16.0	0.402	18.8
Phosphorus	mg/kg	22	22	1,510	923	102	1,456
Sulfate	mg/kg	22	22	403	123	1.08	168
Metals							
Total Aluminum	mg/kg	22	22	24,100	19,900	1,960	20,100
Total Antimony	mg/kg	18	3	2.10	2.10	<0.230	2.10
Total Arsenic	mg/kg	22	21	239	86.5	<0.300	52.2
Total Barium	mg/kg	22	22	424	255	22.6	258
Total Beryllium	mg/kg	22	22	2.62	2.18	0.280	2.50
Total Cadmium	mg/kg	22	19	1.23	0.615	<0.0200	0.680
Total Calcium	mg/kg	22	22	9,610	5,700	582	6,400
Total Chromium	mg/kg	22	22	24.4	20.2	1.40	22.3
Total Cobalt	mg/kg	22	22	15.2	12.6	0.910	12.9
Total Copper	mg/kg	22	22	36.6	29.9	1.00	30.7
Total Iron	mg/kg	22	22	29,700	25,100	3,390	26,800
Total Lead	mg/kg	22	22	27.0	19.9	4.00	21.0
Total Magnesium	mg/kg	22	22	6,260	4,300	630	4,990
Total Manganese	mg/kg	22	22	1,320	870	88.6	871
Total Mercury	mg/kg	22	0	0.140	0.140	<0.0500	<0.140
Total Molybdenum	mg/kg	4	4	2,060	61.8	0.290	8.40
Total Nickel	mg/kg	22	22	24.8	20.0	0.890	23.8
Total Potassium	mg/kg	22	22	6,390	4,230	560	5,610
Total Selenium	mg/kg	22	13	2.43	1.38	<0.220	1.30
Total Silver	mg/kg	22	0	0.240	0.240	<0.0700	<0.240
Total Sodium	mg/kg	22	22	230	192	32.7	182
Total Thallium	mg/kg	22	11	0.498	0.358	0.110	0.38
Total Uranium, Calculated	mg/kg	22	22	115	53.8	2.38	66.2
Total Vanadium	mg/kg	22	22	42.5	35.8	4.60	33.7
Total Zinc	mg/kg	22	22	137	84.6	10.3	100

Table 5-27
SUMMARY OF ANALYTICAL RESULTS FOR BACKGROUND COMPOSITE SEDIMENT SAMPLES

Parameter	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (1)	RBL (2)		
Other Parameters							
Alkalinity, Total	mg/kg	22	22	239	171	29.9	200
Bicarbonate Alkalinity	mg/kg	22	22	239	171	29.9	200
Carbonate Alkalinity	mg/kg	22	0	10.0	10.0	<8.00	<10.0
Cation Exchange Capacity	meq/g	1	1	NA	NA	0.189	0.189
pH	SU	22	22	NA	NA	5.80	7.48
Total Organic Carbon	mg/kg	22	22	NA	NA	1,009	63,050
Radionuclides							
Gross Alpha	pCi/g	18	18	161	92.9	9.45	75.9
Gross Beta	pCi/g	18	18	146	104	30.4	133
Total Lead 210	pCi/g	22	9	24.0	12.2	-0.50	17.0
Total Polonium 210	pCi/g	22	22	20.8	11.0	0.700	18.0
Total Radium 226	pCi/g	18	18	15.2	9.14	1.36	8.21
Total Radium 226, Calculated	pCi/g	4	4	15.2	9.14	1.33	12.4
Total Radium 228	pCi/g	22	22	9.63	6.22	1.03	3.92
Total Thorium 227	pCi/g	22	12	1.62	0.806	-0.03	1.14
Total Thorium 228	pCi/g	22	22	11.2	6.34	0.384	12.0
Total Thorium 230	pCi/g	22	22	9.51	5.63	0.590	10.8
Total Thorium 232	pCi/g	22	22	13.1	13.1	0.350	13.1
Total Uranium 234	pCi/g	22	22	50.4	23.3	0.842	25.4
Total Uranium 235	pCi/g	22	20	2.92	1.31	<0.0325	1.53
Total Uranium 238	pCi/g	22	22	38.3	17.9	0.790	22.0

Notes:
(1) 99% Upper Tolerance Limit for the URS background composite sediment sample data set
(2) 95% Upper Prediction Limit for the URS background composite sediment sample data set
NA = Not Applicable

Table 5-28
SUMMARY OF ANALYTICAL RESULTS FOR BACKGROUND GRAB SEDIMENT SAMPLES

Parameter	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (1)	RBL (2)		
Inorganics							
Chloride	mg/kg	22	22	36.6	16.0	0.311	12.3
Nitrate	mg/kg	22	21	9.08	2.00	<0.0300	10.9
Nitrite	mg/kg	22	9	8.82	1.00	<0.0200	1.34
Nitrogen, Ammonia	mg/kg	22	17	45.2	13.0	<0.0600	11.3
Phosphate-P	mg/kg	22	22	41.4	18.0	0.336	10.8
Phosphorus	mg/kg	22	22	1,830	1,080	102	1,170
Sulfate	mg/kg	22	22	477	131	0.656	185
Metals							
Total Aluminum	mg/kg	22	22	59,900	33,500	1,770	32,100
Total Antimony	mg/kg	19	3	1.00	1.00	<0.200	1.00
Total Arsenic	mg/kg	22	20	315	107	<0.300	123
Total Barium	mg/kg	22	22	563	309	18.6	348
Total Beryllium	mg/kg	22	22	6.66	3.84	0.240	4.20
Total Cadmium	mg/kg	22	20	1.23	0.600	<0.0200	0.690
Total Calcium	mg/kg	22	22	14,600	7,440	406	10,100
Total Chromium	mg/kg	22	22	29.1	23.6	1.10	23.1
Total Cobalt	mg/kg	22	22	33.3	19.2	0.920	13.9
Total Copper	mg/kg	22	22	51.9	41.3	0.790	45.7
Total Iron	mg/kg	22	22	39,000	32,000	2,930	34,500
Total Lead	mg/kg	22	22	21.7	18.3	2.90	20.2
Total Magnesium	mg/kg	22	22	7,480	4,840	598	4,900
Total Manganese	mg/kg	22	22	1,980	1,160	97.9	1,420
Total Mercury	mg/kg	22	0	0.130	0.130	<0.0500	<0.130
Total Molybdenum	mg/kg	4	4	10.5	7.00	0.430	3.90
Total Nickel	mg/kg	22	22	28.2	22.5	0.720	25.6
Total Potassium	mg/kg	22	22	7,890	4,870	488	6,360
Total Selenium	mg/kg	22	13	1.90	1.18	<0.230	1.60
Total Silver	mg/kg	22	0	0.150	0.150	<0.0600	<0.150
Total Sodium	mg/kg	22	22	573	317	21.4	276
Total Thallium	mg/kg	22	10	0.528	0.380	<0.130	0.39
Total Uranium, Calculated	mg/kg	22	22	216	87.0	2.93	107
Total Vanadium	mg/kg	22	22	52.4	43.0	3.50	45.4
Total Zinc	mg/kg	22	22	153	89.5	7.90	113

Table 5-28
SUMMARY OF ANALYTICAL RESULTS FOR BACKGROUND GRAB SEDIMENT SAMPLES

Parameter	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (1)	RBL (2)		
Other Parameters							
Alkalinity, Total	mg/kg	22	22	301	198	34.0	265
Bicarbonate Alkalinity	mg/kg	22	22	301	198	34.0	265
Carbonate Alkalinity	mg/kg	21	0	10.0	10.0	<8.00	<10.0
Cation Exchange Capacity	meq/g	1	1	NA	NA	0.365	0.365
pH	SU	22	22	NA	NA	5.29	7.73
Total Organic Carbon	mg/kg	22	22	NA	NA	632	65,400
Radionuclides							
Gross Alpha	pCi/g	18	18	218	115	9.05	93.6
Gross Beta	pCi/g	18	18	95.7	96.0	30.9	95.7
Total Lead 210	pCi/g	22	11	25.2	13.0	-0.10	9.50
Total Polonium 210	pCi/g	22	22	21.4	11.0	0.600	10.0
Total Radium 226	pCi/g	17	17	19.6	10.6	0.952	8.47
Total Radium 226, Calculated	pCi/g	4	4	19.6	10.6	1.64	6.18
Total Radium 228	pCi/g	22	22	5.77	4.70	0.949	9.57
Total Thorium 227	pCi/g	22	17	1.04	1.00	<0.0504	0.792
Total Thorium 228	pCi/g	22	22	6.76	4.48	0.674	4.90
Total Thorium 230	pCi/g	22	22	9.29	5.69	0.791	6.22
Total Thorium 232	pCi/g	22	22	5.74	3.81	0.677	5.00
Total Uranium 234	pCi/g	22	22	105	40.1	1.16	44.7
Total Uranium 235	pCi/g	22	21	4.29	1.76	<0.0504	1.98
Total Uranium 238	pCi/g	22	22	72.0	29.0	0.975	35.6

Notes:
(1) 99% Upper Tolerance Limit for the URS background grab sediment sample data set
(2) 95% Upper Prediction Limit for the URS background grab sediment sample data set
NA = Not Applicable

Table 5-29
SUMMARY OF ANALYTICAL RESULTS FOR MIDDLE BLUE CREEK COMPOSITE SEDIMENT SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Inorganics							
Chloride	mg/kg	2	2	23.3	11.0	1.57	2.42
Nitrate	mg/kg	2	2	53.2	8.40	0.188	0.270
Nitrite	mg/kg	2	2	1.69	0.452	0.162	0.231
Nitrogen, Ammonia	mg/kg	2	1	58.3	16.4	<0.0600	0.203
Phosphate-P	mg/kg	2	2	36.7	16.0	3.12	3.94
Phosphorus	mg/kg	2	2	1,510	923	164	191
Sulfate	mg/kg	2	2	403	123	501	710
Metals							
Total Aluminum	mg/kg	9	9	24,100	19,900	1,860	5,520
Total Arsenic	mg/kg	9	8	239	86.5	1.40	8.00
Total Barium	mg/kg	9	9	424	255	16.9	41.1
Total Beryllium	mg/kg	9	9	2.62	2.18	0.300	0.510
Total Cadmium	mg/kg	9	9	1.23	0.615	0.190	1.10
Total Calcium	mg/kg	2	2	9,610	5,700	1,240	1,930
Total Chromium	mg/kg	9	7	24.4	20.2	2.10	13 (5)
Total Cobalt	mg/kg	9	9	15.2	12.6	2.40	5.00
Total Copper	mg/kg	9	9	36.6	29.9	2.00	4.00
Total Iron	mg/kg	9	9	29,700	25,100	3,730	7,880
Total Lead	mg/kg	9	7	27.0	19.9	3.30	5.00
Total Magnesium	mg/kg	2	2	6,260	4,300	834	989
Total Manganese	mg/kg	9	9	1,320	870	790	3,690
Total Mercury	mg/kg	9	0	0.140	0.140	<0.0200	<0.120
Total Nickel	mg/kg	9	9	24.8	20.0	11.0	41.7
Total Potassium	mg/kg	2	2	6,390	4,230	660	673
Total Selenium	mg/kg	9	0	2.43	1.38	<0.210	<4.00 (4)
Total Silver	mg/kg	9	0	0.240	0.240	<0.0500	<5.00 (4)
Total Sodium	mg/kg	2	0	230	192	<40.5	<50.3
Total Thallium	mg/kg	9	2	0.498	0.358	<0.0500	0.47 (6)
Total Uranium, Calculated	mg/kg	9	9	115	53.8	6.61	18.6
Total Vanadium	mg/kg	2	2	42.5	35.8	6.30	7.70
Total Zinc	mg/kg	9	9	137	84.6	25.8	55.9

Table 5-29
SUMMARY OF ANALYTICAL RESULTS FOR MIDDLE BLUE CREEK COMPOSITE SEDIMENT SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Other Parameters							
Alkalinity, Total	mg/kg	2	2	239	171	47.0	49.0
Bicarbonate Alkalinity	mg/kg	2	2	239	171	47.0	49.0
Carbonate Alkalinity	mg/kg	2	0	10.0	10.0	<10.0	<10.0
pH	SU	2	2	NA	NA	7.30	7.36
Total Organic Carbon	mg/kg	2	2	NA	NA	1,915	2,900
Radionuclides							
Gross Alpha	pCi/g	2	2	161	92.9	39.2	59.3
Gross Beta	pCi/g	2	2	146	104	58.4	64.2
Total Lead 210	pCi/g	2	2	24.0	12.2	2.20	6.30
Total Polonium 210	pCi/g	2	2	20.8	11.0	3.00	3.20
Total Radium 226, Calculated	pCi/g	2	2	15.2	9.14	2.41	7.25
Total Radium 228	pCi/g	2	2	9.63	6.22	2.73	4.16
Total Thorium 227	pCi/g	2	1	1.62	0.806	<0.157	0.213
Total Thorium 228	pCi/g	2	2	11.2	6.34	1.87	3.09
Total Thorium 230	pCi/g	2	2	9.51	5.63	1.30	2.39
Total Thorium 232	pCi/g	2	2	13.1	13.1	1.37	3.85
Total Uranium 234	pCi/g	9	9	50.4	23.3	2.00	5.50
Total Uranium 235	pCi/g	9	9	2.92	1.31	0.110	1.20
Total Uranium 238	pCi/g	9	9	38.3	17.9	2.20	6.20

Notes:
(1) Parameters in bold exceed background limits for the URS samples
(2) 99% Upper Tolerance Limit for the URS background composite sediment sample data set
(3) 95% Upper Prediction Limit for the URS background composite sediment sample data set
(4) The result is reported as non-detect value above the RBL
(5) The maximum result is reported from E&E samples
(6) The maximum result is reported from SMI samples
NA = Not Applicable

Table 5-30
SUMMARY OF ANALYTICAL RESULTS FOR MIDDLE BLUE CREEK GRAB SEDIMENT SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Metals							
Total Aluminum	mg/kg	10	10	59,900	33,500	2,640	21,600
Total Antimony	mg/kg	5	0	1.00	1.00	<1.20	<2.60 (4)
Total Arsenic	mg/kg	10	4	315	107	<1.50	80.0
Total Barium	mg/kg	10	10	563	309	22.0	663
Total Beryllium	mg/kg	10	7	6.66	3.84	0.300	2.68
Total Cadmium	mg/kg	10	9	1.23	0.600	<0.250	9.60
Total Calcium	mg/kg	5	5	14,600	7,440	1,960	5,630
Total Chromium	mg/kg	10	10	29.1	23.6	1.40	13.0
Total Cobalt	mg/kg	10	10	33.3	19.2	2.00	139
Total Copper	mg/kg	10	10	51.9	41.3	1.00	20.0
Total Iron	mg/kg	10	10	39,000	32,000	5,830	30,500
Total Lead	mg/kg	10	7	21.7	18.3	<4.00	13.3
Total Magnesium	mg/kg	5	5	7,480	4,840	1,390	3,220
Total Manganese	mg/kg	10	10	1,980	1,160	560	63,300
Total Mercury	mg/kg	10	1	0.130	0.130	<0.0200	0.03
Total Nickel	mg/kg	10	10	28.2	22.5	5.00	460
Total Potassium	mg/kg	5	5	7,890	4,870	748	2,380
Total Selenium	mg/kg	10	2	1.90	1.18	<0.990	<40.0
Total Silver	mg/kg	10	1	0.150	0.150	0.0900	0.09 (6)
Total Sodium	mg/kg	5	5	573	317	123	428
Total Thallium	mg/kg	10	1	0.528	0.380	<0.100	0.47 (6)
Total Uranium	mg/kg	5	5	216	87.3	10.0	47.0
Total Uranium, Calculated	mg/kg	5	5	216	87.0	3.58	89.9
Total Vanadium	mg/kg	5	5	52.4	43.0	10.0	25.9
Total Zinc	mg/kg	10	10	153	89.5	19.0	520
Radionuclides							
Gross Alpha	pCi/g	5	5	218	115	31.4	82.9
Total Radium 226	pCi/g	5	2	19.6	10.6	<0.395	2.94
Total Radium 228	pCi/g	5	5	5.77	4.70	2.81	5.36
Total Thorium 228	pCi/g	5	5	6.76	4.48	0.619	3.17
Total Thorium 230	pCi/g	5	4	9.29	5.69	<1.18	3.76
Total Thorium 232	pCi/g	5	5	5.74	3.81	0.562	2.02
Total Uranium 234	pCi/g	10	10	105	40.1	0.970	31.0
Total Uranium 235	pCi/g	10	9	4.29	1.76	0.00	1.20
Total Uranium 238	pCi/g	10	10	72.0	29.0	1.20	30.0

Notes:

(1) Concentrations and activities of parameters in bold are greater than the RBL for the SMI or E&E samples

(2) 99% Upper Tolerance Limit for the URS background grab sediment sample data set

(3) 95% Upper Prediction Limit for the URS background grab sediment sample data set

(4) The result is reported as non-detect value above the RBL

(5) The maximum result is reported from E&E samples

(6) The maximum result is reported from SMI samples

Table 5-31
SUMMARY OF ANALYTICAL RESULTS FOR MIDDLE BLUE CREEK RIPARIAN COMPOSITE SEDIMENT SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Inorganics							
Chloride	mg/kg	4	4	23.3	11.0	1.47	9.41
Nitrate	mg/kg	4	3	53.2	8.40	<0.0200	2.58
Nitrite	mg/kg	4	2	1.69	0.452	<0.0200	1.95
Nitrogen, Ammonia	mg/kg	4	4	58.3	16.4	2.04	3.45
Phosphate-P	mg/kg	1	1	36.7	16.0	1.28	1.28
Phosphorus	mg/kg	4	4	1,510	923	261	404
Sulfate	mg/kg	4	4	403	123	584	1,591
Metals							
Total Aluminum	mg/kg	7	7	24,100	19,900	3,610	12,600
Total Antimony	mg/kg	4	1	2.10	2.10	0.640	0.64
Total Arsenic	mg/kg	7	7	239	86.5	1.20	5.20
Total Barium	mg/kg	7	7	424	255	36.4	159
Total Beryllium	mg/kg	7	7	2.62	2.18	0.370	1.40
Total Cadmium	mg/kg	7	7	1.23	0.615	0.290	1.20
Total Calcium	mg/kg	7	7	9,610	5,700	1,190	4,840
Total Chromium	mg/kg	7	7	24.4	20.2	3.50	9.40
Total Cobalt	mg/kg	7	7	15.2	12.6	4.40	17.9 (4)
Total Copper	mg/kg	7	7	36.6	29.9	2.50	12.7
Total Iron	mg/kg	7	7	29,700	25,100	7,610	14,400
Total Lead	mg/kg	7	7	27.0	19.9	5.10	13.5
Total Magnesium	mg/kg	7	7	6,260	4,300	1,020	3,020
Total Manganese	mg/kg	7	7	1,320	870	743	3,780
Total Mercury	mg/kg	4	0	0.140	0.140	<0.0500	<0.0600
Total Molybdenum	mg/kg	7	7	2,060	61.8	0.300	1.40
Total Nickel	mg/kg	7	7	24.8	20.0	11.4	53.0
Total Potassium	mg/kg	7	7	6,390	4,230	745	2,510
Total Selenium	mg/kg	7	2	2.43	1.38	<0.270	0.32
Total Silver	mg/kg	7	0	0.240	0.240	<0.0700	<0.120
Total Sodium	mg/kg	7	7	230	192	43.2	158
Total Thallium	mg/kg	4	4	0.498	0.358	0.160	0.220
Total Uranium, Calculated	mg/kg	4	4	115	53.8	37.2	45.0
Total Vanadium	mg/kg	7	7	42.5	35.8	12.5	21.5
Total Zinc	mg/kg	7	7	137	84.6	37.4	105 (4)

Table 5-31
SUMMARY OF ANALYTICAL RESULTS FOR MIDDLE BLUE CREEK RIPARIAN COMPOSITE SEDIMENT SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Other Parameters							
Alkalinity, Total	mg/kg	4	4	239	171	38.8	87.3
Bicarbonate Alkalinity	mg/kg	4	4	239	171	38.8	87.3
Carbonate Alkalinity	mg/kg	4	0	10.0	10.0	<8.00	<9.00
Cation Exchange Capacity	meq/g	1	1	NA	NA	0.158	0.158
pH	SU	4	4	NA	NA	5.52	6.42
Total Organic Carbon	mg/kg	4	4	NA	NA	27,200	38,900
Radionuclides							
Total Lead 210	pCi/g	4	4	24.0	12.2	3.00	5.50
Total Polonium 210	pCi/g	4	4	20.8	11.0	2.50	4.70
Total Radium 226, Calculated	pCi/g	4	4	15.2	9.14	3.62	5.71
Total Radium 228	pCi/g	4	4	9.63	6.22	3.37	4.15
Total Uranium 234	pCi/g	4	4	50.4	23.3	12.4	15.7
Total Uranium 235	pCi/g	4	4	2.92	1.31	0.849	1.32
Total Uranium 238	pCi/g	4	4	38.3	17.9	12.3	14.9

Notes:
(1) Parameters in bold exceed background limits for the URS samples
(2) 99% Upper Tolerance Limit for the URS background composite sediment sample data set
(3) 95% Upper Prediction Limit for the URS background composite sediment sample data set
(4) Maximum value is from a URS sample; verification sample result is below the RBL
NA = Not Applicable

Table 5-32
SUMMARY OF ANALYTICAL RESULTS FOR LOWER BLUE CREEK COMPOSITE SEDIMENT SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Inorganics							
Chloride	mg/kg	2	2	23.3	11.0	1.88	2.22
Nitrate	mg/kg	2	2	53.2	8.40	0.277	1.13
Nitrite	mg/kg	2	1	1.69	0.452	<0.0200	0.0720
Nitrogen, Ammonia	mg/kg	2	2	58.3	16.4	0.164	0.202
Phosphate-P	mg/kg	2	2	36.7	16.0	1.59	4.52
Phosphorus	mg/kg	2	2	1,510	923	209	397
Sulfate	mg/kg	2	2	403	123	563	755
Metals							
Total Aluminum	mg/kg	2	2	24,100	19,900	3,280	6,790
Total Antimony	mg/kg	1	0	2.10	2.10	<0.280	<0.280
Total Arsenic	mg/kg	2	2	239	86.5	1.80	5.80
Total Barium	mg/kg	2	2	424	255	29.6	48.3
Total Beryllium	mg/kg	2	2	2.62	2.18	0.350	0.450
Total Cadmium	mg/kg	2	2	1.23	0.615	0.0300	0.0800
Total Calcium	mg/kg	2	2	9,610	5,700	1,190	2,710
Total Chromium	mg/kg	2	1	24.4	20.2	<2.90	7.70
Total Cobalt	mg/kg	2	2	15.2	12.6	3.50	5.70
Total Copper	mg/kg	2	2	36.6	29.9	2.60	7.10
Total Iron	mg/kg	2	2	29,700	25,100	6,450	12,500
Total Lead	mg/kg	2	2	27.0	19.9	4.40	6.70
Total Magnesium	mg/kg	2	2	6,260	4,300	1,300	3,720
Total Manganese	mg/kg	2	2	1,320	870	495	585
Total Mercury	mg/kg	2	0	0.140	0.140	<0.100	<0.110
Total Nickel	mg/kg	2	2	24.8	20.0	9.40	12.5
Total Potassium	mg/kg	2	2	6,390	4,230	792	1,420
Total Selenium	mg/kg	2	0	2.43	1.38	<0.220	<0.220
Total Silver	mg/kg	2	0	0.240	0.240	<0.0800	<0.0800
Total Sodium	mg/kg	2	1	230	192	<35.3	76.5
Total Thallium	mg/kg	2	2	0.498	0.358	0.230	0.310
Total Uranium, Calculated	mg/kg	2	2	115	53.8	5.97	7.93
Total Vanadium	mg/kg	2	2	42.5	35.8	8.20	15.1
Total Zinc	mg/kg	2	2	137	84.6	28.0	43.4

Table 5-32
SUMMARY OF ANALYTICAL RESULTS FOR LOWER BLUE CREEK COMPOSITE SEDIMENT SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Other Parameters							
Alkalinity, Total	mg/kg	2	2	239	171	48.0	71.0
Bicarbonate Alkalinity	mg/kg	2	2	239	171	48.0	71.0
Carbonate Alkalinity	mg/kg	2	0	10.0	10.0	<10.0	<10.0
pH	SU	2	2	NA	NA	6.90	7.89
Total Organic Carbon	mg/kg	2	2	NA	NA	626	3,360
Radionuclides							
Gross Alpha	pCi/g	2	2	161	92.9	21.9	33.6
Gross Beta	pCi/g	2	2	146	104	48.5	54.8
Total Lead 210	pCi/g	2	2	24.0	12.2	1.10	1.60
Total Polonium 210	pCi/g	2	2	20.8	11.0	0.900	1.70
Total Radium 226	pCi/g	2	2	15.2	9.14	1.25	1.95
Total Radium 228	pCi/g	2	2	9.63	6.22	2.08	2.81
Total Thorium 227	pCi/g	2	1	1.62	0.806	<0.0932	0.183
Total Thorium 228	pCi/g	2	2	11.2	6.34	1.23	1.88
Total Thorium 230	pCi/g	2	2	9.51	5.63	1.16	1.27
Total Thorium 232	pCi/g	2	2	13.1	13.1	1.11	1.73
Total Uranium 234	pCi/g	2	2	50.4	23.3	2.38	2.84
Total Uranium 235	pCi/g	2	1	2.92	1.31	<0.105	0.147
Total Uranium 238	pCi/g	2	2	38.3	17.9	1.98	2.66

Notes:
(1) Parameters in bold exceed background limits for the URS samples
(2) 99% Upper Tolerance Limit for the URS background composite sediment sample data set
(3) 95% Upper Prediction Limit for the URS background composite sediment sample data set
NA = Not Applicable

Table 5-33
SUMMARY OF ANALYTICAL RESULTS FOR LOWER BLUE CREEK GRAB SEDIMENT SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Metals							
Total Aluminum	mg/kg	4	4	59,900	33,500	8,200	17,500
Total Antimony	mg/kg	4	0	1.00	1.00	<1.30	<1.70 (4)
Total Arsenic	mg/kg	4	4	315	107	6.60	11.9
Total Barium	mg/kg	4	4	563	309	54.4	138
Total Beryllium	mg/kg	4	4	6.66	3.84	0.430	1.40
Total Cadmium	mg/kg	4	1	1.23	0.600	<0.270	1.00
Total Calcium	mg/kg	4	4	14,600	7,440	2,780	8,870
Total Chromium	mg/kg	4	4	29.1	23.6	8.00	11.1
Total Cobalt	mg/kg	4	4	33.3	19.2	4.60	16.5
Total Copper	mg/kg	4	4	51.9	41.3	9.30	16.2
Total Iron	mg/kg	4	4	39,000	32,000	14,500	17,400
Total Lead	mg/kg	4	4	21.7	18.3	8.00	10.8
Total Magnesium	mg/kg	4	4	7,480	4,840	3,130	6,480
Total Manganese	mg/kg	4	4	1,980	1,160	447	3,670
Total Mercury	mg/kg	4	0	0.130	0.130	<0.140	<0.180 (4)
Total Nickel	mg/kg	4	4	28.2	22.5	10.7	51.4
Total Potassium	mg/kg	4	4	7,890	4,870	1,350	2,000
Total Selenium	mg/kg	4	0	1.90	1.18	<1.10	<1.40 (4)
Total Silver	mg/kg	4	0	0.150	0.150	<0.530	<0.700 (4)
Total Sodium	mg/kg	4	4	573	317	170	241
Total Thallium	mg/kg	4	0	0.528	0.380	<1.60	<2.10 (4)
Total Uranium, Calculated	mg/kg	4	4	216	87.3	4.23	28.6
Total Vanadium	mg/kg	4	4	52.4	43.0	16.3	23.3
Total Zinc	mg/kg	4	4	153	89.5	46.0	118
Radionuclides							
Total Gross Alpha	pCi/g	4	4	218	115	11.1	46.2
Total Radium 226	pCi/g	4	0	19.6	10.6	<0.410	<3.33
Total Radium 228	pCi/g	4	4	5.77	4.70	3.24	5.15
Total Thorium 228	pCi/g	4	4	6.76	4.48	0.519	2.56
Total Thorium 230	pCi/g	4	0	9.29	5.69	<0.717	<3.03
Total Thorium 232	pCi/g	4	4	5.74	3.81	0.757	2.50
Total Uranium 234	pCi/g	4	2	105	40.1	<0.716	9.91
Total Uranium 235	pCi/g	4	2	4.29	1.76	<0.0721	0.438
Total Uranium 238	pCi/g	4	2	72.0	29.0	<0.648	8.26

Notes:
(1) Concentrations or activities of parameters in bold are greater than the RBL for E&E samples
(2) 99% Upper Tolerance Limit for the URS background grab sediment sample data set
(3) 95% Upper Prediction Limit for the URS background grab sediment sample data set
(4) The maximum concentration or activity is reported as non-detect value the RBL
NA = Not Applicable

Table 5-34
ANALYTICAL RESULTS FOR THE LOWER BLUE CREEK RIPARIAN COMPOSITE SEDIMENT SAMPLE

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		
				BL (2)	RBL (3)	Result
Inorganics						
Chloride	mg/kg	1	1	23.3	11.0	0.445
Nitrate	mg/kg	1	1	53.2	8.40	0.398
Nitrite	mg/kg	1	1	1.69	0.452	0.151
Nitrogen, Ammonia	mg/kg	1	1	58.3	16.4	0.501
Phosphate-P	mg/kg	1	1	36.7	16.0	3.40
Phosphorus	mg/kg	1	1	1,510	923	306
Sulfate	mg/kg	1	1	403	123	2.30
Metals						
Total Aluminum	mg/kg	1	1	24,100	19,900	7,120
Total Antimony	mg/kg	1	1	2.10	2.10	0.780
Total Arsenic	mg/kg	1	1	239	86.5	8.70
Total Barium	mg/kg	1	1	424	255	56.1
Total Beryllium	mg/kg	1	1	2.62	2.18	0.380
Total Cadmium	mg/kg	1	1	1.23	0.615	0.130
Total Calcium	mg/kg	1	1	9,610	5,700	4,040
Total Chromium	mg/kg	1	1	24.4	20.2	8.80
Total Cobalt	mg/kg	1	1	15.2	12.6	4.70
Total Copper	mg/kg	1	1	36.6	29.9	9.40
Total Iron	mg/kg	1	1	29,700	25,100	14,100
Total Lead	mg/kg	1	1	27.0	19.9	8.50
Total Magnesium	mg/kg	1	1	6,260	4,300	4,670
Total Manganese	mg/kg	1	1	1,320	870	414
Total Mercury	mg/kg	1	0	0.140	0.140	<0.0400
Total Molybdenum	mg/kg	1	1	2,060	61.8	0.210
Total Nickel	mg/kg	1	1	24.8	20.0	9.90
Total Potassium	mg/kg	1	1	6,390	4,230	1,610
Total Selenium	mg/kg	1	1	2.43	1.38	0.260
Total Silver	mg/kg	1	0	0.240	0.240	<0.0800
Total Sodium	mg/kg	1	1	230	192	56.1
Total Thallium	mg/kg	1	1	0.498	0.358	0.0700
Total Uranium, Calculated	mg/kg	1	1	115	53.8	8.65
Total Vanadium	mg/kg	1	1	42.5	35.8	16.3
Total Zinc	mg/kg	1	1	137	84.6	41.7

Table 5-34
ANALYTICAL RESULTS FOR THE LOWER BLUE CREEK RIPARIAN COMPOSITE SEDIMENT SAMPLE

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		
				BL (2)	RBL (3)	Result
Other Parameters						
Alkalinity, Total	mg/kg	1	1	239	171	139
Bicarbonate Alkalinity	mg/kg	1	1	239	171	138
Carbonate Alkalinity	mg/kg	1	0	10.0	10.0	<9.00
pH	SU	1	1	NA	NA	7.79
Total Organic Carbon	mg/kg	1	1	NA	NA	13,500
Radionuclides						
Total Lead 210	pCi/g	1	1	24.0	12.2	2.40
Total Polonium 210	pCi/g	1	1	20.8	11.0	0.900
Total Radium 226, Calculated	pCi/g	1	1	15.2	9.14	1.44
Total Radium 228	pCi/g	1	1	9.63	6.22	1.82
Total Uranium 234	pCi/g	1	1	50.4	23.3	2.84
Total Uranium 235	pCi/g	1	1	2.92	1.31	0.164
Total Uranium 238	pCi/g	1	1	38.3	17.9	2.88

Notes:
(1) Parameters in bold exceed background limits for the URS sample
(2) 99% Upper Tolerance Limit for the URS background composite sediment sample data set
(3) 95% Upper Prediction Limit for the URS background composite sediment sample data set
NA = Not Applicable

Table 5-35
SUMMARY OF ANALYTICAL RESULTS FOR NORTHEASTERN DRAINAGE COMPOSITE SEDIMENT SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Inorganics							
Chloride	mg/kg	4	4	23.3	11.0	1.79	2.93
Nitrate	mg/kg	4	4	53.2	8.40	0.0250	0.829
Nitrite	mg/kg	4	2	1.69	0.452	<0.0200	0.223
Nitrogen, Ammonia	mg/kg	4	2	58.3	16.4	<0.286	0.833
Phosphate-P	mg/kg	4	3	36.7	16.0	<0.794	9.69
Phosphorus	mg/kg	4	4	1,510	923	3.06	533
Sulfate	mg/kg	4	4	403	123	3.95	5.72
Metals							
Total Aluminum	mg/kg	4	4	24,100	19,900	17,600	22,500 (4)
Total Antimony	mg/kg	3	2	2.10	2.10	<0.280	0.950
Total Arsenic	mg/kg	4	4	239	86.5	12.6	29.5
Total Barium	mg/kg	4	4	424	255	77.3	140
Total Beryllium	mg/kg	4	4	2.62	2.18	1.20	2.40 (5)
Total Cadmium	mg/kg	4	1	1.23	0.615	<0.0200	0.35
Total Calcium	mg/kg	4	4	9,610	5,700	1,240	3,370
Total Chromium	mg/kg	4	4	24.4	20.2	21.3	32.7
Total Cobalt	mg/kg	4	4	15.2	12.6	15.2	23.1
Total Copper	mg/kg	4	4	36.6	29.9	19.2	28.3
Total Iron	mg/kg	4	4	29,700	25,100	22,400	34,100
Total Lead	mg/kg	4	4	27.0	19.9	14.7	23.8 (5)
Total Magnesium	mg/kg	4	4	6,260	4,300	3,790	4,490 (5)
Total Manganese	mg/kg	4	4	1,320	870	548	806
Total Mercury	mg/kg	4	0	0.140	0.140	<0.0500	<0.110
Total Molybdenum	mg/kg	2	2	2,060	61.8	3.70	8.60
Total Nickel	mg/kg	4	4	24.8	20.0	19.3	36.4
Total Potassium	mg/kg	4	4	6,390	4,230	3,030	5,250 (5)
Total Selenium	mg/kg	4	2	2.43	1.38	<0.300	1.10
Total Silver	mg/kg	4	0	0.240	0.240	<0.0700	<0.100
Total Sodium	mg/kg	4	4	230	192	71.8	166
Total Thallium	mg/kg	4	4	0.498	0.358	0.430	0.710
Total Uranium, Calculated	mg/kg	4	4	115	53.8	34.3	190
Total Vanadium	mg/kg	4	4	42.5	35.8	34.5	44.8
Total Zinc	mg/kg	4	4	137	84.6	39.6	67.8
Organic Compounds							
Total Petroleum Hydrocarbons-Diesel	ug/kg	1	1	NA	NA	24,000	24,000

Table 5-35
SUMMARY OF ANALYTICAL RESULTS FOR NORTHEASTERN DRAINAGE COMPOSITE SEDIMENT SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Other Parameters							
Alkalinity, Total	mg/kg	4	4	239	171	57.9	167
Bicarbonate Alkalinity	mg/kg	4	4	239	171	57.9	167
Carbonate Alkalinity	mg/kg	4	0	10.0	10.0	<9.00	<10.0
pH	SU	4	4	NA	NA	6.44	7.13
Total Organic Carbon	mg/kg	4	4	NA	NA	1,960	13,950
Radionuclides							
Gross Alpha	pCi/g	2	2	161	92.9	75.4	347
Gross Beta	pCi/g	2	2	146	104	91.5	310
Total Lead 210	pCi/g	4	4	24.0	12.2	14.0	62.0
Total Polonium 210	pCi/g	4	4	20.8	11.0	14.0	69.0
Total Protactinium 231	pCi/g	2	2	NC	NC	1.32	2.90
Total Radium 226	pCi/g	2	2	15.2	9.14	16.4	62.1
Total Radium 226, Calculated	pCi/g	2	2	15.2	9.14	19.2	59.0
Total Radium 228	pCi/g	2	2	9.63	6.22	1.89	3.20
Total Thorium 227	pCi/g	2	2	1.62	0.806	0.704	3.56
Total Thorium 228	pCi/g	4	4	11.2	6.34	0.986	3.44
Total Thorium 230	pCi/g	4	4	9.51	5.63	13.0	65.0
Total Thorium 232	pCi/g	4	3	13.1	13.1	0.937	3.53
Total Uranium 234	pCi/g	4	4	50.4	23.3	11.3	59.5
Total Uranium 235	pCi/g	4	4	2.92	1.31	0.663	3.39
Total Uranium 238	pCi/g	4	4	38.3	17.9	11.4	63.3

Notes:
(1) Parameters in bold exceed background limits for the URS samples
(2) 99% Upper Tolerance Limit for the URS background composite sediment sample data set
(3) 95% Upper Prediction Limit for the URS background composite sediment sample data set
(4) Maximum value is from a URS verification sample; the associated primary sample did not exceed the BL
(5) Maximum value is from a primary URS sample and does not exceed the BL
NA = Not Applicable
NC = Not calculated; insufficient background samples

Table 5-36
SUMMARY OF ANALYTICAL RESULTS FOR NORTHERN DRAINAGE COMPOSITE SEDIMENT SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Inorganics							
Chloride	mg/kg	4	4	23.3	11.0	0.540	4.16
Nitrate	mg/kg	4	3	53.2	8.40	<0.0200	3.20
Nitrite	mg/kg	4	1	1.69	0.452	<0.0200	0.0670
Nitrogen, Ammonia	mg/kg	4	3	58.3	16.4	<0.312	10.1
Phosphate-P	mg/kg	4	4	36.7	16.0	1.21	9.45
Phosphorus	mg/kg	4	4	1,510	923	261	385
Sulfate	mg/kg	4	4	403	123	3.60	9.11
Metals							
Total Aluminum	mg/kg	4	4	24,100	19,900	5,960	17,300
Total Antimony	mg/kg	3	1	2.10	2.10	<0.320	0.860
Total Arsenic	mg/kg	4	4	239	86.5	2.20	28.2
Total Barium	mg/kg	4	4	424	255	58.2	142
Total Beryllium	mg/kg	4	4	2.62	2.18	0.530	1.20
Total Cadmium	mg/kg	4	1	1.23	0.615	<0.0200	0.34
Total Calcium	mg/kg	4	4	9,610	5,700	1,480	2,620
Total Chromium	mg/kg	4	4	24.4	20.2	5.00	21.3 (4)
Total Cobalt	mg/kg	4	4	15.2	12.6	3.00	17.3 (4)
Total Copper	mg/kg	4	4	36.6	29.9	4.20	31.0 (4)
Total Iron	mg/kg	4	4	29,700	25,100	10,000	29,400 (4)
Total Lead	mg/kg	4	4	27.0	19.9	7.80	10.6
Total Magnesium	mg/kg	4	4	6,260	4,300	1,580	2,980
Total Manganese	mg/kg	4	4	1,320	870	261	722
Total Mercury	mg/kg	4	0	0.140	0.140	<0.0500	<0.100
Total Molybdenum	mg/kg	2	2	2,060	61.8	1.20	1.90
Total Nickel	mg/kg	4	4	24.8	20.0	3.80	18.6
Total Potassium	mg/kg	4	4	6,390	4,230	1,240	3,940
Total Selenium	mg/kg	4	2	2.43	1.38	<0.290	0.860
Total Silver	mg/kg	4	0	0.240	0.240	<0.0600	<0.100
Total Sodium	mg/kg	4	4	230	192	53.4	84.6
Total Thallium	mg/kg	4	3	0.498	0.358	0.0900	0.410 (5)
Total Uranium, Calculated	mg/kg	4	4	115	53.8	19.3	34.1
Total Vanadium	mg/kg	4	4	42.5	35.8	17.5	35.4
Total Zinc	mg/kg	4	4	137	84.6	23.4	40.5

Table 5-36
SUMMARY OF ANALYTICAL RESULTS FOR NORTHERN DRAINAGE COMPOSITE SEDIMENT SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Other Parameters							
Alkalinity, Total	mg/kg	4	4	239	171	45.1	105
Bicarbonate Alkalinity	mg/kg	4	4	239	171	45.1	105
Carbonate Alkalinity	mg/kg	4	0	10.0	10.0	<8.00	<10.0
pH	SU	4	4	NA	NA	5.65	7.12
Total Organic Carbon	mg/kg	4	4	NA	NA	3,050	27,200
Radionuclides							
Gross Alpha	pCi/g	2	2	161	92.9	24.2	39.3
Gross Beta	pCi/g	2	2	146	104	43.0	65.1
Total Lead 210	pCi/g	4	4	24.0	12.2	3.60	6.90
Total Polonium 210	pCi/g	4	4	20.8	11.0	1.60	6.90
Total Radium 226	pCi/g	2	2	15.2	9.14	1.97	8.35
Total Radium 226, Calculated	pCi/g	2	2	15.2	9.14	3.23	9.08
Total Radium 228	pCi/g	4	4	9.63	6.22	1.93	5.08
Total Thorium 227	pCi/g	3	3	1.62	0.806	0.444	1.45
Total Thorium 228	pCi/g	3	3	11.2	6.34	1.92	16.6
Total Thorium 230	pCi/g	3	3	9.51	5.63	6.36	9.63
Total Thorium 232	pCi/g	3	3	13.1	13.1	1.90	16.5
Total Uranium 234	pCi/g	4	4	50.4	23.3	5.43	11.8
Total Uranium 235	pCi/g	4	4	2.92	1.31	0.335	1.18
Total Uranium 238	pCi/g	4	4	38.3	17.9	6.42	11.3

Notes:
(1) Parameters in bold exceed background limits
(2) 99% Upper Tolerance Limit for the URS background composite sediment sample data set
(3) 95% Upper Prediction Limit for the URS background composite sediment sample data set
(4) The result is a non-detect value higher than the RBL
(5) The maximum value is from a URS primary sample and did not exceed the BL
NA = Not Applicable

Table 5-37
SUMMARY OF ANALYTICAL RESULTS FOR THE NORTHERN DRAINAGE GRAB SEDIMENT SAMPLE

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Result
				BL (2)	RBL (3)	
Inorganics						
Chloride	mg/kg	1	1	36.6	16.0	0.765
Nitrate	mg/kg	1	1	9.08	2.00	7.22
Nitrite	mg/kg	1	1	8.82	1.00	0.0340
Nitrogen, Ammonia	mg/kg	1	0	45.2	13.0	<0.205
Phosphate-P	mg/kg	1	1	41.4	18.0	3.91
Phosphorus	mg/kg	1	1	1,830	1,080	306
Sulfate	mg/kg	1	1	477	131	2.47
Metals						
Total Aluminum	mg/kg	1	1	59,900	33,500	5,730
Total Arsenic	mg/kg	1	1	315	107	2.30
Total Barium	mg/kg	1	1	563	309	58.4
Total Beryllium	mg/kg	1	1	6.66	3.84	0.540
Total Cadmium	mg/kg	1	0	1.23	0.600	<0.0200
Total Calcium	mg/kg	1	1	14,600	7,440	1,900
Total Chromium	mg/kg	1	1	29.1	23.6	5.20
Total Cobalt	mg/kg	1	1	33.3	19.2	3.40
Total Copper	mg/kg	1	1	51.9	41.3	4.20
Total Iron	mg/kg	1	1	39,000	32,000	11,100
Total Lead	mg/kg	1	1	21.7	18.3	6.30
Total Magnesium	mg/kg	1	1	7,480	4,840	1,610
Total Manganese	mg/kg	1	1	1,980	1,160	331
Total Mercury	mg/kg	1	0	0.130	0.130	<0.100
Total Nickel	mg/kg	1	1	28.2	22.5	4.00
Total Potassium	mg/kg	1	1	7,890	4,870	1,280
Total Selenium	mg/kg	1	1	1.90	1.18	0.760
Total Silver	mg/kg	1	0	0.150	0.150	<0.0700
Total Sodium	mg/kg	1	0	573	317	<45.5
Total Thallium	mg/kg	1	1	0.528	0.380	0.160
Total Uranium, Calculated	mg/kg	1	1	216	87.0	16.1
Total Vanadium	mg/kg	1	1	52.4	43.0	18.7
Total Zinc	mg/kg	1	1	153	89.5	23.2
Other Parameters						
Alkalinity, Total	mg/kg	1	1	301	198	123
Bicarbonate Alkalinity	mg/kg	1	1	301	198	123
Carbonate Alkalinity	mg/kg	1	0	10.0	10.0	<10.0
pH	SU	1	1	NA	NA	7.54
Total Organic Carbon	mg/kg	1	1	NA	NA	4,380

Table 5-37
SUMMARY OF ANALYTICAL RESULTS FOR THE NORTHERN DRAINAGE GRAB SEDIMENT SAMPLE

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Result
				BL (2)	RBL (3)	
Radionuclides						
Gross Alpha	pCi/g	1	1	218	115	24.3
Gross Beta	pCi/g	1	1	95.7	96.0	63.4
Total Lead 210	pCi/g	1	1	25.2	13.0	3.10
Total Polonium 210	pCi/g	1	1	21.4	11.0	2.60
Total Radium 226	pCi/g	1	1	19.6	10.6	2.90
Total Radium 228	pCi/g	1	1	5.77	4.70	5.60
Total Thorium 227	pCi/g	1	1	1.04	1.00	0.517
Total Thorium 228	pCi/g	1	1	6.76	4.48	8.34
Total Thorium 230	pCi/g	1	1	9.29	5.69	4.51
Total Thorium 232	pCi/g	1	1	5.74	3.81	8.33
Total Uranium 234	pCi/g	1	1	105	40.1	5.94
Total Uranium 235	pCi/g	1	1	4.29	1.76	0.348
Total Uranium 238	pCi/g	1	1	72.0	29.0	5.35

Notes:
(1) Parameters in bold exceed background limits
(2) 99% Upper Tolerance Limit for the URS background grab sediment sample data set
(3) 95% Upper Prediction Limit for the URS background grab sediment sample data set
NA = Not Applicable

Table 5-38
ANALYTICAL RESULTS FOR THE OUTFALL POND COMPOSITE SEDIMENT SAMPLE

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Result
				BL (2)	RBL (3)	
Inorganics						
Chloride	mg/kg	1	1	23.3	11.0	3.83
Nitrate	mg/kg	1	1	53.2	8.40	0.499
Nitrite	mg/kg	1	0	1.69	0.452	<0.0200
Nitrogen, Ammonia	mg/kg	1	1	58.3	16.4	2.41
Phosphate-P	mg/kg	1	1	36.7	16.0	4.75
Phosphorus	mg/kg	1	1	1,510	923	785
Sulfate	mg/kg	1	1	403	123	1,310
Metals						
Total Aluminum	mg/kg	1	1	24,100	19,900	17,100
Total Arsenic	mg/kg	1	1	239	86.5	7.20
Total Barium	mg/kg	1	1	424	255	165
Total Beryllium	mg/kg	1	1	2.62	2.18	0.980
Total Cadmium	mg/kg	1	1	1.23	0.615	0.140
Total Calcium	mg/kg	1	1	9,610	5,700	5,600
Total Chromium	mg/kg	1	1	24.4	20.2	18.1
Total Cobalt	mg/kg	1	1	15.2	12.6	10.2
Total Copper	mg/kg	1	1	36.6	29.9	18.3
Total Iron	mg/kg	1	1	29,700	25,100	18,000
Total Lead	mg/kg	1	1	27.0	19.9	15.5
Total Magnesium	mg/kg	1	1	6,260	4,300	3,980
Total Manganese	mg/kg	1	1	1,320	870	485
Total Mercury	mg/kg	1	0	0.140	0.140	<0.160 (4)
Total Nickel	mg/kg	1	1	24.8	20.0	14.6
Total Potassium	mg/kg	1	1	6,390	4,230	2,920
Total Selenium	mg/kg	1	1	2.43	1.38	0.920
Total Silver	mg/kg	1	0	0.240	0.240	<0.100
Total Sodium	mg/kg	1	1	230	192	206
Total Thallium	mg/kg	1	1	0.498	0.358	0.350
Total Uranium, Calculated	mg/kg	1	1	115	53.8	31.9
Total Vanadium	mg/kg	1	1	42.5	35.8	26.1
Total Zinc	mg/kg	1	1	137	84.6	73.3
Organic Compounds						
Total Petroleum Hydrocarbons-Diesel	ug/kg	1	1	NA	NA	37,000

Table 5-38
ANALYTICAL RESULTS FOR THE OUTFALL POND COMPOSITE SEDIMENT SAMPLE

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Result
				BL (2)	RBL (3)	
Other Parameters						
Alkalinity, Total	mg/kg	1	1	239	171	133
Bicarbonate Alkalinity	mg/kg	1	1	239	171	133
Carbonate Alkalinity	mg/kg	1	0	10.0	10.0	<10.0
pH	SU	1	1	NA	NA	7.20
Total Organic Carbon	mg/kg	1	1	NA	NA	22,300
Radionuclides						
Gross Alpha	pCi/g	1	1	161	92.9	70.3
Gross Beta	pCi/g	1	1	146	104	72.6
Total Lead 210	pCi/g	1	1	24.0	12.2	4.80
Total Polonium 210	pCi/g	1	1	20.8	11.0	9.50
Total Radium 226	pCi/g	1	1	15.2	9.14	6.91
Total Radium 228	pCi/g	1	1	9.63	6.22	1.51
Total Thorium 227	pCi/g	1	1	1.62	0.806	0.392
Total Thorium 228	pCi/g	1	1	11.2	6.34	1.02
Total Thorium 230	pCi/g	1	1	9.51	5.63	8.68
Total Thorium 232	pCi/g	1	1	13.1	13.1	0.949
Total Uranium 234	pCi/g	1	1	50.4	23.3	11.9
Total Uranium 235	pCi/g	1	1	2.92	1.31	0.740
Total Uranium 238	pCi/g	1	1	38.3	17.9	10.6

Notes:
(1) Parameters in bold exceed background limits
(2) 99% Upper Tolerance Limit for the URS background composite sediment sample data set
(3) 95% Upper Prediction Limit for the URS background composite sediment sample data set
(4) The result is a non-detect value higher than the RBL
NA = Not Applicable

Table 5-39
ANALYTICAL RESULTS FOR THE OUTFALL POND GRAB SEDIMENT SAMPLE

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Result
				BL (2)	RBL (3)	
Metals						
Total Aluminum	mg/kg	1	1	59,900	33,500	20,100
Total Antimony	mg/kg	1	1	1.00	1.00	1.80
Total Arsenic	mg/kg	1	1	315	107	82.1
Total Barium	mg/kg	1	1	563	309	112
Total Beryllium	mg/kg	1	0	6.66	3.84	<1.90
Total Cadmium	mg/kg	1	1	1.23	0.600	0.750
Total Calcium	mg/kg	1	1	14,600	7,440	12,300
Total Chromium	mg/kg	1	1	29.1	23.6	39.2
Total Cobalt	mg/kg	1	1	33.3	19.2	23.1
Total Copper	mg/kg	1	1	51.9	41.3	57.5
Total Iron	mg/kg	1	1	39,000	32,000	33,800
Total Lead	mg/kg	1	1	21.7	18.3	32.7
Total Magnesium	mg/kg	1	1	7,480	4,840	7,410
Total Manganese	mg/kg	1	1	1,980	1,160	3,090
Total Mercury	mg/kg	1	0	0.130	0.130	<0.160 (4)
Total Nickel	mg/kg	1	1	28.2	22.5	37.1
Total Potassium	mg/kg	1	1	7,890	4,870	3,060
Total Selenium	mg/kg	1	0	1.90	1.18	<1.20 (4)
Total Silver	mg/kg	1	0	0.150	0.150	<0.620 (4)
Total Sodium	mg/kg	1	1	573	317	658
Total Thallium	mg/kg	1	0	0.528	0.380	<1.90 (4)
Total Uranium	mg/kg	1	1	216	87.3	406
Total Vanadium	mg/kg	1	1	52.4	43.0	32.8
Total Zinc	mg/kg	1	1	153	89.5	142
Radionuclides						
Gross Alpha	pCi/g	1	1	218	115	510
Total Radium 226	pCi/g	1	0	19.6	10.6	<1.63
Total Radium 228	pCi/g	1	1	5.77	4.70	5.10
Total Thorium 228	pCi/g	1	0	6.76	4.48	<6.04 (4)
Total Thorium 230	pCi/g	1	1	9.29	5.69	50.3
Total Thorium 232	pCi/g	1	1	5.74	3.81	4.52
Total Uranium 234	pCi/g	1	1	105	40.1	126
Total Uranium 235	pCi/g	1	1	4.29	1.76	5.41
Total Uranium 238	pCi/g	1	1	72.0	29.0	137

Notes:

(1) Concentrations or activities of parameters in bold are greater than the RBL

(2) 99% Upper Tolerance Limit for the URS background grab sediment sample data set

(3) 95% Upper Prediction Limit for the URS background grab sediment sample data set

(4) The result is a non-detect value higher than the RBL

Table 5-40
SUMMARY OF ANALYTICAL RESULTS FOR UPPER EASTERN DRAINAGE COMPOSITE SEDIMENT SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Inorganics							
Chloride	mg/kg	8	8	23.3	11.0	1.15	4.23
Nitrate	mg/kg	8	8	53.2	8.40	0.0360	1.14
Nitrite	mg/kg	8	8	1.69	0.452	0.0570	0.801 (4)
Nitrogen, Ammonia	mg/kg	8	4	58.3	16.4	<0.0800	9.73
Phosphate-P	mg/kg	8	8	36.7	16.0	0.307	1.69
Phosphorus	mg/kg	8	8	1,510	923	11.6	450
Sulfate	mg/kg	8	8	403	123	640	1,780
Metals							
Total Aluminum	mg/kg	10	10	24,100	19,900	6,690	15,900
Total Antimony	mg/kg	4	2	2.10	2.10	<0.300	1.10
Total Arsenic	mg/kg	10	8	239	86.5	2.40	10.8
Total Barium	mg/kg	10	10	424	255	45.3	130
Total Beryllium	mg/kg	10	10	2.62	2.18	0.630	1.60
Total Cadmium	mg/kg	10	10	1.23	0.615	0.400	1.10
Total Calcium	mg/kg	8	8	9,610	5,700	3,220	7,950
Total Chromium	mg/kg	10	10	24.4	20.2	9.00	22.6
Total Cobalt	mg/kg	10	10	15.2	12.6	7.50	23.3
Total Copper	mg/kg	10	10	36.6	29.9	5.80	21.0
Total Iron	mg/kg	10	10	29,700	25,100	8,420	17,500
Total Lead	mg/kg	10	9	27.0	19.9	<4.00	11.8
Total Magnesium	mg/kg	8	8	6,260	4,300	2,190	4,380
Total Manganese	mg/kg	10	10	1,320	870	923	2,490
Total Mercury	mg/kg	10	0	0.140	0.140	<0.0200	<0.150 (5)
Total Molybdenum	mg/kg	3	2	2,060	61.8	<0.570	2.10
Total Nickel	mg/kg	10	10	24.8	20.0	12.0	32.0
Total Potassium	mg/kg	8	8	6,390	4,230	1,180	2,040
Total Selenium	mg/kg	10	5	2.43	1.38	<0.300	1.3
Total Silver	mg/kg	10	2	0.240	0.240	<0.0900	0.120
Total Sodium	mg/kg	8	8	230	192	108	268
Total Thallium	mg/kg	10	9	0.498	0.358	0.100	0.330
Total Uranium, Calculated	mg/kg	10	10	115	53.8	9.84	57.5
Total Vanadium	mg/kg	8	8	42.5	35.8	11.9	22.7
Total Zinc	mg/kg	10	10	137	84.6	33.0	86.2
Organic Compounds							
Total Petroleum Hydrocarbons-Diesel	ug/kg	5	5	NA	NA	15,000	44,000

Table 5-40
SUMMARY OF ANALYTICAL RESULTS FOR UPPER EASTERN DRAINAGE COMPOSITE SEDIMENT SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Other Parameters							
Alkalinity, Total	mg/kg	8	8	239	171	47.4	117
Bicarbonate Alkalinity	mg/kg	8	8	239	171	47.4	117
Carbonate Alkalinity	mg/kg	8	0	10.0	10.0	<8.00	<10.0
pH	SU	8	8	NA	NA	7.15	7.38
Total Organic Carbon	mg/kg	8	8	NA	NA	6,025	34,450
Radionuclides							
Gross Alpha	pCi/g	5	5	161	92.9	53.3	110
Gross Beta	pCi/g	5	5	146	104	54.6	99.1
Total Lead 210	pCi/g	8	8	24.0	12.2	5.10	12.0
Total Polonium 210	pCi/g	8	8	20.8	11.0	2.90	12.0
Total Radium 226	pCi/g	5	5	15.2	9.14	7.28	11.3
Total Radium 226, Calculated	pCi/g	3	3	15.2	9.14	4.44	11.2
Total Radium 228	pCi/g	8	8	9.63	6.22	1.82	2.41
Total Thorium 227	pCi/g	8	6	1.62	0.806	0.254	1.63
Total Thorium 228	pCi/g	8	7	11.2	6.34	0.934	2.36
Total Thorium 230	pCi/g	8	8	9.51	5.63	3.34	14.2
Total Thorium 232	pCi/g	8	8	13.1	13.1	0.959	2.04
Total Uranium 234	pCi/g	10	10	50.4	23.3	4.10	22.6
Total Uranium 235	pCi/g	10	10	2.92	1.31	0.00	1.16
Total Uranium 238	pCi/g	10	10	38.3	17.9	3.30	19.2

Notes:
(1) Parameters in bold exceed background limits for the URS samples
(2) 99% Upper Tolerance Limit for the URS background composite sediment sample data set
(3) 95% Upper Prediction Limit for the URS background composite sediment sample data set
(4) The maximum result is from a URS sample; the result was not confirmed by the verification sample
(5) The result is a non-detect value higher than the RBL
NA = Not Applicable

Table 5-41
SUMMARY OF ANALYTICAL RESULTS FOR UPPER EASTERN DRAINAGE GRAB SEDIMENT SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Metals							
Total Aluminum	mg/kg	7	7	59,900	33,500	5,200	20,800
Total Antimony	mg/kg	5	0	1.00	1.00	<1.30	<3.50 (4)
Total Arsenic	mg/kg	7	6	315	107	3.30	17.8
Total Barium	mg/kg	7	7	563	309	35.3	135
Total Beryllium	mg/kg	7	4	6.66	3.84	0.400	<1.90
Total Cadmium	mg/kg	7	4	1.23	0.600	<0.250	0.5 (5)
Total Calcium	mg/kg	5	5	14,600	7,440	6,370	21,400
Total Chromium	mg/kg	7	7	29.1	23.6	5.40	24.7
Total Cobalt	mg/kg	7	7	33.3	19.2	5.19	23.3
Total Copper	mg/kg	7	7	51.9	41.3	3.60	29.9
Total Iron	mg/kg	7	7	39,000	32,000	10,200	25,800
Total Lead	mg/kg	7	6	21.7	18.3	<4.00	15.4
Total Magnesium	mg/kg	5	5	7,480	4,840	2,920	6,710
Total Manganese	mg/kg	7	7	1,980	1,160	199	2,240
Total Mercury	mg/kg	7	0	0.130	0.130	<0.0200	<0.320 (4)
Total Nickel	mg/kg	7	7	28.2	22.5	9.00	34.9
Total Potassium	mg/kg	5	5	7,890	4,870	1,240	2,810
Total Selenium	mg/kg	7	1	1.90	1.18	<1.00	4.10
Total Silver	mg/kg	7	1	0.150	0.150	<0.0500	0.66
Total Sodium	mg/kg	5	5	573	317	240	498
Total Thallium	mg/kg	7	2	0.528	0.380	0.0800	0.11
Total Uranium	mg/kg	5	5	216	87.3	8.30	83.0
Total Uranium, Calculated	mg/kg	2	2	216	87.0	5.40	8.70
Total Vanadium	mg/kg	5	5	52.4	43.0	13.2	51.5
Total Zinc	mg/kg	7	7	153	89.5	28.0	97.7
Radionuclides							
Gross Alpha	pCi/g	5	5	218	115	37.8	258
Total Radium 226	pCi/g	5	2	19.6	10.6	<0.751	12.9
Total Radium 228	pCi/g	5	5	5.77	4.70	1.74	5.14
Total Thorium 228	pCi/g	5	2	6.76	4.48	<0.703	1.059
Total Thorium 230	pCi/g	5	5	9.29	5.69	3.21	34.5
Total Thorium 232	pCi/g	5	4	5.74	3.81	<0.577	4.42
Total Uranium 234	pCi/g	7	7	105	40.1	1.30	19.9
Total Uranium 235	pCi/g	7	7	4.29	1.76	0.0800	1.37
Total Uranium 238	pCi/g	7	7	72.0	29.0	1.80	19.7

Notes:

(1) Concentrations or activities of parameters in bold are greater than the RBL

(2) 99% Upper Tolerance Limit for the URS background grab sediment sample data set

(3) 95% Upper Prediction Limit for the URS background grab sediment sample data set

(4) The result is a non-detect value higher than the RBL

(5) The maximum result is reported from E&E samples

(6) The maximum result is reported from SMI samples

Table 5-42
SUMMARY OF ANALYTICAL RESULTS FOR UPPER EASTERN DRAINAGE RIPARIAN COMPOSITE SEDIMENT SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Inorganics							
Chloride	mg/kg	4	4	23.3	11.0	4.10	9.28
Nitrate	mg/kg	4	1	53.2	8.40	<0.0200	3.28
Nitrite	mg/kg	4	1	1.69	0.452	<0.0200	1.04
Nitrogen, Ammonia	mg/kg	4	4	58.3	16.4	5.09	33.5
Phosphate-P	mg/kg	4	4	36.7	16.0	0.763	3.19
Phosphorus	mg/kg	4	4	1,510	923	396	853
Sulfate	mg/kg	4	4	403	123	952	2,130
Metals							
Total Aluminum	mg/kg	4	4	24,100	19,900	11,800	21,000
Total Antimony	mg/kg	4	1	2.10	2.10	0.690	0.69
Total Arsenic	mg/kg	4	4	239	86.5	2.40	9.90
Total Barium	mg/kg	4	4	424	255	85.8	136
Total Beryllium	mg/kg	4	4	2.62	2.18	0.580	1.30
Total Cadmium	mg/kg	4	1	1.23	0.615	<0.500	0.5
Total Calcium	mg/kg	4	4	9,610	5,700	2,350	13,500
Total Chromium	mg/kg	4	4	24.4	20.2	9.50	22.3
Total Cobalt	mg/kg	4	4	15.2	12.6	4.90	12.2
Total Copper	mg/kg	4	4	36.6	29.9	10.3	22.1
Total Iron	mg/kg	4	4	29,700	25,100	12,500	20,300
Total Lead	mg/kg	4	4	27.0	19.9	14.3	21.3
Total Magnesium	mg/kg	4	4	6,260	4,300	2,660	6,420
Total Manganese	mg/kg	4	4	1,320	870	347	1,090
Total Mercury	mg/kg	4	0	0.140	0.140	<0.0600	<0.0900
Total Molybdenum	mg/kg	4	3	2,060	61.8	<0.890	3.30
Total Nickel	mg/kg	4	4	24.8	20.0	9.00	24.3
Total Potassium	mg/kg	4	4	6,390	4,230	2,110	3,380
Total Selenium	mg/kg	4	0	2.43	1.38	<0.300	<0.500
Total Silver	mg/kg	4	0	0.240	0.240	<0.100	<0.170
Total Sodium	mg/kg	4	4	230	192	130	415
Total Thallium	mg/kg	4	4	0.498	0.358	0.170	0.290
Total Uranium, Calculated	mg/kg	4	4	115	53.8	20.4	35.4
Total Vanadium	mg/kg	4	4	42.5	35.8	17.1	30.4
Total Zinc	mg/kg	4	4	137	84.6	48.1	65.6

Table 5-42
SUMMARY OF ANALYTICAL RESULTS FOR UPPER EASTERN DRAINAGE RIPARIAN COMPOSITE SEDIMENT SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Other Parameters							
Alkalinity, Total	mg/kg	4	4	239	171	73.8	308
Bicarbonate Alkalinity	mg/kg	4	4	239	171	73.8	308
Carbonate Alkalinity	mg/kg	4	0	10.0	10.0	<9.00	<10.0
pH	SU	4	4	NA	NA	6.48	7.40
Total Organic Carbon	mg/kg	4	4	NA	NA	55,900	65,300
Radionuclides							
Total Lead 210	pCi/g	4	4	24.0	12.2	1.90	12.0
Total Polonium 210	pCi/g	4	4	20.8	11.0	0.200	9.50
Total Radium 226, Calculated	pCi/g	4	4	15.2	9.14	0.851	8.32
Total Radium 228	pCi/g	4	4	9.63	6.22	0.651	2.64
Total Thorium 227	pCi/g	4	3	1.62	0.806	0.109	0.615
Total Thorium 228	pCi/g	4	4	11.2	6.34	0.590	2.10
Total Thorium 230	pCi/g	4	4	9.51	5.63	1.35	13.6
Total Thorium 232	pCi/g	4	4	13.1	13.1	0.607	1.99
Total Uranium 234	pCi/g	4	4	50.4	23.3	6.71	17.0
Total Uranium 235	pCi/g	4	4	2.92	1.31	0.293	0.621
Total Uranium 238	pCi/g	4	4	38.3	17.9	6.79	11.8

Notes:
(1) Parameters in bold exceed background limits
(2) 99% Upper Tolerance Limit for the URS background composite sediment sample data set
(3) 95% Upper Prediction Limit for the URS background composite sediment sample data set
NA = Not Applicable

Table 5-43
ANALYTICAL RESULTS FOR THE EAST SEEP COMPOSITE SEDIMENT SAMPLE

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Result
				BL (2)	RBL (3)	
Inorganics						
Chloride	mg/kg	1	1	23.3	11.0	5.35
Nitrate	mg/kg	1	1	53.2	8.40	0.156
Nitrite	mg/kg	1	0	1.69	0.452	<0.0200
Nitrogen, Ammonia	mg/kg	\	0	58.3	16.4	<0.463
Phosphate-P	mg/kg	1	0	36.7	16.0	<0.500
Phosphorus	mg/kg	1	1	1,510	923	646
Sulfate	mg/kg	1	1	403	123	250
Metals						
Total Aluminum	mg/kg	1	1	24,100	19,900	20,700
Total Antimony	mg/kg	1	1	2.10	2.10	0.210
Total Arsenic	mg/kg	1	1	239	86.5	5.30
Total Barium	mg/kg	1	1	424	255	121
Total Beryllium	mg/kg	1	1	2.62	2.18	2.50
Total Cadmium	mg/kg	1	1	1.23	0.615	0.310
Total Calcium	mg/kg	1	1	9,610	5,700	2,600
Total Chromium	mg/kg	1	1	24.4	20.2	20.0
Total Cobalt	mg/kg	1	1	15.2	12.6	33.6
Total Copper	mg/kg	1	1	36.6	29.9	44.0
Total Iron	mg/kg	1	1	29,700	25,100	16,400
Total Lead	mg/kg	1	1	27.0	19.9	22.1
Total Magnesium	mg/kg	1	1	6,260	4,300	5,870
Total Manganese	mg/kg	1	1	1,320	870	1,220
Total Mercury	mg/kg	1	0	0.140	0.140	<0.0900
Total Nickel	mg/kg	1	1	24.8	20.0	40.1
Total Potassium	mg/kg	1	1	6,390	4,230	2,480
Total Selenium	mg/kg	1	1	2.43	1.38	0.890
Total Silver	mg/kg	1	0	0.240	0.240	<0.0600
Total Sodium	mg/kg	1	1	230	192	152
Total Thallium	mg/kg	1	1	0.498	0.358	0.110
Total Uranium, Calculated	mg/kg	1	1	115	53.8	1,159
Total Vanadium	mg/kg	1	1	42.5	35.8	28.3
Total Zinc	mg/kg	1	1	137	84.6	117
Organic Compounds						
Total Petroleum Hydrocarbons-Diesel	ug/kg	1	1	NA	NA	110,000

Table 5-43
ANALYTICAL RESULTS FOR THE EAST SEEP COMPOSITE SEDIMENT SAMPLE

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Result
				BL (2)	RBL (3)	
Other Parameters						
Alkalinity, Total	mg/kg	1	1	239	171	29.0
Bicarbonate Alkalinity	mg/kg	1	1	239	171	29.0
Carbonate Alkalinity	mg/kg	1	0	10.0	10.0	<10.0
pH	SU	1	1	NA	NA	5.10
Total Organic Carbon	mg/kg	1	1	NA	NA	19,450
Radionuclides						
Gross Alpha	pCi/g	1	1	161	92.9	557
Gross Beta	pCi/g	1	1	146	104	645
Total Lead 210	pCi/g	1	1	24.0	12.2	7.30
Total Polonium 210	pCi/g	1	1	20.8	11.0	8.50
Total Radium 226	pCi/g	1	1	15.2	9.14	6.78
Total Radium 228	pCi/g	1	1	9.63	6.22	2.73
Total Thorium 227	pCi/g	1	0	1.62	0.806	<1.28 (4)
Total Thorium 228	pCi/g	1	0	11.2	6.34	<2.83
Total Thorium 230	pCi/g	1	1	9.51	5.63	19.2
Total Thorium 232	pCi/g	1	1	13.1	13.1	1.62
Total Uranium 234	pCi/g	1	1	50.4	23.3	407
Total Uranium 235	pCi/g	1	1	2.92	1.31	20.9
Total Uranium 238	pCi/g	1	1	38.3	17.9	386

Notes:
(1) Parameters in bold exceed background limits
(2) 99% Upper Tolerance Limit for the URS background composite sediment sample data set
(3) 95% Upper Prediction Limit for the URS background composite sediment sample data set
(4) The result is a non-detect value higher than the RBL
NA = Not Applicable

Table 5-44
SUMMARY OF ANALYTICAL RESULTS FOR LOWER EASTERN DRAINAGE COMPOSITE SEDIMENT SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Inorganics							
Chloride	mg/kg	2	2	23.3	11.0	2.72	3.43
Nitrate	mg/kg	2	1	53.2	8.40	<0.0300	0.0440
Nitrite	mg/kg	2	1	1.69	0.452	<0.0200	0.225
Nitrogen, Ammonia	mg/kg	2	2	58.3	16.4	8.56	13.2
Phosphate-P	mg/kg	2	2	36.7	16.0	2.57	2.72
Phosphorus	mg/kg	2	2	1,510	923	2.81	471
Sulfate	mg/kg	2	2	403	123	1,330	1,620
Metals							
Total Aluminum	mg/kg	4	4	24,100	19,900	9,740	18,500
Total Antimony	mg/kg	2	0	2.10	2.10	<0.310	<0.440
Total Arsenic	mg/kg	4	3	239	86.5	<4.00	11.9
Total Barium	mg/kg	4	4	424	255	93.7	257
Total Beryllium	mg/kg	4	4	2.62	2.18	0.750	3.50
Total Cadmium	mg/kg	4	4	1.23	0.615	1.70	14.4
Total Calcium	mg/kg	2	2	9,610	5,700	8,140	12,500
Total Chromium	mg/kg	4	4	24.4	20.2	8.20	23.1
Total Cobalt	mg/kg	4	4	15.2	12.6	9.93	31.9
Total Copper	mg/kg	4	4	36.6	29.9	7.60	22.1
Total Iron	mg/kg	4	4	29,700	25,100	10,800	18,500
Total Lead	mg/kg	4	3	27.0	19.9	<4.00	16.1
Total Magnesium	mg/kg	2	2	6,260	4,300	3,450	4,150
Total Manganese	mg/kg	4	4	1,320	870	6,040	33,600
Total Mercury	mg/kg	4	0	0.140	0.140	<0.0200	<0.100
Total Nickel	mg/kg	4	4	24.8	20.0	64.0	516
Total Potassium	mg/kg	2	2	6,390	4,230	1,680	2,520
Total Selenium	mg/kg	4	3	2.43	1.38	3.90	7.20
Total Silver	mg/kg	4	3	0.240	0.240	0.100	0.430
Total Sodium	mg/kg	2	2	230	192	204	241
Total Thallium	mg/kg	4	4	0.498	0.358	0.140	0.300
Total Uranium, Calculated	mg/kg	4	4	115	53.8	17.1	138
Total Vanadium	mg/kg	2	2	42.5	35.8	21.2	30.6
Total Zinc	mg/kg	4	4	137	84.6	92.0	553
Organic Compounds							
Total Petroleum Hydrocarbons-Diesel	ug/kg	2	2	NA	NA	17,000	49,000

Table 5-44
SUMMARY OF ANALYTICAL RESULTS FOR LOWER EASTERN DRAINAGE COMPOSITE SEDIMENT SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Other Parameters							
Alkalinity, Total	mg/kg	2	2	239	171	149	186
Bicarbonate Alkalinity	mg/kg	2	2	239	171	149	186
Carbonate Alkalinity	mg/kg	2	0	10.0	10.0	<10.0	<10.0
pH	SU	2	2	NA	NA	7.00	7.12
Total Organic Carbon	mg/kg	2	2	NA	NA	16,650	36,750
Radionuclides							
Gross Alpha	pCi/g	2	2	161	92.9	105	155
Gross Beta	pCi/g	2	2	146	104	83.2	139
Total Lead 210	pCi/g	2	2	24.0	12.2	3.30	6.50
Total Polonium 210	pCi/g	2	2	20.8	11.0	4.10	8.30
Total Radium 226	pCi/g	2	2	15.2	9.14	16.1	20.0
Total Radium 228	pCi/g	2	2	9.63	6.22	3.17	3.42
Total Thorium 227	pCi/g	2	1	1.62	0.806	<0.557	3.85
Total Thorium 228	pCi/g	2	1	11.2	6.34	2.97	2.97
Total Thorium 230	pCi/g	2	2	9.51	5.63	6.11	13.3
Total Thorium 232	pCi/g	2	2	13.1	13.1	2.72	3.08
Total Uranium 234	pCi/g	4	4	50.4	23.3	6.30	50.0
Total Uranium 235	pCi/g	4	4	2.92	1.31	0.240	4.83
Total Uranium 238	pCi/g	4	4	38.3	17.9	5.70	45.7

Notes:
(1) Parameters in bold exceed background limits for the URS samples
(2) 99% Upper Tolerance Limit for the URS background composite sediment sample data set
(3) 95% Upper Prediction Limit for the URS background composite sediment sample data set
NA = Not Applicable

Table 5-45
SUMMARY OF ANALYTICAL RESULTS FOR LOWER EASTERN DRAINAGE GRAB SEDIMENT SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Metals							
Total Aluminum	mg/kg	2	2	59,900	33,500	17,700	22,400
Total Antimony	mg/kg	2	0	1.00	1.00	<2.40	<2.60 (4)
Total Arsenic	mg/kg	2	2	315	107	11.3	14.7
Total Barium	mg/kg	2	2	563	309	252	254
Total Beryllium	mg/kg	2	2	6.66	3.84	2.20	3.80
Total Cadmium	mg/kg	2	2	1.23	0.600	7.10	9.60
Total Calcium	mg/kg	2	2	14,600	7,440	11,000	13,100
Total Chromium	mg/kg	2	2	29.1	23.6	22.9	27.0
Total Cobalt	mg/kg	2	2	33.3	19.2	29.1	35.9
Total Copper	mg/kg	2	2	51.9	41.3	20.3	29.8
Total Iron	mg/kg	2	2	39,000	32,000	18,500	21,600
Total Lead	mg/kg	2	2	21.7	18.3	13.3	16.5
Total Magnesium	mg/kg	2	2	7,480	4,840	5,030	5,450
Total Manganese	mg/kg	2	2	1,980	1,160	16,200	24,300
Total Mercury	mg/kg	2	0	0.130	0.130	<0.240	<0.260 (4)
Total Nickel	mg/kg	2	2	28.2	22.5	195	309
Total Potassium	mg/kg	2	2	7,890	4,870	2,160	2,610
Total Selenium	mg/kg	2	2	1.90	1.18	12.2	16.0
Total Silver	mg/kg	2	0	0.150	0.150	<0.980	<1.00 (4)
Total Sodium	mg/kg	2	2	573	317	461	519
Total Thallium	mg/kg	2	0	0.528	0.380	<2.90	<3.10 (4)
Total Uranium, Calculated	mg/kg	2	2	216	87.3	56.6	83.8
Total Vanadium	mg/kg	2	2	52.4	43.0	29.0	33.8
Total Zinc							
Radionuclides							
Gross Alpha	pCi/g	2	2	218	115	106	158
Total Radium 226	pCi/g	2	1	19.6	10.6	<0.123	7.42
Total Radium 228	pCi/g	2	2	5.77	4.70	3.15	5.80
Total Thorium 228	pCi/g	2	1	6.76	4.48	<1.77	1.87
Total Thorium 230	pCi/g	2	2	9.29	5.69	5.51	10.6
Total Thorium 232	pCi/g	2	2	5.74	3.81	0.979	2.24
Total Uranium 234	pCi/g	2	2	105	40.1	18.5	25.7
Total Uranium 235	pCi/g	2	2	4.29	1.76	0.964	1.40
Total Uranium 238	pCi/g	2	2	72.0	29.0	18.3	29.7

Notes:

(1) Concentrations or activities of parameters in bold are greater than the RBL

(2) 99% Upper Tolerance Limit for the URS background grab sediment sample data set

(3) 95% Upper Prediction Limit for the URS background grab sediment sample data set

(4) The result is a non-detect value higher than the RBL

Table 5-46
SUMMARY OF ANALYTICAL RESULTS FOR LOWER EASTERN DRAINAGE RIPARIAN COMPOSITE SEDIMENT SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Inorganics							
Chloride	mg/kg	1	1	23.3	11.0	10.1	10.1
Nitrate	mg/kg	1	0	53.2	8.40	<0.0200	<0.0200
Nitrite	mg/kg	1	0	1.69	0.452	<0.0200	<0.0200
Nitrogen, Ammonia	mg/kg	1	1	58.3	16.4	5.57	5.57
Phosphate-P	mg/kg	1	1	36.7	16.0	0.253	0.253
Phosphorus	mg/kg	1	1	1,510	923	373	373
Sulfate	mg/kg	1	1	403	123	1,784	1,784
Metals							
Total Aluminum	mg/kg	2	2	24,100	19,900	16,200	22,600 (4)
Total Antimony	mg/kg	1	0	2.10	2.10	<1.40	<1.40
Total Arsenic	mg/kg	2	2	239	86.5	8.90	18.9
Total Barium	mg/kg	2	2	424	255	162	193
Total Beryllium	mg/kg	2	2	2.62	2.18	2.30	3.40 (4)
Total Cadmium	mg/kg	2	2	1.23	0.615	3.80	10.8
Total Calcium	mg/kg	2	2	9,610	5,700	8,830	10,000
Total Chromium	mg/kg	2	2	24.4	20.2	16.9	26.2 (4)
Total Cobalt	mg/kg	2	2	15.2	12.6	21.8	29.5
Total Copper	mg/kg	2	2	36.6	29.9	22.4	27.2
Total Iron	mg/kg	2	2	29,700	25,100	16,300	24,100
Total Lead	mg/kg	2	2	27.0	19.9	16.8	18.0
Total Magnesium	mg/kg	2	2	6,260	4,300	3,900	4,980 (4)
Total Manganese	mg/kg	2	2	1,320	870	7,500	17,100
Total Mercury	mg/kg	1	0	0.140	0.140	<0.0800	<0.0800
Total Molybdenum	mg/kg	2	2	2,060	61.8	4.10	9.00
Total Nickel	mg/kg	2	2	24.8	20.0	129	237
Total Potassium	mg/kg	2	2	6,390	4,230	2,510	3,350
Total Selenium	mg/kg	2	1	2.43	1.38	<0.450	0.590
Total Silver	mg/kg	2	1	0.240	0.240	<0.150	0.320 (4)
Total Sodium	mg/kg	2	2	230	192	197	223 (4)
Total Thallium	mg/kg	1	1	0.498	0.358	0.220	0.220
Total Uranium, Calculated	mg/kg	1	1	115	53.8	126	126
Total Vanadium	mg/kg	2	2	42.5	35.8	25.0	36.3 (4)
Total Zinc	mg/kg	2	2	137	84.6	181	305

Table 5-46
SUMMARY OF ANALYTICAL RESULTS FOR LOWER EASTERN DRAINAGE RIPARIAN COMPOSITE SEDIMENT SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Other Parameters							
Alkalinity, Total	mg/kg	1	1	239	171	92.0	92.0
Bicarbonate Alkalinity	mg/kg	1	1	239	171	92.0	92.0
Carbonate Alkalinity	mg/kg	1	0	10.0	10.0	<9.00	<9.00
pH	SU	1	1	NA	NA	7.04	7.04
Total Organic Carbon	mg/kg	1	1	NA	NA	34,000	34,000
Radionuclides							
Total Lead 210	pCi/g	1	1	24.0	12.2	9.00	9.00
Total Polonium 210	pCi/g	1	1	20.8	11.0	13.0	13.0
Total Radium 226, Calculated	pCi/g	1	1	15.2	9.14	15.3	15.3
Total Radium 228	pCi/g	1	1	9.63	6.22	3.13	3.13
Total Uranium 234	pCi/g	2	2	50.4	23.3	44.0	45.8 (5)
Total Uranium 235	pCi/g	2	2	2.92	1.31	2.03	2.20 (5)
Total Uranium 238	pCi/g	2	2	38.3	17.9	41.0	41.9

Notes:
(1) Parameters in bold exceed background limits
(2) 99% Upper Tolerance Limit for the URS background composite sediment sample data set
(3) 95% Upper Prediction Limit for the URS background composite sediment sample data set
(4) The maximum value is from the verification sample; the associated primary sample did not exceed the BL
(5) The maximum value is from the primary sample and did not exceed the BL
NA = Not Applicable

Table 5-47
SUMMARY OF ANALYTICAL RESULTS FOR CENTRAL DRAINAGE COMPOSITE SEDIMENT SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Inorganics							
Chloride	mg/kg	5	5	23.3	11.0	1.77	5.62
Nitrate	mg/kg	5	5	53.2	8.40	0.04	1.13
Nitrite	mg/kg	5	3	1.69	0.452	<0.0200	0.45
Nitrogen, Ammonia	mg/kg	5	4	58.3	16.4	0.988	5.12
Phosphate-P	mg/kg	4	3	36.7	16.0	0.79	8.66
Phosphorus	mg/kg	5	5	1,510	923	268	574
Sulfate	mg/kg	5	5	403	123	28.4	2,400
Metals							
Total Aluminum	mg/kg	7	7	24,100	19,900	12,200	30,500
Total Antimony	mg/kg	6	2	2.10	2.10	<0.36	1.2
Total Arsenic	mg/kg	7	7	239	86.5	3.20	44.6
Total Barium	mg/kg	7	7	424	255	86.1	188
Total Beryllium	mg/kg	7	7	2.62	2.18	1.20	10.7
Total Cadmium	mg/kg	7	7	1.23	0.615	1.40	5.3
Total Calcium	mg/kg	7	7	9,610	5,700	3,100	7,830
Total Chromium	mg/kg	7	7	24.4	20.2	7.60	21.6
Total Cobalt	mg/kg	7	7	15.2	12.6	12.3	144
Total Copper	mg/kg	7	7	36.6	29.9	11.5	103
Total Iron	mg/kg	7	7	29,700	25,100	13,600	29,800
Total Lead	mg/kg	7	7	27.0	19.9	13.4	30
Total Magnesium	mg/kg	7	7	6,260	4,300	3,300	7,050
Total Manganese	mg/kg	7	7	1,320	870	1,550	4,650
Total Mercury	mg/kg	5	0	0.140	0.140	<0.0600	<0.0800
Total Nickel	mg/kg	7	7	24.8	20.0	23.7	281
Total Potassium	mg/kg	7	7	6,390	4,230	2,230	2,980
Total Selenium	mg/kg	7	4	2.43	1.38	<0.21	0.92
Total Silver	mg/kg	7	0	0.240	0.240	<0.0700	<0.11
Total Sodium	mg/kg	7	7	230	192	136	213
Total Thallium	mg/kg	5	5	0.498	0.358	0.170	1.8
Total Uranium, Calculated	mg/kg	5	5	115	53.8	228	2,271
Total Vanadium	mg/kg	7	7	42.5	35.8	18.6	36.8
Total Zinc	mg/kg	7	7	137	84.6	75.4	866
Organic Compounds							
Total Petroleum Hydrocarbons-Diesel	ug/kg	2	2	NA	NA	100,000	150,000

Table 5-47
SUMMARY OF ANALYTICAL RESULTS FOR CENTRAL DRAINAGE COMPOSITE SEDIMENT SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Other Parameters							
Alkalinity, Total	mg/kg	5	5	239	171	30.0	151
Bicarbonate Alkalinity	mg/kg	5	5	239	171	30.0	151
Carbonate Alkalinity	mg/kg	5	0	10.0	10.0	<10.0	<10.0
pH	SU	5	5	NA	NA	4.82	7.14
Total Organic Carbon	mg/kg	5	5	NA	NA	4,025	43,200
Radionuclides							
Gross Alpha	pCi/g	6	6	161	92.9	16	1,700
Gross Beta	pCi/g	6	6	146	104	9.9	1,300
Total Lead 210	pCi/g	5	5	24.0	12.2	2.30	7.20
Total Polonium 210	pCi/g	5	5	20.8	11.0	2.50	94
Total Radium 226	pCi/g	4	4	15.2	9.14	2.84	242
Total Radium 228	pCi/g	5	5	9.63	6.22	1.89	3.53
Total Thorium 227	pCi/g	2	0	1.62	0.806	-0.42	<1.05 (4)
Total Thorium 228	pCi/g	2	0	11.2	6.34	<2.31	<3.08
Total Thorium 230	pCi/g	2	2	9.51	5.63	3.85	41.8
Total Thorium 232	pCi/g	2	2	13.1	13.1	2.17	3.84
Total Uranium 234	pCi/g	2	2	50.4	23.3	77.7	361
Total Uranium 235	pCi/g	2	2	2.92	1.31	3.61	21.6
Total Uranium 238	pCi/g	2	2	38.3	17.9	76.0	338

Notes:
(1) Parameters in bold exceed background limits for the URS samples
(2) 99% Upper Tolerance Limit for the URS background composite sediment sample data set
(3) 95% Upper Prediction Limit for the URS background composite sediment sample data set
(4) The result is a non-detect value higher than the RBL
NA = Not Applicable

Table 5-48
SUMMARY OF ANALYTICAL RESULTS FOR CENTRAL DRAINAGE GRAB SEDIMENT SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Metals							
Total Aluminum	mg/kg	5	5	59,900	33,500	6,560	44,500
Total Antimony	mg/kg	5	0	1.00	1.00	<1.10	2.7
Total Arsenic	mg/kg	5	5	315	107	3.90	76.2
Total Barium	mg/kg	5	5	563	309	31.9	162
Total Beryllium	mg/kg	5	5	6.66	3.84	0.610	24.4
Total Cadmium	mg/kg	5	4	1.23	0.600	<0.250	10.2
Total Calcium	mg/kg	5	5	14,600	7,440	1,930	14,000
Total Chromium	mg/kg	5	5	29.1	23.6	6.10	33.1
Total Cobalt	mg/kg	5	5	33.3	19.2	11.8	382
Total Copper	mg/kg	5	5	51.9	41.3	10.7	171
Total Iron	mg/kg	5	5	39,000	32,000	9,590	39,500
Total Lead	mg/kg	5	5	21.7	18.3	9.40	49.9
Total Magnesium	mg/kg	5	5	7,480	4,840	2,230	7,580
Total Manganese	mg/kg	5	5	1,980	1,160	983	6,910
Total Mercury	mg/kg	5	0	0.130	0.130	<0.110	<0.250 (4)
Total Nickel	mg/kg	5	5	28.2	22.5	14.0	502
Total Potassium	mg/kg	5	5	7,890	4,870	856	3,460
Total Selenium	mg/kg	5	3	1.90	1.18	<0.860	6.2
Total Silver	mg/kg	5	0	0.150	0.150	<0.430	<1.1 (4)
Total Sodium	mg/kg	5	5	573	317	151	474
Total Thallium	mg/kg	5	2	0.528	0.380	<1.30	3.2
Total Uranium	mg/kg	5	5	216	87.3	144	4,140
Total Vanadium	mg/kg	5	4	52.4	43.0	<0.210	29.9
Total Zinc	mg/kg	5	5	153	89.5	35.5	1,080
Radionuclides							
Gross Alpha	pCi/g	5	5	218	115	172	4,752
Total Radium 226	pCi/g	5	2	19.6	10.6	<0.545	263
Total Radium 228	pCi/g	5	4	5.77	4.70	2.07	6.02
Total Thorium 228	pCi/g	5	1	6.76	4.48	<1.59	92.8
Total Thorium 230	pCi/g	5	5	9.29	5.69	3.39	124
Total Thorium 232	pCi/g	5	2	5.74	3.81	1.35	70.3
Total Uranium 234	pCi/g	5	5	105	40.1	43.1	1,432
Total Uranium 235	pCi/g	5	5	4.29	1.76	4.23	137
Total Uranium 238	pCi/g	5	5	72.0	29.0	40.7	1,432

Notes:

(1) Concentrations or activities of parameters in bold are greater than the RBL

(2) 99% Upper Tolerance Limit for the URS background grab sediment sample data set

(3) 95% Upper Prediction Limit for the URS background grab sediment sample data set

(4) The result is a non-detect value higher than the RBL

Table 5-49
SUMMARY OF ANALYTICAL RESULTS FOR CENTRAL DRAINAGE RIPARIAN COMPOSITE SEDIMENT SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Inorganics							
Chloride	mg/kg	2	2	23.3	11.0	1.77	1.84
Nitrate	mg/kg	2	2	53.2	8.40	0.145	1.13
Nitrite	mg/kg	2	2	1.69	0.452	0.390	0.448
Nitrogen, Ammonia	mg/kg	2	2	58.3	16.4	1.40	1.40
Phosphate-P	mg/kg	2	1	36.7	16.0	<0.787	1.44
Phosphorus	mg/kg	2	2	1,510	923	382	574
Sulfate	mg/kg	2	2	403	123	28.4	511
Metals							
Total Aluminum	mg/kg	4	4	24,100	19,900	13,400	30,500 (4)
Total Antimony	mg/kg	4	2	2.10	2.10	<0.620	1.20
Total Arsenic	mg/kg	4	4	239	86.5	7.40	37.7
Total Barium	mg/kg	4	4	424	255	86.1	145
Total Beryllium	mg/kg	4	4	2.62	2.18	1.20	10.3
Total Cadmium	mg/kg	4	4	1.23	0.615	1.50	4.30
Total Calcium	mg/kg	4	4	9,610	5,700	3,760	5,390
Total Chromium	mg/kg	4	4	24.4	20.2	11.4	21.6 (4)
Total Cobalt	mg/kg	4	4	15.2	12.6	28.9	114
Total Copper	mg/kg	4	4	36.6	29.9	16.8	68.5
Total Iron	mg/kg	4	4	29,700	25,100	14,300	29,200 (4)
Total Lead	mg/kg	4	4	27.0	19.9	13.4	23.4 (4)
Total Magnesium	mg/kg	4	4	6,260	4,300	4,740	7,050 (4)
Total Manganese	mg/kg	4	4	1,320	870	1,550	3,970
Total Mercury	mg/kg	2	0	0.140	0.140	<0.0500	<0.0500
Total Molybdenum	mg/kg	4	4	2,060	61.8	1.50	7.50
Total Nickel	mg/kg	4	4	24.8	20.0	43.6	281
Total Potassium	mg/kg	4	4	6,390	4,230	2,230	2,980
Total Selenium	mg/kg	4	1	2.43	1.38	<0.210	0.27
Total Silver	mg/kg	4	0	0.240	0.240	<0.0600	<0.100
Total Sodium	mg/kg	4	4	230	192	136	213 (4)
Total Thallium	mg/kg	2	2	0.498	0.358	0.230	1.80
Total Uranium, Calculated	mg/kg	2	2	115	53.8	460	2,271
Total Vanadium	mg/kg	4	4	42.5	35.8	18.6	36.8 (4)
Total Zinc	mg/kg	4	4	137	84.6	79.3	866

Table 5-49
SUMMARY OF ANALYTICAL RESULTS FOR CENTRAL DRAINAGE RIPARIAN COMPOSITE SEDIMENT SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Other Parameters							
Alkalinity, Total	mg/kg	2	2	239	171	75.0	107
Bicarbonate Alkalinity	mg/kg	2	2	239	171	75.0	107
Carbonate Alkalinity	mg/kg	2	0	10.0	10.0	<9.00	<9.00
Cation Exchange Capacity	meq/g	1	1	NA	NA	0.283	0.283
pH	SU	2	2	NA	NA	6.23	6.32
Total Organic Carbon	mg/kg	2	2	NA	NA	29,600	43,200
Radionuclides							
Total Lead 210	pCi/g	2	2	24.0	12.2	6.80	23.0
Total Polonium 210	pCi/g	2	2	20.8	11.0	9.10	31.0
Total Radium 226	pCi/g	1	1	15.2	9.14	41.1	41.1
Total Radium, Calculated	pCi/g	2	2	15.2	9.14	9.11	45.9
Total Radium 228	pCi/g	2	2	9.63	6.22	2.33	2.87
Total Thorium 227	pCi/g	2	0	1.62	0.806	<0.708	<2.21
Total Thorium 228	pCi/g	2	0	11.2	6.34	<2.87	<4.64
Total Thorium 230	pCi/g	2	2	9.51	5.63	11.4	55.4
Total Thorium 232	pCi/g	2	1	13.1	13.1	<1.67	3.50
Total Uranium 234	pCi/g	4	4	50.4	23.3	165	1,560
Total Uranium 235	pCi/g	4	4	2.92	1.31	10.3	66.0
Total Uranium 238	pCi/g	4	4	38.3	17.9	153	1,550

Notes:
(1) Parameters in bold exceed background limits
(2) 99% Upper Tolerance Limit for the URS background composite sediment sample data set
(3) 95% Upper Prediction Limit for the URS background composite sediment sample data set
(4) The maximum value is from the verification sample; the associated primary sample did not exceed the BL
NA = Not Applicable

Table 5-50
ANALYTICAL RESULTS FOR THE CENTRAL DRAINAGE SEEP COMPOSITE SEDIMENT SAMPLE

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Result
				BL (2)	RBL (3)	
Inorganics						
Chloride	mg/kg	1	1	23.3	11.0	4.13
Nitrate	mg/kg	1	1	53.2	8.40	0.914
Nitrite	mg/kg	1	1	1.69	0.452	0.258
Nitrogen, Ammonia	mg/kg	1	0	58.3	16.4	<5.12
Phosphorus	mg/kg	1	1	1,510	923	268
Sulfate	mg/kg	1	1	403	123	2,400
Metals						
Total Aluminum	mg/kg	1	1	24,100	19,900	26,500
Total Antimony	mg/kg	1	0	2.10	2.10	<0.360
Total Arsenic	mg/kg	1	1	239	86.5	44.6
Total Barium	mg/kg	1	1	424	255	188
Total Beryllium	mg/kg	1	1	2.62	2.18	10.7
Total Cadmium	mg/kg	1	1	1.23	0.615	5.30
Total Calcium	mg/kg	1	1	9,610	5,700	7,830
Total Chromium	mg/kg	1	1	24.4	20.2	19.1
Total Cobalt	mg/kg	1	1	15.2	12.6	144
Total Copper	mg/kg	1	1	36.6	29.9	103
Total Iron	mg/kg	1	1	29,700	25,100	29,800
Total Lead	mg/kg	1	1	27.0	19.9	30.0
Total Magnesium	mg/kg	1	1	6,260	4,300	5,750
Total Manganese	mg/kg	1	1	1,320	870	4,650
Total Mercury	mg/kg	1	0	0.140	0.140	<0.0800
Total Nickel	mg/kg	1	1	24.8	20.0	230
Total Potassium	mg/kg	1	1	6,390	4,230	2,610
Total Selenium	mg/kg	1	1	2.43	1.38	0.920
Total Silver	mg/kg	1	0	0.240	0.240	<0.110
Total Sodium	mg/kg	1	1	230	192	191
Total Thallium	mg/kg	1	1	0.498	0.358	0.480
Total Uranium, Calculated	mg/kg	1	1	115	53.8	1,808
Total Vanadium	mg/kg	1	1	42.5	35.8	35.4
Total Zinc	mg/kg	1	1	137	84.6	611
Organic Compounds						
Total Petroleum Hydrocarbons-Diesel	ug/kg	1	1	NA	NA	55,000

Table 5-50
ANALYTICAL RESULTS FOR THE CENTRAL DRAINAGE SEEP COMPOSITE SEDIMENT SAMPLE

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Result
				BL (2)	RBL (3)	
Other Parameters						
Alkalinity, Total	mg/kg	1	1	239	171	103
Bicarbonate Alkalinity	mg/kg	1	1	239	171	103
Carbonate Alkalinity	mg/kg	1	0	10.0	10.0	<10.0
pH	SU	1	1	NA	NA	7.14
Total Organic Carbon	mg/kg	1	1	NA	NA	4,025
Radionuclides						
Gross Alpha	pCi/g	1	1	161	92.9	1,700
Gross Beta	pCi/g	1	1	146	104	1,300
Total Lead 210	pCi/g	1	1	24.0	12.2	110
Total Polonium 210	pCi/g	1	1	20.8	11.0	94.0
Total Radium 226	pCi/g	1	1	15.2	9.14	242
Total Radium 228	pCi/g	1	1	9.63	6.22	2.80
Total Thorium 227	pCi/g	1	0	1.62	0.806	<10.0 (4)
Total Thorium 228	pCi/g	1	0	11.2	6.34	-14.60
Total Thorium 230	pCi/g	1	1	9.51	5.63	167
Total Thorium 232	pCi/g	1	0	13.1	13.1	0.00
Total Uranium 234	pCi/g	1	1	50.4	23.3	647
Total Uranium 235	pCi/g	1	1	2.92	1.31	57.9
Total Uranium 238	pCi/g	1	1	38.3	17.9	598

Notes:
(1) Parameters in bold exceed background limits
(2) 99% Upper Tolerance Limit for the URS background composite sediment sample data set
(3) 95% Upper Prediction Limit for the URS background composite sediment sample data set
(4) The result is a non-detect value higher than the RBL
NA = Not Applicable

Table 5-51
ANALYTICAL RESULTS FOR THE CENTRAL DRAINAGE SEEP GRAB SEDIMENT SAMPLE

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Result
				BL (2)	RBL (3)	
Metals						
Total Aluminum	mg/kg	1	1	59,900	33,500	44,500
Total Antimony	mg/kg	1	0	1.00	1.00	<2.70 (4)
Total Arsenic	mg/kg	1	1	315	107	76.2
Total Barium	mg/kg	1	1	563	309	162
Total Beryllium	mg/kg	1	1	6.66	3.84	24.4
Total Cadmium	mg/kg	1	1	1.23	0.600	10.2
Total Calcium	mg/kg	1	1	14,600	7,440	14,000
Total Chromium	mg/kg	1	1	29.1	23.6	33.1
Total Cobalt	mg/kg	1	1	33.3	19.2	382
Total Copper	mg/kg	1	1	51.9	41.3	171
Total Iron	mg/kg	1	1	39,000	32,000	39,500
Total Lead	mg/kg	1	1	21.7	18.3	49.9
Total Magnesium	mg/kg	1	1	7,480	4,840	7,580
Total Manganese	mg/kg	1	1	1,980	1,160	6,910
Total Mercury	mg/kg	1	0	0.130	0.130	<0.250 (4)
Total Nickel	mg/kg	1	1	28.2	22.5	502
Total Potassium	mg/kg	1	1	7,890	4,870	3,460
Total Selenium	mg/kg	1	1	1.90	1.18	6.20
Total Silver	mg/kg	1	0	0.150	0.150	<1.10 (4)
Total Sodium	mg/kg	1	1	573	317	474
Total Thallium	mg/kg	1	1	0.528	0.380	3.20
Total Uranium, Calculated	mg/kg	1	1	216	87.3	4,140
Total Vanadium	mg/kg	1	1	52.4	43.0	16.7
Total Zinc	mg/kg	1	1	153	89.5	1,080
Radionuclides						
Gross Alpha	pCi/g	1	1	218	115	4,752
Total Radium 226	pCi/g	1	1	19.6	10.6	263
Total Radium 228	pCi/g	1	0	5.77	4.70	<2.70
Total Thorium 228	pCi/g	1	0	6.76	4.48	<92.8 (4)
Total Thorium 230	pCi/g	1	1	9.29	5.69	124
Total Thorium 232	pCi/g	1	0	5.74	3.81	<70.3 (4)
Total Uranium 234	pCi/g	1	1	105	40.1	1,432
Total Uranium 235	pCi/g	1	1	4.29	1.76	137
Total Uranium 238	pCi/g	1	1	72.0	29.0	1,432

Notes:

(1) Concentrations or activities of parameters in bold are greater than the RBL

(2) 99% Upper Tolerance Limit for the URS background grab sediment sample data set

(3) 95% Upper Prediction Limit for the URS background grab sediment sample data set

(4) The result is a non-detect value higher than the RBL

NA = Not Applicable

Table 5-52
SUMMARY OF ANALYTICAL RESULTS FOR WESTERN DRAINAGE COMPOSITE SEDIMENT SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Inorganics							
Chloride	mg/kg	2	2	23.3	11.0	0.953	3.45
Nitrate	mg/kg	2	2	53.2	8.40	0.0390	0.155
Nitrite	mg/kg	2	1	1.69	0.452	<0.0200	0.0230
Nitrogen, Ammonia	mg/kg	2	1	58.3	16.4	<0.201	1.47
Phosphate-P	mg/kg	2	2	36.7	16.0	0.775	1.10
Phosphorus	mg/kg	2	2	1,510	923	335	1,428
Sulfate	mg/kg	2	2	403	123	15.5	972
Metals							
Total Aluminum	mg/kg	6	6	24,100	19,900	5,930	14,000
Total Arsenic	mg/kg	6	2	239	86.5	<4.00	8.10
Total Barium	mg/kg	6	6	424	255	38.5	88.9
Total Beryllium	mg/kg	6	6	2.62	2.18	0.870	2.16
Total Cadmium	mg/kg	6	6	1.23	0.615	0.190	1.20
Total Calcium	mg/kg	2	2	9,610	5,700	1,190	2,140
Total Chromium	mg/kg	6	6	24.4	20.2	3.50	10.8
Total Cobalt	mg/kg	6	6	15.2	12.6	6.24	33.5
Total Copper	mg/kg	6	6	36.6	29.9	6.70	19.9
Total Iron	mg/kg	6	6	29,700	25,100	8,910	16,700
Total Lead	mg/kg	6	6	27.0	19.9	5.00	20.0 (4)
Total Magnesium	mg/kg	2	2	6,260	4,300	2,100	2,680
Total Manganese	mg/kg	6	6	1,320	870	540	12,900
Total Mercury	mg/kg	6	0	0.140	0.140	<0.0200	<0.0800
Total Nickel	mg/kg	6	6	24.8	20.0	9.60	39.0
Total Potassium	mg/kg	2	2	6,390	4,230	1,630	2,150
Total Selenium	mg/kg	6	3	2.43	1.38	0.360	4 (5)
Total Silver	mg/kg	6	3	0.24	0.24	<0.07	0.13
Total Sodium	mg/kg	6	6	230	192	48.4	105
Total Thallium	mg/kg	2	2	0.498	0.358	0.110	0.370
Total Uranium, Calculated	mg/kg	6	6	115	53.8	62.4	293
Total Vanadium	mg/kg	6	6	42.5	35.8	12.4	22.3
Total Zinc	mg/kg	2	2	137	84.6	37.7	74.5
Organic Compounds							
Total Petroleum Hydrocarbons-Diesel	ug/kg	2	2	NA	NA	19,000	43,000

Table 5-52
SUMMARY OF ANALYTICAL RESULTS FOR WESTERN DRAINAGE COMPOSITE SEDIMENT SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Other Parameters							
Alkalinity, Total	mg/kg	2	2	239	171	45.9	105
Bicarbonate Alkalinity	mg/kg	2	2	239	171	45.9	105
Carbonate Alkalinity	mg/kg	2	0	10.0	10.0	<10.0	<10.0
pH	SU	2	2	NA	NA	6.14	6.16
Total Organic Carbon	mg/kg	2	2	NA	NA	4,250	11,850
Radionuclides							
Gross Alpha	pCi/g	2	2	161	92.9	99.3	168
Gross Beta	pCi/g	2	2	146	104	103	165
Total Lead 210	pCi/g	2	2	24.0	12.2	3.20	4.70
Total Polonium 210	pCi/g	2	2	20.8	11.0	3.80	4.60
Total Radium 226	pCi/g	2	2	15.2	9.14	4.19	8.31
Total Radium 228	pCi/g	2	2	9.63	6.22	2.98	4.24
Total Thorium 227	pCi/g	2	0	1.62	0.806	<0.173	<0.446
Total Thorium 228	pCi/g	2	2	11.2	6.34	3.12	6.05
Total Thorium 230	pCi/g	2	2	9.51	5.63	5.01	6.88
Total Thorium 232	pCi/g	2	2	13.1	13.1	3.36	4.63
Total Uranium 234	pCi/g	6	6	50.4	23.3	22.3	110
Total Uranium 235	pCi/g	6	6	2.92	1.31	1.65	3.83
Total Uranium 238	pCi/g	6	6	38.3	17.9	20.7	98.0

Notes:
(1) Parameters in bold exceed background limits for the URS samples
(2) 99% Upper Tolerance Limit for the URS background composite sediment sample data set
(3) 95% Upper Prediction Limit for the URS background composite sediment sample data set
(4) The maximum value is from an SMI sample
(5) The maximum result is reported from SMI samples
NA = Not Applicable

Table 5-53
SUMMARY OF ANALYTICAL RESULTS FOR WESTERN DRAINAGE GRAB SEDIMENT SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Metals							
Total Aluminum	mg/kg	4	4	59,900	33,500	5,190	15,700
Total Antimony	mg/kg	2	0	1.00	1.00	<1.00	<1.10 (4)
Total Arsenic	mg/kg	4	2	315	107	2.80	<20.0
Total Barium	mg/kg	4	4	563	309	31.5	68.1
Total Beryllium	mg/kg	4	4	6.66	3.84	0.780	4.14
Total Cadmium	mg/kg	4	2	1.23	0.600	<0.200	1.00
Total Calcium	mg/kg	2	2	14,600	7,440	1,180	2,270
Total Chromium	mg/kg	4	4	29.1	23.6	2.60	7.30
Total Cobalt	mg/kg	4	4	33.3	19.2	4.05	7.30
Total Copper	mg/kg	4	4	51.9	41.3	7.90	20.4
Total Iron	mg/kg	4	4	39,000	32,000	8,520	14,100
Total Lead	mg/kg	4	4	21.7	18.3	5.00	10.0
Total Magnesium	mg/kg	2	2	7,480	4,840	1,870	1,950
Total Manganese	mg/kg	4	4	1,980	1,160	443	910
Total Mercury	mg/kg	4	1	0.130	0.130	<0.0200	0.02
Total Nickel	mg/kg	4	4	28.2	22.5	5.90	23.0
Total Potassium	mg/kg	2	2	7,890	4,870	1,100	1,260
Total Selenium	mg/kg	4	0	1.90	1.18	<0.820	<20.0 (4)
Total Silver	mg/kg	4	2	0.150	0.150	0.0600	0.14
Total Sodium	mg/kg	2	2	573	317	98.1	113
Total Thallium	mg/kg	4	2	0.528	0.380	0.120	0.17
Total Uranium	mg/kg	2	2	216	87.3	27.2	41.4
Total Uranium, Calculated	mg/kg	2	2	216	87.0	234	330
Total Vanadium	mg/kg	2	2	52.4	43.0	11.4	12.8
Total Zinc	mg/kg	4	4	153	89.5	32.7	93.0
Radionuclides							
Gross Alpha	pCi/g	2	2	218	115	48.0	68.1
Total Radium 226	pCi/g	2	0	19.6	10.6	<0.453	<0.593
Total Radium 228	pCi/g	2	2	5.77	4.70	2.81	2.83
Total Thorium 228	pCi/g	2	2	6.76	4.48	1.04	1.13
Total Thorium 230	pCi/g	2	2	9.29	5.69	1.91	3.45
Total Thorium 232	pCi/g	2	2	5.74	3.81	1.57	1.63
Total Uranium 234	pCi/g	4	4	105	40.1	6.05	110
Total Uranium 235	pCi/g	4	3	4.29	1.76	<0.297	4.30
Total Uranium 238	pCi/g	4	4	72.0	29.0	6.40	110

Notes:
(1) Concentrations or activities of parameters in bold are greater than the RBL
(2) 99% Upper Tolerance Limit for the URS background grab sediment sample data set
(3) 95% Upper Prediction Limit for the URS background grab sediment sample data set
(4) The maximum is a non-detect value higher than the RBL

Table 5-54
SUMMARY OF ANALYTICAL RESULTS FOR WESTERN DRAINAGE RIPARIAN COMPOSITE SEDIMENT SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Inorganics							
Chloride	mg/kg	4	4	23.3	11.0	1.46	12.0
Nitrate	mg/kg	4	1	53.2	8.40	<0.0200	0.0720
Nitrite	mg/kg	4	0	1.69	0.452	<0.0200	<0.0200
Nitrogen, Ammonia	mg/kg	4	4	58.3	16.4	0.740	4.02
Phosphate-P	mg/kg	4	4	36.7	16.0	0.232	4.50
Phosphorus	mg/kg	4	4	1,510	923	252	379
Sulfate	mg/kg	4	4	403	123	18.3	2,404
Metals							
Total Aluminum	mg/kg	6	6	24,100	19,900	8,880	13,900
Total Antimony	mg/kg	6	1	2.10	2.10	<0.520	1.1
Total Arsenic	mg/kg	6	6	239	86.5	3.50	9.00
Total Barium	mg/kg	6	6	424	255	38.9	106
Total Beryllium	mg/kg	6	6	2.62	2.18	0.570	1.20
Total Cadmium	mg/kg	6	1	1.23	0.615	<0.220	0.510
Total Calcium	mg/kg	6	6	9,610	5,700	1,350	24,700 (4)
Total Chromium	mg/kg	6	6	24.4	20.2	6.10	27.9 (4)
Total Cobalt	mg/kg	6	6	15.2	12.6	4.90	17.5 (5)
Total Copper	mg/kg	6	6	36.6	29.9	7.30	14.9
Total Iron	mg/kg	6	6	29,700	25,100	8,280	16,500
Total Lead	mg/kg	6	6	27.0	19.9	8.10	15.6
Total Magnesium	mg/kg	6	6	6,260	4,300	2,010	4,450
Total Manganese	mg/kg	6	6	1,320	870	72.3	2,500 (4)
Total Mercury	mg/kg	4	0	0.140	0.140	<0.0500	<0.180 (6)
Total Molybdenum	mg/kg	6	5	2,060	61.8	0.930	3.40
Total Nickel	mg/kg	6	5	24.8	20.0	7.50	20.1 (5)
Total Potassium	mg/kg	6	6	6,390	4,230	1,390	2,750
Total Selenium	mg/kg	6	2	2.43	1.38	0.200	2.70 (4)
Total Silver	mg/kg	6	0	0.240	0.240	<0.0500	<0.320 (6)
Total Sodium	mg/kg	6	6	230	192	95.6	270
Total Thallium	mg/kg	4	4	0.498	0.358	0.0900	0.320
Total Uranium, Calculated	mg/kg	4	4	115	53.8	35.4	113
Total Vanadium	mg/kg	6	6	42.5	35.8	15.1	48.5 (4)
Total Zinc	mg/kg	6	6	137	84.6	26.5	50.1

Table 5-54
SUMMARY OF ANALYTICAL RESULTS FOR WESTERN DRAINAGE RIPARIAN COMPOSITE SEDIMENT SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Other Parameters							
Alkalinity, Total	mg/kg	4	3	239	171	<33.3	89.9
Bicarbonate Alkalinity	mg/kg	4	3	239	171	<33.3	89.9
Carbonate Alkalinity	mg/kg	4	0	10.0	10.0	<8.00	<9.00
Cation Exchange Capacity	meq/g	2	2	NA	NA	0.0317	0.114
pH	SU	4	4	NA	NA	4.73	6.61
Total Organic Carbon	mg/kg	4	4	NA	NA	20,000	47,550
Radionuclides							
Total Lead 210	pCi/g	4	4	24.0	12.2	5.10	13.0
Total Polonium 210	pCi/g	4	4	20.8	11.0	3.60	16.0
Total Radium 226	pCi/g	2	2	15.2	9.14	8.60	16.1
Total Radium, Calculated	pCi/g	4	4	15.2	9.14	3.66	18.7
Total Radium 228	pCi/g	4	4	9.63	6.22	2.74	3.96
Total Thorium 227	pCi/g	4	4	1.62	0.806	0.189	1.40
Total Thorium 228	pCi/g	4	4	11.2	6.34	2.07	3.16
Total Thorium 230	pCi/g	4	4	9.51	5.63	3.31	17.0
Total Thorium 232	pCi/g	4	4	13.1	13.1	1.86	3.14
Total Uranium 234	pCi/g	4	4	50.4	23.3	11.5	39.1
Total Uranium 235	pCi/g	4	4	2.92	1.31	0.641	2.72
Total Uranium 238	pCi/g	4	4	38.3	17.9	11.8	37.5

Notes:
(1) Parameters in bold exceed background limits for the URS samples
(2) 99% Upper Tolerance Limit for the URS background composite sediment sample data set
(3) 95% Upper Prediction Limit for the URS background composite sediment sample data set
(4) The maximum value is from a URS primary sample; the associated verification sample did not exceed the RBL
(5) The maximum value is from a URS verification sample; the associated primary sample did not exceed the BL
(6) The maximum is a non-detect value higher than the RBL
NA = Not Applicable

Table 5-55
ANALYTICAL RESULTS FOR THE WESTERN DRAINAGE SEEP COMPOSITE SEDIMENT SAMPLE

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Result
				BL (2)	RBL (3)	
Inorganics						
Chloride	mg/kg	1	1	23.3	11.0	1.36
Nitrate	mg/kg	1	1	53.2	8.40	0.087
Nitrite	mg/kg	1	1	1.69	0.452	<0.02
Nitrogen, Ammonia	mg/kg	1	0	58.3	16.4	<5.8
Phosphorus	mg/kg	1	1	1,510	923	248
Sulfate	mg/kg	1	1	403	123	770
Metals						
Total Aluminum	mg/kg	1	1	24,100	19,900	7660
Total Antimony	mg/kg	1	0	2.10	2.10	<0.27
Total Arsenic	mg/kg	1	1	239	86.5	11.1
Total Barium	mg/kg	1	1	424	255	37.8
Total Beryllium	mg/kg	1	1	2.62	2.18	1.2
Total Cadmium	mg/kg	1	1	1.23	0.615	0.12
Total Calcium	mg/kg	1	1	9,610	5,700	742
Total Chromium	mg/kg	1	1	24.4	20.2	3.7
Total Cobalt	mg/kg	1	1	15.2	12.6	21.3
Total Copper	mg/kg	1	1	36.6	29.9	19.2
Total Iron	mg/kg	1	1	29,700	25,100	9330
Total Lead	mg/kg	1	1	27.0	19.9	10
Total Magnesium	mg/kg	1	1	6,260	4,300	1260
Total Manganese	mg/kg	1	1	1,320	870	789
Total Mercury	mg/kg	1	0	0.140	0.140	<0.06
Total Nickel	mg/kg	1	1	24.8	20.0	6.1
Total Potassium	mg/kg	1	1	6,390	4,230	960
Total Selenium	mg/kg	1	1	2.43	1.38	0.42
Total Silver	mg/kg	1	0	0.240	0.240	<0.08
Total Sodium	mg/kg	1	1	230	192	64.9
Total Thallium	mg/kg	1	1	0.498	0.358	<0.13
Total Uranium, Calculated	mg/kg	1	1	115	53.8	294
Total Vanadium	mg/kg	1	1	42.5	35.8	10.6
Total Zinc	mg/kg	1	1	137	84.6	28.9
Organic Compounds						
Total Petroleum Hydrocarbons-Diesel	ug/kg	1	1	NA	NA	17,000

Table 5-55
ANALYTICAL RESULTS FOR THE WESTERN DRAINAGE SEEP COMPOSITE SEDIMENT SAMPLE

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Result
				BL (2)	RBL (3)	
Other Parameters						
Alkalinity, Total	mg/kg	1	1	239	171	17
Bicarbonate Alkalinity	mg/kg	1	1	239	171	17
Carbonate Alkalinity	mg/kg	1	0	10.0	10.0	<10.0
pH	SU	1	1	NA	NA	4
Total Organic Carbon	mg/kg	1	1	NA	NA	4.59
Radionuclides						
Gross Alpha	pCi/g	1	1	161	92.9	319
Gross Beta	pCi/g	1	1	146	104	290
Total Lead 210	pCi/g	1	1	24.0	12.2	5.1
Total Polonium 210	pCi/g	1	1	20.8	11.0	5.3
Total Radium 226	pCi/g	1	1	15.2	9.14	7.81
Total Radium 228	pCi/g	1	1	9.63	6.22	4
Total Thorium 227	pCi/g	1	0	1.62	0.806	2.16
Total Thorium 228	pCi/g	1	0	11.2	6.34	<1.29
Total Thorium 230	pCi/g	1	1	9.51	5.63	11.7
Total Thorium 232	pCi/g	1	0	13.1	13.1	3.99
Total Uranium 234	pCi/g	1	1	50.4	23.3	99.4
Total Uranium 235	pCi/g	1	1	2.92	1.31	5.99
Total Uranium 238	pCi/g	1	1	38.3	17.9	97.9

Notes:
(1) Parameters in bold exceed background limits
(2) 99% Upper Tolerance Limit for the URS background composite sediment sample data set
(3) 95% Upper Prediction Limit for the URS background composite sediment sample data set
NA = Not Applicable

Table 5-56
ANALYTICAL RESULTS FOR THE WESTERN DRAINAGE SEEP GRAB SEDIMENT SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Result
				BL (2)	RBL (3)	
Metals						
Total Aluminum	mg/kg	1	1	59,900	33,500	7,250
Total Antimony	mg/kg	1	0	1.00	1.00	<1.30 (4)
Total Arsenic	mg/kg	1	1	315	107	4.10
Total Barium	mg/kg	1	1	563	309	31.8
Total Beryllium	mg/kg	1	1	6.66	3.84	1.00
Total Cadmium	mg/kg	1	0	1.23	0.600	<0.260
Total Calcium	mg/kg	1	1	14,600	7,440	804
Total Chromium	mg/kg	1	1	29.1	23.6	3.40
Total Cobalt	mg/kg	1	1	33.3	19.2	10.9
Total Copper	mg/kg	1	1	51.9	41.3	18.3
Total Iron	mg/kg	1	1	39,000	32,000	7,530
Total Lead	mg/kg	1	1	21.7	18.3	8.50
Total Magnesium	mg/kg	1	1	7,480	4,840	912
Total Manganese	mg/kg	1	1	1,980	1,160	509
Total Mercury	mg/kg	1	0	0.130	0.130	<0.130
Total Nickel	mg/kg	1	1	28.2	22.5	3.60
Total Potassium	mg/kg	1	1	7,890	4,870	605
Total Selenium	mg/kg	1	0	1.90	1.18	<1.00
Total Silver	mg/kg	1	0	0.150	0.150	<0.520 (4)
Total Sodium	mg/kg	1	1	573	317	142
Total Thallium	mg/kg	1	0	0.528	0.380	<1.60 (4)
Total Uranium	mg/kg	1	1	216	87.3	107
Total Vanadium	mg/kg	1	1	52.4	43.0	6.80
Total Zinc	mg/kg	1	1	153	89.5	21.9
Radionuclides						
Gross Alpha	pCi/g	1	1	218	115	139
Total Radium 226	pCi/g	1	1	19.6	10.6	3.00
Total Radium 228	pCi/g	1	1	5.77	4.70	2.94
Total Thorium 228	pCi/g	1	0	6.76	4.48	<2.05
Total Thorium 230	pCi/g	1	1	9.29	5.69	7.02
Total Thorium 232	pCi/g	1	1	5.74	3.81	2.20
Total Uranium 234	pCi/g	1	1	105	40.1	36.0
Total Uranium 235	pCi/g	1	1	4.29	1.76	2.87
Total Uranium 238	pCi/g	1	1	72.0	29.0	34.5

Notes:

(1) Concentrations or activities of parameters in bold are greater than the RBL

(2) 99% Upper Tolerance Limit for the URS background grab sediment sample data set

(3) 95% Upper Prediction Limit for the URS background grab sediment sample data set

(4) The result is a non-detect value higher than the RBL

Table 5-57
ANALYTICAL RESULTS FOR THE FAR WEST DRAINAGE COMPOSITE SEDIMENT SAMPLE

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Result
				BL (2)	RBL (3)	
Inorganics						
Chloride	mg/kg	1	1	36.6	11.0	1.52
Nitrate	mg/kg	1	1	9.08	8.40	0.0380
Nitrite	mg/kg	1	1	8.82	0.452	0.0450
Nitrogen, Ammonia	mg/kg	1	0	45.2	16.4	<5.74
Phosphate-P	mg/kg	1	1	41.4	16.0	4.09
Phosphorus	mg/kg	1	1	1,830	923	217
Sulfate	mg/kg	1	1	477	123	20.4
Metals						
Total Aluminum	mg/kg	1	1	59,900	19,900	8,180
Total Antimony	mg/kg	1	0	1.00	2.10	<0.230
Total Arsenic	mg/kg	1	1	315	86.5	7.10
Total Barium	mg/kg	1	1	563	255	83.7
Total Beryllium	mg/kg	1	1	6.66	2.18	0.790
Total Cadmium	mg/kg	1	1	1.23	0.615	0.250
Total Calcium	mg/kg	1	1	14,600	5,700	2,810
Total Chromium	mg/kg	1	1	29.1	20.2	6.50
Total Cobalt	mg/kg	1	1	33.3	12.6	5.00
Total Copper	mg/kg	1	1	51.9	29.9	10.7
Total Iron	mg/kg	1	1	39,000	25,100	10,600
Total Lead	mg/kg	1	1	21.7	19.9	11.9
Total Magnesium	mg/kg	1	1	7,480	4,300	2,450
Total Manganese	mg/kg	1	1	1,980	870	469
Total Mercury	mg/kg	1	0	0.130	0.140	<0.0500
Total Nickel	mg/kg	1	1	28.2	20.0	6.70
Total Potassium	mg/kg	1	1	7,890	4,230	1,470
Total Selenium	mg/kg	1	1	1.90	1.38	0.580
Total Silver	mg/kg	1	0	0.150	0.240	<0.0700
Total Sodium	mg/kg	1	1	573	192	113
Total Thallium	mg/kg	1	1	0.528	0.358	0.170
Total Uranium, Calculated	mg/kg	1	1	216	53.8	57.6
Total Vanadium	mg/kg	1	1	52.4	35.8	15.9
Total Zinc	mg/kg	1	1	153	84.6	53.2
Organic Compounds						
Total Petroleum Hydrocarbons-Diesel	ug/kg	1	1	NA	NA	26,000

Table 5-57
ANALYTICAL RESULTS FOR THE FAR WEST DRAINAGE COMPOSITE SEDIMENT SAMPLE

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Result
				BL (2)	RBL (3)	
Other Parameters						
Alkalinity, Total	mg/kg	1	1	301	171	141
Bicarbonate Alkalinity	mg/kg	1	1	301	171	141
Carbonate Alkalinity	mg/kg	1	0	10.0	10.0	<10.0
pH	SU	1	1	NA	NA	7.14
Total Organic Carbon	mg/kg	1	1	NA	NA	13,850
Radionuclides						
Gross Alpha	pCi/g	1	1	218	92.9	155
Gross Beta	pCi/g	1	1	95.7	104	133
Total Lead 210	pCi/g	1	1	25.2	12.2	17.0
Total Polonium 210	pCi/g	1	1	21.4	11.0	18.0
Total Radium 226	pCi/g	1	1	19.6	9.14	21.3
Total Radium 228	pCi/g	1	1	5.77	6.22	3.08
Total Thorium 227	pCi/g	1	0	1.04	0.806	<0.574
Total Thorium 228	pCi/g	1	1	6.76	6.34	6.04
Total Thorium 230	pCi/g	1	1	9.29	5.63	19.7
Total Thorium 232	pCi/g	1	1	5.74	13.1	2.21
Total Uranium 234	pCi/g	1	1	105	23.3	22.8
Total Uranium 235	pCi/g	1	1	4.29	1.31	1.50
Total Uranium 238	pCi/g	1	1	72.0	17.9	19.1

Notes:
(1) Parameters in bold exceed background limits
(2) 99% Upper Tolerance Limit for the URS background composite sediment sample data set
(3) 95% Upper Prediction Limit for the URS background composite sediment sample data set
NA = Not Applicable

Table 5-58
ANALYTICAL RESULTS FOR THE PIT 3 COMPOSITE SEDIMENT SAMPLE

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Result
				BL (2)	RBL (3)	
Inorganics						
Chloride	mg/kg	1	1	23.3	11.0	2.93
Nitrate	mg/kg	1	1	53.2	8.40	0.300
Nitrite	mg/kg	1	1	1.69	0.452	0.0670
Nitrogen, Ammonia	mg/kg	1	1	58.3	16.4	0.890
Phosphate-P	mg/kg	1	1	36.7	16.0	0.928
Phosphorus	mg/kg	1	1	1,510	923	158
Sulfate	mg/kg	1	1	403	123	1,947
Metals						
Total Aluminum	mg/kg	1	1	24,100	19,900	26,500
Total Antimony	mg/kg	1	1	2.10	2.10	0.930
Total Arsenic	mg/kg	1	1	239	86.5	26.7
Total Barium	mg/kg	1	1	424	255	410
Total Beryllium	mg/kg	1	1	2.62	2.18	5.50
Total Cadmium	mg/kg	1	1	1.23	0.615	1.00
Total Calcium	mg/kg	1	1	9,610	5,700	17,100
Total Chromium	mg/kg	1	1	24.4	20.2	11.7
Total Cobalt	mg/kg	1	1	15.2	12.6	57.1
Total Copper	mg/kg	1	1	36.6	29.9	61.5
Total Iron	mg/kg	1	1	29,700	25,100	20,000
Total Lead	mg/kg	1	1	27.0	19.9	32.4
Total Magnesium	mg/kg	1	1	6,260	4,300	8,700
Total Manganese	mg/kg	1	1	1,320	870	2,160
Total Mercury	mg/kg	1	0	0.140	0.140	<0.0600
Total Molybdenum	mg/kg	1	1	2,060	61.8	13.5
Total Nickel	mg/kg	1	1	24.8	20.0	72.2
Total Potassium	mg/kg	1	1	6,390	4,230	2,370
Total Selenium	mg/kg	1	0	2.43	1.38	<0.390
Total Silver	mg/kg	1	0	0.240	0.240	<0.130
Total Sodium	mg/kg	1	1	230	192	284
Total Thallium	mg/kg	1	1	0.498	0.358	0.260
Total Uranium, Calculated	mg/kg	1	1	115	53.8	874
Total Vanadium	mg/kg	1	1	42.5	35.8	18.1
Total Zinc	mg/kg	1	1	137	84.6	243

Table 5-58
ANALYTICAL RESULTS FOR THE PIT 3 COMPOSITE SEDIMENT SAMPLE

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Result
				BL (2)	RBL (3)	
Other Parameters						
Alkalinity, Total	mg/kg	1	1	239	171	77.7
Bicarbonate Alkalinity	mg/kg	1	1	239	171	77.7
Carbonate Alkalinity	mg/kg	1	0	10.0	10.0	<8.00
pH	SU	1	1	NA	NA	7.31
Total Organic Carbon	mg/kg	1	1	NA	NA	1,665
Radionuclides						
Total Lead 210	pCi/g	1	1	24.0	12.2	62.0
Total Polonium 210	pCi/g	1	1	20.8	11.0	61.0
Total Radium 226, Calculated	pCi/g	1	1	15.2	9.14	71.6
Total Radium 228	pCi/g	1	1	9.63	6.22	6.40
Total Thorium 227	pCi/g	1	0	1.62	0.806	<21.3 (4)
Total Thorium 228	pCi/g	1	0	11.2	6.34	<19.6 (4)
Total Thorium 230	pCi/g	1	1	9.51	5.63	173
Total Thorium 232	pCi/g	1	0	13.1	13.1	<12.2
Total Uranium 234	pCi/g	1	1	50.4	23.3	342
Total Uranium 235	pCi/g	1	0	2.92	1.31	<12.5 (4)
Total Uranium 238	pCi/g	1	1	38.3	17.9	293

Notes:
(1) Parameters in bold exceed background limits
(2) 99% Upper Tolerance Limit for the URS background composite sediment sample data set
(3) 95% Upper Prediction Limit for the URS background composite sediment sample data set
(4) The result is a non-detect value higher than the RBL
NA = Not Applicable

Table 5-59
SUMMARY OF ANALYTICAL RESULTS FOR PIT 3 GRAB SEDIMENT SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Metals							
Total Aluminum	mg/kg	2	2	59,900	33,500	18,500	31,300
Total Antimony	mg/kg	2	0	1.00	1.00	<1.50	<1.50 (4)
Total Arsenic	mg/kg	2	2	315	107	2.80	54.7
Total Barium	mg/kg	2	2	563	309	9.70	516
Total Beryllium	mg/kg	2	2	6.66	3.84	6.00	7.00
Total Cadmium	mg/kg	2	0	1.23	0.600	<0.310	<0.720 (4)
Total Calcium	mg/kg	2	2	14,600	7,440	11,400	17,700
Total Chromium	mg/kg	2	2	29.1	23.6	7.20	19.6
Total Cobalt	mg/kg	2	2	33.3	19.2	34.9	62.1
Total Copper	mg/kg	2	2	51.9	41.3	38.0	102
Total Iron	mg/kg	2	2	39,000	32,000	21,600	32,300
Total Lead	mg/kg	2	2	21.7	18.3	11.7	25.2
Total Magnesium	mg/kg	2	2	7,480	4,840	3,200	11,100
Total Manganese	mg/kg	2	2	1,980	1,160	1,300	1,350
Total Mercury	mg/kg	2	0	0.130	0.130	<0.160	<0.160 (4)
Total Nickel	mg/kg	2	2	28.2	22.5	54.6	87.6
Total Potassium	mg/kg	2	2	7,890	4,870	644	3,370
Total Selenium	mg/kg	2	0	1.90	1.18	<1.20	<1.20 (4)
Total Silver	mg/kg	2	0	0.150	0.150	<0.600	<0.620 (4)
Total Sodium	mg/kg	2	2	573	317	211	520
Total Thallium	mg/kg	2	0	0.528	0.380	<1.80	<1.80
Total Uranium	mg/kg	2	2	216	87.3	395	917
Total Vanadium	mg/kg	2	2	52.4	43.0	19.9	41.2
Total Zinc	mg/kg	2	2	153	89.5	269	315
Radionuclides							
Gross Alpha	pCi/g	2	2	218	115	266	1,241
Total Radium 226	pCi/g	2	0	19.6	10.6	<0.912	<1.98
Total Radium 228	pCi/g	2	2	5.77	4.70	4.28	4.90
Total Thorium 228	pCi/g	2	0	6.76	4.48	<3.06	<7.75 (4)
Total Thorium 230	pCi/g	2	2	9.29	5.69	17.3	139
Total Thorium 232	pCi/g	2	0	5.74	3.81	<2.25	<4.69 (4)
Total Uranium 234	pCi/g	2	2	105	40.1	96.2	285
Total Uranium 235	pCi/g	2	2	4.29	1.76	3.80	7.90
Total Uranium 238	pCi/g	2	2	72.0	29.0	92.0	305

Notes:

(1) Concentrations or activities of parameters in bold are greater than the RBL

(2) 99% Upper Tolerance Limit for the URS background grab sediment sample data set

(3) 95% Upper Prediction Limit for the URS background grab sediment sample data set

(4) The result is a non-detect value higher than the RBL

Table 5-60
ANALYTICAL RESULTS FOR THE PIT 4 COMPOSITE SEDIMENT SAMPLE

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Result
				BL (2)	RBL (3)	
Inorganics						
Chloride	mg/kg	1	1	23.3	11.0	1.45
Nitrate	mg/kg	1	1	53.2	8.40	0.137
Nitrite	mg/kg	1	1	1.69	0.452	0.268
Nitrogen, Ammonia	mg/kg	1	1	58.3	16.4	2.69
Phosphate-P	mg/kg	1	1	36.7	16.0	0.865
Phosphorus	mg/kg	1	1	1,510	923	277
Sulfate	mg/kg	1	1	403	123	671
Metals						
Total Aluminum	mg/kg	1	1	24,100	19,900	16,100
Total Arsenic	mg/kg	1	1	239	86.5	25.3
Total Barium	mg/kg	1	1	424	255	60.0
Total Beryllium	mg/kg	1	1	2.62	2.18	2.70
Total Cadmium	mg/kg	1	1	1.23	0.615	0.160
Total Calcium	mg/kg	1	1	9,610	5,700	5,420
Total Chromium	mg/kg	1	1	24.4	20.2	19.9
Total Cobalt	mg/kg	1	1	15.2	12.6	19.6
Total Copper	mg/kg	1	1	36.6	29.9	20.1
Total Iron	mg/kg	1	1	29,700	25,100	22,700
Total Lead	mg/kg	1	1	27.0	19.9	20.0
Total Magnesium	mg/kg	1	1	6,260	4,300	5,180
Total Manganese	mg/kg	1	1	1,320	870	1,060
Total Mercury	mg/kg	1	0	0.140	0.140	<0.0500
Total Molybdenum	mg/kg	1	1	2,060	61.8	18.0
Total Nickel	mg/kg	1	1	24.8	20.0	28.0
Total Potassium	mg/kg	1	1	6,390	4,230	3,070
Total Selenium	mg/kg	1	0	2.43	1.38	<0.320
Total Silver	mg/kg	1	0	0.240	0.240	<0.110
Total Sodium	mg/kg	1	1	230	192	110
Total Thallium	mg/kg	1	1	0.498	0.358	0.410
Total Uranium, Calculated	mg/kg	1	1	115	53.8	429
Total Vanadium	mg/kg	1	1	42.5	35.8	30.2
Total Zinc	mg/kg	1	1	137	84.6	75.1

Table 5-60
ANALYTICAL RESULTS FOR THE PIT 4 COMPOSITE SEDIMENT SAMPLE

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Result
				BL (2)	RBL (3)	
Other Parameters						
Alkalinity, Total	mg/kg	1	1	239	171	81.7
Bicarbonate Alkalinity	mg/kg	1	1	239	171	81.7
Carbonate Alkalinity	mg/kg	1	0	10.0	10.0	<8.00
pH	SU	1	1	NA	NA	7.29
Total Organic Carbon	mg/kg	1	1	NA	NA	2,800
Radionuclides						
Total Lead 210	pCi/g	1	1	24.0	12.2	130
Total Polonium 210	pCi/g	1	1	20.8	11.0	160
Protactinium 231	pCi/g	1	1	NC	NC	4.61
Total Radium 226, Calculated	pCi/g	1	1	15.2	9.14	122
Total Radium 228	pCi/g	1	1	9.63	6.22	4.05
Total Thorium 227	pCi/g	1	0	1.62	0.806	<15.5 (4)
Total Thorium 228	pCi/g	1	0	11.2	6.34	<0.463
Total Thorium 230	pCi/g	1	1	9.51	5.63	151
Total Thorium 232	pCi/g	1	0	13.1	13.1	0.00
Total Uranium 234	pCi/g	1	1	50.4	23.3	221
Total Uranium 235	pCi/g	1	0	2.92	1.31	<14.4 (4)
Total Uranium 238	pCi/g	1	1	38.3	17.9	144

Notes:
(1) Parameters in bold exceed background limits
(2) 99% Upper Tolerance Limit for the URS background composite sediment sample data set
(3) 95% Upper Prediction Limit for the URS background composite sediment sample data set
(4) The result is a non-detect value higher than the RBL
NA = Not Applicable
NC = Not Calculated; insufficient background samples

Table 5-61
SUMMARY OF ANALYTICAL RESULTS FOR PIT 4 GRAB SEDIMENT SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Metals							
Total Aluminum	mg/kg	3	3	59,900	33,500	8,130	29,900
Total Antimony	mg/kg	3	0	1.00	1.00	<1.20	<1.70 (4)
Total Arsenic	mg/kg	3	3	315	107	7.40	25.4
Total Barium	mg/kg	3	3	563	309	29.4	131
Total Beryllium	mg/kg	3	3	6.66	3.84	1.30	3.60
Total Cadmium	mg/kg	3	0	1.23	0.600	<0.230	<0.340
Total Calcium	mg/kg	3	3	14,600	7,440	986	5,740
Total Chromium	mg/kg	3	3	29.1	23.6	7.40	30.5
Total Cobalt	mg/kg	3	3	33.3	19.2	9.10	23.1
Total Copper	mg/kg	3	3	51.9	41.3	9.00	26.7
Total Iron	mg/kg	3	3	39,000	32,000	12,100	35,200
Total Lead	mg/kg	3	3	21.7	18.3	7.60	29.7
Total Magnesium	mg/kg	3	3	7,480	4,840	1,950	7,130
Total Manganese	mg/kg	3	3	1,980	1,160	629	1,820
Total Mercury	mg/kg	3	0	0.130	0.130	<0.120	<0.170 (4)
Total Nickel	mg/kg	3	3	28.2	22.5	16.1	38.6
Total Potassium	mg/kg	3	3	7,890	4,870	1,900	3,670
Total Selenium	mg/kg	3	0	1.90	1.18	<0.940	<1.40 (4)
Total Silver	mg/kg	3	0	0.150	0.150	<0.470	<0.680 (4)
Total Sodium	mg/kg	3	3	573	317	135	302
Total Thallium	mg/kg	3	1	0.528	0.380	<1.40	2.10
Total Uranium	mg/kg	3	3	216	87.3	179	772
Total Vanadium	mg/kg	3	3	52.4	43.0	14.3	46.1
Total Zinc	mg/kg	3	3	153	89.5	35.3	79.8
Radionuclides							
Gross Alpha	pCi/g	3	3	218	115	265	1,449
Total Radium 226	pCi/g	3	3	19.6	10.6	9.95	38.1
Total Radium 228	pCi/g	3	3	5.77	4.70	1.80	5.89
Total Thorium 228	pCi/g	3	0	6.76	4.48	<1.15	<11.4 (4)
Total Thorium 230	pCi/g	3	3	9.29	5.69	11.0	100
Total Thorium 232	pCi/g	3	1	5.74	3.81	<0.865	1.45
Total Uranium 234	pCi/g	3	3	105	40.1	75.4	312
Total Uranium 235	pCi/g	3	3	4.29	1.76	2.59	14.8
Total Uranium 238	pCi/g	3	3	72.0	29.0	56.3	237

Notes:
(1) Concentrations or activities of parameters in bold are greater than the RBL
(2) 99% Upper Tolerance Limit for the URS background grab sediment sample data set
(3) 95% Upper Prediction Limit for the URS background grab sediment sample data set
(4) The result is a non-detect value higher than the RBL

Table 5-62
SUMMARY OF ANALYTICAL RESULTS FOR POLLUTION CONTROL POND GRAB SEDIMENT SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Metals							
Total Aluminum	mg/kg	2	2	59,900	33,500	15,800	160,000
Total Antimony	mg/kg	2	0	1.00	1.00	<1.30	<8.10 (4)
Total Arsenic	mg/kg	2	2	315	107	5.50	25.6
Total Barium	mg/kg	2	2	563	309	47.4	689
Total Beryllium	mg/kg	2	2	6.66	3.84	1.60	29.8
Total Cadmium	mg/kg	2	1	1.23	0.600	<0.260	11.2
Total Calcium	mg/kg	2	2	14,600	7,440	13,200	16,700
Total Chromium	mg/kg	2	2	29.1	23.6	7.60	30.4
Total Cobalt	mg/kg	2	2	33.3	19.2	7.90	166
Total Copper	mg/kg	2	2	51.9	41.3	29.0	751
Total Iron	mg/kg	2	2	39,000	32,000	15,800	16,900
Total Lead	mg/kg	2	2	21.7	18.3	6.50	25.4
Total Magnesium	mg/kg	2	2	7,480	4,840	4,320	9,570
Total Manganese	mg/kg	2	2	1,980	1,160	442	4,330
Total Mercury	mg/kg	2	0	0.130	0.130	<0.130	<0.830 (4)
Total Nickel	mg/kg	2	2	28.2	22.5	17.5	757
Total Potassium	mg/kg	2	2	7,890	4,870	932	1,730
Total Selenium	mg/kg	2	0	1.90	1.18	<1.00	<6.50 (4)
Total Silver	mg/kg	2	0	0.150	0.150	<0.520	<3.20 (4)
Total Sodium	mg/kg	2	2	573	317	168	1,300
Total Thallium	mg/kg	2	0	0.528	0.380	<1.60	<9.70 (4)
Total Uranium	mg/kg	2	2	216	87.3	60.9	5,780
Total Vanadium	mg/kg	2	1	52.4	43.0	<1.60	16.3
Total Zinc	mg/kg	2	2	153	89.5	62.1	995
Radionuclides							
Gross Alpha	pCi/g	2	2	218	115	399	3,259
Total Radium 226	pCi/g	2	1	19.6	10.6	<2.86	5.92
Total Radium 228	pCi/g	2	2	5.77	4.70	6.38	16.9
Total Thorium 228	pCi/g	2	1	6.76	4.48	5.13	5.13
Total Thorium 230	pCi/g	2	2	9.29	5.69	157	2,542
Total Thorium 232	pCi/g	2	2	5.74	3.81	12.3	47.2
Total Uranium 234	pCi/g	2	2	105	40.1	19.7	2,408
Total Uranium 235	pCi/g	2	2	4.29	1.76	0.736	115
Total Uranium 238	pCi/g	2	2	72.0	29.0	21.3	2,336

Notes:

(1) Concentrations or activities of parameters in bold are greater than the RBL

(2) 99% Upper Tolerance Limit for the URS background grab sediment sample data set

(3) 95% Upper Prediction Limit for the URS background grab sediment sample data set

(4) The maximum is a non-detect value higher than the RBL

Table 5-63
SUMMARY OF ANALYTICAL RESULTS FOR BLOOD POOL GRAB SEDIMENT SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Metals							
Total Aluminum	mg/kg	2	2	59,900	33,500	20,600	26,000
Total Antimony	mg/kg	2	1	1.00	1.00	<1.40	1.60
Total Arsenic	mg/kg	2	2	315	107	49.1	75.0
Total Barium	mg/kg	2	2	563	309	101	131
Total Beryllium	mg/kg	2	2	6.66	3.84	0.990	1.10
Total Cadmium	mg/kg	2	0	1.23	0.600	<0.280	<0.280
Total Calcium	mg/kg	2	2	14,600	7,440	13,400	16,200
Total Chromium	mg/kg	2	2	29.1	23.6	35.4	50.7
Total Cobalt	mg/kg	2	2	33.3	19.2	5.90	11.3
Total Copper	mg/kg	2	2	51.9	41.3	64.1	87.8
Total Iron	mg/kg	2	2	39,000	32,000	51,000	67,400
Total Lead	mg/kg	2	2	21.7	18.3	18.5	21.1
Total Magnesium	mg/kg	2	2	7,480	4,840	4,600	8,060
Total Manganese	mg/kg	2	2	1,980	1,160	310	352
Total Mercury	mg/kg	2	0	0.130	0.130	<0.140	<0.140 (4)
Total Nickel	mg/kg	2	2	28.2	22.5	19.6	29.0
Total Potassium	mg/kg	2	2	7,890	4,870	4,210	4,880
Total Selenium	mg/kg	2	0	1.90	1.18	<1.10	<1.10
Total Silver	mg/kg	2	0	0.150	0.150	<0.550	<0.560 (4)
Total Sodium	mg/kg	2	2	573	317	861	1,090
Total Thallium	mg/kg	2	0	0.528	0.380	<1.70	<1.70 (4)
Total Uranium	mg/kg	2	2	216	87.3	47.5	104
Total Vanadium	mg/kg	2	2	52.4	43.0	51.4	66.3
Total Zinc	mg/kg	2	2	153	89.5	72.1	74.5
Radionuclides							
Gross Alpha	pCi/g	2	2	218	115	310	449
Total Radium 226	pCi/g	2	1	19.6	10.6	<1.31	35.2
Total Radium 228	pCi/g	2	2	5.77	4.70	4.72	5.42
Total Thorium 228	pCi/g	2	2	6.76	4.48	1.60	1.87
Total Thorium 230	pCi/g	2	2	9.29	5.69	37.1	46.0
Total Thorium 232	pCi/g	2	2	5.74	3.81	1.49	1.90
Total Uranium 234	pCi/g	2	2	105	40.1	16.6	42.5
Total Uranium 235	pCi/g	2	0	4.29	1.76	<0.387	<0.921
Total Uranium 238	pCi/g	2	2	72.0	29.0	13.4	32.1

Notes:

(1) Concentrations or activities of parameters in bold are greater than the RBL

(2) 99% Upper Tolerance Limit for the URS background grab sediment sample data set

(3) 95% Upper Prediction Limit for the URS background grab sediment sample data set

(4) The result is a non-detect value higher than the RBL

Table 5-64
SUMMARY OF ANALYTICAL RESULTS FOR SOUTHWESTERN DRAINAGE COMPOSITE SEDIMENT SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Inorganics							
Chloride	mg/kg	2	2	23.3	11.0	3.13	4.92
Nitrate	mg/kg	2	0	53.2	8.40	<0.0200	<0.0300
Nitrite	mg/kg	2	1	1.69	0.452	<0.0200	0.0390
Nitrogen, Ammonia	mg/kg	2	1	58.3	16.4	1.07	1.07
Phosphate-P	mg/kg	2	2	36.7	16.0	10.4	17.1
Phosphorus	mg/kg	2	1	1,510	923	<0.490	409
Sulfate	mg/kg	2	2	403	123	20.6	21.7
Metals							
Total Aluminum	mg/kg	2	2	24,100	19,900	8,510	11,300
Total Antimony	mg/kg	2	0	2.10	2.10	<0.220	<0.570
Total Arsenic	mg/kg	2	2	239	86.5	3.80	4.50
Total Barium	mg/kg	2	2	424	255	90.6	102
Total Beryllium	mg/kg	2	2	2.62	2.18	0.660	0.680
Total Cadmium	mg/kg	2	1	1.23	0.615	0.260	0.26
Total Calcium	mg/kg	2	2	9,610	5,700	3,260	3,430
Total Chromium	mg/kg	2	2	24.4	20.2	6.10	7.30
Total Cobalt	mg/kg	2	2	15.2	12.6	4.80	5.00
Total Copper	mg/kg	2	2	36.6	29.9	7.80	9.50
Total Iron	mg/kg	2	2	29,700	25,100	11,600	13,200
Total Lead	mg/kg	2	2	27.0	19.9	11.2	11.4
Total Magnesium	mg/kg	2	2	6,260	4,300	3,530	3,770
Total Manganese	mg/kg	2	2	1,320	870	592	598
Total Mercury	mg/kg	2	0	0.140	0.140	<0.0500	<0.0500
Total Molybdenum	mg/kg	1	1	2,060	61.8	1.10	1.10
Total Nickel	mg/kg	2	2	24.8	20.0	5.60	8.60
Total Potassium	mg/kg	2	2	6,390	4,230	2,130	2,530
Total Selenium	mg/kg	2	1	2.43	1.38	0.260	0.26
Total Silver	mg/kg	2	0	0.240	0.240	<0.0700	<0.0900
Total Sodium	mg/kg	2	2	230	192	160	187
Total Thallium	mg/kg	2	1	0.498	0.358	<0.110	0.220
Total Uranium, Calculated	mg/kg	2	2	115	53.8	22.1	22.8
Total Vanadium	mg/kg	2	2	42.5	35.8	16.4	19.6
Total Zinc	mg/kg	2	2	137	84.6	43.9	46.2

Table 5-64
SUMMARY OF ANALYTICAL RESULTS FOR SOUTHWESTERN DRAINAGE COMPOSITE SEDIMENT SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Other Parameters							
Alkalinity, Total	mg/kg	2	2	239	171	205	300
Bicarbonate Alkalinity	mg/kg	2	2	239	171	205	300
Carbonate Alkalinity	mg/kg	2	0	10.0	10.0	<9.00	<10.0
pH	SU	2	2	NA	NA	6.99	7.60
Total Organic Carbon	mg/kg	2	2	NA	NA	6,290	23,150
Radionuclides							
Gross Alpha	pCi/g	1	1	161	92.9	78.9	78.9
Gross Beta	pCi/g	1	1	146	104	81.0	81.0
Total Lead 210	pCi/g	2	2	24.0	12.2	9.40	11.0
Total Polonium 210	pCi/g	2	2	20.8	11.0	9.30	11.0
Total Radium 226	pCi/g	1	1	15.2	9.14	4.80	4.80
Total Radium 226, Calculated	pCi/g	1	1	15.2	9.14	7.36	7.36
Total Radium 228	pCi/g	2	2	9.63	6.22	2.49	2.74
Total Thorium 227	pCi/g	2	1	1.62	0.806	0.686	0.686
Total Thorium 228	pCi/g	2	1	11.2	6.34	<2.05	2.93
Total Thorium 230	pCi/g	2	2	9.51	5.63	7.96	14.4
Total Thorium 232	pCi/g	2	2	13.1	13.1	2.38	2.40
Total Uranium 234	pCi/g	2	2	50.4	23.3	8.67	9.25
Total Uranium 235	pCi/g	2	1	2.92	1.31	<0.515	0.624
Total Uranium 238	pCi/g	2	2	38.3	17.9	7.42	7.57

Notes:
(1) Parameters in bold exceed background limits
(2) 99% Upper Tolerance Limit for the URS background composite sediment sample data set
(3) 95% Upper Prediction Limit for the URS background composite sediment sample data set
NA = Not Applicable

Table 5-65
ANALYTICAL RESULTS FOR THE SOUTHWESTERN DRAINAGE GRAB SEDIMENT SAMPLE

Parameter	Units	Number of Samples	Number of Detects	Background Limits		Result
				BL (1)	RBL (2)	
Metals						
Total Aluminum	mg/kg	1	1	59,900	33,500	4,560
Total Antimony	mg/kg	1	0	1.00	1.00	<1.30 (3)
Total Arsenic	mg/kg	1	0	315	107	<1.50
Total Barium	mg/kg	1	1	563	309	44.5
Total Beryllium	mg/kg	1	0	6.66	3.84	<0.400
Total Cadmium	mg/kg	1	0	1.23	0.600	<0.250
Total Calcium	mg/kg	1	1	14,600	7,440	1,670
Total Chromium	mg/kg	1	1	29.1	23.6	2.40
Total Cobalt	mg/kg	1	1	33.3	19.2	2.90
Total Copper	mg/kg	1	1	51.9	41.3	4.70
Total Iron	mg/kg	1	1	39,000	32,000	6,570
Total Lead	mg/kg	1	1	21.7	18.3	9.10
Total Magnesium	mg/kg	1	1	7,480	4,840	1,490
Total Manganese	mg/kg	1	1	1,980	1,160	314
Total Mercury	mg/kg	1	0	0.130	0.130	<0.120
Total Nickel	mg/kg	1	1	28.2	22.5	2.10
Total Potassium	mg/kg	1	1	7,890	4,870	1,120
Total Selenium	mg/kg	1	0	1.90	1.18	<1.00
Total Silver	mg/kg	1	0	0.150	0.150	<0.500 (3)
Total Sodium	mg/kg	1	1	573	317	158
Total Thallium	mg/kg	1	0	0.528	0.380	<1.50 (3)
Total Uranium, Calculated	mg/kg	1	1	216	87.3	5.10
Total Vanadium	mg/kg	1	1	52.4	43.0	9.60
Total Zinc	mg/kg	1	1	153	89.5	25.4
Radionuclides						
Gross Alpha	pCi/g	1	1	218	115	30.4
Total Radium 226	pCi/g	1	0	19.6	10.6	<0.213
Total Radium 228	pCi/g	1	1	5.77	4.70	2.67
Total Thorium 228	pCi/g	1	1	6.76	4.48	1.24
Total Thorium 230	pCi/g	1	1	9.29	5.69	1.43
Total Thorium 232	pCi/g	1	1	5.74	3.81	1.42
Total Uranium 234	pCi/g	1	0	105	40.1	<1.24
Total Uranium 235	pCi/g	1	0	4.29	1.76	<0.113
Total Uranium 238	pCi/g	1	1	72.0	29.0	1.29

Notes:

(1) 99% Upper Tolerance Limit for the URS background grab sediment sample data set

(2) 95% Upper Prediction Limit for the URS background grab sediment sample data set

(3) The result is a non-detect value higher than the RBL

Table 5-66
SUMMARY OF ANALYTICAL RESULTS FOR UPPER BLUE CREEK COMPOSITE SEDIMENT SAMPLES

Parameter	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (1)	RBL (2)		
Inorganics							
Chloride	mg/kg	1	1	23.3	11.0	0.593	0.593
Nitrate	mg/kg	1	1	53.2	8.40	0.225	0.225
Nitrite	mg/kg	1	1	1.69	0.452	0.0240	0.0240
Nitrogen, Ammonia	mg/kg	1	1	58.3	16.4	0.300	0.300
Phosphate-P	mg/kg	1	1	36.7	16.0	2.51	2.51
Phosphorus	mg/kg	1	1	1,510	923	193	193
Sulfate	mg/kg	1	1	403	123	2.43	2.43
Metals							
Total Aluminum	mg/kg	8	8	24,100	19,900	2,360	4,210
Total Antimony	mg/kg	1	0	2.10	2.10	<0.250	<0.250
Total Arsenic	mg/kg	8	4	239	86.5	<0.460	6.00
Total Barium	mg/kg	8	8	424	255	23.1	71.6
Total Beryllium	mg/kg	8	8	2.62	2.18	0.200	0.560
Total Cadmium	mg/kg	8	1	1.23	0.615	<0.0200	1.00 (3)
Total Calcium	mg/kg	1	1	9,610	5,700	1,050	1,050
Total Chromium	mg/kg	8	8	24.4	20.2	1.60	3.10
Total Cobalt	mg/kg	8	8	15.2	12.6	1.00	15.0 (3)
Total Copper	mg/kg	8	6	36.6	29.9	1.10	4.10
Total Iron	mg/kg	8	8	29,700	25,100	4,310	6,720
Total Lead	mg/kg	8	6	27.0	19.9	3.90	7.00
Total Magnesium	mg/kg	1	1	6,260	4,300	828	828
Total Manganese	mg/kg	8	8	1,320	870	116	7,480 (3)
Total Mercury	mg/kg	8	0	0.140	0.140	<0.0200	<0.120
Total Nickel	mg/kg	8	8	24.8	20.0	1.00	32.0 (3)
Total Potassium	mg/kg	1	1	6,390	4,230	733	733
Total Selenium	mg/kg	8	0	2.43	1.38	<0.220	<4.00 (4)
Total Silver	mg/kg	8	0	0.240	0.240	<0.0500	<0.100
Total Sodium	mg/kg	1	0	230	192	<55.5	<55.5
Total Thallium	mg/kg	8	7	0.498	0.358	0.0800	0.200
Total Uranium, Calculated	mg/kg	8	8	115	53.8	5.12	18.9
Total Vanadium	mg/kg	1	1	42.5	35.8	7.90	7.90
Total Zinc	mg/kg	8	8	137	84.6	12.0	41.0

Table 5-66
SUMMARY OF ANALYTICAL RESULTS FOR UPPER BLUE CREEK COMPOSITE SEDIMENT SAMPLES

Parameter	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (1)	RBL (2)		
Other Parameters							
Alkalinity, Total	mg/kg	1	1	239	171	51.0	51.0
Bicarbonate Alkalinity	mg/kg	1	1	239	171	51.0	51.0
Carbonate Alkalinity	mg/kg	1	0	10.0	10.0	<10.0	<10.0
pH	SU	1	1	NA	NA	7.58	7.58
Total Organic Carbon	mg/kg	1	1	NA	NA	859	859
Radionuclides							
Gross Alpha	pCi/g	1	1	161	92.9	28.9	28.9
Gross Beta	pCi/g	1	1	146	104	56.8	56.8
Total Lead 210	pCi/g	1	1	24.0	12.2	3.10	3.10
Total Polonium 210	pCi/g	1	1	20.8	11.0	1.70	1.70
Total Radium 226	pCi/g	1	1	15.2	9.14	3.42	3.42
Total Radium 228	pCi/g	1	1	9.63	6.22	4.55	4.55
Total Thorium 227	pCi/g	1	1	1.62	0.806	0.216	0.216
Total Thorium 228	pCi/g	1	1	11.2	6.34	4.27	4.27
Total Thorium 230	pCi/g	1	1	9.51	5.63	2.59	2.59
Total Thorium 232	pCi/g	1	1	13.1	13.1	4.86	4.86
Total Uranium 234	pCi/g	8	8	50.4	23.3	1.80	6.50
Total Uranium 235	pCi/g	8	8	2.92	1.31	0.0100	0.290
Total Uranium 238	pCi/g	8	8	38.3	17.9	1.70	6.30

Notes:
(1) 99% Upper Tolerance Limit for the URS background composite sediment sample data set
(2) 95% Upper Prediction Limit for the URS background composite sediment sample data set
(3) Maximum value is from a SMI sample
(4) The result is a non-detect value higher than the RBL
NA = Not Applicable

Table 5-67
SUMMARY OF ANALYTICAL RESULTS FOR UPPER BLUE CREEK GRAB SEDIMENT SAMPLES

Parameter	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (1)	RBL (2)		
Metals							
Total Aluminum	mg/kg	5	5	59,900	33,500	2,390	3,790
Total Antimony	mg/kg	1	0	1.00	1.00	<1.20	<1.20 (3)
Total Arsenic	mg/kg	5	0	315	107	<1.40	<4.00
Total Barium	mg/kg	5	5	563	309	23.2	47.7
Total Beryllium	mg/kg	5	4	6.66	3.84	0.200	0.3 (4)
Total Cadmium	mg/kg	5	0	1.23	0.600	<0.200	<0.240
Total Calcium	mg/kg	1	1	14,600	7,440	1,520	1,520
Total Chromium	mg/kg	5	5	29.1	23.6	1.60	2.90
Total Cobalt	mg/kg	5	5	33.3	19.2	1.00	2.00
Total Copper	mg/kg	5	5	51.9	41.3	1.00	3.30
Total Iron	mg/kg	5	5	39,000	32,000	4,360	6,530
Total Lead	mg/kg	5	1	21.7	18.3	<4.00	6.10
Total Magnesium	mg/kg	1	1	7,480	4,840	1,020	1,020
Total Manganese	mg/kg	5	5	1,980	1,160	102	170
Total Mercury	mg/kg	5	0	0.130	0.130	<0.0200	<0.120
Total Nickel	mg/kg	5	1	28.2	22.5	<1.00	1.90
Total Potassium	mg/kg	1	1	7,890	4,870	715	715
Total Selenium	mg/kg	5	0	1.90	1.18	<0.950	<4.00 (3)
Total Silver	mg/kg	5	0	0.150	0.150	<0.100	<0.470 (3)
Total Sodium	mg/kg	1	1	573	317	130	130
Total Thallium	mg/kg	5	0	0.528	0.380	<0.100	<1.40 (3)
Total Uranium	mg/kg	1	1	216	87.3	19.7	19.7
Total Uranium, Calculated	mg/kg	4	4	216	87.0	2.68	11.7
Total Vanadium	mg/kg	1	1	52.4	43.0	9.20	9.20
Total Zinc	mg/kg	5	5	153	89.5	10.0	18.0
Radionuclides							
Gross Alpha	pCi/g	1	1	218	115	38.2	38.2
Total Radium 226	pCi/g	1	1	19.6	10.6	2.69	2.69
Total Radium 228	pCi/g	1	1	5.77	4.70	4.42	4.42
Total Thorium 228	pCi/g	1	1	6.76	4.48	1.73	1.73
Total Thorium 230	pCi/g	1	1	9.29	5.69	1.86	1.86
Total Thorium 232	pCi/g	1	1	5.74	3.81	2.05	2.05
Total Uranium 234	pCi/g	5	5	105	40.1	0.880	5.41
Total Uranium 235	pCi/g	5	5	4.29	1.76	0.0600	1.30
Total Uranium 238	pCi/g	5	5	72.0	29.0	0.890	4.73

Notes:

(1) 99% Upper Tolerance Limit for the URS background grab sediment sample data set

(2) 95% Upper Prediction Limit for the URS background grab sediment sample data set

(3) The result is a non-detect value higher than the RBL

Table 5-68
SUMMARY OF ANALYTICAL RESULTS FOR ROOSEVELT LAKE GRAB SEDIMENT SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Metals							
Total Aluminum	mg/kg	2	2	59,900	33,500	7,300	9,600
Total Antimony	mg/kg	2	0	1.00	1.00	<1.20	<1.30 (4)
Total Arsenic	mg/kg	2	2	315	107	6.70	12.8
Total Barium	mg/kg	2	2	563	309	41.6	79.9
Total Beryllium	mg/kg	2	1	6.66	3.84	<0.250	0.370
Total Cadmium	mg/kg	2	0	1.23	0.600	<0.240	<0.250
Total Calcium	mg/kg	2	2	14,600	7,440	2,130	2,840
Total Chromium	mg/kg	2	2	29.1	23.6	13.8	17.3
Total Cobalt	mg/kg	2	2	33.3	19.2	4.60	6.90
Total Copper	mg/kg	2	2	51.9	41.3	9.30	11.3
Total Iron	mg/kg	2	2	39,000	32,000	14,200	20,800
Total Lead	mg/kg	2	2	21.7	18.3	9.00	13.7
Total Magnesium	mg/kg	2	2	7,480	4,840	5,450	6,170
Total Manganese	mg/kg	2	2	1,980	1,160	141	274
Total Mercury	mg/kg	2	0	0.130	0.130	<0.120	<0.120
Total Nickel	mg/kg	2	2	28.2	22.5	9.90	11.5
Total Potassium	mg/kg	2	2	7,890	4,870	1,130	1,720
Total Selenium	mg/kg	2	0	1.90	1.18	<0.950	<1.00
Total Silver	mg/kg	2	0	0.150	0.150	<0.480	<0.500 (4)
Total Sodium	mg/kg	2	2	573	317	146	179
Total Thallium	mg/kg	2	0	0.528	0.380	<1.40	<1.50 (4)
Total Uranium, Calculated	mg/kg	2	2	216	87.3	1.89	2.60
Total Vanadium	mg/kg	2	2	52.4	43.0	16.0	25.1
Total Zinc	mg/kg	2	2	153	89.5	142	154
Radionuclides							
Gross Alpha	pCi/g	2	2	218	115	6.87	18.8
Total Radium 226	pCi/g	2	1	19.6	10.6	<0.357	1.74
Total Radium 228	pCi/g	2	2	5.77	4.70	1.65	2.42
Total Thorium 228	pCi/g	2	1	6.76	4.48	<0.522	0.732
Total Thorium 230	pCi/g	2	1	9.29	5.69	<0.871	0.989
Total Thorium 232	pCi/g	2	2	5.74	3.81	0.482	0.592
Total Uranium 234	pCi/g	2	0	105	40.1	<0.292	<0.677
Total Uranium 235	pCi/g	2	0	4.29	1.76	<0.0676	<0.126
Total Uranium 238	pCi/g	2	0	72.0	29.0	<0.499	<0.535

Notes:

(1) Concentrations or activities of parameters in bold are greater than the RBL

(2) 99% Upper Tolerance Limit for the URS background grab sediment sample data set

(3) 95% Upper Prediction Limit for the URS background grab sediment sample data set

(4) The result is a non-detect value higher than the RBL

Table 5-69
Approximate Confidence Levels on Ratios of Median Values (R=M1/M2)
for
Weighted Averages of Sediment Data
Affected Drainage above Blue Creek vs. Background

M1: Affected Drainage above Blue Creek
M2: Background

Ratio of Median (M1/M2)							
Analyte	**95th**	**90th**	**50th**	**5th**	**Sample Size 1**	**Sample Size 2**	**dof**
Arsenic	**1.59**	1.40	0.90	**0.51**	22	22	35
Cadmium	**11.00**	9.56	5.91	**3.17**	22	22	39
Chromium	**1.99**	1.85	1.43	**1.03**	22	22	44
Cobalt	**3.92**	3.65	2.85	**2.07**	22	22	44
Lead	**1.40**	1.34	1.15	**0.95**	22	22	44
Manganese	**9.66**	8.63	5.88	**3.57**	22	22	29
Nickel	**7.21**	6.43	4.33	**2.59**	22	22	37
^{210}Polonium	**3.14**	2.90	2.21	**1.55**	13	22	35
^{226}Radium	**1.03**	0.85	0.46	**0.20**	14	9	21
Sulfate	**144.22**	113.06	50.30	**17.54**	13	22	22
^{238}Uranium	**11.81**	10.25	6.33	**3.40**	22	22	38
Zinc	**4.39**	4.04	3.04	**2.10**	22	22	40

95th and 5th Confidence Limits (Bolded) Represent 90% Confidence Interval

Table 5-70
Approximate Confidence Levels on Ratios of Median Values (R=M1/M2)
for
Weighted Averages of Sediment Data
Blue Creek vs. Background

M1: Blue Creek
M2: Background

Ratio of Median (M1/M2)							
Analyte	**95th**	**90th**	**50th**	**5th**	**Sample Size 1**	**Sample Size 2**	**dof**
Arsenic	**0.66**	0.56	0.33	**0.17**	10	22	28
Cadmium	**3.12**	2.56	1.34	**0.58**	10	22	14
Chromium	**0.78**	0.71	0.52	**0.35**	10	22	20
Cobalt	**1.12**	1.06	0.88	**0.70**	10	22	27
Lead	**0.73**	0.70	0.60	**0.50**	10	22	28
Manganese	**4.59**	4.07	2.78	**1.68**	10	22	13
Nickel	**3.25**	2.99	2.24	**1.54**	10	22	30
^{210}Polonium	**1.08**	0.92	0.56	**0.29**	5	22	8
^{226}Radium	**0.28**	0.24	0.13	**0.06**	9	9	15
Sulfate	**132.63**	95.34	36.01	**9.77**	5	22	7
^{238}Uranium	**1.31**	1.13	0.70	**0.38**	10	22	20
Zinc	**2.16**	2.04	1.69	**1.32**	10	22	31

95th and 5th Confidence Limits (Bolded) Represent 90% Confidence Interval

Table 5-71
SUMMARY OF ANALYTICAL RESULTS FOR BACKGROUND AREA GROUNDWATER SAMPLES

Parameter	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (1)	RBL (2)		
Field Parameters							
Dissolved Oxygen	mg/l	36	36	NA	NA	0.330	15.0
Eh	mV	33	33	NA	NA	-116.00	447
Ferrous Iron	mg/l	35	15	NA	NA	<0.0500	10.0
Field pH	SU	35	35	NA	NA	4.28	7.46
Specific Conductance	uS/cm	18	18	42,200	34,600	82.0	33,000
Temperature	C	35	35	NA	NA	4.76	16.7
Turbidity	NTU	35	35	NA	NA	-4.60	827
Inorganics							
Chloride	mg/l	56	56	2.05	2.05	0.429	2.05
Nitrate	mg/l	55	34	1.75	0.583	<0.0200	0.825
Nitrite	mg/l	55	0	0.0200	0.0200	<0.0200	<0.0200
Nitrogen, Ammonia	mg/l	56	29	0.258	0.0940	<0.0100	0.213
Phosphate-P	mg/l	56	51	1.41	0.533	<0.0100	1.52
Phosphorus	mg/l	56	54	2.07	0.795	<0.0100	8.76
Sulfate	mg/l	56	56	193	77.4	0.870	187
Metals							
Dissolved Aluminum	ug/l	56	31	14,300	2,080	<3.90	3,780
Total Aluminum	ug/l	56	49	82,000	16,200	<8.40	38,500
Dissolved Antimony	ug/l	56	16	8.29	1.98	<0.100	5.20
Total Antimony	ug/l	56	15	7.10	7.10	<0.100	7.10
Dissolved Arsenic	ug/l	56	52	217	54.4	0.150	61.4
Total Arsenic	ug/l	56	56	78.2	78.2	0.220	78.2
Dissolved Barium	ug/l	56	53	67.6	67.6	<1.00	67.6
Total Barium	ug/l	56	55	178	93.7	2.10	190
Dissolved Beryllium	ug/l	56	10	1.93	0.343	<0.100	4.10
Total Beryllium	ug/l	56	24	5.15	1.47	<0.100	5.80
Dissolved Cadmium	ug/l	56	2	0.270	0.270	<0.200	0.27
Total Cadmium	ug/l	56	1	0.520	0.520	<0.200	0.520
Dissolved Calcium	ug/l	56	56	72,500	39,700	1,870	56,200
Total Calcium	ug/l	56	56	70,500	39,700	1,950	56,600
Dissolved Chromium	ug/l	56	27	19.9	7.85	<0.400	11.7
Total Chromium	ug/l	56	40	137	42.1	<0.400	95.9
Dissolved Cobalt	ug/l	56	9	7.77	2.75	<0.500	7.20
Total Cobalt	ug/l	56	23	29.5	10.2	0.510	62.4
Dissolved Copper	ug/l	56	11	4.84	2.14	<0.500	<5.00
Total Copper	ug/l	56	20	220	31.6	<0.500	230

Table 5-71
SUMMARY OF ANALYTICAL RESULTS FOR BACKGROUND AREA GROUNDWATER SAMPLES

Parameter	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (1)	RBL (2)		
Dissolved Iron	ug/l	56	41	167,000	19,800	<8.40	28,300
Total Iron	ug/l	56	50	36,500	36,500	<16.2	36,500
Dissolved Lead	ug/l	56	7	1.31	0.624	<0.100	1.2
Total Lead	ug/l	56	34	51.5	13.1	<0.100	27.9
Dissolved Magnesium	ug/l	56	56	18,200	11,200	674	14,700
Total Magnesium	ug/l	56	56	19,800	12,400	748	15,500
Dissolved Manganese	ug/l	56	56	1,930	1,930	1.00	1,930
Total Manganese	ug/l	56	55	1,990	1,990	1.00	1,990
Dissolved Mercury	ug/l	37	0	0.200	0.200	<0.100	<0.200
Total Mercury	ug/l	37	0	0.200	0.200	<0.100	<0.200
Dissolved Molybdenum	ug/l	19	8	119	25.5	<1.20	71.5
Total Molybdenum	ug/l	19	8	48.4	15.5	<1.20	80.1
Dissolved Nickel	ug/l	56	23	13.9	13.9	<0.500	13.9
Total Nickel	ug/l	56	32	102	33.2	<0.500	112
Dissolved Potassium	ug/l	56	53	5,560	3,760	499	5,970
Total Potassium	ug/l	56	55	6,960	4,640	574	6,450
Dissolved Selenium	ug/l	56	7	1.57	0.594	<0.200	1.70
Total Selenium	ug/l	56	5	2.20	2.20	<0.200	2.20
Dissolved Silver	ug/l	56	2	1.20	1.20	<0.700	1.20
Total Silver	ug/l	56	0	0.900	0.900	<0.700	<0.900
Dissolved Sodium	ug/l	56	56	21,400	21,400	2,100	21,400
Total Sodium	ug/l	56	56	19,800	19,800	1,990	19,800
Dissolved Thallium	ug/l	56	1	1.10	1.10	<0.100	1.1
Total Thallium	ug/l	56	2	1.30	1.30	<0.100	1.30
Total Uranium, Calculated	mg/l	56	56	0.160	0.0510	0.000200	0.101
Dissolved Vanadium	ug/l	56	15	7.70	3.10	<0.500	4.80
Total Vanadium	ug/l	56	26	58.9	14.2	<0.500	54.1
Dissolved Zinc	ug/l	56	32	181	181	<0.300	181
Total Zinc	ug/l	56	43	349	108	<0.300	353
Other Parameters							
Alkalinity, Total	mg/l	56	55	176	176	<2.00	176
Bicarbonate Alkalinity	mg/l	56	55	176	176	<2.00	176
Carbonate Alkalinity	mg/l	56	0	2.00	2.00	<2.00	<2.00
Chemical Oxygen Demand	mg/l	22	10	20.7	12.5	<5.00	16.9
Hardness	mg/l	56	56	231	140	7.44	167
Hydroxide Alkalinity	mg/l	37	0	2.00	2.00	<2.00	<2.00
Total Dissolved Solids	mg/l	56	56	411	301	67.0	646

Table 5-71
SUMMARY OF ANALYTICAL RESULTS FOR BACKGROUND AREA GROUNDWATER SAMPLES

Parameter	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (1)	RBL (2)		
Total Suspended Solids	mg/l	56	32	1,150	247	<4.00	984
Radionuclides							
Gross Alpha	pCi/L	37	35	303	99.1	<0.0651	152
Gross Beta	pCi/L	37	37	165	78.2	3.16	115
Lead 210	pCi/L	37	24	107	38.6	<0.300	47.0
Polonium 210	pCi/L	37	30	42.6	15.5	<0.200	32.0
Radium 226	pCi/L	37	37	11.9	11.9	0.121	11.9
Radium 228	pCi/L	37	18	12.7	12.7	-0.20	12.7
Radon 222, Calculated	pCi/L	56	56	89,200	89,200	304	89,155
Thorium 227	pCi/L	37	7	1.24	0.491	-0.01	0.864
Thorium 228	pCi/L	37	21	2.50	2.50	-0.43	2.50
Thorium 230	pCi/L	37	34	10.2	3.35	0.0248	20.3
Thorium 232	pCi/L	37	25	5.71	1.67	0.00	2.40
Uranium 234	pCi/L	56	56	66.2	21.4	0.112	37.2
Uranium 235	pCi/L	56	42	4.09	1.32	0.00	2.13
Uranium 238	pCi/L	56	53	67.9	19.2	<0.0274	33.5

Notes:

(1) 99% Upper Tolerance Limit for the URS background groundwater data set
(2) 95% Upper Prediction Limit for the URS background groundwater data set
NA = Not Applicable

Table 5-72
SUMMARY OF ANALYTICAL RESULTS FOR WESTERN DRAINAGE SEEP GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Field Parameters							
Dissolved Oxygen	mg/l	17	17	NA	NA	8.20	11.1
Eh	mV	5	5	NA	NA	380	489
Ferrous Iron	mg/l	17	15	NA	NA	<0.0500	0.370
Field Iron	ug/l	15	15	NA	NA	30.0	190
Field pH	SU	17	17	NA	NA	4.36	4.98
Specific Conductance	umhos/cm	16	16	42,200	34,600	926	3,530
Temperature	C	16	16	NA	NA	8.40	16.4
Turbidity	NTU	4	4	NA	NA	2.98	39.0
Inorganics							
Chloride	mg/l	17	15	2.05	2.05	1.88	3.00
Fluoride	mg/l	15	15	NC	NC	1.00	1.90
Nitrate	mg/l	16	16	1.75	0.583	1.10	2.00
Nitrate/Nitrite	mg/l	15	15	NC	NC	1.41	2.00
Nitrite	mg/l	15	0	0.0200	0.0200	<0.0100	<0.250
Nitrogen, Ammonia	mg/l	2	2	0.258	0.0940	0.0477	0.114
Nitrogen, Kjeldahl	mg/l	4	3	NC	NC	<0.200	3.40
Phosphate-P	mg/l	2	0	1.41	0.533	<0.0100	<0.0100
Phosphorus	mg/l	17	4	2.07	0.795	<0.0100	0.0200
Silica	mg/l	15	15	NC	NC	26.1	39.6
Sulfate	mg/l	17	17	193	77.4	2,130	2,600 (5)
Metals							
Dissolved Aluminum	ug/l	17	17	14,300	2,080	5,000	23,300
Total Aluminum	ug/l	18	18	82,000	16,200	4,430	24,100
Dissolved Antimony	ug/l	4	0	8.29	1.98	<2.20	<5.00
Total Antimony	ug/l	5	0	7.10	7.10	<2.20	<5.00
Dissolved Arsenic	ug/l	17	6	217	54.4	0.240	5
Total Arsenic	ug/l	18	7	78.2	78.2	0.250	8
Dissolved Barium	ug/l	17	17	67.6	67.6	9.30	12.0
Total Barium	ug/l	18	18	178	93.7	4.70	12.0
Dissolved Beryllium	ug/l	17	16	1.93	0.343	5.00	14.0 (5)
Total Beryllium	ug/l	18	18	5.15	1.47	5.00	16.0 (5)
Dissolved Cadmium	ug/l	17	16	0.270	0.270	7.70	16.0 (5)
Total Cadmium	ug/l	18	18	0.520	0.520	7.70	15.0 (5)
Dissolved Calcium	ug/l	17	17	72,500	39,700	378,000	483,000 (5)
Total Calcium	ug/l	3	3	70,500	39,700	393,000	472,000 (5)
Dissolved Chromium	ug/l	17	5	19.9	7.85	<0.400	6
Total Chromium	ug/l	18	5	137	42.1	<0.200	7
Dissolved Cobalt	ug/l	4	4	7.77	2.75	190	279

Table 5-72
SUMMARY OF ANALYTICAL RESULTS FOR WESTERN DRAINAGE SEEP GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Total Cobalt	ug/l	5	5	29.5	10.2	180	277
Dissolved Copper	ug/l	17	16	4.84	2.14	41.0	206 (5)
Total Copper	ug/l	18	17	220	31.6	42.0	230 (5)
Dissolved Iron	ug/l	17	13	167,000	19,800	<8.40	670
Total Iron	ug/l	18	14	36,500	36,500	<8.40	240
Dissolved Lead	ug/l	17	7	1.31	0.624	<0.500	1
Total Lead	ug/l	18	6	51.5	13.1	<0.500	7.50
Dissolved Magnesium	ug/l	17	17	18,200	11,200	237,000	310,000 (5)
Total Magnesium	ug/l	3	3	19,800	12,400	253,000	303,000
Dissolved Manganese	ug/l	17	17	1,930	1,930	26,400	34,200 (5)
Total Manganese	ug/l	18	18	1,990	1,990	23,400	33,900 (5)
Dissolved Mercury	ug/l	17	0	0.200	0.200	<0.100	<0.200
Total Mercury	ug/l	19	0	0.200	0.200	<0.100	<0.200
Dissolved Nickel	ug/l	17	17	13.9	13.9	440	630 (5)
Total Nickel	ug/l	18	18	102	33.2	410	620 (5)
Dissolved Potassium	ug/l	17	17	5,560	3,760	3,600	7,000 (5)
Total Potassium	ug/l	3	3	6,960	4,640	5,790	6,810
Dissolved Selenium	ug/l	17	0	1.57	0.594	<1.00	<2.00
Total Selenium	ug/l	18	2	2.20	2.20	<1.00	16.8
Dissolved Silver	ug/l	17	4	1.20	1.20	<0.700	20.0
Total Silver	ug/l	18	0	0.900	0.900	<0.700	<10.0
Dissolved Sodium	ug/l	17	17	21,400	21,400	33,800	40,500 (5)
Total Sodium	ug/l	3	3	19,800	19,800	34,800	41,100 (6)
Dissolved Thallium	ug/l	17	1	1.10	1.10	0.100	0.1
Total Thallium	ug/l	18	2	1.30	1.30	<0.100	0.3
Total Uranium	ug/l	1	1	160	50.0	36,800	36,800
Total Uranium, Calculated	mg/l	3	3	0.160	0.0510	1.52	4.57
Dissolved Vanadium	ug/l	4	1	7.70	3.10	<1.00	1.1
Total Vanadium	ug/l	5	0	58.9	14.2	<0.500	<10.0
Dissolved Zinc	ug/l	17	17	181	181	720	1,400 (5)
Total Zinc	ug/l	18	17	349	108	670	1,300 (5)
Organic Compounds							
Total Petroleum Hydrocarbons-Diesel	ug/l	1	0	NA	NA	<1,000	<1,000
Total Petroleum Hydrocarbons-Gasoline	ug/l	1	0	NA	NA	<100	<100
Other Parameters							
Alkalinity	mg/l	15	6	176	176	<2.00	4
Alkalinity, Total	mg/l	2	0	176	176	<2.00	<2.00
Bicarbonate Alkalinity	mg/l	17	6	176	176	<2.00	4
Carbonate Alkalinity	mg/l	17	0	2.00	2.00	<2.00	<20.0

Table 5-72
SUMMARY OF ANALYTICAL RESULTS FOR WESTERN DRAINAGE SEEP GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Chemical Oxygen Demand	mg/l	2	1	20.7	12.5	<5.00	27.1
Hardness	mg/l	17	17	231	140	1,940	4,620 (5)
Hydroxide Alkalinity	mg/l	17	0	2.00	2.00	<2.00	<20.0
Total Dissolved Solids	mg/l	17	17	411	301	3,110	3,910 (5)
Total Inorganic Carbon	mg/l	15	2	NC	NC	<1.00	2
Total Suspended Solids	mg/l	17	5	1,150	247	<5.00	12.0
Radionuclides							
Gross Alpha	pCi/L	19	19	303	99.1	1,020	3,914 (5)
Gross Beta	pCi/L	18	18	165	78.2	270	1,990 (5)
Dissolved Lead 210	pCi/L	1	0	NC	NC	<1.30	<1.30
Total Lead 210	pCi/L	18	12	107	38.6	-12.00	50.0
Dissolved Polonium 210	pCi/L	1	1	NC	NC	3.40	3.40
Total Polonium 210	pCi/L	8	2	42.6	15.5	<0.100	2.1
Dissolved Radium 226	pCi/L	1	1	NC	NC	16.8	16.8
Total Radium 226	pCi/L	19	19	11.9	11.9	4.61	13.4
Dissolved Radium 228	pCi/L	1	0	NC	NC	<1.85	<1.85
Total Radium 228	pCi/L	19	18	12.7	12.7	1.00	4
Total Radon 222	pCi/L	4	4	NC	NC	530	1,000
Total Radon 222, Calculated	pCi/L	3	3	89,200	89,200	516	1,240
Total Thorium 227	pCi/L	3	1	1.24	0.491	0.00	13.3
Total Thorium 228	pCi/L	6	0	2.50	2.50	-12.40	<1.95
Dissolved Thorium 230	pCi/L	1	0	NC	NC	<0.400	<0.400
Total Thorium 230	pCi/L	19	13	10.2	3.35	-1.88	6.30
Total Thorium 232	pCi/L	6	3	5.71	1.67	-0.63	0.4
Dissolved Uranium 234	pCi/L	1	1	NC	NC	960	960
Total Uranium 234	pCi/L	19	19	66.2	21.4	537	2,000 (5)
Dissolved Uranium 235	pCi/L	1	1	NC	NC	40.0	40.0
Total Uranium 235	pCi/L	19	19	4.09	1.32	27.0	118 (5)
Dissolved Uranium 238	pCi/L	1	1	NC	NC	980	980
Total Uranium 238	pCi/L	19	19	67.9	19.2	502	2,000 (5)

Notes:

(1) Parameters in bold exceed background limits for the URS samples

(2) 99% Upper Tolerance Limit for the URS background groundwater data set

(3) 95% Upper Prediction Limit for the URS background groundwater data set

(4) The result is reported as non-detect value above the RBL

(5) The maximum concentration or activity exceeding the background limit is reported from SMI samples.

(6) The maximum concentration or activity exceeding the background limit is reported from E&E samples.

NA = Not Applicable

NC = Not calculated; parameter not analyzed for URS background samples

Table 5-73
SUMMARY OF ANALYTICAL RESULTS FOR CENTRAL DRAINAGE SEEP GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Field Parameters							
Dissolved Oxygen	mg/l	15	15	NA	NA	4.20	7.70
Eh	mV	4	4	NA	NA	281	504
Ferrous Iron	mg/l	15	6	NA	NA	<0.00700	0.04 (5)
Field Iron	ug/l	13	9	NA	NA	<7.00	320
Field pH	SU	15	15	NA	NA	6.17	6.84
Specific Conductance	umhos/cm	14	14	42,200	34,600	885	4,280
Temperature	C	15	15	NA	NA	8.00	17.2
Turbidity	NTU	3	3	NA	NA	0.00	0.200
Inorganics							
Chloride	mg/l	15	14	2.05	2.05	2.00	4.00
Fluoride	mg/l	13	13	NC	NC	1.60	3.90
Nitrate	mg/l	14	14	1.75	0.583	1.64	2.71
Nitrate/Nitrite	mg/l	13	13	NC	NC	1.91	2.77
Nitrite	mg/l	14	2	0.0200	0.0200	<0.0100	0.01 (5)
Nitrogen, Ammonia	mg/l	2	2	0.258	0.0940	2.74	2.89
Nitrogen, Kjeldahl	mg/l	4	4	NC	NC	0.900	4.00
Phosphate-P	mg/l	2	0	1.41	0.533	<0.0100	<0.0100
Phosphorus	mg/l	15	2	2.07	0.795	<0.0100	0.0200
Silica	mg/l	13	13	NC	NC	20.2	26.0
Sulfate	mg/l	15	15	193	77.4	2,430	2,990
Metals							
Dissolved Aluminum	ug/l	15	15	14,300	2,080	190	1,100
Total Aluminum	ug/l	16	16	82,000	16,200	197	2,140
Dissolved Antimony	ug/l	3	1	8.29	1.98	<2.20	13.0 (5)
Total Antimony	ug/l	4	0	7.10	7.10	<2.20	<5.00
Dissolved Arsenic	ug/l	15	8	217	54.4	1.70	6.0 (5)
Total Arsenic	ug/l	16	10	78.2	78.2	1.60	8.7 (6)
Dissolved Barium	ug/l	15	15	67.6	67.6	8.70	13.0
Total Barium	ug/l	16	16	178	93.7	2.30	12.0
Dissolved Beryllium	ug/l	15	12	1.93	0.343	8.00	11.0
Total Beryllium	ug/l	16	13	5.15	1.47	8.70	12.4
Dissolved Cadmium	ug/l	15	15	0.270	0.270	48.8	73.8
Total Cadmium	ug/l	16	16	0.520	0.520	44.0	64.0
Dissolved Calcium	ug/l	15	15	72,500	39,700	439,000	521,000
Total Calcium	ug/l	3	3	70,500	39,700	430,000	527,000
Dissolved Chromium	ug/l	15	5	19.9	7.85	<0.400	9

Table 5-73
SUMMARY OF ANALYTICAL RESULTS FOR CENTRAL DRAINAGE SEEP GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Total Chromium	ug/l	16	5	137	42.1	<0.200	9.9
Dissolved Cobalt	ug/l	3	3	7.77	2.75	827	862
Total Cobalt	ug/l	4	4	29.5	10.2	720	859
Dissolved Copper	ug/l	15	13	4.84	2.14	0.570	100 (5)
Total Copper	ug/l	16	11	220	31.6	<0.500	110 (5)
Dissolved Iron	ug/l	15	7	167,000	19,800	<8.40	500
Total Iron	ug/l	16	2	36,500	36,500	<8.40	378
Dissolved Lead	ug/l	15	0	1.31	0.624	<0.200	<200 (4)
Total Lead	ug/l	16	3	51.5	13.1	<0.200	34.7 (6)
Dissolved Magnesium	ug/l	15	15	18,200	11,200	338,000	371,000
Total Magnesium	ug/l	3	3	19,800	12,400	351,000	367,000
Dissolved Manganese	ug/l	15	15	1,930	1,930	94,000	133,000
Total Manganese	ug/l	16	16	1,990	1,990	93,000	123,000
Dissolved Mercury	ug/l	15	0	0.200	0.200	<0.100	<0.200
Total Mercury	ug/l	17	0	0.200	0.200	<0.100	<0.200
Dissolved Nickel	ug/l	15	15	13.9	13.9	1,230	1,620
Total Nickel	ug/l	16	16	102	33.2	1,130	1,550
Dissolved Potassium	ug/l	15	14	5,560	3,760	<3,000	5,500 (5)
Total Potassium	ug/l	3	3	6,960	4,640	4,610	5,420 (5)
Dissolved Selenium	ug/l	15	0	1.57	0.594	<1.00	<2.00 (4)
Total Selenium	ug/l	16	2	2.20	2.20	<1.00	70.0 (6)
Dissolved Silver	ug/l	15	8	1.20	1.20	<0.700	50.0 (5)
Total Silver	ug/l	16	7	0.900	0.900	<1.10	90.0 (5)
Dissolved Sodium	ug/l	15	15	21,400	21,400	41,000	48,000
Total Sodium	ug/l	3	3	19,800	19,800	42,900	49,200
Dissolved Thallium	ug/l	15	3	1.10	1.10	<0.200	0.3 (5)
Total Thallium	ug/l	16	2	1.30	1.30	<0.200	0.4 (5)
Total Uranium	ug/l	1	1	160	50.0	30,600	30,600 (6)
Total Uranium, Calculated	mg/l	3	3	0.160	0.0510	25.4	30.6
Dissolved Vanadium	ug/l	3	0	7.70	3.10	<0.500	<30.0 (4)
Total Vanadium	ug/l	4	0	58.9	14.2	<0.500	<30.0 (4)
Dissolved Zinc	ug/l	15	15	181	181	2,140	4,000
Total Zinc	ug/l	16	16	349	108	2,160	3,000
Organic Compounds							
Total Petroleum Hydrocarbons-Diesel	ug/l	1	0	NA	NA	<1,000	<1,000
Other Parameters							
Alkalinity	mg/l	15	15	176	176	181	205

Table 5-73
SUMMARY OF ANALYTICAL RESULTS FOR CENTRAL DRAINAGE SEEP GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Bicarbonate Alkalinity	mg/l	15	15	176	176	181	205
Carbonate Alkalinity	mg/l	15	0	2.00	2.00	<2.00	<2.00
Chemical Oxygen Demand	mg/l	2	0	20.7	12.5	<5.00	<5.00
Hardness	mg/l	15	15	231	140	2,590	5,530
Hydroxide Alkalinity	mg/l	15	0	2.00	2.00	<2.00	<2.00
Total Dissolved Solids	mg/l	15	15	411	301	3,930	4,550
Total Inorganic Carbon	mg/l	13	12	NC	NC	39.0	45.0
Total Suspended Solids	mg/l	15	6	1,150	247	4.20	10.0
Radionuclides							
Gross Alpha	pCi/L	17	17	303	99.1	7,760	22,000
Gross Beta	pCi/L	16	16	165	78.2	3,000	12,200
Dissolved Lead 210	pCi/L	1	0	NC	NC	<4.90	<4.90
Total Lead 210	pCi/L	16	13	107	38.6	1.90	91.0 (5)
Dissolved Polonium 210	pCi/L	1	1	NC	NC	4.70	4.70 (5)
Total Polonium 210	pCi/L	6	4	42.6	15.5	<0.600	11.0
Dissolved Radium 226	pCi/L	1	1	NC	NC	44.2	44.2 (5)
Total Radium 226	pCi/L	17	17	11.9	11.9	15.4	34.7
Total Radium 228	pCi/L	16	14	12.7	12.7	0.681	22.0 (5)
Total Radon 222, Calculated	pCi/L	3	3	89,200	89,200	22,612	26,704
Total Thorium 227	pCi/L	3	0	1.24	0.491	<2.84	<24.7
Total Thorium 228	pCi/L	5	0	2.50	2.50	<0.0700	<43.0
Dissolved Thorium 230	pCi/L	1	0	NC	NC	<0.600	<0.600
Total Thorium 230	pCi/L	17	10	10.2	3.35	0.100	47.3 (6)
Total Thorium 232	pCi/L	5	1	5.71	1.67	0.00	1.3 (5)
Dissolved Uranium 234	pCi/L	1	1	NC	NC	10,000	10,000 (5)
Total Uranium 234	pCi/L	17	17	66.2	21.4	6,290	29,000
Dissolved Uranium 235	pCi/L	1	1	NC	NC	460	460 (5)
Total Uranium 235	pCi/L	17	17	4.09	1.32	330	1,400
Dissolved Uranium 238	pCi/L	1	1	NC	NC	10,000	10,000 (5)
Total Uranium 238	pCi/L	17	17	67.9	19.2	6,390	31,000

Notes:
(1) Parameters in bold exceed background limits for the URS samples
(2) 99% Upper Tolerance Limit for the URS background groundwater data set
(3) 95% Upper Prediction Limit for the URS background groundwater data set
(4) The result is reported as non-detect value above the RBL
(5) The maximum concentration or activity is reported from SMI samples
(6) The maximum concentration or activity is reported from E&E samples
NA = Not Applicable
NC = Not calculated; parameter not analyzed for URS background samples

Table 5-74
SUMMARY OF ANALYTICAL RESULTS FOR EAST SEEP GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Field Parameters							
Dissolved Oxygen	mg/l	11	11	NA	NA	3.90	11.6
Eh	mV	2	2	NA	NA	392	445
Ferrous Iron	mg/l	9	7	NA	NA	<0.0500	0.680
Field Iron	ug/l	9	9	NA	NA	10.0	60.0
Field pH	SU	11	11	NA	NA	4.18	4.54
Specific Conductance	uS/cm	10	10	42,200	34,600	383	3,740
Temperature	C	11	11	NA	NA	6.60	17.3
Turbidity	NTU	2	2	NA	NA	0.00	0.00
Inorganics							
Chloride	mg/l	11	11	2.05	2.05	1.00	3.00 (5)
Fluoride	mg/l	9	9	NC	NC	0.300	1.40
Nitrate	mg/l	11	11	1.75	0.583	0.420	0.770
Nitrate/Nitrite	mg/l	9	9	NC	NC	0.550	0.890
Nitrite	mg/l	11	0	0.0200	0.0200	<0.0200	<0.250 (4)
Nitrogen, Ammonia	mg/l	2	1	0.258	0.0940	<0.0100	0.0240
Nitrogen, Kjeldahl	mg/l	4	1	NC	NC	<0.100	0.4
Phosphate-P	mg/l	2	0	1.41	0.533	<0.0100	<0.0100
Phosphorus	mg/l	11	4	2.07	0.795	<0.0100	0.0200
Silica	mg/l	9	9	NC	NC	29.1	34.2
Sulfate	mg/l	11	11	193	77.4	2,420	2,860 (5)
Metals							
Dissolved Aluminum	ug/l	11	11	14,300	2,080	16,300	29,200 (5)
Total Aluminum	ug/l	11	11	82,000	16,200	14,400	29,700
Dissolved Antimony	ug/l	2	0	8.29	1.98	<2.20	<2.70 (4)
Total Antimony	ug/l	2	0	7.10	7.10	<2.20	<2.70
Dissolved Arsenic	ug/l	11	2	217	54.4	<0.200	3
Total Arsenic	ug/l	11	4	78.2	78.2	0.200	5
Dissolved Barium	ug/l	11	10	67.6	67.6	<8.90	15.0
Total Barium	ug/l	11	11	178	93.7	7.30	14.0
Dissolved Beryllium	ug/l	11	11	1.93	0.343	12.0	19.0 (5)
Total Beryllium	ug/l	11	11	5.15	1.47	12.0	18.0 (5)
Dissolved Cadmium	ug/l	11	11	0.270	0.270	14.1	20.9 (5)
Total Cadmium	ug/l	11	11	0.520	0.520	12.4	19.1 (5)
Dissolved Calcium	ug/l	11	11	72,500	39,700	421,000	487,000 (5)
Total Calcium	ug/l	2	2	70,500	39,700	473,000	497,000
Dissolved Chromium	ug/l	11	2	19.9	7.85	<0.400	4

Table 5-74
SUMMARY OF ANALYTICAL RESULTS FOR EAST SEEP GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Total Chromium	ug/l	11	0	137	42.1	<0.400	<20.0
Dissolved Cobalt	ug/l	2	2	7.77	2.75	89.4	273
Total Cobalt	ug/l	2	2	29.5	10.2	91.3	272
Dissolved Copper	ug/l	11	10	4.84	2.14	61.0	185 (5)
Total Copper	ug/l	11	10	220	31.6	55.0	200
Dissolved Iron	ug/l	11	7	167,000	19,800	<8.40	150
Total Iron	ug/l	11	8	36,500	36,500	<8.40	60
Dissolved Lead	ug/l	11	10	1.31	0.624	9.00	18.5 (5)
Total Lead	ug/l	11	11	51.5	13.1	4.50	17.0
Dissolved Magnesium	ug/l	11	11	18,200	11,200	263,000	327,000 (5)
Total Magnesium	ug/l	2	2	19,800	12,400	298,000	313,000
Dissolved Manganese	ug/l	11	11	1,930	1,930	21,600	34,200 (5)
Total Manganese	ug/l	11	11	1,990	1,990	19,300	33,900 (5)
Dissolved Mercury	ug/l	11	0	0.200	0.200	<0.100	<0.200
Total Mercury	ug/l	12	0	0.200	0.200	<0.100	<0.200
Dissolved Nickel	ug/l	11	11	13.9	13.9	380	730 (5)
Total Nickel	ug/l	11	11	102	33.2	360	740 (5)
Dissolved Potassium	ug/l	11	11	5,560	3,760	6,500	10,300 (5)
Total Potassium	ug/l	2	2	6,960	4,640	7,510	9,890
Dissolved Selenium	ug/l	11	0	1.57	0.594	<1.00	<2.00 (4)
Total Selenium	ug/l	11	0	2.20	2.20	<1.00	<6.50 (4)
Dissolved Silver	ug/l	11	1	1.20	1.20	<0.700	10.0 (5)
Total Silver	ug/l	11	0	0.900	0.900	<0.700	<30.0 (4)
Dissolved Sodium	ug/l	11	11	21,400	21,400	40,000	62,000 (5)
Total Sodium	ug/l	2	2	19,800	19,800	44,800	55,200
Dissolved Thallium	ug/l	11	1	1.10	1.10	<0.200	0.3
Total Thallium	ug/l	11	0	1.30	1.30	<0.200	<2.00 (4)
Total Uranium, Calculated	mg/l	2	2	0.160	0.0510	5.75	6.19
Dissolved Vanadium	ug/l	2	1	7.70	3.10	0.970	0.97
Total Vanadium	ug/l	2	0	58.9	14.2	<0.500	<1.00
Dissolved Zinc	ug/l	11	11	181	181	1,000	2,100 (5)
Total Zinc	ug/l	11	11	349	108	1,000	2,000 (5)
Organic Compounds							
Total Petroleum Hydrocarbons-Diesel	ug/l	1	0	NA	NA	<1,000	<1,000
Total Petroleum Hydrocarbons-Gasoline	ug/l	1	0	NA	NA	<100	<100
Other Parameters							
Alkalinity, Total	mg/l	11	0	176	176	<2.00	<2.00

Table 5-74
SUMMARY OF ANALYTICAL RESULTS FOR EAST SEEP GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Bicarbonate Alkalinity	mg/l	11	0	176	176	<2.00	<2.00
Carbonate Alkalinity	mg/l	11	0	2.00	2.00	<2.00	<2.00
Chemical Oxygen Demand	mg/l	2	1	20.7	12.5	<5.00	15.8
Hardness	mg/l	11	11	231	140	2,130	5,120 (5)
Hydroxide Alkalinity	mg/l	11	0	2.00	2.00	<2.00	<2.00
Total Dissolved Solids	mg/l	11	11	411	301	3,270	3,990 (5)
Total Inorganic Carbon	mg/l	9	3	NC	NC	<1.00	1
Total Suspended Solids	mg/l	11	4	1,150	247	<5.00	61.9
Radionuclides							
Gross Alpha	pCi/L	11	11	303	99.1	2,040	4,700 (5)
Gross Beta	pCi/L	11	11	165	78.2	566	2,880
Dissolved Lead 210	pCi/L	1	0	NC	NC	<7.40	<7.40
Total Lead 210	pCi/L	11	7	107	38.6	-2.50	52 (5)
Dissolved Polonium 210	pCi/L	1	1	NC	NC	3.40	3.40
Total Polonium 210	pCi/L	3	1	42.6	15.5	<0.500	3.60
Dissolved Radium 226	pCi/L	1	1	NC	NC	78.5	78.5
Total Radium 226	pCi/L	11	11	11.9	11.9	17.2	62.0
Dissolved Radium 228	pCi/L	1	1	NC	NC	7.27	7.27
Total Radium 228	pCi/L	11	11	12.7	12.7	3.50	8.80
Total Radon 222, Calculated	pCi/L	2	2	89,200	89,200	856	4,122
Total Thorium 227	pCi/L	2	2	1.24	0.491	17.8	27.5
Total Thorium 228	pCi/L	2	0	2.50	2.50	-3.74	-0.96
Dissolved Thorium 230	pCi/L	1	0	NC	NC	<2.10	<2.10
Total Thorium 230	pCi/L	11	10	10.2	3.35	3.10	18.9
Total Thorium 232	pCi/L	2	1	5.71	1.67	<0.511	3.36
Dissolved Uranium 234	pCi/L	1	1	NC	NC	1,900	1,900
Total Uranium 234	pCi/L	11	11	66.2	21.4	1,500	2,600 (5)
Dissolved Uranium 235	pCi/L	1	1	NC	NC	77.0	77.0
Total Uranium 235	pCi/L	11	11	4.09	1.32	52.0	137
Dissolved Uranium 238	pCi/L	1	1	NC	NC	1,800	1,800
Total Uranium 238	pCi/L	11	11	67.9	19.2	1,400	2,600 (5)

Notes:
(1) Parameters in bold exceed background limits for the URS samples
(2) 99% Upper Tolerance Limit for the URS background groundwater data set
(3) 95% Upper Prediction Limit for the URS background groundwater data set
(4) The result is reported as non-detect value above the RBL
(5) The maximum concentration or activity exceeding the background limit is reported from SMI samples
NA = Not Applicable
NC = Not calculated; parameter not analyzed for URS background samples

Table 5-75
ANALYTICAL RESULTS FOR THE MIDDLE BLUE CREEK GROUNDWATER SAMPLE

Parameter (1)	Units	No. of Samples	No. of Detects	Background Limits		Result
				BL (2)	RBL (3)	
Inorganics						
Chloride	mg/l	1	1	2.05	2.05	2.48
Nitrate	mg/l	1	1	1.75	0.583	0.0510
Nitrite	mg/l	1	0	0.0200	0.0200	<0.0200
Sulfate	mg/l	1	1	193	77.4	787
Metals						
Dissolved Aluminum	ug/l	1	0	14,300	2,080	<8.40
Dissolved Antimony	ug/l	1	1	8.29	1.98	0.110
Dissolved Arsenic	ug/l	1	1	217	54.4	0.190
Dissolved Barium	ug/l	1	1	67.6	67.6	70.8
Dissolved Beryllium	ug/l	1	0	1.93	0.343	<0.100
Dissolved Cadmium	ug/l	1	0	0.270	0.270	<0.400 (4)
Dissolved Calcium	ug/l	1	1	72,500	39,700	247,000
Dissolved Chromium	ug/l	1	0	19.9	7.85	<1.10
Dissolved Cobalt	ug/l	1	0	7.77	2.75	<1.00
Dissolved Copper	ug/l	1	0	4.84	2.14	<0.800
Dissolved Iron	ug/l	1	0	167,000	19,800	<16.2
Dissolved Lead	ug/l	1	0	1.31	0.624	<0.100
Dissolved Magnesium	ug/l	1	1	18,200	11,200	45,900
Dissolved Manganese	ug/l	1	1	1,930	1,930	166
Dissolved Molybdenum	ug/l	1	0	119	25.5	<2.20
Dissolved Nickel	ug/l	1	1	13.9	13.9	2.70
Dissolved Potassium	ug/l	1	1	5,560	3,760	4,390
Dissolved Selenium	ug/l	1	1	1.57	0.594	0.540
Dissolved Silver	ug/l	1	0	1.20	1.20	<0.900
Dissolved Sodium	ug/l	1	1	21,400	21,400	19,700
Dissolved Thallium	ug/l	1	0	1.10	1.10	<0.100
Total Uranium, Calculated	mg/l	1	1	0.160	0.0510	0.0380
Dissolved Vanadium	ug/l	1	0	7.70	3.10	<0.800
Dissolved Zinc	ug/l	1	1	181	181	6.10
Other Parameters						
Total Dissolved Solids	mg/l	1	1	411	301	1,400
Radionuclides						
Total Radon 222, Calculated	pCi/L	1	1	89,200	89,200	4,629
Total Uranium 234	pCi/L	1	1	66.2	21.4	14.4
Total Uranium 235	pCi/L	1	1	4.09	1.32	0.492
Total Uranium 238	pCi/L	1	1	67.9	19.2	12.6

Notes:

(1) Parameters in bold exceed background limits

(2) 99% Upper Tolerance Limit for the URS background groundwater data set

(3) 95% Upper Prediction Limit for the URS background groundwater data set

(4) The result is reported as non-detect value above the RBL

Table 5-76
SUMMARY OF ANALYTICAL RESULTS FOR EAST SEEP FORK BEDROCK GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Field Parameters							
Dissolved Oxygen	mg/l	3	3	NA	NA	2.07	15.0
Eh	mV	3	3	NA	NA	106	268
Ferrous Iron	mg/l	3	1	NA	NA	<0.0500	0.100
Field pH	SU	4	4	NA	NA	6.74	7.17
Specific Conductance	uS/cm	2	2	42,200	34,600	208	2,870
Temperature	C	4	4	NA	NA	9.99	11.8
Turbidity	NTU	4	4	NA	NA	0.00	11.8
Inorganics							
Chloride	mg/l	4	4	2.05	2.05	1.75	2.29
Nitrate	mg/l	4	4	1.75	0.583	1.69	3.74
Nitrite	mg/l	4	0	0.0200	0.0200	<0.0200	<0.0200
Nitrogen, Ammonia	mg/l	4	2	0.258	0.0940	<0.0100	0.0151
Phosphate-P	mg/l	4	4	1.41	0.533	0.0329	0.0386
Phosphorus	mg/l	4	4	2.07	0.795	0.0314	0.0378
Sulfate	mg/l	4	4	193	77.4	945	1,680
Metals							
Dissolved Aluminum	ug/l	4	0	14,300	2,080	<5.40	<30.6
Total Aluminum	ug/l	4	2	82,000	16,200	<35.4	229
Dissolved Antimony	ug/l	4	0	8.29	1.98	<2.20	<2.70 (4)
Total Antimony	ug/l	4	2	7.10	7.10	<2.20	5.10
Dissolved Arsenic	ug/l	4	4	217	54.4	2.90	3.60
Total Arsenic	ug/l	4	4	78.2	78.2	2.80	3.70
Dissolved Barium	ug/l	4	4	67.6	67.6	36.2	60.7
Total Barium	ug/l	4	4	178	93.7	36.0	61.3
Dissolved Beryllium	ug/l	4	0	1.93	0.343	<0.100	<0.130
Total Beryllium	ug/l	4	0	5.15	1.47	<0.100	<0.100
Dissolved Cadmium	ug/l	4	0	0.270	0.270	<0.200	<0.500 (4)
Total Cadmium	ug/l	4	0	0.520	0.520	<0.200	<0.500
Dissolved Calcium	ug/l	4	4	72,500	39,700	269,000	490,000
Total Calcium	ug/l	4	4	70,500	39,700	271,000	482,000
Dissolved Chromium	ug/l	4	0	19.9	7.85	<0.400	<1.10
Total Chromium	ug/l	4	0	137	42.1	<0.710	<1.10
Dissolved Cobalt	ug/l	4	1	7.77	2.75	<1.20	3.00
Total Cobalt	ug/l	4	2	29.5	10.2	<1.20	5.60
Dissolved Copper	ug/l	4	0	4.84	2.14	<0.500	<5.00 (4)
Total Copper	ug/l	4	0	220	31.6	<0.500	<5.00

Table 5-76
SUMMARY OF ANALYTICAL RESULTS FOR EAST SEEP FORK BEDROCK GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Dissolved Iron	ug/l	4	0	167,000	19,800	<8.40	<35.2
Total Iron	ug/l	4	2	36,500	36,500	<8.40	136
Dissolved Lead	ug/l	4	0	1.31	0.624	<0.900	<1.00 (4)
Total Lead	ug/l	4	0	51.5	13.1	<0.900	<1.00
Dissolved Magnesium	ug/l	4	4	18,200	11,200	98,800	165,000
Total Magnesium	ug/l	4	4	19,800	12,400	98,500	163,000
Dissolved Manganese	ug/l	4	2	1,930	1,930	<0.100	41.1
Total Manganese	ug/l	4	3	1,990	1,990	<0.200	58.4
Dissolved Mercury	ug/l	4	0	0.200	0.200	<0.100	<0.200
Total Mercury	ug/l	4	0	0.200	0.200	<0.100	<0.200
Dissolved Nickel	ug/l	4	1	13.9	13.9	<1.20	<3.80
Total Nickel	ug/l	4	2	102	33.2	<0.900	3.10
Dissolved Potassium	ug/l	4	4	5,560	3,760	6,780	7,800
Total Potassium	ug/l	4	4	6,960	4,640	6,410	7,630
Dissolved Selenium	ug/l	4	0	1.57	0.594	<1.00	<1.30 (4)
Total Selenium	ug/l	4	0	2.20	2.20	<1.00	<1.30
Dissolved Silver	ug/l	4	0	1.20	1.20	<0.700	<0.800
Total Silver	ug/l	4	0	0.900	0.900	<0.700	<0.800
Dissolved Sodium	ug/l	4	4	21,400	21,400	25,300	62,100
Total Sodium	ug/l	4	4	19,800	19,800	25,000	59,900
Dissolved Thallium	ug/l	4	1	1.10	1.10	1.10	1.1
Total Thallium	ug/l	4	0	1.30	1.30	<1.10	<1.20
Total Uranium, Calculated	mg/l	4	4	0.160	0.0510	0.0490	0.0650
Dissolved Vanadium	ug/l	4	1	7.70	3.10	<0.500	1.10
Total Vanadium	ug/l	4	2	58.9	14.2	<0.500	2.10
Dissolved Zinc	ug/l	4	0	181	181	<0.400	<17.4
Total Zinc	ug/l	4	0	349	108	<0.400	<17.4
Organic Compounds							
Total Petroleum Hydrocarbons-Diesel	ug/l	2	0	NA	NA	<1,000	<1,000
Total Petroleum Hydrocarbons-Gasoline	ug/l	2	0	NA	NA	<100	<100
Other Parameters							
Alkalinity, Total	mg/l	4	4	176	176	198	232
Bicarbonate Alkalinity	mg/l	4	4	176	176	198	232
Carbonate Alkalinity	mg/l	4	0	2.00	2.00	<2.00	<2.00
Hardness	mg/l	4	4	231	140	1,087	1,903
Hydroxide Alkalinity	mg/l	4	1	2.00	2.00	<2.00	2.00
Total Dissolved Solids	mg/l	4	4	411	301	1,670	2,810

Table 5-76
SUMMARY OF ANALYTICAL RESULTS FOR EAST SEEP FORK BEDROCK GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Total Suspended Solids	mg/l	4	2	1,150	247	<4.00	11.6
Radionuclides							
Gross Alpha	pCi/L	4	3	303	99.1	20.2	32.0
Gross Beta	pCi/L	4	4	165	78.2	27.6	44.0
Total Lead 210	pCi/L	4	1	107	38.6	<1.20	1.4
Total Polonium 210	pCi/L	4	1	42.6	15.5	-0.30	0.400
Total Radium 226	pCi/L	4	4	11.9	11.9	0.167	0.270
Total Radium 228	pCi/L	4	0	12.7	12.7	<0.0816	<0.306
Total Radon 222, Calculated	pCi/L	4	4	89,200	89,200	2,006	2,820
Total Thorium 227	pCi/L	4	0	1.24	0.491	-0.04	<0.0100
Total Thorium 228	pCi/L	4	0	2.50	2.50	-0.05	<0.106
Total Thorium 230	pCi/L	4	4	10.2	3.35	0.0448	0.0929
Total Thorium 232	pCi/L	4	1	5.71	1.67	<0.0103	0.0505
Total Uranium 234	pCi/L	4	4	66.2	21.4	21.2	27.8
Total Uranium 235	pCi/L	4	4	4.09	1.32	0.806	1.49
Total Uranium 238	pCi/L	4	4	67.9	19.2	16.3	21.6

Notes:
(1) Parameters in bold exceed background limits
(2) 99% Upper Tolerance Limit for the URS background groundwater data set
(3) 95% Upper Prediction Limit for the URS background groundwater data set
(4) The result is reported as non-detect value above the RBL
NA = Not Applicable

Table 5-77
ANALYTICAL RESULTS FOR THE EAST DUMP FORK ALLUVIAL GROUNDWATER SAMPLE

Parameter (1)	Units	Background Limits		Result
		BL (2)	RBL (3)	
Field Parameters				
Dissolved Oxygen	mg/l	NA	NA	5.27
Eh	mV	NA	NA	389
Ferrous Iron	mg/l	NA	NA	<0.0500
Field pH	SU	NA	NA	4.95
Specific Conductance	uS/cm	42,200	34,600	3,360
Temperature	C	NA	NA	10.6
Turbidity	NTU	NA	NA	0.00
Inorganics				
Chloride	mg/l	2.05	2.05	1.73
Nitrate	mg/l	1.75	0.583	0.585
Nitrite	mg/l	0.0200	0.0200	<0.0200
Nitrogen, Ammonia	mg/l	0.258	0.0940	0.0843
Phosphate-P	mg/l	1.41	0.533	<0.0100
Phosphorus	mg/l	2.07	0.795	<0.0100
Sulfate	mg/l	193	77.4	2,500
Metals				
Dissolved Aluminum	ug/l	14,300	2,080	2,900
Total Aluminum	ug/l	82,000	16,200	2,970
Dissolved Antimony	ug/l	8.29	1.98	<2.70 (4)
Total Antimony	ug/l	7.10	7.10	<2.70
Dissolved Arsenic	ug/l	217	54.4	<0.200
Total Arsenic	ug/l	78.2	78.2	0.410
Dissolved Barium	ug/l	67.6	67.6	15.6
Total Barium	ug/l	178	93.7	15.4
Dissolved Beryllium	ug/l	1.93	0.343	4.50
Total Beryllium	ug/l	5.15	1.47	4.20
Dissolved Cadmium	ug/l	0.270	0.270	9.10
Total Cadmium	ug/l	0.520	0.520	9.00
Dissolved Calcium	ug/l	72,500	39,700	498,000
Total Calcium	ug/l	70,500	39,700	490,000
Dissolved Chromium	ug/l	19.9	7.85	<1.10
Total Chromium	ug/l	137	42.1	<1.10
Dissolved Cobalt	ug/l	7.77	2.75	107
Total Cobalt	ug/l	29.5	10.2	106
Dissolved Copper	ug/l	4.84	2.14	16.7
Total Copper	ug/l	220	31.6	13.5
Dissolved Iron	ug/l	167,000	19,800	<70.4
Total Iron	ug/l	36,500	36,500	<70.4

Table 5-77
ANALYTICAL RESULTS FOR THE EAST DUMP FORK ALLUVIAL GROUNDWATER SAMPLE

Parameter (1)	Units	Background Limits		Result
		BL (2)	RBL (3)	
Dissolved Lead	ug/l	1.31	0.624	<4.50 (4)
Total Lead	ug/l	51.5	13.1	<0.900
Dissolved Magnesium	ug/l	18,200	11,200	311,000
Total Magnesium	ug/l	19,800	12,400	309,000
Dissolved Manganese	ug/l	1,930	1,930	28,800
Total Manganese	ug/l	1,990	1,990	28,300
Dissolved Mercury	ug/l	0.200	0.200	<0.100
Total Mercury	ug/l	0.200	0.200	<0.100
Dissolved Nickel	ug/l	13.9	13.9	467
Total Nickel	ug/l	102	33.2	460
Dissolved Potassium	ug/l	5,560	3,760	7,500
Total Potassium	ug/l	6,960	4,640	7,280
Dissolved Selenium	ug/l	1.57	0.594	<1.30 (4)
Total Selenium	ug/l	2.20	2.20	<1.30
Dissolved Silver	ug/l	1.20	1.20	<2.50 (4)
Total Silver	ug/l	0.900	0.900	1.70
Dissolved Sodium	ug/l	21,400	21,400	38,600
Total Sodium	ug/l	19,800	19,800	37,400
Dissolved Thallium	ug/l	1.10	1.10	<1.20 (4)
Total Thallium	ug/l	1.30	1.30	<1.20
Total Uranium, Calculated	mg/l	0.160	0.0510	9.80
Dissolved Vanadium	ug/l	7.70	3.10	<1.00
Total Vanadium	ug/l	58.9	14.2	<1.00
Dissolved Zinc	ug/l	181	181	737
Total Zinc	ug/l	349	108	734
Other Parameters				
Alkalinity, Total	mg/l	176	176	3.20
Bicarbonate Alkalinity	mg/l	176	176	3.20
Carbonate Alkalinity	mg/l	2.00	2.00	<2.00
Hardness	mg/l	231	140	2,524
Hydroxide Alkalinity	mg/l	2.00	2.00	2.00
Total Dissolved Solids	mg/l	411	301	3,700
Total Suspended Solids	mg/l	1,150	247	5.40

Table 5-77
ANALYTICAL RESULTS FOR THE EAST DUMP FORK ALLUVIAL GROUNDWATER SAMPLE

Parameter (1)	Units	Background Limits		Result
		BL (2)	RBL (3)	
Radionuclides				
Gross Alpha	pCi/L	303	99.1	3,060
Gross Beta	pCi/L	165	78.2	4,690
Total Lead 210	pCi/L	107	38.6	17.0
Total Polonium 210	pCi/L	42.6	15.5	0.00
Total Radium 226	pCi/L	11.9	11.9	0.0783
Total Radium 228	pCi/L	12.7	12.7	<0.0988
Total Radon 222, Calculated	pCi/L	89,200	89,200	1,728
Total Thorium 227	pCi/L	1.24	0.491	<5.59 (4)
Total Thorium 228	pCi/L	2.50	2.50	<1.24
Total Thorium 230	pCi/L	10.2	3.35	4.31
Total Thorium 232	pCi/L	5.71	1.67	<0.253
Total Uranium 234	pCi/L	66.2	21.4	3,280
Total Uranium 235	pCi/L	4.09	1.32	190
Total Uranium 238	pCi/L	67.9	19.2	3,260

Notes:
(1) Parameters in bold exceed background limits
(2) 99% Upper Tolerance Limit for the URS background groundwater data set
(3) 95% Upper Prediction Limit for the URS background groundwater data set
(4) The result is reported as non-detect value above the RBL
NA = Not Applicable

Table 5-78
SUMMARY OF ANALYTICAL RESULTS FOR EAST DUMP FORK BEDROCK GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Field Parameters							
Dissolved Oxygen	mg/l	2	2	NA	NA	3.99	15.0
Eh	mV	2	2	NA	NA	168	228
Ferrous Iron	mg/l	2	1	NA	NA	<0.0500	0.100
Field pH	SU	2	2	NA	NA	6.26	6.37
Specific Conductance	uS/cm	1	1	42,200	34,600	363	363
Temperature	C	2	2	NA	NA	9.51	13.7
Turbidity	NTU	2	2	NA	NA	2.10	3.00
Inorganics							
Chloride	mg/l	2	2	2.05	2.05	1.60	2.57 (5)
Nitrate	mg/l	2	2	1.75	0.583	1.20	1.23
Nitrite	mg/l	2	0	0.0200	0.0200	<0.0200	<0.0200
Nitrogen, Ammonia	mg/l	2	2	0.258	0.0940	0.0280	0.0434
Phosphate-P	mg/l	2	2	1.41	0.533	0.0182	0.0206
Phosphorus	mg/l	2	2	2.07	0.795	0.0182	0.0270
Sulfate	mg/l	2	2	193	77.4	2,450	2,475
Metals							
Dissolved Aluminum	ug/l	2	2	14,300	2,080	212	762
Total Aluminum	ug/l	2	2	82,000	16,200	276	1,140
Dissolved Antimony	ug/l	2	0	8.29	1.98	<2.20	<2.70 (4)
Total Antimony	ug/l	2	0	7.10	7.10	<2.20	<2.70
Dissolved Arsenic	ug/l	2	2	217	54.4	0.450	0.570
Total Arsenic	ug/l	2	2	78.2	78.2	0.650	0.770
Dissolved Barium	ug/l	2	2	67.6	67.6	20.2	27.4
Total Barium	ug/l	2	2	178	93.7	21.7	28.7
Dissolved Beryllium	ug/l	2	2	1.93	0.343	1.80	5.40 (6)
Total Beryllium	ug/l	2	2	5.15	1.47	1.90	5.30 (6)
Dissolved Cadmium	ug/l	2	2	0.270	0.270	5.30	7.70
Total Cadmium	ug/l	2	2	0.520	0.520	5.40	7.70
Dissolved Calcium	ug/l	2	2	72,500	39,700	503,000	524,000
Total Calcium	ug/l	2	2	70,500	39,700	500,000	516,000
Dissolved Chromium	ug/l	2	0	19.9	7.85	<1.10	<1.30
Total Chromium	ug/l	2	1	137	42.1	<1.10	4.50
Dissolved Cobalt	ug/l	2	2	7.77	2.75	5.10	8.40 (6)
Total Cobalt	ug/l	2	2	29.5	10.2	7.40	9.50
Dissolved Copper	ug/l	2	0	4.84	2.14	<0.530	<4.20 (4)
Total Copper	ug/l	2	1	220	31.6	<0.500	2.00

Table 5-78
SUMMARY OF ANALYTICAL RESULTS FOR EAST DUMP FORK BEDROCK GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Dissolved Iron	ug/l	2	1	167,000	19,800	<70.4	136
Total Iron	ug/l	2	0	36,500	36,500	<8.40	<70.4
Dissolved Lead	ug/l	2	0	1.31	0.624	<1.00	<4.50 (4)
Total Lead	ug/l	2	0	51.5	13.1	<0.900	<1.00
Dissolved Magnesium	ug/l	2	2	18,200	11,200	282,000	294,000
Total Magnesium	ug/l	2	2	19,800	12,400	294,000	295,000
Dissolved Manganese	ug/l	2	2	1,930	1,930	11,500	17,600
Total Manganese	ug/l	2	2	1,990	1,990	12,000	17,400
Dissolved Mercury	ug/l	2	0	0.200	0.200	<0.100	<0.100
Total Mercury	ug/l	2	0	0.200	0.200	<0.100	<0.100
Dissolved Nickel	ug/l	2	2	13.9	13.9	252	379
Total Nickel	ug/l	2	2	102	33.2	264	372
Dissolved Potassium	ug/l	2	2	5,560	3,760	6,570	6,740
Total Potassium	ug/l	2	2	6,960	4,640	6,630	6,770
Dissolved Selenium	ug/l	2	0	1.57	0.594	<1.00	<1.30 (4)
Total Selenium	ug/l	2	0	2.20	2.20	<1.00	<1.30
Dissolved Silver	ug/l	2	0	1.20	1.20	<0.700	<0.800
Total Silver	ug/l	2	0	0.900	0.900	<0.700	<0.800
Dissolved Sodium	ug/l	2	2	21,400	21,400	38,100	39,600
Total Sodium	ug/l	2	2	19,800	19,800	37,600	39,600
Dissolved Thallium	ug/l	2	0	1.10	1.10	<1.10	<1.20 (4)
Total Thallium	ug/l	2	0	1.30	1.30	<1.10	<1.20
Total Uranium, Calculated	mg/l	1	1	0.160	0.0510	3.21	3.21
Dissolved Vanadium	ug/l	2	0	7.70	3.10	<0.500	<1.00
Total Vanadium	ug/l	2	0	58.9	14.2	<0.500	<1.00
Dissolved Zinc	ug/l	2	2	181	181	499	537
Total Zinc	ug/l	2	2	349	108	342	536 (6)
Organic Compounds							
Total Petroleum Hydrocarbons-Diesel	ug/l	1	0	NA	NA	<1,000	<1,000
Total Petroleum Hydrocarbons-Gasoline	ug/l	1	0	NA	NA	<100	<100
Other Parameters							
Alkalinity, Total	mg/l	2	2	176	176	35.4	62.6
Bicarbonate Alkalinity	mg/l	2	2	176	176	35.4	62.6
Carbonate Alkalinity	mg/l	2	0	2.00	2.00	<2.00	<2.00
Hardness	mg/l	2	2	231	140	2,467	2,503
Hydroxide Alkalinity	mg/l	2	0	2.00	2.00	<2.00	<2.00
Total Dissolved Solids	mg/l	2	2	411	301	3,460	3,610

Table 5-78
SUMMARY OF ANALYTICAL RESULTS FOR EAST DUMP FORK BEDROCK GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Total Suspended Solids	mg/l	2	2	1,150	247	7.60	15.5
Radionuclides							
Gross Alpha	pCi/L	2	2	303	99.1	1,140	1,410
Gross Beta	pCi/L	2	2	165	78.2	1,500	2,450
Total Lead 210	pCi/L	2	0	107	38.6	0.00	<0.100
Total Polonium 210	pCi/L	2	1	42.6	15.5	-0.30	0.00
Total Radium 226	pCi/L	2	2	11.9	11.9	0.217	0.947
Total Radium 228	pCi/L	2	0	12.7	12.7	<0.0389	<0.333
Total Radon 222, Calculated	pCi/L	2	2	89,200	89,200	383	600
Total Thorium 227	pCi/L	1	0	1.24	0.491	<1.34	<1.34 (4)
Total Thorium 228	pCi/L	1	0	2.50	2.50	-2.74	-2.74
Total Thorium 230	pCi/L	1	1	10.2	3.35	3.42	3.42
Total Thorium 232	pCi/L	1	0	5.71	1.67	<1.62	<1.62 (4)
Total Uranium 234	pCi/L	1	1	66.2	21.4	1,070	1,070
Total Uranium 235	pCi/L	1	1	4.09	1.32	56.5	56.5
Total Uranium 238	pCi/L	1	1	67.9	19.2	1,070	1,070

Notes:
(1) Parameters in bold exceed background limits
(2) 99% Upper Tolerance Limit for the URS background groundwater data set
(3) 95% Upper Prediction Limit for the URS background groundwater data set
(4) The result is reported as non-detect value above the RBL
(5) The maximum concentration or activity is from a URS primary sample; the associated verification sample did not exceed the RBL
(6) The maximum concentration or activity is from a URS verification sample; the associated primary sample did not exceed the BL
NA = Not Applicable

Table 5-79
SUMMARY OF ANALYTICAL RESULTS FOR EASTERN DRAINAGE ALLUVIAL GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Field Parameters							
Dissolved Oxygen	mg/l	7	7	NA	NA	1.00	15.0
Eh	mV	6	6	NA	NA	150	232
Ferrous Iron	mg/l	7	0	NA	NA	<0.0500	<0.0500
Field pH	SU	8	8	NA	NA	6.50	7.68
Specific Conductance	uS/cm	3	3	42,200	34,600	144	78,300
Temperature	C	8	8	NA	NA	7.01	13.4
Turbidity	NTU	8	8	NA	NA	0.00	38.3
Inorganics							
Chloride	mg/l	8	8	2.05	2.05	0.761	3.22
Nitrate	mg/l	8	7	1.75	0.583	<0.0300	7.67
Nitrite	mg/l	8	0	0.0200	0.0200	<0.0200	<0.0200
Nitrogen, Ammonia	mg/l	8	2	0.258	0.0940	<0.0100	0.0195
Phosphate-P	mg/l	8	8	1.41	0.533	0.0282	0.306
Phosphorus	mg/l	8	8	2.07	0.795	0.0231	0.350
Sulfate	mg/l	8	8	193	77.4	8.71	2,170
Metals							
Dissolved Aluminum	ug/l	8	3	14,300	2,080	4.50	17.8
Total Aluminum	ug/l	11	10	82,000	16,200	<5.40	73,400
Dissolved Antimony	ug/l	8	1	8.29	1.98	<2.20	5.80
Total Antimony	ug/l	11	1	7.10	7.10	<2.20	3.8
Dissolved Arsenic	ug/l	8	8	217	54.4	1.10	7.70
Total Arsenic	ug/l	11	11	78.2	78.2	1.20	99.4 (6)
Dissolved Barium	ug/l	8	8	67.6	67.6	11.6	44.7
Total Barium	ug/l	11	11	178	93.7	12.0	431 (6)
Dissolved Beryllium	ug/l	8	0	1.93	0.343	<0.100	<0.100
Total Beryllium	ug/l	11	3	5.15	1.47	0.100	6.60 (6)
Dissolved Cadmium	ug/l	8	1	0.270	0.270	<0.200	0.22
Total Cadmium	ug/l	11	1	0.520	0.520	<0.200	0.23
Dissolved Calcium	ug/l	8	8	72,500	39,700	60,300	683,000
Total Calcium	ug/l	11	11	70,500	39,700	60,800	672,000
Dissolved Chromium	ug/l	8	1	19.9	7.85	<0.400	0.93
Total Chromium	ug/l	11	5	137	42.1	<0.400	99.4
Dissolved Cobalt	ug/l	8	0	7.77	2.75	<0.500	<1.30
Total Cobalt	ug/l	11	3	29.5	10.2	<0.500	51.2 (6)
Dissolved Copper	ug/l	8	0	4.84	2.14	<0.500	<3.00 (4)
Total Copper	ug/l	11	4	220	31.6	<0.500	84.9
Dissolved Iron	ug/l	8	1	167,000	19,800	<8.40	8.5

Table 5-79
SUMMARY OF ANALYTICAL RESULTS FOR EASTERN DRAINAGE ALLUVIAL GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Total Iron	ug/l	11	6	36,500	36,500	<8.40	102,000 (6)
Dissolved Lead	ug/l	8	1	1.31	0.624	<0.900	1.10
Total Lead	ug/l	11	6	51.5	13.1	<0.900	118 (6)
Dissolved Magnesium	ug/l	8	8	18,200	11,200	9,710	151,000
Total Magnesium	ug/l	11	11	19,800	12,400	9,840	159,000
Dissolved Manganese	ug/l	8	2	1,930	1,930	<0.100	1,470
Total Manganese	ug/l	11	11	1,990	1,990	0.470	3,720 (6)
Dissolved Mercury	ug/l	8	0	0.200	0.200	<0.100	<0.200
Total Mercury	ug/l	11	0	0.200	0.200	<0.100	<0.200
Dissolved Nickel	ug/l	8	2	13.9	13.9	<0.620	24.8 (5)
Total Nickel	ug/l	11	7	102	33.2	<0.500	60.6
Dissolved Potassium	ug/l	8	8	5,560	3,760	852	8,560
Total Potassium	ug/l	11	11	6,960	4,640	1,110	23,900
Dissolved Selenium	ug/l	8	1	1.57	0.594	<1.00	1.4
Total Selenium	ug/l	11	0	2.20	2.20	<1.00	<6.50 (4)
Dissolved Silver	ug/l	8	0	1.20	1.20	<0.700	<0.800
Total Silver	ug/l	11	0	0.900	0.900	<0.700	<2.00 (4)
Dissolved Sodium	ug/l	8	8	21,400	21,400	5,330	38,300
Total Sodium	ug/l	11	11	19,800	19,800	5,460	38,300
Dissolved Thallium	ug/l	8	0	1.10	1.10	<1.10	<1.20
Total Thallium	ug/l	11	0	1.30	1.30	<1.10	<6.00 (4)
Total Uranium	ug/l	3	3	160	50.0	3.90	27.6
Total Uranium, Calculated	mg/l	8	8	0.160	0.0510	0.00200	0.0410
Dissolved Vanadium	ug/l	8	4	7.70	3.10	<0.500	3.2
Total Vanadium	ug/l	11	9	58.9	14.2	<0.500	182 (6)
Dissolved Zinc	ug/l	8	1	181	181	<0.400	155
Total Zinc	ug/l	11	4	349	108	<0.400	321
Organic Compounds							
Total Petroleum Hydrocarbons-Diesel	ug/l	4	0	NA	NA	<1,000	<1,000
Total Petroleum Hydrocarbons-Gasoline	ug/l	4	0	NA	NA	<100	<100
Other Parameters							
Alkalinity, Total	mg/l	8	8	176	176	49.0	247
Bicarbonate Alkalinity	mg/l	8	8	176	176	49.0	247
Carbonate Alkalinity	mg/l	8	0	2.00	2.00	<2.00	<2.00
Chemical Oxygen Demand	mg/l	2	1	20.7	12.5	<5.00	12.8
Hardness	mg/l	8	8	231	140	191	2,102
Hydroxide Alkalinity	mg/l	8	0	2.00	2.00	<2.00	<2.00
Total Dissolved Solids	mg/l	8	8	411	301	273	3,250

Table 5-79
SUMMARY OF ANALYTICAL RESULTS FOR EASTERN DRAINAGE ALLUVIAL GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Total Suspended Solids	mg/l	8	2	1,150	247	<4.00	18.8
Radionuclides							
Gross Alpha	pCi/L	11	8	303	99.1	<1.12	24.2
Gross Beta	pCi/L	8	6	165	78.2	2.27	30.9
Total Lead 210	pCi/L	8	2	107	38.6	-0.60	2.9
Total Polonium 210	pCi/L	8	1	42.6	15.5	-0.10	1.50
Total Radium 226	pCi/L	11	9	11.9	11.9	0.0890	1.91
Total Radium 228	pCi/L	11	7	12.7	12.7	<0.0804	3.70
Total Radon 222, Calculated	pCi/L	8	8	89,200	89,200	452	5,631
Total Thorium 227	pCi/L	8	1	1.24	0.491	-0.07	0.119
Total Thorium 228	pCi/L	11	2	2.50	2.50	-0.06	1.40
Total Thorium 230	pCi/L	11	6	10.2	3.35	-0.01	1.80
Total Thorium 232	pCi/L	11	2	5.71	1.67	<0.00976	1.33
Total Uranium 234	pCi/L	11	11	66.2	21.4	0.600	15.2
Total Uranium 235	pCi/L	11	8	4.09	1.32	<0.0502	1.17
Total Uranium 238	pCi/L	11	11	67.9	19.2	0.300	13.7

Notes:
(1) Parameters in bold exceed background limits for the URS samples
(2) 99% Upper Tolerance Limit for the URS background groundwater data set
(3) 95% Upper Prediction Limit for the URS background groundwater data set
(4) The result is reported as non-detect value above the RBL
(5) The maximum concentration or activity is from a URS primary sample; the associated verification sample did not exceed the RBL
(6) The maximum concentration or activity exceeding the background limit is reported from E&E samples.
NA = Not Applicable

Table 5-80
SUMMARY OF ANALYTICAL RESULTS FOR EASTERN DRAINAGE BEDROCK GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Field Parameters							
Dissolved Oxygen	mg/l	10	10	NA	NA	0.00	15.0
Eh	mV	10	10	NA	NA	23.3	193
Ferrous Iron	mg/l	10	1	NA	NA	<0.0500	0.100
Field pH	SU	10	10	NA	NA	7.02	8.36
Specific Conductance	uS/cm	5	5	42,200	34,600	123	37,300
Temperature	C	10	10	NA	NA	5.90	39.6
Turbidity	NTU	10	10	NA	NA	-3.70	43.8
Inorganics							
Chloride	mg/l	10	10	2.05	2.05	0.734	2.33
Nitrate	mg/l	10	7	1.75	0.583	<0.0300	716 (5)
Nitrite	mg/l	10	0	0.0200	0.0200	<0.0200	<0.0200
Nitrogen, Ammonia	mg/l	10	2	0.258	0.0940	<0.0100	0.0317
Phosphate-P	mg/l	10	8	1.41	0.533	<0.0100	0.179
Phosphorus	mg/l	10	8	2.07	0.795	<0.0100	0.212
Sulfate	mg/l	10	10	193	77.4	8.59	856
Metals							
Dissolved Aluminum	ug/l	10	1	14,300	2,080	<4.80	39.9
Total Aluminum	ug/l	10	7	82,000	16,200	<5.40	855
Dissolved Antimony	ug/l	10	3	8.29	1.98	<2.20	5.20
Total Antimony	ug/l	10	2	7.10	7.10	<2.20	4.60
Dissolved Arsenic	ug/l	10	10	217	54.4	0.420	5.70
Total Arsenic	ug/l	10	10	78.2	78.2	0.440	5.80
Dissolved Barium	ug/l	10	10	67.6	67.6	9.50	71.3 (5)
Total Barium	ug/l	10	10	178	93.7	12.5	64.7
Dissolved Beryllium	ug/l	10	0	1.93	0.343	<0.100	<0.110
Total Beryllium	ug/l	10	0	5.15	1.47	<0.100	<0.210
Dissolved Cadmium	ug/l	10	1	0.270	0.270	<0.200	0.520 (5)
Total Cadmium	ug/l	10	1	0.520	0.520	<0.200	0.530 (5)
Dissolved Calcium	ug/l	10	10	72,500	39,700	20,800	324,000
Total Calcium	ug/l	10	9	70,500	39,700	23,800	289,000
Dissolved Chromium	ug/l	10	6	19.9	7.85	<0.400	16.9
Total Chromium	ug/l	10	6	137	42.1	<0.630	21.0
Dissolved Cobalt	ug/l	10	1	7.77	2.75	<0.500	1.6
Total Cobalt	ug/l	10	2	29.5	10.2	<0.500	3.20
Dissolved Copper	ug/l	10	1	4.84	2.14	<0.500	1.1
Total Copper	ug/l	10	2	220	31.6	<0.500	<5.00

Table 5-80
SUMMARY OF ANALYTICAL RESULTS FOR EASTERN DRAINAGE BEDROCK GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Dissolved Iron	ug/l	10	0	167,000	19,800	<8.40	<30.3
Total Iron	ug/l	10	5	36,500	36,500	<8.40	394
Dissolved Lead	ug/l	10	2	1.31	0.624	<0.900	3.50 (5)
Total Lead	ug/l	10	3	51.5	13.1	<0.900	3.70
Dissolved Magnesium	ug/l	10	10	18,200	11,200	2,260	68,000
Total Magnesium	ug/l	10	10	19,800	12,400	2,250	64,600
Dissolved Manganese	ug/l	10	10	1,930	1,930	0.230	82.6
Total Manganese	ug/l	10	10	1,990	1,990	0.450	117
Dissolved Mercury	ug/l	10	0	0.200	0.200	<0.100	<0.200
Total Mercury	ug/l	10	0	0.200	0.200	<0.100	<0.200
Dissolved Nickel	ug/l	10	5	13.9	13.9	<0.500	12.6
Total Nickel	ug/l	10	6	102	33.2	<0.500	15.6
Dissolved Potassium	ug/l	10	10	5,560	3,760	633	6,130
Total Potassium	ug/l	10	10	6,960	4,640	675	6,040
Dissolved Selenium	ug/l	10	0	1.57	0.594	<1.00	<6.50 (4)
Total Selenium	ug/l	10	0	2.20	2.20	<1.00	<1.30
Dissolved Silver	ug/l	10	0	1.20	1.20	<0.700	<0.800
Total Silver	ug/l	10	0	0.900	0.900	<0.700	<0.800
Dissolved Sodium	ug/l	10	10	21,400	21,400	5,590	36,200
Total Sodium	ug/l	10	10	19,800	19,800	5,480	35,900
Dissolved Thallium	ug/l	10	1	1.10	1.10	<1.10	1.20 (6)
Total Thallium	ug/l	10	1	1.30	1.30	<1.10	1.30
Total Uranium, Calculated	mg/l	10	10	0.160	0.0510	0.00200	0.0280
Dissolved Vanadium	ug/l	10	3	7.70	3.10	<0.500	3.00
Total Vanadium	ug/l	10	3	58.9	14.2	<0.500	3.30
Dissolved Zinc	ug/l	10	3	181	181	<0.400	63.5
Total Zinc	ug/l	10	4	349	108	<0.400	249
Organic Compounds							
Total Petroleum Hydrocarbons-Diesel	ug/l	5	1	NA	NA	<1,000	1,900
Total Petroleum Hydrocarbons-Gasoline	ug/l	5	0	NA	NA	<100	<100
Other Parameters							
Alkalinity, Total	mg/l	10	9	176	176	<2.00	235
Bicarbonate Alkalinity	mg/l	10	9	176	176	<2.00	235
Carbonate Alkalinity	mg/l	10	0	2.00	2.00	<2.00	<2.00
Hardness	mg/l	10	10	231	140	79.8	1,089
Hydroxide Alkalinity	mg/l	10	0	2.00	2.00	<2.00	<2.00
Total Dissolved Solids	mg/l	10	10	411	301	192	1,440

Table 5-80
SUMMARY OF ANALYTICAL RESULTS FOR EASTERN DRAINAGE BEDROCK GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Total Suspended Solids	mg/l	10	7	1,150	247	<4.00	21.1
Radionuclides							
Gross Alpha	pCi/L	10	6	303	99.1	<1.82	57.5
Gross Beta	pCi/L	10	8	165	78.2	<1.47	35.6
Total Lead 210	pCi/L	10	6	107	38.6	-0.10	26.0
Total Polonium 210	pCi/L	10	7	42.6	15.5	-0.20	11.0
Total Radium 226	pCi/L	10	10	11.9	11.9	0.0945	4.89
Total Radium 228	pCi/L	10	9	12.7	12.7	<0.307	7.22
Total Radon 222, Calculated	pCi/L	10	10	89,200	89,200	14.0	58,872
Total Thorium 227	pCi/L	10	0	1.24	0.491	-0.01	<0.144
Total Thorium 228	pCi/L	10	3	2.50	2.50	<0.0196	0.262
Total Thorium 230	pCi/L	10	7	10.2	3.35	<0.0238	0.219
Total Thorium 232	pCi/L	10	4	5.71	1.67	-0.03	0.061
Total Uranium 234	pCi/L	10	10	66.2	21.4	1.02	42.0
Total Uranium 235	pCi/L	10	9	4.09	1.32	0.00	0.760
Total Uranium 238	pCi/L	10	10	67.9	19.2	0.639	9.36

Notes:
(1) Parameters in bold exceed background limits for the URS samples
(2) 99% Upper Tolerance Limit for the URS background groundwater data set
(3) 95% Upper Prediction Limit for the URS background groundwater data set
(4) The result is reported as non-detect value above the RBL
(5) The maximum concentration or activity is from a URS verification sample; the associated primary sample did not exceed the BL
(6) The maximum concentration or activity is from a URS primary sample; the associated verification sample did not exceed the RBL
NA = Not Applicable

Table 5-81
SUMMARY OF ANALYTICAL RESULTS FOR CENTRAL DRAINAGE ALLUVIAL GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Field Parameters							
Dissolved Oxygen	mg/l	25	25	NA	NA	0.00	15.0
Eh	mV	23	23	NA	NA	10.0	481
Ferrous Iron	mg/l	24	13	NA	NA	<0.00700	6.00
Field Iron	ug/l	18	10	NA	NA	<7.00	4,240
Field pH	SU	25	25	NA	NA	5.81	7.15
Specific Conductance	uS/cm	21	21	42,200	34,600	163	2,990
Temperature	C	25	25	NA	NA	5.75	28.0
Turbidity	NTU	7	7	NA	NA	-0.90	51.5
Inorganics							
Chloride	mg/l	24	24	2.05	2.05	2.00	4.00
Fluoride	mg/l	18	18	NC	NC	0.100	0.900
Nitrate	mg/l	23	21	1.75	0.583	0.0340	4.63
Nitrate/Nitrite	mg/l	18	18	NC	NC	0.0400	4.53
Nitrite	mg/l	22	0	0.0200	0.0200	<0.0200	<0.0500 (4)
Nitrogen, Ammonia	mg/l	6	5	0.258	0.0940	<0.0100	0.762 (5)
Phosphate-P	mg/l	6	6	1.41	0.533	0.0203	0.0523
Phosphorus	mg/l	24	22	2.07	0.795	0.0104	0.210
Silica	mg/l	18	18	NC	NC	36.5	122
Sulfate	mg/l	24	24	193	77.4	640	1,990
Metals							
Dissolved Aluminum	ug/l	24	10	14,300	2,080	<3.90	1,100
Total Aluminum	ug/l	7	6	82,000	16,200	14.9	9,700
Dissolved Antimony	ug/l	6	1	8.29	1.98	<2.20	2.70 (5)
Total Antimony	ug/l	7	2	7.10	7.10	<2.20	6.50
Dissolved Arsenic	ug/l	24	7	217	54.4	0.670	1.4
Total Arsenic	ug/l	7	7	78.2	78.2	0.830	12.4
Dissolved Barium	ug/l	24	23	67.6	67.6	8.50	42.0
Total Barium	ug/l	7	7	178	93.7	4.40	901 (7)
Dissolved Beryllium	ug/l	24	3	1.93	0.343	<0.100	5.00 (6)
Total Beryllium	ug/l	7	3	5.15	1.47	<0.100	0.31
Dissolved Cadmium	ug/l	24	11	0.270	0.270	<0.200	34.0
Total Cadmium	ug/l	7	6	0.520	0.520	0.390	17.1
Dissolved Calcium	ug/l	24	24	72,500	39,700	227,000	566,000
Total Calcium	ug/l	7	7	70,500	39,700	256,000	538,000
Dissolved Chromium	ug/l	24	1	19.9	7.85	<0.400	4
Total Chromium	ug/l	7	3	137	42.1	<0.400	16.3
Dissolved Cobalt	ug/l	6	5	7.77	2.75	<0.900	20.9

Table 5-81
SUMMARY OF ANALYTICAL RESULTS FOR CENTRAL DRAINAGE ALLUVIAL GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Total Cobalt	ug/l	7	7	29.5	10.2	1.80	21.8 (5)
Dissolved Copper	ug/l	24	0	4.84	2.14	<0.500	<50.0 (4)
Total Copper	ug/l	7	1	220	31.6	<0.500	31.5
Dissolved Iron	ug/l	24	10	167,000	19,800	<8.40	4,830
Total Iron	ug/l	7	3	36,500	36,500	<8.40	17,600
Dissolved Lead	ug/l	24	0	1.31	0.624	<0.900	<5.00 (4)
Total Lead	ug/l	7	1	51.5	13.1	<0.900	19.8 (7)
Dissolved Magnesium	ug/l	24	24	18,200	11,200	56,900	222,000
Total Magnesium	ug/l	7	7	19,800	12,400	133,000	168,000
Dissolved Manganese	ug/l	24	19	1,930	1,930	<5.00	60,200
Total Manganese	ug/l	7	7	1,990	1,990	1,060	34,700
Dissolved Mercury	ug/l	6	1	0.200	0.200	<0.100	0.11
Total Mercury	ug/l	25	0	0.200	0.200	<0.100	<0.200
Dissolved Nickel	ug/l	24	11	13.9	13.9	1.30	1,870
Total Nickel	ug/l	7	7	102	33.2	2.00	551
Dissolved Potassium	ug/l	24	24	5,560	3,760	3,800	6,200
Total Potassium	ug/l	7	7	6,960	4,640	4,160	14,300 (7)
Dissolved Selenium	ug/l	24	0	1.57	0.594	<1.00	<6.50 (4)
Total Selenium	ug/l	7	0	2.20	2.20	<1.30	<6.50 (4)
Dissolved Silver	ug/l	24	5	1.20	1.20	<0.700	10.0 (6)
Total Silver	ug/l	7	4	0.900	0.900	0.720	6.70
Dissolved Sodium	ug/l	24	24	21,400	21,400	23,500	77,000
Total Sodium	ug/l	7	7	19,800	19,800	30,000	78,100
Dissolved Thallium	ug/l	24	0	1.10	1.10	<1.10	<10.0 (4)
Total Thallium	ug/l	7	0	1.30	1.30	<1.10	<6.00 (4)
Total Uranium	ug/l	1	1	160	50.0	1,020	1,020
Total Uranium, Calculated	mg/l	6	6	0.160	0.0510	0.119	2.88
Dissolved Vanadium	ug/l	6	0	7.70	3.10	<0.500	<1.00
Total Vanadium	ug/l	7	2	58.9	14.2	<0.500	24.5 (7)
Dissolved Zinc	ug/l	24	13	181	181	<0.400	1,610
Total Zinc	ug/l	7	5	349	108	<0.400	398
Organic Compounds							
Total Petroleum Hydrocarbons-Diesel	ug/l	3	0	NA	NA	<1,000	<1,000
Total Petroleum Hydrocarbons-Gasoline	ug/l	3	0	NA	NA	<100	<100
Other Parameters							
Alkalinity	mg/l	24	24	176	176	39.0	246
Bicarbonate Alkalinity	mg/l	24	24	176	176	39.0	246
Carbonate Alkalinity	mg/l	24	0	2.00	2.00	<2.00	<2.00

Table 5-81
SUMMARY OF ANALYTICAL RESULTS FOR CENTRAL DRAINAGE ALLUVIAL GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Chemical Oxygen Demand	mg/l	1	1	20.7	12.5	5.81	5.81
Hardness	mg/l	6	6	231	140	1,180	1,973
Hydroxide Alkalinity	mg/l	24	0	2.00	2.00	<2.00	<2.00
Total Dissolved Solids	mg/l	24	24	411	301	192	2,990
Total Inorganic Carbon	mg/l	18	17	NC	NC	<5.00	65.0
Total Suspended Solids	mg/l	6	3	1,150	247	<4.00	62.4
Radionuclides							
Gross Alpha	pCi/L	25	24	303	99.1	15.0	1,080
Gross Beta	pCi/L	24	21	165	78.2	11.0	1,150
Dissolved Lead 210	pCi/L	17	10	NC	NC	-5.50	10 (6)
Total Lead 210	pCi/L	6	1	107	38.6	-0.40	9.6
Dissolved Polonium 210	pCi/L	2	2	NC	NC	0.270	1.00
Total Polonium 210	pCi/L	6	2	42.6	15.5	-0.20	0.900
Dissolved Radium 226	pCi/L	18	18	NC	NC	0.160	0.920
Total Radium 226	pCi/L	7	7	11.9	11.9	0.219	2.57
Dissolved Radium 228	pCi/L	18	15	NC	NC	0.0800	3.20
Total Radium 228	pCi/L	7	7	12.7	12.7	0.560	3.30
Total Radon 222, Calculated	pCi/L	6	6	89,200	89,200	794	4,190
Total Thorium 227	pCi/L	6	1	1.24	0.491	-9.34	0.358
Total Thorium 228	pCi/L	7	0	2.50	2.50	-0.29	<1.65
Dissolved Thorium 230	pCi/L	11	5	NC	NC	0.0200	0.22 (6)
Total Thorium 230	pCi/L	7	5	10.2	3.35	<0.0568	18.2 (5)
Total Thorium 232	pCi/L	7	0	5.71	1.67	0.00	<5.40 (4)
Dissolved Uranium 234	pCi/L	18	18	NC	NC	16.0	260 (6)
Total Uranium 234	pCi/L	7	7	66.2	21.4	41.3	970
Dissolved Uranium 235	pCi/L	18	18	NC	NC	0.220	9.50 (6)
Total Uranium 235	pCi/L	7	6	4.09	1.32	2.74	54.3
Dissolved Uranium 238	pCi/L	18	18	NC	NC	10.0	270 (6)
Total Uranium 238	pCi/L	7	7	67.9	19.2	39.4	957

Notes:
(1) Parameters in bold exceed background limits for the URS samples
(2) 99% Upper Tolerance Limit for the URS background groundwater data set
(3) 95% Upper Prediction Limit for the URS background groundwater data set
(4) The result is reported as non-detect value above the RBL
(5) The maximum concentration or activity is from a URS verification sample; the associated primary sample did not exceed the BL
(6) The maximum concentration or activity is reported from SMI samples
(7) The maximum concentration or activity is reported from E&E samples
NA = Not Applicable
NC = Not calculated; parameter not analyzed for URS background samples

Table 5-82
SUMMARY OF ANALYTICAL RESULTS FOR CENTRAL DRAINAGE BEDROCK GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Field Parameters							
Dissolved Oxygen	mg/l	16	16	NA	NA	1.46	15.0
Eh	mV	15	15	NA	NA	-124.00	429
Ferrous Iron	mg/l	16	9	NA	NA	<0.00700	1.00
Field Iron	ug/l	10	6	NA	NA	<7.00	100
Field pH	SU	16	16	NA	NA	4.02	8.05
Specific Conductance	umhos/cm	13	13	42,200	34,600	1,063	1,279,000
Temperature	C	16	16	NA	NA	8.82	15.5
Turbidity	NTU	9	9	NA	NA	0.00	81.0
Inorganics							
Chloride	mg/l	16	16	2.05	2.05	0.949	3.00
Fluoride	mg/l	10	10	NC	NC	0.200	0.300
Nitrate	mg/l	14	12	1.75	0.583	<0.0300	0.990 (5)
Nitrate/Nitrite	mg/l	10	10	NC	NC	0.900	1.08
Nitrite	mg/l	14	0	0.0200	0.0200	<0.0100	<0.0500 (4)
Nitrogen, Ammonia	mg/l	6	2	0.258	0.0940	<0.0100	0.0216
Phosphate-P	mg/l	6	3	1.41	0.533	<0.0100	0.0686
Phosphorus	mg/l	16	5	2.07	0.795	<0.0100	0.0634
Silica	mg/l	10	10	NC	NC	30.3	35.2
Sulfate	mg/l	16	16	193	77.4	18.0	590
Metals							
Dissolved Aluminum	ug/l	16	1	14,300	2,080	<5.40	133
Total Aluminum	ug/l	8	3	82,000	16,200	<5.40	548
Dissolved Antimony	ug/l	7	2	8.29	1.98	<0.200	3.00 (6)
Total Antimony	ug/l	7	1	7.10	7.10	<0.500	3.10 (6)
Dissolved Arsenic	ug/l	16	5	217	54.4	<0.200	<5.00
Total Arsenic	ug/l	8	6	78.2	78.2	0.280	3.50
Dissolved Barium	ug/l	16	16	67.6	67.6	45.0	93.1
Total Barium	ug/l	8	8	178	93.7	45.0	93.2
Dissolved Beryllium	ug/l	16	0	1.93	0.343	<0.100	<2.00 (4)
Total Beryllium	ug/l	8	0	5.15	1.47	<0.100	<2.00 (4)
Dissolved Cadmium	ug/l	16	1	0.270	0.270	<0.200	0.3 (5)
Total Cadmium	ug/l	8	1	0.520	0.520	<0.200	<0.500
Dissolved Calcium	ug/l	16	16	72,500	39,700	28,400	209,000
Total Calcium	ug/l	6	6	70,500	39,700	29,900	198,000
Dissolved Chromium	ug/l	16	0	19.9	7.85	<0.400	<20.0 (4)
Total Chromium	ug/l	8	3	137	42.1	<0.400	<10.0
Dissolved Cobalt	ug/l	7	0	7.77	2.75	<0.500	<10.0 (4)
Total Cobalt	ug/l	7	0	29.5	10.2	<0.500	<10.0
Dissolved Copper	ug/l	16	0	4.84	2.14	<0.900	<10.0 (4)

Table 5-82
SUMMARY OF ANALYTICAL RESULTS FOR CENTRAL DRAINAGE BEDROCK GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Total Copper	ug/l	8	0	220	31.6	<0.900	<10.0
Dissolved Iron	ug/l	16	7	167,000	19,800	<8.40	621
Total Iron	ug/l	8	6	36,500	36,500	<17.6	745
Dissolved Lead	ug/l	16	0	1.31	0.624	<0.200	<1.00 (4)
Total Lead	ug/l	8	0	51.5	13.1	<0.200	<1.00
Dissolved Magnesium	ug/l	16	16	18,200	11,200	5,470	51,000
Total Magnesium	ug/l	6	6	19,800	12,400	5,730	49,800
Dissolved Manganese	ug/l	16	13	1,930	1,930	0.890	295
Total Manganese	ug/l	8	7	1,990	1,990	4.90	319
Dissolved Mercury	ug/l	10	0	0.200	0.200	<0.100	<0.200
Total Mercury	ug/l	14	0	0.200	0.200	<0.100	<0.200
Dissolved Nickel	ug/l	16	3	13.9	13.9	<0.900	2.7
Total Nickel	ug/l	8	3	102	33.2	<0.900	4.3
Dissolved Potassium	ug/l	16	16	5,560	3,760	1,710	4,250 (7)
Total Potassium	ug/l	6	6	6,960	4,640	1,760	4,210
Dissolved Selenium	ug/l	16	0	1.57	0.594	<1.00	<1.30 (4)
Total Selenium	ug/l	8	0	2.20	2.20	<1.00	<1.30
Dissolved Silver	ug/l	16	1	1.20	1.20	<0.700	9.00 (5)
Total Silver	ug/l	8	0	0.900	0.900	<0.700	<10.0 (4)
Dissolved Sodium	ug/l	16	16	21,400	21,400	20,700	53,500
Total Sodium	ug/l	6	6	19,800	19,800	21,500	51,800
Dissolved Thallium	ug/l	16	1	1.10	1.10	<0.100	1.6
Total Thallium	ug/l	8	0	1.30	1.30	<0.100	<1.20
Total Uranium, Calculated	mg/l	6	6	0.160	0.0510	0.0180	0.0940 (6)
Dissolved Vanadium	ug/l	7	0	7.70	3.10	<0.500	<5.00 (4)
Total Vanadium	ug/l	7	0	58.9	14.2	<0.500	<5.00
Dissolved Zinc	ug/l	16	2	181	181	<0.400	2.6
Total Zinc	ug/l	8	2	349	108	<0.400	5.5
Organic Compounds							
Total Petroleum Hydrocarbons-Diesel	ug/l	3	0	NA	NA	<1,000	<1,000
Total Petroleum Hydrocarbons-Gasoline	ug/l	3	0	NA	NA	<100	<100
Other Parameters							
Alkalinity	mg/l	16	16	176	176	156	204
Bicarbonate Alkalinity	mg/l	16	16	176	176	156	204
Carbonate Alkalinity	mg/l	16	0	2.00	2.00	<2.00	<2.00
Hardness	mg/l	8	8	231	140	98.3	705
Hydroxide Alkalinity	mg/l	16	0	2.00	2.00	<2.00	<2.00
Total Dissolved Solids	mg/l	16	16	411	301	218	1,070
Total Inorganic Carbon	mg/l	10	10	NC	NC	47.0	54.0
Total Suspended Solids	mg/l	8	3	1,150	247	<4.00	36.2

Table 5-82
SUMMARY OF ANALYTICAL RESULTS FOR CENTRAL DRAINAGE BEDROCK GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Radionuclides							
Gross Alpha	pCi/L	16	15	303	99.1	19.5	81.5
Gross Beta	pCi/L	16	15	165	78.2	10.9	33.9
Dissolved Lead 210	pCi/L	10	8	NC	NC	-4.70	18.0 (5)
Total Lead 210	pCi/L	8	4	107	38.6	<1.20	9.6
Dissolved Polonium 210	pCi/L	2	2	NC	NC	1.10	2.60 (5)
Total Polonium 210	pCi/L	8	6	42.6	15.5	0.00	12.0
Dissolved Radium 226	pCi/L	10	10	NC	NC	0.160	0.580 (5)
Total Radium 226	pCi/L	8	8	11.9	11.9	0.400	1.38
Dissolved Radium 228	pCi/L	10	7	NC	NC	<0.500	4.1 (5)
Total Radium 228	pCi/L	8	8	12.7	12.7	0.700	1.63
Total Radon 222, Calculated	pCi/L	6	6	89,200	89,200	20.0	19,968
Total Thorium 227	pCi/L	6	1	1.24	0.491	<0.00325	0.113
Dissolved Thorium 228	pCi/L	1	1	NC	NC	0.210	0.210 (5)
Total Thorium 228	pCi/L	7	3	2.50	2.50	<0.0405	0.275
Dissolved Thorium 230	pCi/L	10	6	NC	NC	0.00	0.800 (5)
Total Thorium 230	pCi/L	8	7	10.2	3.35	0.0596	0.319
Dissolved Thorium 232	pCi/L	1	1	NC	NC	0.130	0.130 (5)
Total Thorium 232	pCi/L	7	3	5.71	1.67	0.00	0.0504
Dissolved Uranium 234	pCi/L	10	8	NC	NC	26.0	37 (5)
Total Uranium 234	pCi/L	8	8	66.2	21.4	23.0	93.2
Dissolved Uranium 235	pCi/L	10	9	NC	NC	<0.410	1.30 (5)
Total Uranium 235	pCi/L	8	8	4.09	1.32	0.365	2.93 (7)
Dissolved Uranium 238	pCi/L	10	8	NC	NC	16.0	22 (5)
Total Uranium 238	pCi/L	8	8	67.9	19.2	5.82	31.3 (6)

Notes:
(1) Parameters in bold exceed background limits for the URS samples
(2) 99% Upper Tolerance Limit for the URS background groundwater data set
(3) 95% Upper Prediction Limit for the URS background groundwater data set
(4) The result is reported as non-detect value above the RBL
(5) The maximum concentration or activity is reported from SMI samples
(6) The maximum concentration or activity is from a URS verification sample; the associated primary sample did not exceed the BL
(7) The maximum concentration or activity is from a URS primary sample and did not exceed the BL
NA = Not Applicable
NC = Not calculated; parameter not analyzed for URS background samples

Table 5-83
SUMMARY OF ANALYTICAL RESULTS FOR WESTERN DRAINAGE ALLUVIAL GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Field Parameters							
Depth to Water	ft	12	12	NA	NA	4.09	7.58
Dissolved Oxygen	mg/l	16	16	NA	NA	2.30	6.10
Eh	mV	15	15	NA	NA	337	492
Ferrous Iron	mg/l	16	8	NA	NA	<0.00700	0.490
Field Iron	ug/l	12	5	NA	NA	<7.00	3,790
Field pH	SU	16	16	NA	NA	2.78	6.12
Specific Conductance	uS/cm	14	14	42,200	34,600	226	3,500
Temperature	C	16	16	NA	NA	7.10	16.3
Turbidity	NTU	4	4	NA	NA	0.00	0.400
Inorganics							
Chloride	mg/l	16	16	2.05	2.05	1.76	4.00
Fluoride	mg/l	12	12	NC	NC	0.300	1.50
Nitrate	mg/l	16	14	1.75	0.583	<0.0500	5.89 (6)
Nitrate/Nitrite	mg/l	12	11	NC	NC	<1.41	6.07
Nitrite	mg/l	16	0	0.0200	0.0200	<0.0200	<1.20 (4)
Nitrogen, Ammonia	mg/l	4	0	0.258	0.0940	<0.0100	<0.0100
Phosphate-P	mg/l	4	2	1.41	0.533	<0.0100	0.0206
Phosphorus	mg/l	16	10	2.07	0.795	<0.0100	0.190
Silica	mg/l	12	12	NC	NC	26.9	41.8
Sulfate	mg/l	16	16	193	77.4	1,180	2,750
Metals							
Dissolved Aluminum	ug/l	16	16	14,300	2,080	40.0	10,200
Total Aluminum	ug/l	5	5	82,000	16,200	2,370	19,400
Dissolved Antimony	ug/l	4	0	8.29	1.98	<2.20	<2.70 (4)
Total Antimony	ug/l	5	0	7.10	7.10	<2.20	<5.00
Dissolved Arsenic	ug/l	16	3	217	54.4	<0.200	0.27
Total Arsenic	ug/l	5	3	78.2	78.2	<0.200	16.8
Dissolved Barium	ug/l	16	16	67.6	67.6	9.00	15.0
Total Barium	ug/l	5	5	178	93.7	11.8	108
Dissolved Beryllium	ug/l	16	10	1.93	0.343	<2.00	15.0 (6)
Total Beryllium	ug/l	5	5	5.15	1.47	6.60	14.3 (7)
Dissolved Cadmium	ug/l	16	14	0.270	0.270	<0.500	12.0 (6)
Total Cadmium	ug/l	5	5	0.520	0.520	4.80	10.6
Dissolved Calcium	ug/l	16	16	72,500	39,700	248,000	491,000
Total Calcium	ug/l	5	5	70,500	39,700	248,000	485,000
Dissolved Chromium	ug/l	16	1	19.9	7.85	<1.10	2.7
Total Chromium	ug/l	5	3	137	42.1	<1.10	13.1

Table 5-83
SUMMARY OF ANALYTICAL RESULTS FOR WESTERN DRAINAGE ALLUVIAL GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Dissolved Cobalt	ug/l	4	4	7.77	2.75	7.40	217
Total Cobalt	ug/l	5	5	29.5	10.2	7.70	214
Dissolved Copper	ug/l	16	8	4.84	2.14	3.30	40.0 (6)
Total Copper	ug/l	5	4	220	31.6	2.10	55.3
Dissolved Iron	ug/l	16	3	167,000	19,800	<8.40	160
Total Iron	ug/l	5	1	36,500	36,500	<8.40	12,400
Dissolved Lead	ug/l	16	0	1.31	0.624	<0.900	<5.00 (4)
Total Lead	ug/l	5	1	51.5	13.1	<0.900	19.1
Dissolved Magnesium	ug/l	16	16	18,200	11,200	101,000	335,000 (6)
Total Magnesium	ug/l	5	5	19,800	12,400	162,000	327,000
Dissolved Manganese	ug/l	16	16	1,930	1,930	2,760	39,700 (6)
Total Manganese	ug/l	5	5	1,990	1,990	15,400	40,200
Dissolved Mercury	ug/l	4	1	0.200	0.200	<0.100	0.140
Total Mercury	ug/l	17	0	0.200	0.200	<0.100	<0.200
Dissolved Nickel	ug/l	16	16	13.9	13.9	60.0	670 (6)
Total Nickel	ug/l	5	5	102	33.2	283	604
Dissolved Potassium	ug/l	16	16	5,560	3,760	3,600	9100 (6)
Total Potassium	ug/l	5	5	6,960	4,640	4,280	10,200 (7)
Dissolved Selenium	ug/l	16	0	1.57	0.594	<1.00	<2.00 (4)
Total Selenium	ug/l	5	1	2.20	2.20	<1.30	23.9 (7)
Dissolved Silver	ug/l	16	1	1.20	1.20	<0.700	10 (6)
Total Silver	ug/l	5	2	0.900	0.900	<0.700	5.20 (5)
Dissolved Sodium	ug/l	16	16	21,400	21,400	21,000	46,100 (6)
Total Sodium	ug/l	5	5	19,800	19,800	20,400	44,400 (7)
Dissolved Thallium	ug/l	16	0	1.10	1.10	<1.10	<10.0 (4)
Total Thallium	ug/l	5	0	1.30	1.30	<1.10	<6.00 (4)
Total Uranium	ug/l	1	1	160	50.0	3,930	3,930 (7)
Total Uranium, Calculated	mg/l	4	4	0.160	0.0510	0.0780	2.98
Dissolved Vanadium	ug/l	4	0	7.70	3.10	<0.500	<1.00
Total Vanadium	ug/l	5	0	58.9	14.2	<0.500	<1.50
Dissolved Zinc	ug/l	16	16	181	181	100	1,170 (6)
Total Zinc	ug/l	5	5	349	108	424	1,060
Organic Compounds							
Total Petroleum Hydrocarbons-Diesel	ug/l	2	0	NA	NA	<1,000	<1,000
Total Petroleum Hydrocarbons-Gasoline	ug/l	2	0	NA	NA	<100	<100
Other Parameters							
Alkalinity	mg/l	16	6	176	176	<2.00	72.0
Bicarbonate Alkalinity	mg/l	16	6	176	176	<2.00	72.0

Table 5-83
SUMMARY OF ANALYTICAL RESULTS FOR WESTERN DRAINAGE ALLUVIAL GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Carbonate Alkalinity	mg/l	16	0	2.00	2.00	<2.00	<2.00
Hardness	mg/l	4	4	231	140	1,290	2,541
Hydroxide Alkalinity	mg/l	16	0	2.00	2.00	<2.00	<2.00
Total Dissolved Solids	mg/l	16	16	411	301	1,810	3,770
Total Inorganic Carbon	mg/l	12	10	NC	NC	2.00	24.0
Total Suspended Solids	mg/l	4	0	1,150	247	<4.00	<4.00
Radionuclides							
Gross Alpha	pCi/L	17	17	303	99.1	150	2,300 (6)
Gross Beta	pCi/L	16	15	165	78.2	36.0	1,240
Dissolved Lead 210	pCi/L	12	9	NC	NC	-3.70	9.00
Total Lead 210	pCi/L	4	3	107	38.6	2.10	5.50
Dissolved Polonium 210	pCi/L	2	2	NC	NC	0.170	0.360
Total Polonium 210	pCi/L	4	2	42.6	15.5	-0.20	1.70
Dissolved Radium 226	pCi/L	12	12	NC	NC	0.330	2.80
Total Radium 226	pCi/L	5	5	11.9	11.9	0.589	4.70
Dissolved Radium 228	pCi/L	12	10	NC	NC	0.360	1.89
Total Radium 228	pCi/L	5	5	12.7	12.7	0.821	2.30
Total Radon 222, Calculated	pCi/L	4	4	89,200	89,200	6,350	7,877
Total Thorium 227	pCi/L	4	2	1.24	0.491	0.00	4.16
Total Thorium 228	pCi/L	5	0	2.50	2.50	-2.31	<4.50 (4)
Dissolved Thorium 230	pCi/L	9	5	NC	NC	0.0200	1.50
Total Thorium 230	pCi/L	5	2	10.2	3.35	-2.66	1.02
Total Thorium 232	pCi/L	5	0	5.71	1.67	<0.156	<7.30 (4)
Dissolved Uranium 234	pCi/L	12	12	NC	NC	73.0	1,100
Total Uranium 234	pCi/L	5	5	66.2	21.4	28.7	1,210 (7)
Dissolved Uranium 235	pCi/L	12	12	NC	NC	2.50	45.0
Total Uranium 235	pCi/L	5	5	4.09	1.32	1.89	161 (7)
Dissolved Uranium 238	pCi/L	12	12	NC	NC	59.0	1,100
Total Uranium 238	pCi/L	5	5	67.9	19.2	25.8	1,016 (7)

Notes:
(1) Parameters in bold exceed background limits for the URS samples
(2) 99% Upper Tolerance Limit for the URS background groundwater data set
(3) 95% Upper Prediction Limit for the URS background groundwater data set
(4) The result is reported as non-detect value above the RBL
(5) The maximum concentration or activity is from a URS primary sample; the associated verification sample did not exceed the RBL
(6) The maximum concentration or activity exceeding the background limit is reported from SMI samples.
(7) The maximum concentration or activity exceeding the background limit is reported from E&E samples.
NA = Not Applicable
NC = Not calculated; parameter not analyzed for URS background samples

Table 5-84
SUMMARY OF ANALYTICAL RESULTS FOR WESTERN DRAINAGE BEDROCK GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Field Parameters							
Depth to Water	ft	10	10	NA	NA	3.52	7.67
Dissolved Oxygen	mg/l	13	13	NA	NA	2.89	11.1
Eh	mV	12	12	NA	NA	187	431
Ferrous Iron	mg/l	13	10	NA	NA	<0.00700	0.160
Field Iron	ug/l	10	10	NA	NA	40.0	180
Field pH	SU	13	13	NA	NA	6.82	8.30
Specific Conductance	umhos/cm	12	12	42,200	34,600	695	866,000
Temperature	C	13	13	NA	NA	8.10	14.0
Turbidity	NTU	6	6	NA	NA	1.00	69.7
Inorganics							
Chloride	mg/l	14	14	2.05	2.05	1.00	3.00 (5)
Fluoride	mg/l	10	10	NC	NC	0.400	0.600
Nitrate	mg/l	13	3	1.75	0.583	<0.0200	0.0500
Nitrate/Nitrite	mg/l	10	3	NC	NC	<0.0200	0.0300
Nitrite	mg/l	13	0	0.0200	0.0200	<0.0100	<0.0500 (4)
Nitrogen, Ammonia	mg/l	4	1	0.258	0.0940	<0.0100	0.0176
Phosphate-P	mg/l	4	3	1.41	0.533	<0.0100	0.0166
Phosphorus	mg/l	14	3	2.07	0.795	<0.0100	0.0197
Silica	mg/l	10	10	NC	NC	13.1	19.7
Sulfate	mg/l	14	14	193	77.4	95.2	290 (5)
Metals							
Dissolved Aluminum	ug/l	14	1	14,300	2,080	<5.40	26.1
Total Aluminum	ug/l	6	3	82,000	16,200	<30.0	235
Dissolved Antimony	ug/l	5	1	8.29	1.98	<1.00	4.80
Total Antimony	ug/l	5	2	7.10	7.10	0.400	2.70
Dissolved Arsenic	ug/l	14	7	217	54.4	0.460	2.4
Total Arsenic	ug/l	6	3	78.2	78.2	<0.750	2.30
Dissolved Barium	ug/l	14	14	67.6	67.6	25.9	119 (5)
Total Barium	ug/l	6	6	178	93.7	26.6	109
Dissolved Beryllium	ug/l	14	0	1.93	0.343	<0.100	<2.00 (4)
Total Beryllium	ug/l	6	0	5.15	1.47	<0.100	<2.00 (4)
Dissolved Cadmium	ug/l	14	2	0.270	0.270	<0.100	0.2
Total Cadmium	ug/l	6	0	0.520	0.520	<0.200	<0.500
Dissolved Calcium	ug/l	14	14	72,500	39,700	29,400	125,000 (5)
Total Calcium	ug/l	4	4	70,500	39,700	29,900	123,000
Dissolved Chromium	ug/l	14	1	19.9	7.85	<0.400	1.4
Total Chromium	ug/l	6	2	137	42.1	<0.400	3.9

Table 5-84
SUMMARY OF ANALYTICAL RESULTS FOR WESTERN DRAINAGE BEDROCK GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Dissolved Cobalt	ug/l	5	1	7.77	2.75	<1.20	2.4
Total Cobalt	ug/l	5	0	29.5	10.2	<1.20	<10.0
Dissolved Copper	ug/l	14	0	4.84	2.14	<0.500	<10.0 (4)
Total Copper	ug/l	6	0	220	31.6	<0.500	<10.0
Dissolved Iron	ug/l	14	11	167,000	19,800	<8.40	1,180
Total Iron	ug/l	6	5	36,500	36,500	25.9	1,230
Dissolved Lead	ug/l	14	1	1.31	0.624	<0.100	0.1
Total Lead	ug/l	6	3	51.5	13.1	<0.200	3.60
Dissolved Magnesium	ug/l	14	14	18,200	11,200	4,820	20,400
Total Magnesium	ug/l	4	4	19,800	12,400	4,830	20,500
Dissolved Manganese	ug/l	14	14	1,930	1,930	5.50	895
Total Manganese	ug/l	6	6	1,990	1,990	14.1	568
Dissolved Mercury	ug/l	8	0	0.200	0.200	<0.100	<0.200
Total Mercury	ug/l	13	0	0.200	0.200	<0.100	<0.200
Dissolved Nickel	ug/l	14	0	13.9	13.9	<0.940	<10.0
Total Nickel	ug/l	6	3	102	33.2	<0.900	10.0
Dissolved Potassium	ug/l	14	14	5,560	3,760	1,070	1,700
Total Potassium	ug/l	4	4	6,960	4,640	1,220	1,570
Dissolved Selenium	ug/l	14	0	1.57	0.594	<1.00	<1.30 (4)
Total Selenium	ug/l	6	0	2.20	2.20	<1.00	<1.30
Dissolved Silver	ug/l	14	0	1.20	1.20	<0.700	<5.00 (4)
Total Silver	ug/l	6	0	0.900	0.900	<0.700	<5.00 (4)
Dissolved Sodium	ug/l	14	14	21,400	21,400	33,500	53,200
Total Sodium	ug/l	4	4	19,800	19,800	36,500	53,400
Dissolved Thallium	ug/l	14	0	1.10	1.10	<0.0500	<2.00 (4)
Total Thallium	ug/l	6	0	1.30	1.30	<0.100	<1.20
Total Uranium, Calculated	mg/l	4	4	0.160	0.0510	0.0220	0.0490
Dissolved Vanadium	ug/l	5	0	7.70	3.10	<0.500	<5.00 (4)
Total Vanadium	ug/l	5	0	58.9	14.2	<0.500	<5.00
Dissolved Zinc	ug/l	14	2	181	181	<0.400	30.0
Total Zinc	ug/l	6	2	349	108	<4.80	7.5
Organic Compounds							
Total Petroleum Hydrocarbons-Diesel	ug/l	2	0	NA	NA	<1,000	<1,000
Total Petroleum Hydrocarbons-Gasoline	ug/l	2	0	NA	NA	<100	<100
Other Parameters							
Alkalinity	mg/l	14	14	176	176	110	198 (5)
Bicarbonate Alkalinity	mg/l	14	14	176	176	110	198 (5)
Carbonate Alkalinity	mg/l	14	0	2.00	2.00	<2.00	<2.00

Table 5-84
SUMMARY OF ANALYTICAL RESULTS FOR WESTERN DRAINAGE BEDROCK GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Hardness	mg/l	6	6	231	140	93.3	394
Hydroxide Alkalinity	mg/l	14	0	2.00	2.00	<2.00	<2.00
Total Dissolved Solids	mg/l	14	14	411	301	253	620 (5)
Total Inorganic Carbon	mg/l	10	10	NC	NC	44.0	50.0
Total Suspended Solids	mg/l	6	1	1,150	247	<4.00	15.5
Radionuclides							
Gross Alpha	pCi/L	14	14	303	99.1	30.2	240
Gross Beta	pCi/L	14	13	165	78.2	12.5	72.0
Dissolved Lead 210	pCi/L	10	9	NC	NC	-5.70	230
Total Lead 210	pCi/L	6	2	107	38.6	-0.70	8.9
Dissolved Polonium 210	pCi/L	3	3	NC	NC	0.980	4.30
Total Polonium 210	pCi/L	6	6	42.6	15.5	0.800	6.00
Dissolved Radium 226	pCi/L	10	10	NC	NC	1.79	4.70
Total Radium 226	pCi/L	6	6	11.9	11.9	0.440	3.92
Dissolved Radium 228	pCi/L	10	8	NC	NC	1.80	6.4
Total Radium 228	pCi/L	6	5	12.7	12.7	<0.348	7.98
Dissolved Radon 222	pCi/L	1	1	89,200	89,200	7.80	7.80
Total Radon 222, Calculated	pCi/L	4	4	89,200	89,200	124	7,512
Total Thorium 227	pCi/L	4	0	1.24	0.491	<0.0299	<0.0511
Dissolved Thorium 227	pCi/L	1	1	NC	NC	0.620	0.620
Total Thorium 228	pCi/L	5	3	2.50	2.50	-0.01	0.891
Dissolved Thorium 230	pCi/L	10	7	NC	NC	0.00	4.20
Total Thorium 230	pCi/L	6	5	10.2	3.35	<0.0480	4.70
Dissolved Thorium 232	pCi/L	1	1	NC	NC	0.170	0.170
Total Thorium 232	pCi/L	5	1	5.71	1.67	0.00	0.150
Dissolved Uranium 234	pCi/L	10	8	NC	NC	88.0	120
Total Uranium 234	pCi/L	6	6	66.2	21.4	40.6	130 (5)
Dissolved Uranium 235	pCi/L	10	9	NC	NC	0.980	2.00
Total Uranium 235	pCi/L	6	6	4.09	1.32	0.641	2.10
Dissolved Uranium 238	pCi/L	10	8	NC	NC	19.0	29
Total Uranium 238	pCi/L	6	6	67.9	19.2	7.28	25.0

Notes:
(1) Parameters in bold exceed background limits for the URS samples
(2) 99% Upper Tolerance Limit for the URS background groundwater data set
(3) 95% Upper Prediction Limit for the URS background groundwater data set
(4) The result is reported as non-detect value above the RBL
(5) The maximum concentration or activity exceeding the background limit is reported from SMI samples.
NA = Not Applicable
NC = Not calculated; parameter not analyzed for URS background samples

Table 5-85
SUMMARY OF ANALYTICAL RESULTS FOR MINED AREA UNCONSOLIDATED MATERIAL GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Field Parameters							
Depth to Water	ft	45	45	NA	NA	9.64	161
Dissolved Oxygen	mg/l	41	41	NA	NA	0.470	10.1
Eh	mV	48	48	NA	NA	229	675
Ferrous Iron	mg/l	47	34	NA	NA	<0.00700	114
Field Iron	ug/l	48	43	NA	NA	<7.00	137,000
Field pH	SU	48	48	NA	NA	3.28	7.57
Specific Conductance	umhos/cm	48	48	42,200	34,600	114	7,940
Temperature	C	48	48	NA	NA	7.80	22.9
Turbidity	NTU	11	11	NA	NA	0.250	199
Inorganics							
Chloride	mg/l	48	41	2.05	2.05	<1.00	50
Fluoride	mg/l	48	43	NC	NC	<0.100	10.0
Nitrate	mg/l	44	42	1.75	0.583	<0.0200	1.77
Nitrate/Nitrite	mg/l	48	46	NC	NC	<0.0200	1.85
Nitrite	mg/l	44	6	0.0200	0.0200	<0.0100	0.25
Phosphorus	mg/l	48	37	2.07	0.795	<0.0100	0.940
Silica	mg/l	48	48	NC	NC	32.8	99.0
Sulfate	mg/l	48	46	193	77.4	<10.0	8,610
Metals							
Dissolved Aluminum	ug/l	48	26	14,300	2,080	<30.0	337,000
Total Aluminum	ug/l	7	7	82,000	16,200	220	181,000
Dissolved Antimony	ug/l	3	1	8.29	1.98	10.0	10
Total Antimony	ug/l	3	1	7.10	7.10	<1.00	14.7
Dissolved Arsenic	ug/l	48	20	217	54.4	<1.00	32
Total Arsenic	ug/l	7	7	78.2	78.2	3.00	7.00
Dissolved Barium	ug/l	48	28	67.6	67.6	<3.00	61.0
Total Barium	ug/l	7	3	178	93.7	<6.00	43.0
Dissolved Beryllium	ug/l	48	15	1.93	0.343	<2.00	260
Total Beryllium	ug/l	7	3	5.15	1.47	<4.00	170
Dissolved Cadmium	ug/l	48	29	0.270	0.270	<0.200	211
Total Cadmium	ug/l	7	5	0.520	0.520	<0.200	140
Dissolved Calcium	ug/l	48	48	72,500	39,700	12,900	623,000
Dissolved Chromium	ug/l	48	0	19.9	7.85	<10.0	<300 (4)
Total Chromium	ug/l	7	0	137	42.1	<20.0	<300 (4)
Dissolved Cobalt	ug/l	3	1	7.77	2.75	<10.0	4,400
Total Cobalt	ug/l	3	2	29.5	10.2	10.0	4,000

Table 5-85
SUMMARY OF ANALYTICAL RESULTS FOR MINED AREA UNCONSOLIDATED MATERIAL GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Dissolved Copper	ug/l	48	21	4.84	2.14	<10.0	1,100
Total Copper	ug/l	7	4	220	31.6	<20.0	640
Dissolved Iron	ug/l	48	34	167,000	19,800	<10.0	131,000
Total Iron	ug/l	7	6	36,500	36,500	<10.0	33,300
Dissolved Lead	ug/l	48	14	1.31	0.624	<0.100	72.9
Total Lead	ug/l	7	5	51.5	13.1	<0.200	16.6
Dissolved Magnesium	ug/l	48	48	18,200	11,200	3,600	1,170,000
Dissolved Manganese	ug/l	48	48	1,930	1,930	12.0	635,000
Total Manganese	ug/l	7	7	1,990	1,990	2,650	537,000
Dissolved Mercury	ug/l	15	1	0.200	0.200	<0.200	0.3
Total Mercury	ug/l	42	1	0.200	0.200	<0.100	0.3
Dissolved Nickel	ug/l	48	31	13.9	13.9	<10.0	9,700
Total Nickel	ug/l	7	5	102	33.2	<20.0	6,400
Dissolved Potassium	ug/l	48	48	5,560	3,760	700	17,800
Dissolved Selenium	ug/l	48	10	1.57	0.594	<1.00	8.00
Total Selenium	ug/l	7	3	2.20	2.20	<1.00	1.00
Dissolved Silver	ug/l	48	14	1.20	1.20	<5.00	500
Total Silver	ug/l	7	1	0.900	0.900	<10.0	11
Dissolved Sodium	ug/l	48	48	21,400	21,400	5,500	59,000
Dissolved Thallium	ug/l	48	5	1.10	1.10	<0.0500	0.8
Total Thallium	ug/l	7	3	1.30	1.30	<0.100	1.00
Total Uranium, Calculated	mg/l	4	4	0.160	0.0510	3.90	54.0
Dissolved Vanadium	ug/l	3	0	7.70	3.10	<10.0	<50.0 (4)
Total Vanadium	ug/l	3	0	58.9	14.2	<10.0	<50.0 (4)
Dissolved Zinc	ug/l	48	38	181	181	<10.0	11,300
Total Zinc	ug/l	7	7	349	108	30.0	8,030
Other Parameters							
Alkalinity	mg/l	48	36	176	176	<2.00	462
Bicarbonate Alkalinity	mg/l	48	36	176	176	<2.00	462
Carbonate Alkalinity	mg/l	48	0	2.00	2.00	<2.00	<20.0 (4)
Hardness	mg/l	7	7	231	140	1,740	4,850
Hydroxide Alkalinity	mg/l	48	0	2.00	2.00	<2.00	<20.0 (4)
Total Dissolved Solids	mg/l	48	48	411	301	90.0	11,800
Total Inorganic Carbon	mg/l	48	45	NC	NC	<1.00	117
Total Suspended Solids	mg/l	7	2	1,150	247	<5.00	40.0
Radionuclides							
Dissolved Gross Alpha	pCi/L	3	3	NC	NC	2,300	34,000

Table 5-85
SUMMARY OF ANALYTICAL RESULTS FOR MINED AREA UNCONSOLIDATED MATERIAL GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Total Gross Alpha	pCi/L	44	41	303	99.1	3.50	52,000
Dissolved Gross Beta	pCi/L	3	3	NC	NC	1,200	17,000
Total Gross Beta	pCi/L	44	40	165	78.2	<6.00	22,000
Dissolved Lead 210	pCi/L	46	39	NC	NC	-3.80	400
Total Lead 210	pCi/L	7	7	107	38.6	4.30	140
Dissolved Polonium 210	pCi/L	13	13	NC	NC	0.00	29.0
Total Polonium 210	pCi/L	7	7	42.6	15.5	8.20	28.0
Dissolved Radium 226	pCi/L	48	48	NC	NC	0.00	660
Total Radium 226	pCi/L	7	7	11.9	11.9	0.280	260
Dissolved Radium 228	pCi/L	48	41	NC	NC	0.00	32.2
Total Radium 228	pCi/L	7	7	12.7	12.7	0.370	11.0
Total Radon 222, Calculated	pCi/L	6	6	89,200	89,200	810	72,000
Dissolved Thorium 228	pCi/L	3	3	NC	NC	0.110	9.00
Total Thorium 228	pCi/L	3	3	2.50	2.50	0.0200	11.0
Dissolved Thorium 230	pCi/L	45	30	NC	NC	-0.26	480
Total Thorium 230	pCi/L	7	6	10.2	3.35	0.470	440
Dissolved Thorium 232	pCi/L	3	3	NC	NC	0.420	4.60
Total Thorium 232	pCi/L	3	3	5.71	1.67	0.880	3.80
Dissolved Uranium 234	pCi/L	48	47	NC	NC	4.60	22,000
Total Uranium 234	pCi/L	7	7	66.2	21.4	1,300	19,000
Dissolved Uranium 235	pCi/L	47	47	NC	NC	0.410	880
Total Uranium 235	pCi/L	7	7	4.09	1.32	53.0	790
Dissolved Uranium 238	pCi/L	48	47	NC	NC	<1.90	21,000
Total Uranium 238	pCi/L	7	7	67.9	19.2	1,300	18,000

Notes:
(1) The concentrations or activities of parameters in bold are greater than the RBL for SMI samples
(2) 99% Upper Tolerance Limit for the URS background groundwater data set
(3) 95% Upper Prediction Limit for the URS background groundwater data set
(4) The result is reported as non-detect value above the RBL
NA = Not Applicable
NC = Not calculated; parameter not analyzed for URS background samples

Table 5-86
SUMMARY OF ANALYTICAL RESULTS FOR MINED AREA BEDROCK GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Field Parameters							
Depth to Water	ft	47	47	NA	NA	19.1	125
Dissolved Oxygen	mg/l	37	37	NA	NA	2.20	9.20
Eh	mV	48	48	NA	NA	269	550
Ferrous Iron	mg/l	48	41	NA	NA	<0.00700	868
Field Iron	ug/l	48	42	NA	NA	<7.00	918,000
Field pH	SU	48	48	NA	NA	3.49	7.25
Specific Conductance	umhos/cm	48	48	42,200	34,600	566	14,730
Temperature	C	48	48	NA	NA	8.30	17.5
Turbidity	NTU	12	12	NA	NA	0.190	86.7
Inorganics							
Chloride	mg/l	53	53	2.05	2.05	1.00	30.0 (5)
Fluoride	mg/l	48	48	NC	NC	0.100	100
Nitrate	mg/l	49	37	1.75	0.583	<0.0200	9.24 (5)
Nitrate/Nitrite	mg/l	48	41	NC	NC	<0.0200	9.49
Nitrite	mg/l	49	7	0.0200	0.0200	<0.0100	1.25 (5)
Phosphorus	mg/l	48	39	2.07	0.795	<0.0100	0.800
Silica	mg/l	48	48	NC	NC	24.7	109
Sulfate	mg/l	53	53	193	77.4	1.11	22,600 (5)
Metals							
Dissolved Aluminum	ug/l	53	28	14,300	2,080	<8.40	1,460,000 (5)
Total Aluminum	ug/l	7	3	82,000	16,200	<60.0	1,320,000 (5)
Dissolved Antimony	ug/l	9	3	8.29	1.98	<0.100	2 (5)
Total Antimony	ug/l	4	0	7.10	7.10	<1.00	<2.00
Dissolved Arsenic	ug/l	53	20	217	54.4	0.170	109
Total Arsenic	ug/l	7	4	78.2	78.2	<3.00	90.0 (5)
Dissolved Barium	ug/l	53	42	67.6	67.6	12.4	80 (5)
Total Barium	ug/l	7	4	178	93.7	20.0	41
Dissolved Beryllium	ug/l	53	15	1.93	0.343	<0.100	680 (5)
Total Beryllium	ug/l	7	3	5.15	1.47	<4.00	610 (5)
Dissolved Cadmium	ug/l	53	27	0.270	0.270	<0.200	855 (5)
Total Cadmium	ug/l	7	3	0.520	0.520	<0.200	718 (5)
Dissolved Calcium	ug/l	53	53	72,500	39,700	44,600	623,000 (5)
Dissolved Chromium	ug/l	53	1	19.9	7.85	<1.10	15.2
Total Chromium	ug/l	7	0	137	42.1	<20.0	<500 (4)
Dissolved Cobalt	ug/l	9	7	7.77	2.75	1.20	20,700 (5)
Total Cobalt	ug/l	4	2	29.5	10.2	<20.0	19,800 (5)

Table 5-86
SUMMARY OF ANALYTICAL RESULTS FOR MINED AREA BEDROCK GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Dissolved Copper	ug/l	53	16	4.84	2.14	<0.800	1,100 (5)
Total Copper	ug/l	7	4	220	31.6	<20.0	1,000 (5)
Dissolved Iron	ug/l	53	44	167,000	19,800	<10.0	526,000 (5)
Total Iron	ug/l	7	7	36,500	36,500	250	480,000 (5)
Dissolved Lead	ug/l	53	13	1.31	0.624	<0.100	192 (5)
Total Lead	ug/l	7	4	51.5	13.1	<0.200	46.4
Dissolved Magnesium	ug/l	53	53	18,200	11,200	11,800	2,060,000 (5)
Dissolved Manganese	ug/l	53	50	1,930	1,930	<10.0	1,430,000 (5)
Total Manganese	ug/l	7	5	1,990	1,990	<20.0	1,330,000 (5)
Dissolved Mercury	ug/l	15	2	0.200	0.200	<0.200	0.500 (5)
Total Mercury	ug/l	41	2	0.200	0.200	<0.100	0.900 (5)
Dissolved Molybdenum	ug/l	5	2	119	25.5	<2.20	85.2
Dissolved Nickel	ug/l	53	28	13.9	13.9	<1.80	31,000 (5)
Total Nickel	ug/l	7	3	102	33.2	<20.0	29,000 (5)
Dissolved Potassium	ug/l	53	45	5,560	3,760	1,030	9,100 (5)
Dissolved Selenium	ug/l	53	19	1.57	0.594	0.270	19.0 (5)
Total Selenium	ug/l	7	1	2.20	2.20	<1.00	1.00
Dissolved Silver	ug/l	53	7	1.20	1.20	<0.900	400 (5)
Total Silver	ug/l	7	1	0.900	0.900	<10.0	100 (5)
Dissolved Sodium	ug/l	53	53	21,400	21,400	10,700	98,500 (5)
Dissolved Thallium	ug/l	53	4	1.10	1.10	<0.100	2 (5)
Total Thallium	ug/l	7	2	1.30	1.30	<0.100	1.70 (5)
Total Uranium, Calculated	mg/l	10	10	0.160	0.0510	0.000400	419 (5)
Dissolved Vanadium	ug/l	9	0	7.70	3.10	<0.800	<100 (4)
Total Vanadium	ug/l	4	0	58.9	14.2	<10.0	<100 (4)
Dissolved Zinc	ug/l	53	31	181	181	3.80	75,700 (5)
Total Zinc	ug/l	7	3	349	108	<20.0	70,900 (5)
Other Parameters							
Alkalinity	mg/l	48	37	176	176	<2.00	337 (5)
Bicarbonate Alkalinity	mg/l	48	37	176	176	<2.00	337 (5)
Carbonate Alkalinity	mg/l	48	0	2.00	2.00	<2.00	<2.00
Hardness	mg/l	8	8	231	140	1,320	9,070 (5)
Hydroxide Alkalinity	mg/l	48	0	2.00	2.00	<2.00	<2.00
Total Dissolved Solids	mg/l	53	53	411	301	390	29,300 (5)
Total Inorganic Carbon	mg/l	48	47	NC	NC	<1.00	85.0
Total Suspended Solids	mg/l	7	2	1,150	247	<5.00	20.0

Table 5-86
SUMMARY OF ANALYTICAL RESULTS FOR MINED AREA BEDROCK GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Radionuclides							
Dissolved Gross Alpha	pCi/L	4	4	NC	NC	450	170,000
Total Gross Alpha	pCi/L	45	44	303	99.1	8.60	180,000 (5)
Dissolved Gross Beta	pCi/L	4	4	NC	NC	220	140,000
Total Gross Beta	pCi/L	45	43	165	78.2	<8.10	140,000 (5)
Dissolved Lead 210	pCi/L	46	37	NC	NC	-3.80	380
Total Lead 210	pCi/L	7	5	107	38.6	0.00	180 (5)
Dissolved Polonium 210	pCi/L	11	11	NC	NC	0.420	41.0
Total Polonium 210	pCi/L	7	7	42.6	15.5	2.30	60.0 (5)
Dissolved Radium 226	pCi/L	48	48	NC	NC	0.100	340
Total Radium 226	pCi/L	7	7	11.9	11.9	0.240	250 (5)
Dissolved Radium 228	pCi/L	46	38	NC	NC	<0.410	44.0
Total Radium 228	pCi/L	7	7	12.7	12.7	0.850	36.0 (5)
Total Radon 222	pCi/L	4	4	NC	NC	360	61,000
Total Radon 222, Calculated	pCi/L	5	5	89,200	89,200	2,274	215,550
Dissolved Thorium 228	pCi/L	4	4	NC	NC	0.0500	56.0
Total Thorium 228	pCi/L	4	4	2.50	2.50	0.00	80.0 (5)
Dissolved Thorium 230	pCi/L	44	28	NC	NC	0.00	1,700
Total Thorium 230	pCi/L	7	6	10.2	3.35	0.310	2,300 (5)
Dissolved Thorium 232	pCi/L	4	4	NC	NC	0.0500	44.0
Total Thorium 232	pCi/L	4	4	5.71	1.67	0.120	51.0 (5)
Dissolved Uranium 234	pCi/L	48	47	NC	NC	6.20	120,000
Total Uranium 234	pCi/L	12	12	66.2	21.4	0.423	130,000 (5)
Dissolved Uranium 235	pCi/L	48	47	NC	NC	0.160	5,000
Total Uranium 235	pCi/L	12	11	4.09	1.32	<0.0289	5,500 (5)
Dissolved Uranium 238	pCi/L	48	46	NC	NC	4.40	120,000
Total Uranium 238	pCi/L	12	12	67.9	19.2	0.148	140,000 (5)

Notes:
(1) Parameters in bold exceed the RBL for the URS samples (only one sample collected from each well).
(2) 99% Upper Tolerance Limit for the URS background groundwater data set
(3) 95% Upper Prediction Limit for the URS background groundwater data set
(4) The result is reported as non-detect value above the RBL
(5) The maximum concentration or activity exceeding the background limit is reported from SMI samples.
NA = Not Applicable
NC = Not calculated; parameter not analyzed for URS background samples

Table 5-87
SUMMARY OF ANALYTICAL RESULTS FOR PUMPHOUSE SEEP SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Field Parameters							
Dissolved Oxygen	mg/l	4	4	NA	NA	6.40	7.80
Eh	mV	2	2	NA	NA	484	641
Field Iron	ug/l	4	4	NA	NA	130	440
Field pH	SU	4	4	NA	NA	3.83	4.30
Specific Conductance	umhos/cm	4	4	42,200	34,600	4,600	5,980
Temperature	C	4	4	NA	NA	5.90	15.5
Turbidity	NTU	1	1	NA	NA	0.250	0.250
Inorganics							
Chloride	mg/l	4	3	2.05	2.05	<2.00	3.00
Fluoride	mg/l	4	4	NC	NC	0.200	1.70
Nitrate	mg/l	3	3	1.75	0.583	1.04	1.54
Nitrate/Nitrite	mg/l	4	4	NC	NC	1.04	1.54
Nitrite	mg/l	3	0	0.0200	0.0200	<0.0100	<0.0100
Phosphorus	mg/l	4	0	2.07	0.795	<0.0100	<0.100
Silica	mg/l	4	4	NC	NC	43.2	59.0
Sulfate	mg/l	4	4	193	77.4	4,180	6,140
Metals							
Dissolved Aluminum	ug/l	4	4	14,300	2,080	120,000	277,000
Total Aluminum	ug/l	4	4	82,000	16,200	118,000	266,000
Dissolved Antimony	ug/l	1	1	8.29	1.98	15.0	15.0
Total Antimony	ug/l	1	1	7.10	7.10	16.0	16.0
Dissolved Arsenic	ug/l	4	2	217	54.4	11.0	13
Total Arsenic	ug/l	4	2	78.2	78.2	10.0	11
Dissolved Barium	ug/l	4	4	67.6	67.6	9.20	10.0
Total Barium	ug/l	4	3	178	93.7	8.70	10
Dissolved Beryllium	ug/l	4	4	1.93	0.343	54.0	140
Total Beryllium	ug/l	4	4	5.15	1.47	70.0	130
Dissolved Cadmium	ug/l	4	4	0.270	0.270	148	203
Total Cadmium	ug/l	4	4	0.520	0.520	127	206
Dissolved Calcium	ug/l	4	4	72,500	39,700	428,000	452,000
Dissolved Chromium	ug/l	4	3	19.9	7.85	3.40	7
Total Chromium	ug/l	4	2	137	42.1	<2.90	10
Dissolved Cobalt	ug/l	1	1	7.77	2.75	4,000	4,000
Total Cobalt	ug/l	1	1	29.5	10.2	3,700	3,700
Dissolved Copper	ug/l	4	4	4.84	2.14	434	718
Total Copper	ug/l	4	4	220	31.6	391	1,430

Table 5-87
SUMMARY OF ANALYTICAL RESULTS FOR PUMPHOUSE SEEP SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Dissolved Iron	ug/l	4	4	167,000	19,800	390	1,600
Total Iron	ug/l	4	4	36,500	36,500	80.0	350
Dissolved Lead	ug/l	4	3	1.31	0.624	2.70	5
Total Lead	ug/l	4	3	51.5	13.1	1.60	3
Dissolved Magnesium	ug/l	4	4	18,200	11,200	428,000	674,000
Dissolved Manganese	ug/l	4	4	1,930	1,930	144,000	301,000
Total Manganese	ug/l	4	4	1,990	1,990	156,000	288,000
Dissolved Mercury	ug/l	4	0	0.200	0.200	<0.200	<0.200
Total Mercury	ug/l	4	0	0.200	0.200	<0.200	<0.200
Dissolved Nickel	ug/l	4	4	13.9	13.9	2,920	6,000
Total Nickel	ug/l	4	4	102	33.2	2,950	5,700
Dissolved Potassium	ug/l	4	4	5,560	3,760	4,000	5,000
Dissolved Selenium	ug/l	4	2	1.57	0.594	<1.00	1.00
Total Selenium	ug/l	4	0	2.20	2.20	<1.00	<1.00
Dissolved Silver	ug/l	4	1	1.20	1.20	<30.0	50.0
Total Silver	ug/l	4	2	0.900	0.900	15.0	60.0
Dissolved Sodium	ug/l	4	4	21,400	21,400	29,000	41,000
Dissolved Thallium	ug/l	4	1	1.10	1.10	<0.500	0.5
Total Thallium	ug/l	4	3	1.30	1.30	0.400	0.8
Total Uranium, Calculated	mg/l	4	4	0.160	0.0510	42.0	69.1
Dissolved Vanadium	ug/l	1	0	7.70	3.10	<50.0	<50.0 (4)
Total Vanadium	ug/l	1	0	58.9	14.2	<50.0	<50.0 (4)
Dissolved Zinc	ug/l	4	4	181	181	7,490	14,100
Total Zinc	ug/l	4	4	349	108	7,250	13,700
Other Parameters							
Alkalinity	mg/l	4	0	176	176	<2.00	<2.00
Bicarbonate Alkalinity	mg/l	4	0	176	176	<2.00	<2.00
Carbonate Alkalinity	mg/l	4	0	2.00	2.00	<2.00	<2.00
Hardness	mg/l	4	4	231	140	2,890	3,860
Hydroxide Alkalinity	mg/l	4	0	2.00	2.00	<2.00	<2.00
Total Dissolved Solids	mg/l	4	4	411	301	5,420	9,460
Total Inorganic Carbon	mg/l	4	1	NC	NC	<1.00	2.00
Total Suspended Solids	mg/l	4	0	1,150	247	<5.00	<5.00
Radionuclides							
Gross Alpha	pCi/L	4	4	303	99.1	15,000	42,000
Gross Beta	pCi/L	4	4	165	78.2	7,800	18,000
Total Lead 210	pCi/L	4	3	107	38.6	14.0	36.0

Table 5-87
SUMMARY OF ANALYTICAL RESULTS FOR PUMPHOUSE SEEP SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Total Polonium 210	pCi/L	2	2	42.6	15.5	3.90	18.0
Total Radium 226	pCi/L	4	4	11.9	11.9	24.0	52.0
Total Radium 228	pCi/L	4	4	12.7	12.7	3.10	14.0
Total Radon 222, Calculated	pCi/L	2	2	89,200	89,200	12,000	18,000
Total Thorium 228	pCi/L	1	1	2.50	2.50	5.80	5.80
Total Thorium 230	pCi/L	4	4	10.2	3.35	120	410
Total Thorium 232	pCi/L	1	1	5.71	1.67	9.40	9.40
Total Uranium 234	pCi/L	4	4	66.2	21.4	13,000	24,000
Total Uranium 235	pCi/L	4	4	4.09	1.32	550	1,200
Total Uranium 238	pCi/L	4	4	67.9	19.2	14,000	23,000

Notes:
(1) Concentrations or activities of parameters in bold are greater than the RBL for the SMI samples
(2) 99% Upper Tolerance Limit for the URS background groundwater data set
(3) 95% Upper Prediction Limit for the URS background groundwater data set
(4) The result is reported as non-detect value above the RBL
NA = Not Applicable
NC = Not calculated; parameter not analyzed for URS background samples

Table 5-88
SUMMARY OF ANALYTICAL RESULTS FOR FAR WEST DRAINAGE ALLUVIAL GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Field Parameters							
Dissolved Oxygen	mg/l	2	2	NA	NA	6.07	15.0
Eh	mV	2	2	NA	NA	156	171
Ferrous Iron	mg/l	2	1	NA	NA	<0.0500	0.200
Field pH	SU	2	2	NA	NA	6.52	6.66
Specific Conductance	uS/cm	1	1	42,200	34,600	16,800	16,800
Temperature	C	2	2	NA	NA	7.75	10.0
Turbidity	NTU	2	2	NA	NA	2.00	356
Inorganics							
Chloride	mg/l	2	2	2.05	2.05	1.32	1.97
Nitrate	mg/l	2	2	1.75	0.583	0.0780	0.0810
Nitrite	mg/l	1	0	0.0200	0.0200	<0.0200	<0.0200
Nitrogen, Ammonia	mg/l	2	0	0.258	0.0940	<0.0100	<0.0100
Phosphate-P	mg/l	2	2	1.41	0.533	0.0175	0.100
Phosphorus	mg/l	2	1	2.07	0.795	<0.0100	0.0197
Sulfate	mg/l	2	2	193	77.4	34.7	55.6
Metals							
Dissolved Aluminum	ug/l	2	1	14,300	2,080	<3.90	244
Total Aluminum	ug/l	2	2	82,000	16,200	407	424
Dissolved Antimony	ug/l	2	0	8.29	1.98	<2.20	<2.70 (4)
Total Antimony	ug/l	2	0	7.10	7.10	<2.20	<2.70
Dissolved Arsenic	ug/l	2	1	217	54.4	<0.200	0.320
Total Arsenic	ug/l	2	2	78.2	78.2	0.240	0.430
Dissolved Barium	ug/l	2	2	67.6	67.6	37.1	38.2
Total Barium	ug/l	2	2	178	93.7	33.9	39.3
Dissolved Beryllium	ug/l	2	0	1.93	0.343	<0.100	<0.310
Total Beryllium	ug/l	2	1	5.15	1.47	0.120	0.12
Dissolved Cadmium	ug/l	2	0	0.270	0.270	<0.200	<0.500 (4)
Total Cadmium	ug/l	2	0	0.520	0.520	<0.200	<0.500
Dissolved Calcium	ug/l	2	2	72,500	39,700	16,000	21,700
Total Calcium	ug/l	2	2	70,500	39,700	16,200	23,000
Dissolved Chromium	ug/l	2	0	19.9	7.85	<0.400	<1.10
Total Chromium	ug/l	2	1	137	42.1	<1.10	1.10
Dissolved Cobalt	ug/l	2	0	7.77	2.75	<1.20	<3.90 (4)
Total Cobalt	ug/l	2	1	29.5	10.2	<1.20	3.30
Dissolved Copper	ug/l	2	0	4.84	2.14	<0.500	<0.900
Total Copper	ug/l	2	1	220	31.6	0.750	0.75

Table 5-88
SUMMARY OF ANALYTICAL RESULTS FOR FAR WEST DRAINAGE ALLUVIAL GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Dissolved Iron	ug/l	2	2	167,000	19,800	188	224
Total Iron	ug/l	2	2	36,500	36,500	414	867
Dissolved Lead	ug/l	2	0	1.31	0.624	<0.900	<1.00
Total Lead	ug/l	2	0	51.5	13.1	<0.900	<1.00
Dissolved Magnesium	ug/l	2	2	18,200	11,200	5,130	6,270
Total Magnesium	ug/l	2	2	19,800	12,400	5,170	6,560
Dissolved Manganese	ug/l	2	2	1,930	1,930	82.2	1,340
Total Manganese	ug/l	2	2	1,990	1,990	81.3	1,190
Dissolved Mercury	ug/l	2	0	0.200	0.200	<0.100	<0.100
Total Mercury	ug/l	2	0	0.200	0.200	<0.100	<0.100
Dissolved Nickel	ug/l	2	2	13.9	13.9	2.60	19.2 (5)
Total Nickel	ug/l	2	2	102	33.2	3.20	18.3
Dissolved Potassium	ug/l	2	2	5,560	3,760	1,090	1,930
Total Potassium	ug/l	2	2	6,960	4,640	1,180	2,160
Dissolved Selenium	ug/l	2	0	1.57	0.594	<1.00	<1.30 (4)
Total Selenium	ug/l	2	0	2.20	2.20	<1.00	<1.30
Dissolved Silver	ug/l	2	0	1.20	1.20	<0.700	<0.800
Total Silver	ug/l	2	0	0.900	0.900	<0.700	<0.800
Dissolved Sodium	ug/l	2	2	21,400	21,400	9,140	10,200
Total Sodium	ug/l	2	2	19,800	19,800	9,000	10,600
Dissolved Thallium	ug/l	2	0	1.10	1.10	<1.10	<1.20 (4)
Total Thallium	ug/l	2	0	1.30	1.30	<1.10	<1.20
Total Uranium, Calculated	mg/l	2	2	0.160	0.0510	0.00300	0.00300
Dissolved Vanadium	ug/l	2	0	7.70	3.10	<0.500	<1.00
Total Vanadium	ug/l	2	0	58.9	14.2	<0.500	<1.00
Dissolved Zinc	ug/l	2	1	181	181	2.40	2.40
Total Zinc	ug/l	2	1	349	108	2.60	2.60
Organic Compounds							
Total Petroleum Hydrocarbons-Diesel	ug/l	1	0	NA	NA	<1,000	<1,000
Total Petroleum Hydrocarbons-Gasoline	ug/l	1	0	NA	NA	<100	<100
Other Parameters							
Alkalinity	mg/l	2	2	176	176	47.4	50.4
Bicarbonate Alkalinity	mg/l	2	2	176	176	47.4	50.4
Carbonate Alkalinity	mg/l	2	0	2.00	2.00	<2.00	<2.00
Chemical Oxygen Demand	mg/l	1	0	20.7	12.5	<5.00	<5.00
Hardness	mg/l	2	2	231	140	61.1	84.4
Hydroxide Alkalinity	mg/l	2	0	2.00	2.00	<2.00	<2.00

Table 5-88
SUMMARY OF ANALYTICAL RESULTS FOR FAR WEST DRAINAGE ALLUVIAL GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Total Dissolved Solids	mg/l	2	2	411	301	145	222
Total Suspended Solids	mg/l	2	1	1,150	247	<4.00	13.0
Radionuclides							
Total Gross Alpha	pCi/L	2	2	303	99.1	3.05	5.82
Total Gross Beta	pCi/L	2	2	165	78.2	7.39	8.81
Total Lead 210	pCi/L	2	2	107	38.6	3.30	5.20
Total Polonium 210	pCi/L	2	1	42.6	15.5	<0.100	1.90
Total Radium 226	pCi/L	2	2	11.9	11.9	0.389	0.414
Total Radium 228	pCi/L	2	1	12.7	12.7	<0.434	0.620
Total Radon 222, Calculated	pCi/L	2	2	89,200	89,200	4,314	8,373
Total Thorium 227	pCi/L	2	0	1.24	0.491	-0.02	<0.163
Total Thorium 228	pCi/L	2	1	2.50	2.50	<0.0659	0.268
Total Thorium 230	pCi/L	2	1	10.2	3.35	<0.112	0.260
Total Thorium 232	pCi/L	2	1	5.71	1.67	<0.0659	0.137
Total Uranium 234	pCi/L	2	2	66.2	21.4	1.44	1.61
Total Uranium 235	pCi/L	2	2	4.09	1.32	0.0767	0.168
Total Uranium 238	pCi/L	2	2	67.9	19.2	0.968	0.972

Notes:

(1) Concentrations or activities of all parameters are less than the background limits

(2) 99% Upper Tolerance Limit for the URS background groundwater data set

(3) 95% Upper Prediction Limit for the URS background groundwater data set

(4) The result is reported as non-detect value above the RBL

(5) The maximum concentration is from a URS primary sample; the associated verification sample did not exceed the RBL.

NA = Not Applicable

Table 5-89
SUMMARY OF ANALYTICAL RESULTS FOR FAR WEST DRAINAGE BEDROCK GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Field Parameters							
Dissolved Oxygen	mg/l	8	8	NA	NA	2.04	15.0
Eh	mV	6	6	NA	NA	101	260
Ferrous Iron	mg/l	7	1	NA	NA	<0.0500	1.00
Field pH	SU	8	8	NA	NA	6.20	8.72
Specific Conductance	uS/cm	4	4	42,200	34,600	257	20,000
Temperature	C	8	8	NA	NA	7.30	15.3
Turbidity	NTU	8	8	NA	NA	0.00	101
Inorganics							
Chloride	mg/l	8	8	2.05	2.05	0.746	1.55
Nitrate	mg/l	8	7	1.75	0.583	<0.0300	1.64
Nitrite	mg/l	7	0	0.0200	0.0200	<0.0200	<0.0200
Nitrogen, Ammonia	mg/l	8	1	0.258	0.0940	<0.0100	0.0232
Phosphate-P	mg/l	8	8	1.41	0.533	0.0127	0.0367
Phosphorus	mg/l	8	8	2.07	0.795	0.0122	0.0453
Sulfate	mg/l	8	8	193	77.4	7.66	116
Metals							
Dissolved Aluminum	ug/l	8	0	14,300	2,080	<3.90	<22.9
Total Aluminum	ug/l	8	5	82,000	16,200	<5.40	292
Dissolved Antimony	ug/l	8	0	8.29	1.98	<2.20	<2.70
Total Antimony	ug/l	8	1	7.10	7.10	<2.20	3.00
Dissolved Arsenic	ug/l	8	8	217	54.4	0.460	2.70
Total Arsenic	ug/l	8	8	78.2	78.2	0.570	2.80
Dissolved Barium	ug/l	8	8	67.6	67.6	6.90	26.6
Total Barium	ug/l	8	8	178	93.7	6.80	26.3
Dissolved Beryllium	ug/l	8	2	1.93	0.343	<0.100	0.180
Total Beryllium	ug/l	8	3	5.15	1.47	<0.100	0.320
Dissolved Cadmium	ug/l	8	0	0.270	0.270	<0.200	<0.500 (4)
Total Cadmium	ug/l	8	0	0.520	0.520	<0.200	<0.500
Dissolved Calcium	ug/l	8	8	72,500	39,700	12,900	28,500
Total Calcium	ug/l	8	8	70,500	39,700	12,900	29,400
Dissolved Chromium	ug/l	8	1	19.9	7.85	<0.400	42.0 (5)
Total Chromium	ug/l	8	2	137	42.1	<0.400	3.60
Dissolved Cobalt	ug/l	8	0	7.77	2.75	<0.500	<2.80 (4)
Total Cobalt	ug/l	8	2	29.5	10.2	<0.500	4.20
Dissolved Copper	ug/l	8	1	4.84	2.14	0.680	0.680
Total Copper	ug/l	8	0	220	31.6	<0.500	<5.00

Table 5-89
SUMMARY OF ANALYTICAL RESULTS FOR FAR WEST DRAINAGE BEDROCK GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Dissolved Iron	ug/l	8	0	167,000	19,800	<8.40	<183
Total Iron	ug/l	8	5	36,500	36,500	<17.6	437
Dissolved Lead	ug/l	8	0	1.31	0.624	<0.900	<1.00
Total Lead	ug/l	8	1	51.5	13.1	<0.900	1.90
Dissolved Magnesium	ug/l	8	8	18,200	11,200	1,340	9,100
Total Magnesium	ug/l	8	8	19,800	12,400	1,390	9,480
Dissolved Manganese	ug/l	8	8	1,930	1,930	2.80	415
Total Manganese	ug/l	8	8	1,990	1,990	3.00	418
Dissolved Mercury	ug/l	8	0	0.200	0.200	<0.100	<0.200
Total Mercury	ug/l	8	0	0.200	0.200	<0.100	<0.200
Dissolved Nickel	ug/l	8	4	13.9	13.9	<0.500	22.9 (5)
Total Nickel	ug/l	8	6	102	33.2	<0.700	7.50
Dissolved Potassium	ug/l	8	8	5,560	3,760	496	1,780
Total Potassium	ug/l	8	8	6,960	4,640	438	1,800
Dissolved Selenium	ug/l	8	0	1.57	0.594	<1.00	<1.30 (4)
Total Selenium	ug/l	8	0	2.20	2.20	<1.00	<1.30
Dissolved Silver	ug/l	8	0	1.20	1.20	<0.700	<0.800
Total Silver	ug/l	8	1	0.900	0.900	<0.700	0.880
Dissolved Sodium	ug/l	8	8	21,400	21,400	7,420	21,500
Total Sodium	ug/l	8	8	19,800	19,800	7,060	21,600
Dissolved Thallium	ug/l	8	1	1.10	1.10	<1.10	1.20 (5)
Total Thallium	ug/l	8	0	1.30	1.30	<1.10	<1.20
Total Uranium, Calculated	mg/l	8	8	0.160	0.0510	0.00300	0.0100
Dissolved Vanadium	ug/l	8	2	7.70	3.10	<0.500	1.60
Total Vanadium	ug/l	8	2	58.9	14.2	<0.500	1.50
Dissolved Zinc	ug/l	8	4	181	181	<0.400	99.5
Total Zinc	ug/l	8	4	349	108	<0.400	91.1
Organic Compounds							
Total Petroleum Hydrocarbons-Diesel	ug/l	4	1	NA	NA	<1,000	4,110
Total Petroleum Hydrocarbons-Gasoline	ug/l	4	0	NA	NA	<100	<100
Other Parameters							
Alkalinity	mg/l	8	8	176	176	57.8	84.2
Bicarbonate Alkalinity	mg/l	8	8	176	176	57.8	84.2
Carbonate Alkalinity	mg/l	8	0	2.00	2.00	<2.00	<2.00
Chemical Oxygen Demand	mg/l	1	0	20.7	12.5	<5.00	<5.00
Hardness	mg/l	8	8	231	140	47.9	112
Hydroxide Alkalinity	mg/l	8	0	2.00	2.00	<2.00	<2.00

Table 5-89
SUMMARY OF ANALYTICAL RESULTS FOR FAR WEST DRAINAGE BEDROCK GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Total Dissolved Solids	mg/l	8	7	411	301	<10.0	225
Total Suspended Solids	mg/l	8	0	1,150	247	<4.00	<4.00
Radionuclides							
Total Gross Alpha	pCi/L	8	8	303	99.1	3.09	14.1
Total Gross Beta	pCi/L	8	8	165	78.2	3.79	28.2
Total Lead 210	pCi/L	8	7	107	38.6	<2.30	22.0
Total Polonium 210	pCi/L	8	7	42.6	15.5	<0.200	6.60
Total Radium 226	pCi/L	8	8	11.9	11.9	0.154	1.00
Total Radium 228	pCi/L	8	2	12.7	12.7	<0.0662	1.01
Total Radon 222, Calculated	pCi/L	8	8	89,200	89,200	139	41,193
Total Thorium 227	pCi/L	8	0	1.24	0.491	-0.09	<0.113
Total Thorium 228	pCi/L	8	2	2.50	2.50	-0.07	0.249
Total Thorium 230	pCi/L	8	4	10.2	3.35	<0.0161	0.244
Total Thorium 232	pCi/L	8	3	5.71	1.67	0.00	0.171
Total Uranium 234	pCi/L	8	8	66.2	21.4	2.92	5.51
Total Uranium 235	pCi/L	8	6	4.09	1.32	<0.0395	0.282
Total Uranium 238	pCi/L	8	8	67.9	19.2	0.891	3.39

Notes:
(1) Parameters in bold exceed background limits for the URS samples
(2) 99% Upper Tolerance Limit for the URS background groundwater data set
(3) 95% Upper Prediction Limit for the URS background groundwater data set
(4) The result is reported as non-detect value above the RBL
(5) The maximum concentration is from a URS primary sample; the associated verification sample did not exceed the RBL.
NA = Not Applicable

Table 5-90
SUMMARY OF ANALYTICAL RESULTS FOR NORTHERN DRAINAGE ALLUVIAL GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Field Parameters							
Dissolved Oxygen	mg/l	2	2	NA	NA	4.33	15.0
Eh	mV	2	2	NA	NA	153	266
Ferrous Iron	mg/l	2	0	NA	NA	<0.0500	<0.0500
Field pH	SU	2	2	NA	NA	6.20	7.09
Specific Conductance	uS/cm	1	1	42,200	34,600	27,900	27,900
Temperature	C	2	2	NA	NA	9.27	11.1
Turbidity	NTU	2	2	NA	NA	0.00	0.200
Inorganics							
Chloride	mg/l	2	2	2.05	2.05	1.27	1.32
Nitrate	mg/l	2	1	1.75	0.583	<0.0870	0.149
Nitrite	mg/l	2	0	0.0200	0.0200	<0.0200	<0.0200
Nitrogen, Ammonia	mg/l	2	1	0.258	0.0940	<0.0100	0.0127
Phosphate-P	mg/l	2	2	1.41	0.533	0.0300	0.0392
Phosphorus	mg/l	2	2	2.07	0.795	0.0294	0.0339
Sulfate	mg/l	2	2	193	77.4	17.8	17.9
Metals							
Dissolved Aluminum	ug/l	2	0	14,300	2,080	<16.9	<21.3
Total Aluminum	ug/l	2	0	82,000	16,200	<18.4	<20.1
Dissolved Antimony	ug/l	2	0	8.29	1.98	<2.20	<2.70 (4)
Total Antimony	ug/l	2	0	7.10	7.10	<2.20	<2.70
Dissolved Arsenic	ug/l	2	2	217	54.4	0.240	0.280
Total Arsenic	ug/l	2	2	78.2	78.2	0.330	0.380
Dissolved Barium	ug/l	2	2	67.6	67.6	10.1	26.3
Total Barium	ug/l	2	2	178	93.7	10.2	27.5
Dissolved Beryllium	ug/l	2	0	1.93	0.343	<0.100	<0.100
Total Beryllium	ug/l	2	0	5.15	1.47	<0.100	<0.100
Dissolved Cadmium	ug/l	2	0	0.270	0.270	<0.200	<0.500 (4)
Total Cadmium	ug/l	2	0	0.520	0.520	<0.200	<0.500
Dissolved Calcium	ug/l	2	2	72,500	39,700	39,600	42,900
Total Calcium	ug/l	2	2	70,500	39,700	38,900	44,900
Dissolved Chromium	ug/l	2	0	19.9	7.85	<0.400	<1.10
Total Chromium	ug/l	2	1	137	42.1	0.760	0.760
Dissolved Cobalt	ug/l	2	0	7.77	2.75	<0.500	<1.20
Total Cobalt	ug/l	2	0	29.5	10.2	<0.500	<1.20
Dissolved Copper	ug/l	2	0	4.84	2.14	<0.880	<0.900
Total Copper	ug/l	2	0	220	31.6	<0.500	<0.900

Table 5-90
SUMMARY OF ANALYTICAL RESULTS FOR NORTHERN DRAINAGE ALLUVIAL GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Dissolved Iron	ug/l	2	0	167,000	19,800	<8.40	<17.6
Total Iron	ug/l	2	1	36,500	36,500	<17.6	241
Dissolved Lead	ug/l	2	0	1.31	0.624	<0.900	<1.10 (4)
Total Lead	ug/l	2	0	51.5	13.1	<0.900	<1.30
Dissolved Magnesium	ug/l	2	2	18,200	11,200	6,240	6,740
Total Magnesium	ug/l	2	2	19,800	12,400	6,150	7,130
Dissolved Manganese	ug/l	2	2	1,930	1,930	0.580	24.8
Total Manganese	ug/l	2	2	1,990	1,990	4.30	30.4
Dissolved Mercury	ug/l	2	0	0.200	0.200	<0.100	<0.100
Total Mercury	ug/l	2	0	0.200	0.200	<0.100	<0.100
Dissolved Nickel	ug/l	2	0	13.9	13.9	<0.500	<0.900
Total Nickel	ug/l	2	0	102	33.2	<0.900	<2.10
Dissolved Potassium	ug/l	2	2	5,560	3,760	1,400	1,890
Total Potassium	ug/l	2	2	6,960	4,640	1,470	1,910
Dissolved Selenium	ug/l	2	0	1.57	0.594	<1.00	<1.30 (4)
Total Selenium	ug/l	2	0	2.20	2.20	<1.00	<1.30
Dissolved Silver	ug/l	2	0	1.20	1.20	<0.700	<0.800
Total Silver	ug/l	2	0	0.900	0.900	<0.700	<0.800
Dissolved Sodium	ug/l	2	2	21,400	21,400	7,860	8,930
Total Sodium	ug/l	2	2	19,800	19,800	7,730	8,980
Dissolved Thallium	ug/l	2	0	1.10	1.10	<1.10	<1.20 (4)
Total Thallium	ug/l	2	0	1.30	1.30	<1.10	<1.20
Total Uranium, Calculated	mg/l	2	2	0.160	0.0510	0.0120	0.0130
Dissolved Vanadium	ug/l	2	0	7.70	3.10	<0.500	<1.00
Total Vanadium	ug/l	2	0	58.9	14.2	<0.500	<1.00
Dissolved Zinc	ug/l	2	0	181	181	<0.400	<8.30
Total Zinc	ug/l	2	1	349	108	<0.400	453 (5)
Other Parameters							
Alkalinity	mg/l	2	2	176	176	127	129
Bicarbonate Alkalinity	mg/l	2	2	176	176	127	129
Carbonate Alkalinity	mg/l	2	0	2.00	2.00	<2.00	<2.00
Hardness	mg/l	2	2	231	140	125	141
Hydroxide Alkalinity	mg/l	2	0	2.00	2.00	<2.00	<2.00
Total Dissolved Solids	mg/l	2	2	411	301	195	229
Total Suspended Solids	mg/l	2	0	1,150	247	<4.00	<4.00
Radionuclides							
Gross Alpha	pCi/L	2	2	303	99.1	6.10	9.15

Table 5-90
SUMMARY OF ANALYTICAL RESULTS FOR NORTHERN DRAINAGE ALLUVIAL GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Gross Beta	pCi/L	2	2	165	78.2	9.20	11.5
Total Lead 210	pCi/L	2	1	107	38.6	<2.20	3.10
Total Polonium 210	pCi/L	2	0	42.6	15.5	<0.300	<0.400
Total Radium 226	pCi/L	2	2	11.9	11.9	0.156	0.227
Total Radium 228	pCi/L	2	0	12.7	12.7	<0.376	<0.391
Total Radon 222, Calculated	pCi/L	2	2	89,200	89,200	4,730	5,153
Total Thorium 227	pCi/L	2	0	1.24	0.491	0.00	<0.00268
Total Thorium 228	pCi/L	2	0	2.50	2.50	-0.05	<0.0363
Total Thorium 230	pCi/L	2	0	10.2	3.35	<0.0136	<0.0203
Total Thorium 232	pCi/L	2	0	5.71	1.67	<0.0116	<0.0136
Total Uranium 234	pCi/L	2	2	66.2	21.4	5.44	6.22
Total Uranium 235	pCi/L	2	2	4.09	1.32	0.281	0.333
Total Uranium 238	pCi/L	2	2	67.9	19.2	4.06	4.22

Notes:
(1) Concentrations or activities of all parameters are less than the background limits
(2) 99% Upper Tolerance Limit for the URS background groundwater data set
(3) 95% Upper Prediction Limit for the URS background groundwater data set
(4) The result is reported as non-detect value above the RBL
(5) The maximum concentration is from a URS primary sample; the associated verification sample did not exceed the RBL
NA = Not Applicable

Table 5-91
SUMMARY OF ANALYTICAL RESULTS FOR NORTHERN DRAINAGE BEDROCK GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Field Parameters							
Dissolved Oxygen	mg/l	1	1	NA	NA	15.0	15.0
Eh	mV	1	1	NA	NA	97.0	97.0
Ferrous Iron	mg/l	1	1	NA	NA	0.200	0.200
Field pH	SU	1	1	NA	NA	6.33	6.33
Temperature	C	1	1	NA	NA	14.1	14.1
Turbidity	NTU	1	1	NA	NA	7.30	7.30
Inorganics							
Chloride	mg/l	2	2	2.05	2.05	0.397	0.460
Nitrate	mg/l	2	1	1.75	0.583	<0.0300	0.127
Nitrite	mg/l	2	0	0.0200	0.0200	<0.0200	<0.0200
Nitrogen, Ammonia	mg/l	2	0	0.258	0.0940	<0.0100	<0.0100
Phosphate-P	mg/l	2	1	1.41	0.533	<0.0100	0.0268
Phosphorus	mg/l	2	1	2.07	0.795	<0.0100	0.0334
Sulfate	mg/l	2	2	193	77.4	22.4	25.6
Metals							
Dissolved Aluminum	ug/l	2	1	14,300	2,080	<11.2	58.8
Total Aluminum	ug/l	2	2	82,000	16,200	35.8	310
Dissolved Antimony	ug/l	2	1	8.29	1.98	<2.20	3.00
Total Antimony	ug/l	2	1	7.10	7.10	<2.20	4.50
Dissolved Arsenic	ug/l	2	2	217	54.4	0.200	2.50
Total Arsenic	ug/l	2	2	78.2	78.2	0.290	2.60
Dissolved Barium	ug/l	2	2	67.6	67.6	21.9	26.3
Total Barium	ug/l	2	2	178	93.7	24.8	25.8
Dissolved Beryllium	ug/l	2	0	1.93	0.343	<0.100	<0.130
Total Beryllium	ug/l	2	0	5.15	1.47	<0.100	<0.220
Dissolved Cadmium	ug/l	2	0	0.270	0.270	<0.200	<0.500 (4)
Total Cadmium	ug/l	2	0	0.520	0.520	<0.200	<0.500
Dissolved Calcium	ug/l	2	2	72,500	39,700	3,790	4,390
Total Calcium	ug/l	2	2	70,500	39,700	4,110	4,250
Dissolved Chromium	ug/l	2	2	19.9	7.85	1.90	4.40
Total Chromium	ug/l	2	2	137	42.1	3.40	11.3
Dissolved Cobalt	ug/l	2	2	7.77	2.75	6.50	9.90
Total Cobalt	ug/l	2	1	29.5	10.2	<6.20	8.90
Dissolved Copper	ug/l	2	1	4.84	2.14	<0.900	1.30
Total Copper	ug/l	2	1	220	31.6	0.710	0.710
Dissolved Iron	ug/l	2	1	167,000	19,800	<17.6	193

Table 5-91
SUMMARY OF ANALYTICAL RESULTS FOR NORTHERN DRAINAGE BEDROCK GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Total Iron	ug/l	2	2	36,500	36,500	40.6	547
Dissolved Lead	ug/l	2	0	1.31	0.624	<0.900	<1.00 (4)
Total Lead	ug/l	2	1	51.5	13.1	<0.900	1.40
Dissolved Magnesium	ug/l	2	2	18,200	11,200	3,770	4,360
Total Magnesium	ug/l	2	2	19,800	12,400	3,540	4,820
Dissolved Manganese	ug/l	2	2	1,930	1,930	101	159
Total Manganese	ug/l	2	2	1,990	1,990	99.6	173
Dissolved Mercury	ug/l	2	0	0.200	0.200	<0.100	<0.100
Total Mercury	ug/l	2	0	0.200	0.200	<0.100	<0.100
Dissolved Nickel	ug/l	2	2	13.9	13.9	13.1	18.7
Total Nickel	ug/l	2	2	102	33.2	16.7	18.7
Dissolved Potassium	ug/l	2	2	5,560	3,760	1,750	2,170
Total Potassium	ug/l	2	2	6,960	4,640	1,790	2,160
Dissolved Selenium	ug/l	2	0	1.57	0.594	<1.00	<1.30
Total Selenium	ug/l	2	0	2.20	2.20	<1.00	<1.30
Dissolved Silver	ug/l	2	0	1.20	1.20	<0.700	<0.800
Total Silver	ug/l	2	0	0.900	0.900	<0.700	<0.800
Dissolved Sodium	ug/l	2	2	21,400	21,400	5,620	5,770
Total Sodium	ug/l	2	2	19,800	19,800	5,430	5,790
Dissolved Thallium	ug/l	2	0	1.10	1.10	<1.10	<1.20 (4)
Total Thallium	ug/l	2	0	1.30	1.30	<1.10	<1.20
Total Uranium, Calculated	mg/l	2	2	0.160	0.0510	0.000200	0.000600
Dissolved Vanadium	ug/l	2	0	7.70	3.10	<0.500	<1.00
Total Vanadium	ug/l	2	0	58.9	14.2	<0.500	<1.00
Dissolved Zinc	ug/l	2	2	181	181	79.7	156
Total Zinc	ug/l	2	2	349	108	71.4	158
Other Parameters							
Alkalinity	mg/l	2	2	176	176	13.6	20.8
Bicarbonate Alkalinity	mg/l	2	2	176	176	13.6	20.8
Carbonate Alkalinity	mg/l	2	0	2.00	2.00	<2.00	<2.00
Hardness	mg/l	2	2	231	140	26.5	30.1
Hydroxide Alkalinity	mg/l	2	0	2.00	2.00	<2.00	<2.00
Total Dissolved Solids	mg/l	2	2	411	301	80.0	101
Total Suspended Solids	mg/l	2	0	1,150	247	<4.00	<4.00
Radionuclides							
Gross Alpha	pCi/L	2	0	303	99.1	<0.179	<0.651
Gross Beta	pCi/L	2	2	165	78.2	2.74	3.10

Table 5-91
SUMMARY OF ANALYTICAL RESULTS FOR NORTHERN DRAINAGE BEDROCK GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Total Lead 210	pCi/L	2	1	107	38.6	-0.30	0.700
Total Polonium 210	pCi/L	2	1	42.6	15.5	0.00	0.800
Total Radium 226	pCi/L	2	2	11.9	11.9	0.193	0.251
Total Radium 228	pCi/L	2	0	12.7	12.7	-0.05	<0.474
Total Radon 222, Calculated	pCi/L	2	2	89,200	89,200	743	1,274
Total Thorium 227	pCi/L	2	0	1.24	0.491	-0.02	<0.109
Total Thorium 228	pCi/L	2	0	2.50	2.50	<0.0378	<0.247
Total Thorium 230	pCi/L	2	1	10.2	3.35	<0.0212	0.205
Total Thorium 232	pCi/L	2	0	5.71	1.67	0.00	<0.0512
Total Uranium 234	pCi/L	2	2	66.2	21.4	0.0693	0.287
Total Uranium 235	pCi/L	2	1	4.09	1.32	<0.0161	0.135
Total Uranium 238	pCi/L	2	2	67.9	19.2	0.0626	0.164

Notes:
(1) Concentrations or activities of all parameters are less than the background limits
(2) 99% Upper Tolerance Limit for the URS background groundwater data set
(3) 95% Upper Prediction Limit for the URS background groundwater data set
(4) The result is reported as non-detect value above the RBL
NA = Not Applicable

Table 5-92
SUMMARY OF ANALYTICAL RESULTS FOR NORTHEASTERN DRAINAGE ALLUVIAL GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Field Parameters							
Dissolved Oxygen	mg/l	4	4	NA	NA	6.32	15.0
Eh	mV	4	4	NA	NA	188	246
Ferrous Iron	mg/l	4	2	NA	NA	<0.0500	0.200
Field pH	SU	4	4	NA	NA	6.42	6.85
Specific Conductance	uS/cm	2	2	42,200	34,600	11,000	38,600
Temperature	C	4	4	NA	NA	5.98	14.6
Turbidity	NTU	4	3	NA	NA	<1.00	237
Inorganics							
Chloride	mg/l	4	4	2.05	2.05	0.509	1.15
Nitrate	mg/l	4	3	1.75	0.583	<0.0300	0.875
Nitrite	mg/l	4	0	0.0200	0.0200	<0.0200	<0.0200
Nitrogen, Ammonia	mg/l	4	1	0.258	0.0940	<0.0100	0.0332
Phosphate-P	mg/l	4	4	1.41	0.533	0.0367	2.14 (5)
Phosphorus	mg/l	4	4	2.07	0.795	0.0392	2.85 (5)
Sulfate	mg/l	4	4	193	77.4	16.1	42.8
Metals							
Dissolved Aluminum	ug/l	4	1	14,300	2,080	<5.40	4,390
Total Aluminum	ug/l	4	2	82,000	16,200	<5.40	12,900
Dissolved Antimony	ug/l	4	1	8.29	1.98	<2.20	4.50
Total Antimony	ug/l	4	2	7.10	7.10	<2.20	5.00
Dissolved Arsenic	ug/l	4	4	217	54.4	0.260	3.60
Total Arsenic	ug/l	4	4	78.2	78.2	1.10	4.70
Dissolved Barium	ug/l	4	3	67.6	67.6	<1.30	49.4
Total Barium	ug/l	4	4	178	93.7	23.8	50.3
Dissolved Beryllium	ug/l	4	0	1.93	0.343	<0.100	<0.600 (4)
Total Beryllium	ug/l	4	1	5.15	1.47	<0.100	1.60
Dissolved Cadmium	ug/l	4	0	0.270	0.270	<0.200	<0.500 (4)
Total Cadmium	ug/l	4	0	0.520	0.520	<0.200	<0.500
Dissolved Calcium	ug/l	4	4	72,500	39,700	5,440	55,600
Total Calcium	ug/l	4	4	70,500	39,700	8,090	58,300
Dissolved Chromium	ug/l	4	2	19.9	7.85	0.470	23.2 (5)
Total Chromium	ug/l	4	2	137	42.1	<0.400	53.7 (5)
Dissolved Cobalt	ug/l	4	0	7.77	2.75	<0.500	<3.50 (4)
Total Cobalt	ug/l	4	1	29.5	10.2	<0.500	13.4
Dissolved Copper	ug/l	4	0	4.84	2.14	<0.900	<8.50 (4)
Total Copper	ug/l	4	1	220	31.6	<0.900	45.8
Dissolved Iron	ug/l	4	2	167,000	19,800	<8.40	3,960

Table 5-92
SUMMARY OF ANALYTICAL RESULTS FOR NORTHEASTERN DRAINAGE ALLUVIAL GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Total Iron	ug/l	4	2	36,500	36,500	<17.6	21,900
Dissolved Lead	ug/l	4	0	1.31	0.624	<0.900	<2.70 (4)
Total Lead	ug/l	4	2	51.5	13.1	<1.00	12.2
Dissolved Magnesium	ug/l	4	4	18,200	11,200	2,380	19,100
Total Magnesium	ug/l	4	4	19,800	12,400	3,710	19,900
Dissolved Manganese	ug/l	4	4	1,930	1,930	6.70	213
Total Manganese	ug/l	4	4	1,990	1,990	10.7	1,030
Dissolved Mercury	ug/l	4	1	0.200	0.200	<0.100	0.12
Total Mercury	ug/l	4	0	0.200	0.200	<0.100	<0.200
Dissolved Nickel	ug/l	4	2	13.9	13.9	<0.900	26.0 (5)
Total Nickel	ug/l	4	2	102	33.2	<0.900	60.0 (5)
Dissolved Potassium	ug/l	4	4	5,560	3,760	631	3,120
Total Potassium	ug/l	4	4	6,960	4,640	1,140	4,420
Dissolved Selenium	ug/l	4	0	1.57	0.594	<1.00	<1.30 (4)
Total Selenium	ug/l	4	0	2.20	2.20	<1.00	<1.30
Dissolved Silver	ug/l	4	0	1.20	1.20	<0.700	<0.800
Total Silver	ug/l	4	0	0.900	0.900	<0.700	<0.800
Dissolved Sodium	ug/l	4	4	21,400	21,400	6,880	15,100
Total Sodium	ug/l	4	4	19,800	19,800	6,900	17,400
Dissolved Thallium	ug/l	4	0	1.10	1.10	<1.10	<1.20 (4)
Total Thallium	ug/l	4	0	1.30	1.30	<1.10	<1.20
Total Uranium, Calculated	mg/l	4	4	0.160	0.0510	0.00200	0.0420
Dissolved Vanadium	ug/l	4	3	7.70	3.10	<1.00	5.70
Total Vanadium	ug/l	4	3	58.9	14.2	<1.00	22.8
Dissolved Zinc	ug/l	4	2	181	181	<0.400	112
Total Zinc	ug/l	4	2	349	108	<0.400	149
Organic Compounds							
Total Petroleum Hydrocarbons-Diesel	ug/l	2	0	NA	NA	<1,000	<1,000
Total Petroleum Hydrocarbons-Gasoline	ug/l	2	0	NA	NA	<100	<100
Other Parameters							
Alkalinity	mg/l	4	4	176	176	32.2	188 (5)
Bicarbonate Alkalinity	mg/l	4	4	176	176	32.2	188 (5)
Carbonate Alkalinity	mg/l	4	0	2.00	2.00	<2.00	<2.00
Hardness	mg/l	4	4	231	140	31.5	228
Hydroxide Alkalinity	mg/l	4	0	2.00	2.00	<2.00	<2.00
Total Dissolved Solids	mg/l	4	4	411	301	134	406
Total Suspended Solids	mg/l	4	2	1,150	247	<4.00	340

Table 5-92
SUMMARY OF ANALYTICAL RESULTS FOR NORTHEASTERN DRAINAGE ALLUVIAL GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Radionuclides							
Gross Alpha	pCi/L	4	4	303	99.1	9.96	62.5
Gross Beta	pCi/L	4	4	165	78.2	13.7	57.0
Total Lead 210	pCi/L	4	3	107	38.6	<2.60	15.0
Total Polonium 210	pCi/L	4	3	42.6	15.5	0.00	13.0
Total Radium 226	pCi/L	4	4	11.9	11.9	0.235	7.36
Total Radium 228	pCi/L	4	2	12.7	12.7	<0.00524	1.81
Total Radon 222, Calculated	pCi/L	4	4	89,200	89,200	6,653	22,105
Total Thorium 227	pCi/L	4	0	1.24	0.491	<0.00850	<0.117
Total Thorium 228	pCi/L	4	1	2.50	2.50	-0.07	1.50
Total Thorium 230	pCi/L	4	3	10.2	3.35	<0.0366	2.40
Total Thorium 232	pCi/L	4	3	5.71	1.67	0.00	2.08
Total Uranium 234	pCi/L	4	4	66.2	21.4	0.683	15.4
Total Uranium 235	pCi/L	4	4	4.09	1.32	0.129	1.33
Total Uranium 238	pCi/L	4	4	67.9	19.2	0.524	13.8

Notes:
(1) Parameters in bold exceed background limits
(2) 99% Upper Tolerance Limit for the URS background groundwater data set
(3) 95% Upper Prediction Limit for the URS background groundwater data set
(4) The result is reported as non-detect value above the RBL
(5) The maximum concentration is from a URS primary sample; the associated verification sample did not exceed the RBL
NA = Not Applicable

Table 5-93
SUMMARY OF ANALYTICAL RESULTS FOR NORTHEASTERN DRAINAGE BEDROCK GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Field Parameters							
Dissolved Oxygen	mg/l	10	10	NA	NA	0.300	15.0
Eh	mV	10	10	NA	NA	-55.00	186
Ferrous Iron	mg/l	9	4	NA	NA	<0.0500	4.50
Field pH	SU	10	10	NA	NA	6.42	9.69
Specific Conductance	uS/cm	5	5	42,200	34,600	130	49,000
Temperature	C	10	10	NA	NA	9.48	14.7
Turbidity	NTU	10	10	NA	NA	0.00	80.7
Inorganics							
Chloride	mg/l	10	10	2.05	2.05	0.476	1.50
Nitrate	mg/l	10	4	1.75	0.583	<0.0300	7.74 (5)
Nitrite	mg/l	10	0	0.0200	0.0200	<0.0200	<0.0200
Nitrogen, Ammonia	mg/l	10	3	0.258	0.0940	<0.0100	0.161
Phosphate-P	mg/l	10	10	1.41	0.533	0.0186	0.227
Phosphorus	mg/l	10	10	2.07	0.795	0.0212	0.267
Sulfate	mg/l	10	10	193	77.4	15.5	462
Metals							
Dissolved Aluminum	ug/l	10	5	14,300	2,080	<5.40	170
Total Aluminum	ug/l	10	8	82,000	16,200	<19.6	399
Dissolved Antimony	ug/l	10	1	8.29	1.98	<2.20	4.70
Total Antimony	ug/l	10	2	7.10	7.10	<2.20	4.10
Dissolved Arsenic	ug/l	10	10	217	54.4	1.00	23.9
Total Arsenic	ug/l	10	10	78.2	78.2	1.40	33.0
Dissolved Barium	ug/l	10	8	67.6	67.6	<2.00	26.9
Total Barium	ug/l	10	10	178	93.7	3.30	26.3
Dissolved Beryllium	ug/l	10	0	1.93	0.343	<0.100	<0.100
Total Beryllium	ug/l	10	0	5.15	1.47	<0.100	<0.320
Dissolved Cadmium	ug/l	10	0	0.270	0.270	<0.200	<0.500 (4)
Total Cadmium	ug/l	10	0	0.520	0.520	<0.200	<0.500
Dissolved Calcium	ug/l	10	10	72,500	39,700	7,690	232,000
Total Calcium	ug/l	10	10	70,500	39,700	7,770	233,000
Dissolved Chromium	ug/l	10	6	19.9	7.85	0.430	4.30
Total Chromium	ug/l	10	6	137	42.1	<0.660	14.4
Dissolved Cobalt	ug/l	10	3	7.77	2.75	<0.500	10.3 (6)
Total Cobalt	ug/l	10	1	29.5	10.2	<0.500	3.6
Dissolved Copper	ug/l	10	1	4.84	2.14	<0.500	0.85
Total Copper	ug/l	10	2	220	31.6	<0.500	1.9

Table 5-93
SUMMARY OF ANALYTICAL RESULTS FOR NORTHEASTERN DRAINAGE BEDROCK GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Dissolved Iron	ug/l	10	7	167,000	19,800	<8.40	3,460
Total Iron	ug/l	10	8	36,500	36,500	<8.40	6,680
Dissolved Lead	ug/l	10	0	1.31	0.624	<0.900	<1.00 (4)
Total Lead	ug/l	10	2	51.5	13.1	<0.900	1.80
Dissolved Magnesium	ug/l	10	10	18,200	11,200	3,430	43,300
Total Magnesium	ug/l	10	10	19,800	12,400	3,660	43,300
Dissolved Manganese	ug/l	10	10	1,930	1,930	1.10	343
Total Manganese	ug/l	10	10	1,990	1,990	4.60	345
Dissolved Mercury	ug/l	10	0	0.200	0.200	<0.100	<0.200
Total Mercury	ug/l	10	0	0.200	0.200	<0.100	<0.200
Dissolved Nickel	ug/l	10	3	13.9	13.9	<0.500	7.10
Total Nickel	ug/l	10	8	102	33.2	0.720	9.70
Dissolved Potassium	ug/l	10	10	5,560	3,760	845	2,880
Total Potassium	ug/l	10	10	6,960	4,640	1,010	2,920
Dissolved Selenium	ug/l	10	0	1.57	0.594	<1.00	<1.30 (4)
Total Selenium	ug/l	10	0	2.20	2.20	<1.00	<1.60
Dissolved Silver	ug/l	10	0	1.20	1.20	<0.700	<0.800
Total Silver	ug/l	10	0	0.900	0.900	<0.700	<1.80 (4)
Dissolved Sodium	ug/l	10	10	21,400	21,400	5,140	11,500
Total Sodium	ug/l	10	10	19,800	19,800	5,100	11,600
Dissolved Thallium	ug/l	10	0	1.10	1.10	<1.10	<1.20 (4)
Total Thallium	ug/l	10	0	1.30	1.30	<1.10	<1.20
Total Uranium, Calculated	mg/l	10	10	0.160	0.0510	0.000100	0.290 (5)
Dissolved Vanadium	ug/l	10	2	7.70	3.10	<0.500	2.70
Total Vanadium	ug/l	10	3	58.9	14.2	<0.500	3.90
Dissolved Zinc	ug/l	10	2	181	181	<0.400	1.6
Total Zinc	ug/l	10	3	349	108	<0.400	6.9
Organic Compounds							
Total Petroleum Hydrocarbons-Diesel	ug/l	2	0	NA	NA	<1,000	<1,000
Total Petroleum Hydrocarbons-Gasoline	ug/l	2	0	NA	NA	<100	<100
Other Parameters							
Alkalinity, Total	mg/l	10	10	176	176	35.8	316
Bicarbonate Alkalinity	mg/l	10	10	176	176	35.8	316
Carbonate Alkalinity	mg/l	10	0	2.00	2.00	<2.00	<2.00
Hardness	mg/l	10	10	231	140	37.7	758
Hydroxide Alkalinity	mg/l	10	0	2.00	2.00	<2.00	<2.00
Total Dissolved Solids	mg/l	10	10	411	301	52.0	1,110

Table 5-93
SUMMARY OF ANALYTICAL RESULTS FOR NORTHEASTERN DRAINAGE BEDROCK GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Total Suspended Solids	mg/l	10	5	1,150	247	<4.00	15.5
Radionuclides							
Gross Alpha	pCi/L	10	8	303	99.1	-0.06	45.2
Gross Beta	pCi/L	10	10	165	78.2	3.20	128
Total Lead 210	pCi/L	10	3	107	38.6	-0.50	5.4
Total Polonium 210	pCi/L	10	4	42.6	15.5	0.00	2.90
Total Radium 226	pCi/L	9	9	11.9	11.9	0.109	0.530
Total Radium 228	pCi/L	10	4	12.7	12.7	0.00	0.869
Total Radon 222, Calculated	pCi/L	10	10	89,200	89,200	1,101	13,588
Total Thorium 227	pCi/L	10	2	1.24	0.491	-0.01	1.02
Total Thorium 228	pCi/L	10	2	2.50	2.50	-0.08	0.141
Total Thorium 230	pCi/L	10	10	10.2	3.35	0.0290	0.340
Total Thorium 232	pCi/L	10	2	5.71	1.67	<0.00598	0.132
Total Uranium 234	pCi/L	10	10	66.2	21.4	0.0803	97.8 (5)
Total Uranium 235	pCi/L	10	5	4.09	1.32	-0.03	6.09 (5)
Total Uranium 238	pCi/L	10	10	67.9	19.2	0.0438	96.5 (5)

(1) Parameters in bold exceed background limits
(2) 99% Upper Tolerance Limit for the URS background groundwater data set
(3) 95% Upper Prediction Limit for the URS background groundwater data set
(4) The result is reported as non-detect value above the RBL
(5) The maximum concentration is from a URS verification sample; the associated primary sample did not exceed the BL
(6) The maximum concentration is from a URS primary sample; the associated verification sample did not exceed the RBL
NA = Not Applicable

Table 5-94
SUMMARY OF ANALYTICAL RESULTS FOR SOUTHWESTERN DRAINAGE ALLUVIAL GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Field Parameters							
Dissolved Oxygen	mg/l	2	2	NA	NA	2.57	6.00
Eh	mV	1	1	NA	NA	243	243
Ferrous Iron	mg/l	2	0	NA	NA	<0.0500	<1.00
Field pH	SU	2	2	NA	NA	5.98	6.66
Specific Conductance	uS/cm	1	1	42,200	34,600	48,700	48,700
Temperature	C	2	2	NA	NA	5.35	15.0
Turbidity	NTU	1	1	NA	NA	42.8	42.8
Inorganics							
Chloride	mg/l	2	2	2.05	2.05	2.42	3.65
Nitrate	mg/l	2	1	1.75	0.583	<0.0300	0.0950
Nitrite	mg/l	2	0	0.0200	0.0200	<0.0200	<0.0200
Nitrogen, Ammonia	mg/l	2	0	0.258	0.0940	<0.0100	<0.0100
Phosphate-P	mg/l	2	2	1.41	0.533	0.0230	0.0245
Phosphorus	mg/l	2	2	2.07	0.795	0.0155	0.0378
Sulfate	mg/l	2	2	193	77.4	160	213
Metals							
Dissolved Aluminum	ug/l	2	0	14,300	2,080	<3.90	<5.40
Total Aluminum	ug/l	2	1	82,000	16,200	<9.20	528
Dissolved Antimony	ug/l	2	0	8.29	1.98	<2.20	<2.70 (4)
Total Antimony	ug/l	2	1	7.10	7.10	<2.20	4.50
Dissolved Arsenic	ug/l	2	2	217	54.4	0.230	0.420
Total Arsenic	ug/l	2	2	78.2	78.2	0.240	0.690
Dissolved Barium	ug/l	2	2	67.6	67.6	51.4	122 (5)
Total Barium	ug/l	2	2	178	93.7	52.4	123 (5)
Dissolved Beryllium	ug/l	2	0	1.93	0.343	<0.100	<0.100
Total Beryllium	ug/l	2	0	5.15	1.47	<0.100	<0.200
Dissolved Cadmium	ug/l	2	0	0.270	0.270	<0.200	<0.500 (4)
Total Cadmium	ug/l	2	0	0.520	0.520	<0.200	<0.500
Dissolved Calcium	ug/l	2	2	72,500	39,700	59,600	79,100
Total Calcium	ug/l	2	2	70,500	39,700	59,300	79,000
Dissolved Chromium	ug/l	2	0	19.9	7.85	<0.840	<1.10
Total Chromium	ug/l	2	1	137	42.1	<1.10	4.00
Dissolved Cobalt	ug/l	2	0	7.77	2.75	<1.20	<3.10 (4)
Total Cobalt	ug/l	2	1	29.5	10.2	<1.20	3.20
Dissolved Copper	ug/l	2	0	4.84	2.14	<0.500	<0.900
Total Copper	ug/l	2	0	220	31.6	<0.830	<1.50

Table 5-94
SUMMARY OF ANALYTICAL RESULTS FOR SOUTHWESTERN DRAINAGE ALLUVIAL GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Dissolved Iron	ug/l	2	0	167,000	19,800	<8.40	<17.6
Total Iron	ug/l	2	1	36,500	36,500	<17.6	744
Dissolved Lead	ug/l	2	0	1.31	0.624	<0.900	<1.00 (4)
Total Lead	ug/l	2	0	51.5	13.1	<0.900	<1.00
Dissolved Magnesium	ug/l	2	2	18,200	11,200	17,700	17,700
Total Magnesium	ug/l	2	2	19,800	12,400	17,600	17,800
Dissolved Manganese	ug/l	2	2	1,930	1,930	2.20	1,690
Total Manganese	ug/l	2	2	1,990	1,990	4.00	1,770
Dissolved Mercury	ug/l	2	0	0.200	0.200	<0.100	<0.100
Total Mercury	ug/l	2	0	0.200	0.200	<0.100	<0.100
Dissolved Nickel	ug/l	2	1	13.9	13.9	<1.10	4.40
Total Nickel	ug/l	2	2	102	33.2	2.00	5.00
Dissolved Potassium	ug/l	2	2	5,560	3,760	3,360	4,240
Total Potassium	ug/l	2	2	6,960	4,640	3,550	4,310
Dissolved Selenium	ug/l	2	0	1.57	0.594	<1.00	<1.30 (4)
Total Selenium	ug/l	2	0	2.20	2.20	<1.00	<1.30
Dissolved Silver	ug/l	2	0	1.20	1.20	<0.700	<0.800
Total Silver	ug/l	2	0	0.900	0.900	<0.700	<0.800
Dissolved Sodium	ug/l	2	2	21,400	21,400	7,310	22,200 (5)
Total Sodium	ug/l	2	2	19,800	19,800	7,200	21,900 (5)
Dissolved Thallium	ug/l	2	0	1.10	1.10	<1.10	<1.20 (4)
Total Thallium	ug/l	2	0	1.30	1.30	<1.10	<1.20
Total Uranium, Calculated	mg/l	2	2	0.160	0.0510	0.000300	0.0230
Dissolved Vanadium	ug/l	2	0	7.70	3.10	<0.500	<1.00
Total Vanadium	ug/l	2	0	58.9	14.2	<0.500	<1.00
Dissolved Zinc	ug/l	2	0	181	181	<0.400	<7.90
Total Zinc	ug/l	2	0	349	108	<0.400	<10.7
Other Parameters							
Alkalinity	mg/l	2	2	176	176	18.2	155
Bicarbonate Alkalinity	mg/l	2	2	176	176	18.2	155
Carbonate Alkalinity	mg/l	2	0	2.00	2.00	<2.00	<2.00
Hardness	mg/l	2	2	231	140	222	270
Hydroxide Alkalinity	mg/l	2	0	2.00	2.00	<2.00	<2.00
Total Dissolved Solids	mg/l	2	2	411	301	395	420
Total Suspended Solids	mg/l	2	1	1,150	247	<4.00	13.7
Radionuclides							
Gross Alpha	pCi/L	2	1	303	99.1	<0.0705	19.0

Table 5-94
SUMMARY OF ANALYTICAL RESULTS FOR SOUTHWESTERN DRAINAGE ALLUVIAL GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Gross Beta	pCi/L	2	2	165	78.2	7.05	23.1
Total Lead 210	pCi/L	2	1	107	38.6	-0.10	5.10
Total Polonium 210	pCi/L	2	0	42.6	15.5	-0.10	<0.700
Total Radium 226	pCi/L	2	2	11.9	11.9	0.246	0.791
Total Radium 228	pCi/L	2	1	12.7	12.7	<0.592	0.998
Total Radon 222, Calculated	pCi/L	2	2	89,200	89,200	1,307	9,742
Total Thorium 227	pCi/L	2	1	1.24	0.491	<0.0347	0.0761
Total Thorium 228	pCi/L	2	0	2.50	2.50	<0.0255	<0.195
Total Thorium 230	pCi/L	2	2	10.2	3.35	0.0134	0.112
Total Thorium 232	pCi/L	2	1	5.71	1.67	0.00	0.0640
Total Uranium 234	pCi/L	2	2	66.2	21.4	0.0969	8.93
Total Uranium 235	pCi/L	2	1	4.09	1.32	<0.0224	0.505
Total Uranium 238	pCi/L	2	2	67.9	19.2	0.0925	7.71

Notes:
(1) Parameters in bold exceed background limits
(2) 99% Upper Tolerance Limit for the URS background groundwater data set
(3) 95% Upper Prediction Limit for the URS background groundwater data set
(4) The result is reported as non-detect value above the RBL
(5) The maximum concentration is from a URS primary sample; the associated verification sample did not exceed the RBL
NA = Not Applicable

Table 5-95
SUMMARY OF ANALYTICAL RESULTS FOR SOUTHWESTERN DRAINAGE BEDROCK GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Field Parameters							
Dissolved Oxygen	mg/l	2	2	NA	NA	2.44	3.60
Eh	mV	2	2	NA	NA	101	143
Ferrous Iron	mg/l	2	0	NA	NA	<0.0500	<0.0500
Field pH	SU	2	2	NA	NA	7.81	7.95
Specific Conductance	uS/cm	1	1	42,200	34,600	33,900	33,900
Temperature	C	2	2	NA	NA	8.93	13.1
Turbidity	NTU	2	2	NA	NA	0.00	3.50
Inorganics							
Chloride	mg/l	2	2	2.05	2.05	1.06	1.38
Nitrate	mg/l	2	1	1.75	0.583	<0.0300	0.104
Nitrite	mg/l	2	0	0.0200	0.0200	<0.0200	<0.0200
Nitrogen, Ammonia	mg/l	2	0	0.258	0.0940	<0.0100	<0.0100
Phosphate-P	mg/l	2	2	1.41	0.533	0.150	0.160
Phosphorus	mg/l	2	2	2.07	0.795	0.146	0.181
Sulfate	mg/l	2	2	193	77.4	23.5	32.7
Metals							
Dissolved Aluminum	ug/l	2	0	14,300	2,080	<7.90	<37.2
Total Aluminum	ug/l	2	1	82,000	16,200	<11.5	248
Dissolved Antimony	ug/l	2	1	8.29	1.98	<2.20	4.00
Total Antimony	ug/l	2	0	7.10	7.10	<2.20	<2.70
Dissolved Arsenic	ug/l	2	2	217	54.4	2.70	2.70
Total Arsenic	ug/l	2	2	78.2	78.2	2.70	2.70
Dissolved Barium	ug/l	2	2	67.6	67.6	79.3	81.9
Total Barium	ug/l	2	2	178	93.7	80.0	82.4
Dissolved Beryllium	ug/l	2	0	1.93	0.343	<0.100	<0.100
Total Beryllium	ug/l	2	0	5.15	1.47	<0.100	<0.190
Dissolved Cadmium	ug/l	2	0	0.270	0.270	<0.200	<0.500 (4)
Total Cadmium	ug/l	2	0	0.520	0.520	<0.200	<0.500
Dissolved Calcium	ug/l	2	2	72,500	39,700	41,800	44,700
Total Calcium	ug/l	2	2	70,500	39,700	41,600	44,600
Dissolved Chromium	ug/l	2	1	19.9	7.85	0.890	0.89
Total Chromium	ug/l	2	1	137	42.1	<1.10	4.90
Dissolved Cobalt	ug/l	2	0	7.77	2.75	<0.640	<1.20
Total Cobalt	ug/l	2	0	29.5	10.2	<0.840	<1.20
Dissolved Copper	ug/l	2	0	4.84	2.14	<0.900	<5.00 (4)
Total Copper	ug/l	2	0	220	31.6	<1.00	<5.00

Table 5-95
SUMMARY OF ANALYTICAL RESULTS FOR SOUTHWESTERN DRAINAGE BEDROCK GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Dissolved Iron	ug/l	2	0	167,000	19,800	<8.40	<17.6
Total Iron	ug/l	2	1	36,500	36,500	<17.6	242
Dissolved Lead	ug/l	2	0	1.31	0.624	<0.900	<1.00 (4)
Total Lead	ug/l	2	0	51.5	13.1	<0.900	<1.00
Dissolved Magnesium	ug/l	2	2	18,200	11,200	5,770	5,800
Total Magnesium	ug/l	2	2	19,800	12,400	5,730	5,790
Dissolved Manganese	ug/l	2	2	1,930	1,930	168	262
Total Manganese	ug/l	2	2	1,990	1,990	184	269
Dissolved Mercury	ug/l	2	0	0.200	0.200	<0.100	<0.200
Total Mercury	ug/l	2	0	0.200	0.200	<0.100	<0.200
Dissolved Nickel	ug/l	2	0	13.9	13.9	<0.900	<2.00
Total Nickel	ug/l	2	1	102	33.2	<0.900	4.30
Dissolved Potassium	ug/l	2	2	5,560	3,760	1,620	2,460
Total Potassium	ug/l	2	2	6,960	4,640	1,720	2,420
Dissolved Selenium	ug/l	2	0	1.57	0.594	<1.00	<1.30 (4)
Total Selenium	ug/l	2	0	2.20	2.20	<1.00	<1.30
Dissolved Silver	ug/l	2	0	1.20	1.20	<0.700	<0.800
Total Silver	ug/l	2	0	0.900	0.900	<0.700	<0.800
Dissolved Sodium	ug/l	2	2	21,400	21,400	22,300	28,700
Total Sodium	ug/l	2	2	19,800	19,800	22,100	28,400
Dissolved Thallium	ug/l	2	0	1.10	1.10	<1.10	<1.20 (4)
Total Thallium	ug/l	2	0	1.30	1.30	<1.10	<1.20
Total Uranium, Calculated	mg/l	2	2	0.160	0.0510	0.0350	0.0380
Dissolved Vanadium	ug/l	2	0	7.70	3.10	<0.500	<1.00
Total Vanadium	ug/l	2	0	58.9	14.2	<0.500	<1.00
Dissolved Zinc	ug/l	2	2	181	181	25.3	102
Total Zinc	ug/l	2	2	349	108	26.6	121
Other Parameters							
Alkalinity	mg/l	2	2	176	176	161	162
Bicarbonate Alkalinity	mg/l	2	2	176	176	161	162
Carbonate Alkalinity	mg/l	2	0	2.00	2.00	<2.00	<2.00
Hardness	mg/l	2	2	231	140	127	136
Hydroxide Alkalinity	mg/l	2	0	2.00	2.00	<2.00	<2.00
Total Dissolved Solids	mg/l	2	2	411	301	222	249
Total Suspended Solids	mg/l	2	1	1,150	247	<4.00	9.30
Radionuclides							
Gross Alpha	pCi/L	2	2	303	99.1	45.2	56.9

Table 5-95
SUMMARY OF ANALYTICAL RESULTS FOR SOUTHWESTERN DRAINAGE BEDROCK GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Gross Beta	pCi/L	2	2	165	78.2	21.6	22.9
Total Lead 210	pCi/L	2	1	107	38.6	<0.300	6.10
Total Polonium 210	pCi/L	2	1	42.6	15.5	<0.500	3.50
Total Radium 226	pCi/L	2	2	11.9	11.9	1.43	2.15
Total Radium 228	pCi/L	2	2	12.7	12.7	0.906	1.21
Total Radon 222, Calculated	pCi/L	2	2	89,200	89,200	135	7,448
Total Thorium 227	pCi/L	2	0	1.24	0.491	<0.0213	<0.122
Total Thorium 228	pCi/L	2	0	2.50	2.50	<0.134	<0.262
Total Thorium 230	pCi/L	2	1	10.2	3.35	<0.0417	0.177
Total Thorium 232	pCi/L	2	1	5.71	1.67	<0.0231	0.150
Total Uranium 234	pCi/L	2	2	66.2	21.4	43.7	48.0
Total Uranium 235	pCi/L	2	2	4.09	1.32	0.842	1.38
Total Uranium 238	pCi/L	2	2	67.9	19.2	11.6	12.7

Notes:
(1) Parameters in bold exceed background limits
(2) 99% Upper Tolerance Limit for the URS background groundwater data set
(3) 95% Upper Prediction Limit for the URS background groundwater data set
(4) The result is reported as non-detect value above the RBL
NA = Not Applicable

Table 5-96
SUMMARY OF ANALYTICAL RESULTS FOR NORTHWEST RIDGE GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Field Parameters							
Dissolved Oxygen	mg/l	2	2	NA	NA	1.90	15.0
Eh	mV	2	2	NA	NA	83.0	141
Ferrous Iron	mg/l	2	1	NA	NA	<0.0500	0.200
Field pH	SU	2	2	NA	NA	6.93	7.39
Specific Conductance	uS/cm	1	1	42,200	34,600	9,900	9,900
Temperature	C	2	2	NA	NA	13.0	15.2
Turbidity	NTU	2	2	NA	NA	24.8	28.2
Inorganics							
Chloride	mg/l	2	2	2.05	2.05	0.513	0.780
Nitrate	mg/l	2	0	1.75	0.583	<0.0300	<0.0300
Nitrite	mg/l	2	0	0.0200	0.0200	<0.0200	<0.0200
Nitrogen, Ammonia	mg/l	2	1	0.258	0.0940	<0.0100	0.0100
Phosphate-P	mg/l	2	2	1.41	0.533	0.0120	0.0360
Phosphorus	mg/l	2	2	2.07	0.795	0.0115	0.0181
Sulfate	mg/l	2	2	193	77.4	12.8	14.5
Metals							
Dissolved Aluminum	ug/l	2	1	14,300	2,080	<5.40	56.3
Total Aluminum	ug/l	2	2	82,000	16,200	18.6	379
Dissolved Antimony	ug/l	2	0	8.29	1.98	<2.20	<2.70 (4)
Total Antimony	ug/l	2	1	7.10	7.10	<2.20	3.10
Dissolved Arsenic	ug/l	2	2	217	54.4	1.60	1.90
Total Arsenic	ug/l	2	2	78.2	78.2	2.00	2.10
Dissolved Barium	ug/l	2	2	67.6	67.6	11.9	20.6
Total Barium	ug/l	2	2	178	93.7	12.7	24.8
Dissolved Beryllium	ug/l	2	0	1.93	0.343	<0.100	<0.100
Total Beryllium	ug/l	2	0	5.15	1.47	<0.100	<0.120
Dissolved Cadmium	ug/l	2	0	0.270	0.270	<0.200	<0.500 (4)
Total Cadmium	ug/l	2	0	0.520	0.520	<0.200	<0.500
Dissolved Calcium	ug/l	2	2	72,500	39,700	5,730	9,070
Total Calcium	ug/l	2	2	70,500	39,700	5,770	9,260
Dissolved Chromium	ug/l	2	2	19.9	7.85	1.90	3.60
Total Chromium	ug/l	2	2	137	42.1	4.70	8.50
Dissolved Cobalt	ug/l	2	1	7.77	2.75	<1.20	7.80 (5)
Total Cobalt	ug/l	2	2	29.5	10.2	1.40	10.7 (5)
Dissolved Copper	ug/l	2	1	4.84	2.14	<0.900	1.00
Total Copper	ug/l	2	1	220	31.6	<0.900	2.60

Table 5-96
SUMMARY OF ANALYTICAL RESULTS FOR NORTHWEST RIDGE GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Dissolved Iron	ug/l	2	1	167,000	19,800	<17.6	37.0
Total Iron	ug/l	2	2	36,500	36,500	163	465
Dissolved Lead	ug/l	2	0	1.31	0.624	<0.900	<1.00 (4)
Total Lead	ug/l	2	0	51.5	13.1	<0.900	<1.00
Dissolved Magnesium	ug/l	2	2	18,200	11,200	2,790	3,010
Total Magnesium	ug/l	2	2	19,800	12,400	2,800	3,070
Dissolved Manganese	ug/l	2	2	1,930	1,930	397	477
Total Manganese	ug/l	2	2	1,990	1,990	416	488
Dissolved Mercury	ug/l	2	0	0.200	0.200	<0.100	<0.100
Total Mercury	ug/l	2	0	0.200	0.200	<0.100	<0.100
Dissolved Nickel	ug/l	2	0	13.9	13.9	<2.60	<4.60
Total Nickel	ug/l	2	2	102	33.2	3.40	8.20
Dissolved Potassium	ug/l	2	2	5,560	3,760	911	1,850
Total Potassium	ug/l	2	2	6,960	4,640	1,060	2,020
Dissolved Selenium	ug/l	2	0	1.57	0.594	<1.00	<1.30
Total Selenium	ug/l	2	0	2.20	2.20	<1.00	<1.30
Dissolved Silver	ug/l	2	0	1.20	1.20	<0.700	<0.800
Total Silver	ug/l	2	0	0.900	0.900	<0.700	<0.800
Dissolved Sodium	ug/l	2	2	21,400	21,400	7,440	9,000
Total Sodium	ug/l	2	2	19,800	19,800	7,580	9,090
Dissolved Thallium	ug/l	2	0	1.10	1.10	<1.10	<1.20 (4)
Total Thallium	ug/l	2	0	1.30	1.30	<1.10	<1.20
Total Uranium, Calculated	mg/l	2	2	0.160	0.0510	0.00700	0.0630
Dissolved Vanadium	ug/l	2	0	7.70	3.10	<0.500	<1.00
Total Vanadium	ug/l	2	1	58.9	14.2	0.600	0.600
Dissolved Zinc	ug/l	2	2	181	181	35.7	54.3
Total Zinc	ug/l	2	2	349	108	38.2	69.3
Other Parameters							
Alkalinity, Total	mg/l	2	2	176	176	33.6	43.0
Bicarbonate Alkalinity	mg/l	2	2	176	176	33.6	43.0
Carbonate Alkalinity	mg/l	2	0	2.00	2.00	<2.00	<2.00
Hardness	mg/l	2	2	231	140	25.8	35.8
Hydroxide Alkalinity	mg/l	2	0	2.00	2.00	<2.00	<2.00
Total Dissolved Solids	mg/l	2	2	411	301	77.0	133
Total Suspended Solids	mg/l	2	1	1,150	247	<4.00	19.1
Radionuclides							
Gross Alpha	pCi/L	2	2	303	99.1	37.7	84.9

Table 5-96
SUMMARY OF ANALYTICAL RESULTS FOR NORTHWEST RIDGE GROUNDWATER SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Gross Beta	pCi/L	2	2	165	78.2	110	122
Total Lead 210	pCi/L	2	2	107	38.6	90.0	98.0
Total Polonium 210	pCi/L	2	2	42.6	15.5	37.0	50.0
Total Radium 226	pCi/L	2	2	11.9	11.9	1.28	4.97
Total Radium 228	pCi/L	2	0	12.7	12.7	<0.275	<0.483
Total Radon 222, Calculated	pCi/L	2	2	89,200	89,200	9,219	171,527 (5)
Total Thorium 227	pCi/L	2	0	1.24	0.491	<0.0747	<0.107
Total Thorium 228	pCi/L	2	0	2.50	2.50	<0.0733	<0.399
Total Thorium 230	pCi/L	2	2	10.2	3.35	0.254	7.20
Total Thorium 232	pCi/L	2	0	5.71	1.67	<0.0165	<0.133
Total Uranium 234	pCi/L	2	2	66.2	21.4	2.81	41.8
Total Uranium 235	pCi/L	2	2	4.09	1.32	0.545	1.35
Total Uranium 238	pCi/L	2	2	67.9	19.2	2.37	21.1

Notes:
(1) Parameters in bold exceed background limits
(2) 99% Upper Tolerance Limit for the URS background groundwater data set
(3) 95% Upper Prediction Limit for the URS background groundwater data set
(4) The result is reported as non-detect value above the RBL
(5) The maximum concentration is from a URS primary sample; the associated verification sample did not exceed the RBL
NA = Not Applicable

Table 5-97
Approximate Confidence Levels on Ratios of Median Values (R=M1/M2)
for
Dissolved Groundwater Data
Affected Alluvial vs. Background

M1: Affected Alluvial
M2: Background

Ratio of Means (M1/M2)									
Analyte	**95th**	**90th**	**50th**	**5th**	**Sample Size 1**	**Sample Size 2**	**dof**	**% NDs 1**	**% NDs 2**
Aluminum	**NA**	NA	NA	**NA**	99	56	154	39%	45%
Antimony	**NA**	NA	NA	**NA**	21	56	32	86%	71%
Chromium	**NA**	NA	NA	**NA**	100	56	154	98%	52%
Cobalt	**NA**	NA	NA	**NA**	21	56	21	43%	84%
Iron	**4.54**	3.85	2.16	**1.03**	181	56	135	24%	27%
Manganese	**194.43**	161.96	85.45	**37.55**	99	56	151	7%	0%
Nickel	**NA**	NA	NA	**NA**	98	56	131	36%	59%
Sulfate	**320.99**	304.45	252.93	**199.30**	158	91	179	0%	1%
^{234}Uranium	**520.70**	456.63	288.38	**159.71**	102	56	158	1%	0%
Zinc	**NA**	NA	NA	**NA**	97	56	152	41%	43%

95th and 5th Confidence Limits (Bolded) Represent 90% Confidence Interval

NA - Not Applicable because of high number of nondetects

Table 5-98
Approximate Confidence Levels on Ratios of Median Values (R=M1/M2)
for
Dissolved Groundwater Data
Affected Bedrock vs. Background

M1: Affected Bedrock
M2: Background

	Ratio of Median (M1/M2)								
Analyte	**95th**	**90th**	**50th**	**5th**	**Sample Size 1**	**Sample Size 2**	**dof**	**% NDs 1**	**% NDs 2**
Aluminum	**NA**	NA	NA	**NA**	40	56	96	90%	45%
Antimony	**NA**	NA	NA	**NA**	21	56	40	81%	71%
Chromium	**NA**	NA	NA	**NA**	40	56	75	85%	52%
Cobalt	**NA**	NA	NA	**NA**	21	56	23	71%	84%
Iron	**0.48**	0.40	0.21	**0.10**	40	56	94	48%	27%
Manganese	**2.08**	1.73	0.90	**0.39**	40	56	69	13%	0%
Nickel	**NA**	NA	NA	**NA**	39	56	70	77%	59%
Sulfate	**72.27**	67.53	53.34	**39.37**	38	91	92	0%	1%
^{234}Uranium	**44.79**	40.01	27.03	**16.31**	39	56	89	5%	0%
Zinc	**NA**	NA	NA	**NA**	39	56	84	85%	43%

95th and 5th Confidence Limits (Bolded) Represent 90% Confidence Interval

NA - Not Applicable because of high number of nondetects

Table 5-99
Approximate Confidence Levels on Ratios of Median Values (R=M1/M2)
for
Dissolved Groundwater Data
Unaffected Alluvial vs. Background

M1: Unaffected Alluvial
M2: Background

	Ratio of Median (M1/M2)								
Analyte	**95th**	**90th**	**50th**	**5th**	**Sample Size 1**	**Sample Size 2**	**dof**	**% NDs 1**	**% NDs 2**
Aluminum	**NA**	NA	NA	**NA**	20	56	35	65%	45%
Antimony	**NA**	NA	NA	**NA**	11	56	24	82%	71%
Chromium	**NA**	NA	NA	**NA**	20	56	29	85%	52%
Cobalt	**NA**	NA	NA	**NA**	10	56	14	100%	84%
Iron	**NA**	NA	NA	**NA**	20	56	41	50%	27%
Manganese	**1.77**	1.38	0.60	**0.20**	20	56	28	10%	0%
Nickel	**NA**	NA	NA	**NA**	20	56	32	70%	59%
Sulfate	**11.03**	9.66	6.19	**3.47**	20	91	25	10%	1%
^{234}Uranium	**7.64**	6.43	3.57	**1.67**	21	56	33	5%	0%
Zinc	**NA**	NA	NA	**NA**	20	56	34	35%	43%

95th and 5th Confidence Limits (Bolded) Represent 90% Confidence Interval

NA - Not Applicable because of high number of nondetects

Table 5-100
Approximate Confidence Levels on Ratios of Median Values (R=M1/M2)
for
Dissolved Groundwater Data
Unaffected Bedrock vs. Background

M1: Unaffected Bedrock
M2: Background

	Ratio of Median (M1/M2)								
Analyte	**95th**	**90th**	**50th**	**5th**	**Sample Size 1**	**Sample Size 2**	**dof**	**% NDs 1**	**% NDs 2**
Aluminum	**NA**	NA	NA	**NA**	28	56	83	79%	45%
Antimony	**NA**	NA	NA	**NA**	30	56	75	80%	71%
Chromium	**NA**	NA	NA	**NA**	30	56	57	57%	52%
Cobalt	**NA**	NA	NA	**NA**	29	56	42	83%	84%
Iron	**NA**	NA	NA	**NA**	30	56	80	77%	27%
Manganese	**2.11**	1.77	0.97	**0.45**	28	56	55	0%	0%
Nickel	**NA**	NA	NA	**NA**	29	56	49	59%	59%
Sulfate	**5.36**	4.95	3.76	**2.64**	29	91	57	0%	1%
^{234}Uranium	**5.78**	4.92	2.84	**1.39**	28	56	46	0%	0%
Zinc	**NA**	NA	NA	**NA**	28	56	49	50%	43%

95th and 5th Confidence Limits (Bolded) Represent 90% Confidence Interval

NA - Not Applicable because of high number of nondetects

Table 5-101
SUMMARY OF ANALYTICAL RESULTS FOR BACKGROUND AREA A SURFACE MATERIAL SAMPLES

Parameter	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (1)	RBL (2)		
Inorganics							
Chloride	mg/kg	20	20	14.1	9.64	2.54	17.9
Nitrate	mg/kg	10	10	3.09	3.09	0.0200	0.772
Nitrite	mg/kg	20	1	0.120	0.0600	<0.0200	0.049
Nitrogen, Ammonia	mg/kg	20	20	64.8	64.8	1.51	4.57
Phosphate-P	mg/kg	20	20	21.0	17.7	0.314	20.6
Phosphorus	mg/kg	20	20	1,550	1,130	441	1,530
Sulfate	mg/kg	20	20	20.8	13.9	3.23	17.3
Metals							
Total Aluminum	mg/kg	20	20	24,100	24,100	8,230	24,100
Total Antimony	mg/kg	20	3	1.40	1.40	<0.540	1.3
Total Arsenic	mg/kg	20	20	234	234	2.40	234
Total Barium	mg/kg	20	20	548	417	135	384
Total Beryllium	mg/kg	20	20	1.51	1.16	0.330	1.10
Total Cadmium	mg/kg	20	20	0.468	0.405	0.110	0.450
Total Calcium	mg/kg	20	20	10,100	7,690	3,310	8,670
Total Chromium	mg/kg	20	20	19.2	16.3	6.10	18.2
Total Cobalt	mg/kg	20	20	23.8	23.8	2.80	23.8
Total Copper	mg/kg	20	20	41.8	41.8	9.00	41.8
Total Iron	mg/kg	20	20	37,700	28,900	13,400	32,600
Total Lead	mg/kg	20	20	21.8	18.5	9.20	20.9
Total Magnesium	mg/kg	20	20	3,680	3,170	1,280	2,580
Total Manganese	mg/kg	20	20	1,530	1,330	254	1,640
Total Mercury	mg/kg	20	1	0.134	0.130	<0.0400	0.05
Total Molybdenum	mg/kg	20	20	5.60	2.97	0.400	3.40
Total Nickel	mg/kg	20	20	30.2	20.9	5.60	24.0
Total Potassium	mg/kg	20	20	3,020	2,740	1,100	2,460
Total Selenium	mg/kg	20	0	0.520	0.520	<0.230	<0.790
Total Silver	mg/kg	20	0	0.110	0.110	<0.0800	<0.110
Total Sodium	mg/kg	20	20	338	291	55.6	295
Total Thallium	mg/kg	20	20	0.300	0.300	0.100	0.300
Total Uranium, Calculated	mg/kg	20	20	45.7	45.7	2.32	22.0
Total Vanadium	mg/kg	20	20	44.3	38.3	15.3	41.8
Total Zinc	mg/kg	20	20	68.0	60.9	17.2	62.4

Table 5-101
SUMMARY OF ANALYTICAL RESULTS FOR BACKGROUND AREA A SURFACE MATERIAL SAMPLES

Parameter	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (1)	RBL (2)		
Other Parameters							
Total Alkalinity	mg/kg	20	20	241	191	81.9	206
Bicarbonate Alkalinity	mg/kg	20	20	241	191	81.9	206
Carbonate Alkalinity	mg/kg	20	0	9.00	9.00	<9.00	<9.00
pH	SU	20	20	NA	NA	5.60	6.92
Total Organic Carbon	mg/kg	20	20	NA	NA	29,250	83,150
Radionuclides							
Lead 210	pCi/g	20	13	5,610	6.30	<1.10	11.0
Polonium 210	pCi/g	20	20	9.28	6.92	1.20	12.0
Radium 226, Calculated	pCi/g	20	20	8.92	8.92	1.57	8.92
Radium 228	pCi/g	20	20	7.72	5.30	1.09	3.18
Thorium 227	pCi/g	20	10	113	113	<0.0417	0.536
Thorium 228	pCi/g	20	20	4.49	3.34	0.947	2.07
Thorium 230	pCi/g	20	20	8.68	8.68	0.843	8.68
Thorium 232	pCi/g	20	20	4.24	3.15	0.853	2.01
Uranium 234	pCi/g	20	20	19.5	19.5	0.784	7.99
Uranium 235	pCi/g	20	19	0.624	0.394	<0.0342	0.579
Uranium 238	pCi/g	20	20	15.2	15.2	0.779	7.30

Notes:
(1) 99% Upper Tolerance Limit for the URS background surface material sample data set
(2) 95% Upper Prediction Limit for the URS background surface material sample data set
NA = Not Applicable

Table 5-102
SUMMARY OF ANALYTICAL RESULTS FOR BACKGROUND AREA B SURFACE MATERIAL SAMPLES

Parameter	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (1)	RBL (2)		
Inorganics							
Chloride	mg/kg	20	20	14.1	9.64	1.67	6.50
Nitrate	mg/kg	16	16	3.09	3.09	0.0400	3.09
Nitrite	mg/kg	16	5	0.120	0.0600	<0.0200	0.0870
Nitrogen, Ammonia	mg/kg	20	20	64.8	64.8	0.219	64.8
Phosphate-P	mg/kg	20	20	21.0	17.7	3.71	12.1
Phosphorus	mg/kg	20	20	1,550	1,130	260	602
Sulfate	mg/kg	20	20	20.8	13.9	2.06	14.1
Metals							
Total Aluminum	mg/kg	20	20	24,100	24,100	8,580	21,900
Total Antimony	mg/kg	20	12	1.40	1.40	0.540	1.40
Total Arsenic	mg/kg	20	16	234	234	0.730	3.30
Total Barium	mg/kg	20	20	548	417	82.1	275
Total Beryllium	mg/kg	20	20	1.51	1.16	0.350	1.70
Total Cadmium	mg/kg	20	20	0.468	0.405	0.0900	0.360
Total Calcium	mg/kg	20	20	10,100	7,690	1,870	6,150
Total Chromium	mg/kg	20	20	19.2	16.3	3.60	15.2
Total Cobalt	mg/kg	20	20	23.8	23.8	3.30	8.30
Total Copper	mg/kg	20	20	41.8	41.8	4.60	17.6
Total Iron	mg/kg	20	20	37,700	28,900	8,600	19,500
Total Lead	mg/kg	20	20	21.8	18.5	7.40	15.5
Total Magnesium	mg/kg	20	20	3,680	3,170	1,660	3,910
Total Manganese	mg/kg	20	20	1,530	1,330	489	1,170
Total Mercury	mg/kg	20	3	0.134	0.130	<0.0400	0.12
Total Molybdenum	mg/kg	20	15	5.60	2.97	0.130	0.800
Total Nickel	mg/kg	20	20	30.2	20.9	3.70	12.6
Total Potassium	mg/kg	20	20	3,020	2,740	1,710	2,860
Total Selenium	mg/kg	20	3	0.520	0.520	<0.230	0.520
Total Silver	mg/kg	20	0	0.110	0.110	<0.0800	<0.110
Total Sodium	mg/kg	20	20	338	291	82.3	212
Total Thallium	mg/kg	20	20	0.300	0.300	0.120	0.300
Total Uranium, Calculated	mg/kg	20	20	45.7	45.7	2.53	45.7
Total Vanadium	mg/kg	20	20	44.3	38.3	13.2	37.0
Total Zinc	mg/kg	20	20	68.0	60.9	28.1	55.2

Table 5-102
SUMMARY OF ANALYTICAL RESULTS FOR BACKGROUND AREA B SURFACE MATERIAL SAMPLES

Parameter	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (1)	RBL (2)		
Other Parameters							
Total Alkalinity	mg/kg	20	20	241	191	70.9	230
Bicarbonate Alkalinity	mg/kg	20	20	241	191	70.9	230
Carbonate Alkalinity	mg/kg	20	0	9.00	9.00	<8.00	<9.00
pH	SU	20	20	NA	NA	5.70	6.67
Total Organic Carbon	mg/kg	20	20	NA	NA	25,050	68,800
Radionuclides							
Lead 210	pCi/g	20	15	5,610	6.30	<1.60	5.50
Polonium 210	pCi/g	20	20	9.28	6.92	2.60	6.10
Radium 226, Calculated	pCi/g	20	20	8.92	8.92	1.33	3.37
Radium 228	pCi/g	20	20	7.72	5.30	1.19	3.81
Thorium 227	pCi/g	20	12	113	113	<0.0486	0.290
Thorium 228	pCi/g	20	20	4.49	3.34	1.27	4.82
Thorium 230	pCi/g	20	20	8.68	8.68	1.02	3.55
Thorium 232	pCi/g	20	20	4.24	3.15	1.09	4.98
Uranium 234	pCi/g	20	20	19.5	19.5	0.808	19.5
Uranium 235	pCi/g	20	20	0.624	0.394	0.0644	0.830
Uranium 238	pCi/g	20	20	15.2	15.2	0.829	15.2

Notes:
(1) 99% Upper Tolerance Limit for the URS background surface material sample data set
(2) 95% Upper Prediction Limit for the URS background surface material sample data set
NA = Not Applicable

Table 5-103
SUMMARY OF ANALYTICAL RESULTS FOR SURFACE MATERIAL SAMPLES ON THE EAST AND WEST HAUL ROADS

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Inorganics							
Chloride	mg/kg	3	3	14.1	9.64	2.82	280
Nitrate	mg/kg	3	3	3.09	3.09	0.0540	0.543
Nitrite	mg/kg	2	2	0.120	0.0600	0.0590	0.0610
Nitrogen, Ammonia	mg/kg	3	0	64.8	64.8	<0.100	<0.100
Phosphate-P	mg/kg	3	3	21.0	17.7	0.354	1.78
Phosphorus	mg/kg	3	3	1,550	1,130	241	397
Sulfate	mg/kg	3	3	20.8	13.9	142	1,401
Metals							
Total Aluminum	mg/kg	5	5	24,100	24,100	10,900	16,700
Total Antimony	mg/kg	4	1	1.40	1.40	<0.450	0.860
Total Arsenic	mg/kg	5	5	234	234	10.1	92.4
Total Barium	mg/kg	5	5	548	417	50.2	118
Total Beryllium	mg/kg	5	5	1.51	1.16	0.600	1.00
Total Cadmium	mg/kg	5	3	0.468	0.405	0.380	0.72
Total Calcium	mg/kg	5	5	10,100	7,690	5,380	146,000
Total Chromium	mg/kg	5	5	19.2	16.3	7.70	17.9 (4)
Total Cobalt	mg/kg	5	5	23.8	23.8	5.80	19.4
Total Copper	mg/kg	5	5	41.8	41.8	17.0	58.4 (5)
Total Iron	mg/kg	5	5	37,700	28,900	13,700	36,800 (4)
Total Lead	mg/kg	5	5	21.8	18.5	8.80	16.3
Total Magnesium	mg/kg	5	5	3,680	3,170	4,370	12,600
Total Manganese	mg/kg	5	5	1,530	1,330	613	1,100
Total Mercury	mg/kg	3	0	0.134	0.130	<0.0400	<0.0500
Total Molybdenum	mg/kg	5	5	5.60	2.97	2.00	7.40 (5)
Total Nickel	mg/kg	5	5	30.2	20.9	7.50	28.6 (4)
Total Potassium	mg/kg	5	5	3,020	2,740	2,340	3,420
Total Selenium	mg/kg	5	0	0.520	0.520	<0.170	<0.280
Total Silver	mg/kg	5	1	0.110	0.110	<0.0500	0.640 (4)
Total Sodium	mg/kg	5	5	338	291	186	805
Total Thallium	mg/kg	3	3	0.300	0.300	0.150	0.490
Total Uranium, Calculated	mg/kg	3	3	45.7	45.7	72.7	262
Total Vanadium	mg/kg	5	5	44.3	38.3	16.2	40.9 (4)
Total Zinc	mg/kg	5	5	68.0	60.9	42.1	90.3 (4)

Table 5-103
SUMMARY OF ANALYTICAL RESULTS FOR SURFACE MATERIAL SAMPLES ON THE EAST AND WEST HAUL ROADS

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Other Parameters							
Total Alkalinity	mg/kg	3	3	241	191	113	300
Bicarbonate Alkalinity	mg/kg	3	3	241	191	112	285
Carbonate Alkalinity	mg/kg	3	2	9.00	9.00	<8.00	14.4
pH	SU	3	3	NA	NA	7.74	8.14
Total Organic Carbon	mg/kg	3	3	NA	NA	8,975	39,650
Radionuclides							
Lead 210	pCi/g	6	6	8.60	6.30	10.6	70.0
Polonium 210	pCi/g	3	3	9.28	6.92	17.0	57.0
Radium 226	pCi/g	3	3	8.92	8.92	15.4	35.4
Radium 226, Calculated	pCi/g	3	3	8.92	8.92	17.0	117
Radium 228	pCi/g	3	3	7.72	5.30	1.20	2.14
Thorium 227	pCi/g	3	1	113	113	1.48	1.48
Thorium 228	pCi/g	3	3	4.49	3.34	1.51	13.7
Thorium 230	pCi/g	3	3	8.68	8.68	16.1	121
Thorium 232	pCi/g	3	2	4.24	3.15	0.924	2.00
Uranium 234	pCi/g	6	6	19.5	19.5	16.2	82.7
Uranium 235	pCi/g	6	6	0.624	0.394	0.750	8.56
Uranium 238	pCi/g	6	6	15.2	15.2	15.7	86.8

Notes:
(1) Parameters in bold exceed background limits
(2) 99% Upper Tolerance Limit for the URS background surface material sample data set
(3) 95% Upper Prediction Limit for the URS background surface material sample data set
(4) Maximum exceeded the RBL for a URS verification sample; the associated primary sample was below the BL
(5) Maximum exceeded the BL for a URS sample; the associated verification sample was below the RBL
NA = Not Applicable

Table 5-104
SUMMARY OF ANALYTICAL RESULTS FOR SURFACE MATERIAL SAMPLES ADJACENT TO THE EAST AND WEST HAUL ROADS

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Inorganics							
Chloride	mg/kg	13	13	14.1	9.64	1.07	6.03
Nitrate	mg/kg	6	6	3.09	3.09	0.0220	0.528
Nitrite	mg/kg	4	2	0.120	0.0600	<0.0200	0.169
Nitrogen, Ammonia	mg/kg	13	12	64.8	64.8	<0.100	18.5
Phosphate-P	mg/kg	13	13	21.0	17.7	2.44	14.2
Phosphorus	mg/kg	13	13	1,550	1,130	217	444
Sulfate	mg/kg	13	13	20.8	13.9	2.25	770
Metals							
Total Aluminum	mg/kg	16	16	24,100	24,100	11,000	20,500
Total Antimony	mg/kg	13	8	1.40	1.40	<0.510	1.10
Total Arsenic	mg/kg	16	16	234	234	2.70	25.0
Total Barium	mg/kg	16	16	548	417	76.4	177
Total Beryllium	mg/kg	16	16	1.51	1.16	0.570	0.930
Total Cadmium	mg/kg	16	13	0.468	0.405	0.0900	0.850
Total Calcium	mg/kg	16	16	10,100	7,690	2,710	34,800
Total Chromium	mg/kg	16	16	19.2	16.3	5.20	21.2
Total Cobalt	mg/kg	16	16	23.8	23.8	4.60	11.2
Total Copper	mg/kg	16	16	41.8	41.8	8.60	37.3
Total Iron	mg/kg	16	16	37,700	28,900	13,400	24,800
Total Lead	mg/kg	16	16	21.8	18.5	9.80	28.9
Total Magnesium	mg/kg	16	16	3,680	3,170	2,370	10,500
Total Manganese	mg/kg	16	16	1,530	1,330	494	1,160
Total Mercury	mg/kg	13	2	0.134	0.130	<0.0400	0.100
Total Molybdenum	mg/kg	16	16	5.60	2.97	0.410	4.1
Total Nickel	mg/kg	16	16	30.2	20.9	5.30	17.8
Total Potassium	mg/kg	16	16	3,020	2,740	2,030	3,830
Total Selenium	mg/kg	16	0	0.520	0.520	<0.190	<0.290
Total Silver	mg/kg	16	0	0.110	0.110	<0.0500	<0.100
Total Sodium	mg/kg	16	16	338	291	125	315
Total Thallium	mg/kg	13	13	0.300	0.300	0.100	0.240
Total Uranium, Calculated	mg/kg	13	13	45.7	45.7	6.98	93.0

Table 5-104
SUMMARY OF ANALYTICAL RESULTS FOR SURFACE MATERIAL SAMPLES ADJACENT TO THE EAST AND WEST HAUL ROADS

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Total Vanadium	mg/kg	16	16	44.3	38.3	19.8	33.7
Total Zinc	mg/kg	16	16	68.0	60.9	39.4	71.3
Other Parameters							
Total Alkalinity	mg/kg	13	13	241	191	75.6	644
Bicarbonate Alkalinity	mg/kg	13	13	241	191	75.6	644
Carbonate Alkalinity	mg/kg	13	1	9.00	9.00	<8.00	10.0
pH	SU	13	13	NA	NA	6.03	7.35
Total Organic Carbon	mg/kg	13	13	NA	NA	16,950	49,200
Radionuclides							
Lead 210	pCi/g	17	14	8.60	6.30	<1.20	41.9
Polonium 210	pCi/g	13	13	9.28	6.92	2.40	39.0
Radium 226	pCi/g	6	6	8.92	8.92	11.5	59.0
Radium 226, Calculated	pCi/g	13	13	8.92	8.92	2.09	38.9
Radium 228	pCi/g	13	13	7.72	5.30	1.67	2.96
Thorium 227	pCi/g	13	9	113	113	0.00	2.09
Thorium 228	pCi/g	13	13	4.49	3.34	1.54	6.34
Thorium 230	pCi/g	13	13	8.68	8.68	1.95	40.6
Thorium 232	pCi/g	13	13	4.24	3.15	1.40	3.58
Uranium 234	pCi/g	17	17	19.5	19.5	2.39	51.0
Uranium 235	pCi/g	17	16	0.624	0.394	0.155	2.82
Uranium 238	pCi/g	17	17	15.2	15.2	2.32	51.0

Notes:
(1) Parameters in bold exceed background limits
(2) 99% Upper Tolerance Limit for the URS background surface material sample data set
(3) 95% Upper Prediction Limit for the URS background surface material sample data set
(4) Maximum exceeded the RBL for a URS verification sample; the associated primary sample was below the BL
NA = Not Applicable

Table 5-105
SUMMARY OF ANALYTICAL RESULTS FOR MINED AREA COMPOSITE SURFACE MATERIAL SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Inorganics							
Chloride	mg/kg	16	16	14.1	9.64	0.186	4.77
Nitrate	mg/kg	13	13	3.09	3.09	0.0240	1.03
Nitrite	mg/kg	16	7	0.120	0.0600	<0.0200	0.082
Nitrogen, Ammonia	mg/kg	14	14	64.8	64.8	0.134	2.25
Phosphate-P	mg/kg	16	12	21.0	17.7	<0.200	2.28
Phosphorus	mg/kg	16	16	1,550	1,130	279	577
Sulfate	mg/kg	16	16	20.8	13.9	1.81	2,655
Metals							
Total Aluminum	mg/kg	36	36	24,100	24,100	4,140	33,700 (5)
Total Antimony	mg/kg	3	3	1.40	1.40	0.650	0.780
Total Arsenic	mg/kg	36	30	234	234	<4.00	137
Total Barium	mg/kg	36	36	548	417	18.7	251
Total Beryllium	mg/kg	36	36	1.51	1.16	0.510	2.91
Total Cadmium	mg/kg	36	32	0.468	0.405	<0.0400	1.80
Total Calcium	mg/kg	16	16	10,100	7,690	730	35,200
Total Chromium	mg/kg	36	36	19.2	16.3	2.90	33.7
Total Cobalt	mg/kg	36	36	23.8	23.8	2.90	19.9
Total Copper	mg/kg	36	36	41.8	41.8	5.70	62.8
Total Iron	mg/kg	36	36	37,700	28,900	7,750	61,700
Total Lead	mg/kg	36	36	21.8	18.5	8.00	43.0
Total Magnesium	mg/kg	16	16	3,680	3,170	1,420	10,100
Total Manganese	mg/kg	36	36	1,530	1,330	428	2,750
Total Mercury	mg/kg	36	6	0.134	0.130	<0.0200	0.0500
Total Molybdenum	mg/kg	16	16	5.60	2.97	2.50	31.9
Total Nickel	mg/kg	36	36	30.2	20.9	3.10	33.0
Total Potassium	mg/kg	16	16	3,020	2,740	1,550	7,950
Total Selenium	mg/kg	36	16	0.520	0.520	<0.240	64.0 (5)
Total Silver	mg/kg	36	21	0.110	0.110	0.0700	0.480
Total Sodium	mg/kg	16	16	338	291	43.7	241
Total Thallium	mg/kg	36	36	0.300	0.300	0.170	0.840
Total Uranium, Calculated	mg/kg	16	16	45.7	45.7	42.9	482
Total Vanadium	mg/kg	16	16	44.3	38.3	9.40	91.2
Total Zinc	mg/kg	36	36	68.0	60.9	32.0	204

Table 5-105
SUMMARY OF ANALYTICAL RESULTS FOR MINED AREA COMPOSITE SURFACE MATERIAL SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Other Parameters							
Total Alkalinity	mg/kg	16	14	241	191	<8.00	610
Bicarbonate Alkalinity	mg/kg	16	14	241	191	<8.00	610
Carbonate Alkalinity	mg/kg	16	0	9.00	9.00	<8.00	<9.00
pH	SU	16	16	NA	NA	2.83	7.97
Total Organic Carbon	mg/kg	16	16	NA	NA	739	20,700
Radionuclides							
Lead 210	pCi/g	16	16	5,610 (4)	6.30	20.0	260
Polonium 210	pCi/g	16	16	9.28	6.92	17.0	320
Protactinium 231	pCi/g	3	3	NC	NC	14.9	22.4
Radium 226, Calculated	pCi/g	16	16	8.92	8.92	24.4	363
Radium 228	pCi/g	16	16	7.72	5.30	2.08	4.84
Thorium 227	pCi/g	16	2	113	113	-2.86	20.9
Thorium 228	pCi/g	16	1	4.49	3.34	-10.80	3.8
Thorium 230	pCi/g	16	16	8.68	8.68	27.9	288
Thorium 232	pCi/g	16	9	4.24	3.15	<1.48	10.9
Uranium 234	pCi/g	36	36	19.5	19.5	0.810	196
Uranium 235	pCi/g	36	26	0.624	0.394	0.0400	17.2
Uranium 238	pCi/g	36	36	15.2	15.2	0.650	159

Notes:
(1) Parameters in bold exceed background limits for the URS samples
(2) 99% Upper Tolerance Limit for the URS background surface material sample data set
(3) 95% Upper Prediction Limit for the URS background surface material sample data set
(4) The BL calculated for this parameter is not reasonable; all results compared to the RBL
(5) The maximum result is from an SMI sample
NA = Not Applicable
NC = Not calculated; insufficient sample results

Table 5-106
SUMMARY OF ANALYTICAL RESULTS FOR MINED AREA GRAB SURFACE MATERIAL SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Metals							
Total Aluminum	mg/kg	11	11	24,100	24,100	13,100	18,200
Total Antimony	mg/kg	11	0	1.40	1.40	<1.00	<1.30
Total Arsenic	mg/kg	11	11	234	234	5.80	239
Total Barium	mg/kg	11	11	548	417	33.0	120
Total Beryllium	mg/kg	11	9	1.51	1.16	0.600	1.80
Total Cadmium	mg/kg	11	2	0.468	0.405	<0.200	0.780
Total Calcium	mg/kg	11	11	10,100	7,690	782	74,800
Total Chromium	mg/kg	11	11	19.2	16.3	10.8	21.8
Total Cobalt	mg/kg	11	11	23.8	23.8	2.00	17.2
Total Copper	mg/kg	11	11	41.8	41.8	14.5	83.0
Total Iron	mg/kg	11	11	37,700	28,900	17,300	65,300
Total Lead	mg/kg	11	11	21.8	18.5	9.60	73.5
Total Magnesium	mg/kg	11	11	3,680	3,170	2,310	10,500
Total Manganese	mg/kg	11	11	1,530	1,330	309	1,430
Total Mercury	mg/kg	11	0	0.134	0.130	<0.100	<0.140 (4)
Total Nickel	mg/kg	11	11	30.2	20.9	3.00	30.2
Total Potassium	mg/kg	11	11	3,020	2,740	1,870	4,050
Total Selenium	mg/kg	11	0	0.520	0.520	<0.810	<1.10 (4)
Total Silver	mg/kg	11	2	0.110	0.110	<0.400	0.620
Total Sodium	mg/kg	11	11	338	291	143	1,970
Total Thallium	mg/kg	11	7	0.300	0.300	<1.30	2.50
Total Uranium	mg/kg	11	11	45.7	45.7	12.6	422
Total Vanadium	mg/kg	11	11	44.3	38.3	20.8	132
Total Zinc	mg/kg	11	11	68.0	60.9	31.4	135
Radionuclides							
Gross Alpha	pCi/g	11	11	NC	NC	52.6	9,288
Radium 226	pCi/g	103	98	8.92	8.92	0.0740	880
Radium 228	pCi/g	11	8	7.72	5.30	0.00300	7.66
Thorium 228	pCi/g	11	6	4.49	3.34	0.575	3
Thorium 230	pCi/g	29	29	8.68	8.68	1.28	591
Thorium 232	pCi/g	11	6	4.24	3.15	<0.430	4.52
Uranium 234	pCi/g	29	29	19.5	19.5	1.26	412
Uranium 235	pCi/g	29	28	0.624	0.394	0.0630	18.9
Uranium 238	pCi/g	29	29	15.2	15.2	1.30	417

Notes:

(1) Concentrations or activities of parameters in bold are greater than the RBL for SMI or E&E samples

(2) 99% Upper Tolerance Limit for the URS background surface material sample data set

(3) 95% Upper Prediction Limit for the URS background surface material sample data set

(4) The maximum concentration or activity is reported as non-detect value above the RBL

NC = Not calculated; insufficient sample results

Table 5-107
SUMMARY OF ANALYTICAL RESULTS FOR SOUTHWEST DOWNWIND AREA SURFACE MATERIAL SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Inorganics							
Chloride	mg/kg	16	16	14.1	9.64	1.23	7.56
Nitrate	mg/kg	10	10	3.09	3.09	0.0200	0.0750
Nitrite	mg/kg	3	3	0.120	0.0600	0.0310	0.0940
Nitrogen, Ammonia	mg/kg	9	9	64.8	64.8	0.119	1.29
Phosphate-P	mg/kg	16	16	21.0	17.7	3.71	13.7
Phosphorus	mg/kg	16	16	1,550	1,130	283	462
Sulfate	mg/kg	16	16	20.8	13.9	5.39	17.8
Metals							
Total Aluminum	mg/kg	16	16	24,100	24,100	11,500	19,900
Total Antimony	mg/kg	16	14	1.40	1.40	<0.490	1.20
Total Arsenic	mg/kg	16	16	234	234	2.00	5.50
Total Barium	mg/kg	16	16	548	417	109	220
Total Beryllium	mg/kg	16	16	1.51	1.16	0.560	0.700
Total Cadmium	mg/kg	16	16	0.468	0.405	0.0700	0.360
Total Calcium	mg/kg	16	16	10,100	7,690	2,230	4,850
Total Chromium	mg/kg	16	16	19.2	16.3	6.30	13.9
Total Cobalt	mg/kg	16	16	23.8	23.8	4.60	8.30
Total Copper	mg/kg	16	16	41.8	41.8	9.50	15.4
Total Iron	mg/kg	16	16	37,700	28,900	11,500	16,700
Total Lead	mg/kg	16	16	21.8	18.5	10.7	16.1
Total Magnesium	mg/kg	16	16	3,680	3,170	1,960	3,150
Total Manganese	mg/kg	16	16	1,530	1,330	458	623
Total Mercury	mg/kg	16	0	0.134	0.130	<0.0400	<0.110
Total Molybdenum	mg/kg	16	12	5.60	2.97	<0.490	1.80
Total Nickel	mg/kg	16	16	30.2	20.9	6.10	12.3
Total Potassium	mg/kg	16	16	3,020	2,740	2,140	2,750
Total Selenium	mg/kg	16	2	0.520	0.520	<0.220	0.760
Total Silver	mg/kg	16	0	0.110	0.110	<0.0700	<0.0900
Total Sodium	mg/kg	16	16	338	291	120	252
Total Thallium	mg/kg	16	16	0.300	0.300	0.110	0.170
Total Uranium, Calculated	mg/kg	16	16	45.7	45.7	3.16	15.5
Total Vanadium	mg/kg	16	16	44.3	38.3	17.1	27.9
Total Zinc	mg/kg	16	16	68.0	60.9	32.9	58.1

Table 5-107
SUMMARY OF ANALYTICAL RESULTS FOR SOUTHWEST DOWNWIND AREA SURFACE MATERIAL SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Other Parameters							
Total Alkalinity	mg/kg	16	16	241	191	81.7	182
Bicarbonate Alkalinity	mg/kg	16	16	241	191	82.0	182
Carbonate Alkalinity	mg/kg	16	0	9.00	9.00	<8.00	<9.00
pH	SU	16	16	NA	NA	6.10	6.79
Total Organic Carbon	mg/kg	16	16	NA	NA	14,650	63,050
Radionuclides							
Lead 210	pCi/g	16	9	8.60	6.30	<1.40	4.60
Polonium 210	pCi/g	16	16	9.28	6.92	2.30	4.10
Radium 226, Calculated	pCi/g	16	16	8.92	8.92	1.29	2.89
Radium 228	pCi/g	16	16	7.72	5.30	1.34	2.85
Thorium 227	pCi/g	16	12	113	113	<0.0237	0.281
Thorium 228	pCi/g	16	16	4.49	3.34	1.10	2.06
Thorium 230	pCi/g	16	16	8.68	8.68	1.07	2.48
Thorium 232	pCi/g	16	16	4.24	3.15	1.04	2.13
Uranium 234	pCi/g	16	16	19.5	19.5	1.21	5.07
Uranium 235	pCi/g	16	15	0.624	0.394	<0.0577	0.304
Uranium 238	pCi/g	16	16	15.2	15.2	1.05	5.18

Notes:
(1) Parameters in bold exceed background limits for the URS samples
(2) 99% Upper Tolerance Limit for the URS background surface material sample data set
(3) 95% Upper Prediction Limit for the URS background surface material sample data set
NA = Not Applicable

Table 5-108
SUMMARY OF ANALYTICAL RESULTS FOR NORTHEAST DOWNWIND AREA SURFACE MATERIAL SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Inorganics							
Chloride	mg/kg	15	15	14.1	9.64	3.12	18.6
Nitrate	mg/kg	9	8	3.09	3.09	<0.0200	0.384
Nitrite	mg/kg	4	4	0.120	0.0600	0.0420	0.302
Nitrogen, Ammonia	mg/kg	15	15	64.8	64.8	0.614	22.8
Phosphate-P	mg/kg	16	16	21.0	17.7	7.82	19.6
Phosphorus	mg/kg	16	16	1,550	1,130	284	653
Sulfate	mg/kg	16	16	20.8	13.9	4.00	153
Metals							
Total Aluminum	mg/kg	25	25	24,100	24,100	13,400	29,500
Total Antimony	mg/kg	23	23	1.40	1.40	0.650	1.50
Total Arsenic	mg/kg	25	25	234	234	2.00	50.5
Total Barium	mg/kg	25	25	548	417	149	364
Total Beryllium	mg/kg	25	25	1.51	1.16	0.430	1.90
Total Cadmium	mg/kg	25	16	0.468	0.405	0.230	0.800 (5)
Total Calcium	mg/kg	20	20	10,100	7,690	3,520	8,550 (6)
Total Chromium	mg/kg	25	25	19.2	16.3	12.7	29.1
Total Cobalt	mg/kg	25	25	23.8	23.8	6.30	15.7
Total Copper	mg/kg	25	25	41.8	41.8	10.3	32.2
Total Iron	mg/kg	25	25	37,700	28,900	12,900	28,900
Total Lead	mg/kg	25	25	21.8	18.5	8.20	27.1
Total Magnesium	mg/kg	25	25	3,680	3,170	2,600	13,900
Total Manganese	mg/kg	25	25	1,530	1,330	532	1,990
Total Mercury	mg/kg	16	0	0.134	0.130	<0.0400	<0.170 (4)
Total Molybdenum	mg/kg	25	19	5.60	2.97	0.260	1.60
Total Nickel	mg/kg	25	25	30.2	20.9	9.30	21.7 (6)
Total Potassium	mg/kg	25	25	3,020	2,740	2,360	4,260
Total Selenium	mg/kg	25	0	0.520	0.520	<0.170	<0.370
Total Silver	mg/kg	25	1	0.110	0.110	<0.0500	0.170 (6)
Total Sodium	mg/kg	25	25	338	291	114	727
Total Thallium	mg/kg	16	16	0.300	0.300	0.110	0.200
Total Uranium, Calculated	mg/kg	16	16	45.7	45.7	2.74	15.3
Total Vanadium	mg/kg	25	25	44.3	38.3	20.3	49.6 (6)
Total Zinc	mg/kg	25	25	68.0	60.9	35.2	116

Table 5-108
SUMMARY OF ANALYTICAL RESULTS FOR NORTHEAST DOWNWIND AREA SURFACE MATERIAL SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Other Parameters							
Total Alkalinity	mg/kg	16	16	241	191	101	286
Bicarbonate Alkalinity	mg/kg	16	16	241	191	101	286
Carbonate Alkalinity	mg/kg	16	0	9.00	9.00	<8.00	<10.0 (4)
pH	SU	16	16	NA	NA	5.66	6.94
Total Organic Carbon	mg/kg	16	16	NA	NA	36,700	69,700
Radionuclides							
Lead 210	pCi/g	16	16	8.60	6.30	2.70	8.30
Polonium 210	pCi/g	16	16	9.28	6.92	3.00	9.50
Radium 226, Calculated	pCi/g	16	16	8.92	8.92	1.43	4.72
Radium 228	pCi/g	16	16	7.72	5.30	1.05	1.58
Thorium 227	pCi/g	16	11	113	113	<0.0251	0.363
Thorium 228	pCi/g	16	16	4.49	3.34	0.757	1.71
Thorium 230	pCi/g	16	16	8.68	8.68	1.06	5.44
Thorium 232	pCi/g	16	16	4.24	3.15	0.830	1.87
Uranium 234	pCi/g	16	16	19.5	19.5	0.994	5.33
Uranium 235	pCi/g	16	15	0.624	0.394	<0.0404	0.251
Uranium 238	pCi/g	16	16	15.2	15.2	0.908	5.11

Notes:
(1) Parameters in bold exceed background limits for the URS samples
(2) 99% Upper Tolerance Limit for the URS background surface material sample data set
(3) 95% Upper Prediction Limit for the URS background surface material sample data set
(4) The maximum concentration or activity is reported as non-detect value above the RBL
(5) Maximum exceeded the BL for a URS sample; the associated verification sample was below the RBL
(6) Maximum exceeded the RBL for a URS verification sample; the associated primary sample was below the BL
NA = Not Applicable

Table 5-109
SUMMARY OF ANALYTICAL RESULTS FOR SMI TRANSECT SURFACE MATERIAL SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum
				BL (2)	RBL (3)		
Radionuclides							
Total Radium 226	pCi/g	25	25	8.92	8.92	1.20	43.6
Total Thorium 230	pCi/g	7	7	8.68	8.68	1.62	41.7
Total Uranium 234	pCi/g	7	7	19.5	19.5	1.77	40.2
Total Uranium 235	pCi/g	7	7	0.624	0.394	0.0793	1.74
Total Uranium 238	pCi/g	7	7	15.2	15.2	1.82	40.4

Notes:
(1) Activities of parameters in bold are greater than the RBL for SMI samples
(2) 99% Upper Tolerance Limit for the URS background surface material sample data set
(3) 95% Upper Prediction Limit for the URS background surface material sample data set

Table 5-110
SUMMARY OF ANALYTICAL RESULTS FOR OTHER SMI PIA SURFACE MATERIAL SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum
				BL (2)	RBL (3)		
Radionuclides							
Total Radium 226	pCi/g	75	75	8.92	8.92	0.859	8.94
Total Thorium 230	pCi/g	12	12	8.68	8.68	1.18	3.21
Total Uranium 234	pCi/g	12	12	19.5	19.5	1.09	2.45
Total Uranium 235	pCi/g	12	12	0.624	0.394	0.0463	0.107
Total Uranium 238	pCi/g	12	12	15.2	15.2	1.20	2.45

Notes:
(1) Activities of parameters in bold are greater than the RBL for SMI samples
(2) 99% Upper Tolerance Limit for the URS background surface material sample data set
(3) 95% Upper Prediction Limit for the URS background surface material sample data set

Table 5-111
Approximate Confidence Levels on Ratios of Median Values (R=M1/M2)
for
Averaged Surface Materials Data
Mining Area vs. Background

M1: Mining Area
M2: Background

	Ratio of Median (M1/M2)						
Analyte	**95th**	**90th**	**50th**	**5th**	**Sample Size 1**	**Sample Size 2**	**dof**
Aluminum	**0.97**	0.95	0.86	**0.76**	27	70	42
Antimony	**0.71**	0.70	0.65	**0.59**	14	57	35
Arsenic	**8.48**	7.62	5.26	**3.26**	27	70	71
Cadmium	**0.95**	0.88	0.67	**0.47**	27	70	31
Chromium	**2.07**	1.99	1.71	**1.42**	27	70	43
Cobalt	**1.91**	1.83	1.58	**1.31**	27	70	43
Copper	**2.71**	2.57	2.14	**1.69**	27	70	47
Iron	**1.95**	1.87	1.64	**1.38**	27	70	36
Lead	**1.93**	1.85	1.60	**1.32**	27	70	34
^{210}Lead	**27.99**	25.48	18.70	**12.50**	16	56	18
Manganese	**1.14**	1.09	0.95	**0.80**	27	70	35
Nickel	**1.81**	1.73	1.49	**1.22**	27	70	41
Nitrate	**3.32**	2.82	1.61	**0.78**	13	26	31
^{210}Polonium	**22.44**	20.41	14.97	**9.99**	16	56	16
^{226}Radium	**24.18**	22.82	18.63	**14.36**	110	94	132
Selenium	**0.47**	0.44	0.33	**0.24**	27	70	97
Sulfate	**43.96**	35.03	16.73	**6.37**	16	40	16
^{234}Uranium	**26.65**	24.77	19.24	**13.90**	40	70	59
^{238}Uranium	**25.51**	23.60	18.03	**12.74**	39	70	52
Vanadium	**1.70**	1.63	1.39	**1.13**	27	57	34
Zinc	**1.57**	1.52	1.37	**1.19**	27	70	34

95th and 5th Confidence Limits (Bolded) Represent 90% Confidence Interval

Table 5-112
Approximate Confidence Levels on Ratios of Median Values (R=M1/M2)
for
Averaged Surface Materials Data
Impacted Haul Road vs. Background

M1: Impacted Haul Road
M2: Background

Ratio of Median (M1/M2)							
Analyte	**95th**	**90th**	**50th**	**5th**	**Sample Size 1**	**Sample Size 2**	**dof**
Aluminum	**1.11**	1.09	1.02	**0.94**	19	70	55
Antimony	**0.69**	0.65	0.54	**0.42**	19	57	20
Arsenic	**1.93**	1.72	1.16	**0.70**	19	70	47
Cadmium	**1.45**	1.33	1.02	**0.72**	19	70	22
Chromium	**1.60**	1.53	1.34	**1.12**	19	70	34
Cobalt	**1.35**	1.31	1.17	**1.00**	19	70	42
Copper	**1.55**	1.47	1.22	**0.97**	19	70	34
Iron	**1.20**	1.17	1.07	**0.95**	19	70	39
Lead	**1.26**	1.23	1.12	**1.01**	19	70	41
^{210}Lead	**4.70**	4.26	3.08	**2.03**	19	56	22
Manganese	**0.98**	0.95	0.88	**0.79**	19	70	43
Nickel	**1.40**	1.34	1.15	**0.94**	19	70	29
Nitrate	**1.99**	1.64	0.87	**0.38**	9	26	19
^{210}Polonium	**3.77**	3.43	2.51	**1.67**	19	56	20
^{226}Radium	**8.81**	8.12	6.16	**4.31**	32	94	35
Selenium	**0.31**	0.29	0.23	**0.16**	19	70	89
Sulfate	**9.38**	7.63	3.89	**1.61**	16	40	16
^{234}Uranium	**9.47**	8.56	6.11	**3.94**	19	70	23
^{238}Uranium	**8.81**	7.96	5.67	**3.65**	19	70	23
Vanadium	**1.23**	1.21	1.11	**1.00**	19	57	54
Zinc	**1.27**	1.24	1.15	**1.04**	19	70	29

95th and 5th Confidence Limits (Bolded) Represent 90% Confidence Interval

Table 5-113
Approximate Confidence Levels on Ratios of Median Values (R=M1/M2)
for
Averaged Surface Materials Data
Southwest Downwind Area vs. Background

M1: Southwest Downwind Area
M2: Background

Ratio of Median (M1/M2)							
Analyte	**95th**	**90th**	**50th**	**5th**	**Sample Size 1**	**Sample Size 2**	**dof**
Aluminum	**1.12**	1.10	1.04	**0.96**	22	70	76
Antimony	**0.83**	0.79	0.69	**0.58**	22	57	27
Arsenic	**0.73**	0.68	0.52	**0.37**	22	70	78
Cadmium	**0.72**	0.67	0.52	**0.38**	22	70	26
Chromium	**1.23**	1.19	1.08	**0.95**	22	70	66
Cobalt	**1.16**	1.13	1.03	**0.92**	22	70	83
Copper	**1.10**	1.07	0.96	**0.84**	22	70	88
Iron	**0.92**	0.91	0.86	**0.80**	22	70	91
Lead	**1.15**	1.13	1.06	**0.98**	22	70	84
^{210}Lead	**1.27**	1.22	1.06	**0.89**	22	56	57
Manganese	**0.76**	0.75	0.70	**0.65**	22	70	91
Nickel	**1.14**	1.11	1.02	**0.91**	22	70	79
Nitrate	**0.47**	0.41	0.27	**0.16**	10	26	33
^{210}Polonium	**0.92**	0.90	0.83	**0.75**	19	56	63
^{226}Radium	**0.96**	0.93	0.85	**0.76**	22	94	74
Selenium	**0.36**	0.33	0.26	**0.18**	22	70	91
Sulfate	**1.56**	1.50	1.29	**1.07**	16	40	52
^{234}Uranium	**1.33**	1.27	1.07	**0.86**	22	70	60
^{238}Uranium	**1.30**	1.24	1.05	**0.85**	22	70	56
Vanadium	**1.05**	1.03	0.96	**0.88**	22	57	78
Zinc	**1.03**	1.02	0.97	**0.91**	22	70	69

95th and 5th Confidence Limits (Bolded) Represent 90% Confidence Interval

Table 5-114
Approximate Confidence Levels on Ratios of Median Values (R=M1/M2)
for
Averaged Surface Materials Data
Northeast Downwind Area vs. Background

M1: Northeast Downwind Area
M2: Background

Ratio of Median (M1/M2)							
Analyte	**95th**	**90th**	**50th**	**5th**	**Sample Size 1**	**Sample Size 2**	**dof**
Aluminum	**1.41**	1.38	1.28	**1.16**	22	70	50
Antimony	**1.09**	1.04	0.91	**0.76**	22	57	27
Arsenic	**1.08**	0.98	0.69	**0.44**	22	70	69
Cadmium	**1.44**	1.35	1.06	**0.78**	22	70	26
Chromium	**2.26**	2.20	2.01	**1.79**	22	70	80
Cobalt	**1.92**	1.87	1.70	**1.51**	22	70	73
Copper	**1.54**	1.48	1.31	**1.12**	22	70	79
Iron	**1.25**	1.22	1.13	**1.02**	22	70	56
Lead	**1.33**	1.29	1.16	**1.02**	22	70	37
^{210}Lead	**1.84**	1.74	1.45	**1.15**	22	56	37
Manganese	**1.18**	1.15	1.03	**0.90**	22	70	35
Nickel	**1.68**	1.64	1.51	**1.36**	22	70	91
Nitrate	**0.72**	0.61	0.34	**0.16**	9	26	22
^{210}Polonium	**1.54**	1.49	1.31	**1.12**	21	56	34
^{226}Radium	**1.34**	1.28	1.12	**0.93**	22	94	34
Sulfate	**2.86**	2.60	1.88	**1.24**	16	40	20
^{234}Uranium	**1.43**	1.35	1.11	**0.85**	22	70	44
^{238}Uranium	**1.41**	1.33	1.10	**0.85**	22	70	41
Vanadium	**1.50**	1.46	1.35	**1.21**	22	57	60
Zinc	**1.24**	1.21	1.10	**0.98**	22	70	29

95th and 5th Confidence Limits (Bolded) Represent 90% Confidence Interval

Table 5-115
SUMMARY OF ANALYTICAL RESULTS FOR BACKGROUND AREA A SUBSURFACE MATERIAL SAMPLES

Parameter	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (1)	RBL (2)		
Metals							
Total Aluminum	mg/kg	8	8	18,800	16,800	12,200	16,500
Total Antimony	mg/kg	8	8	1.32	1.20	0.840	1.20
Total Arsenic	mg/kg	8	8	86.1	86.1	2.30	86.1
Total Barium	mg/kg	8	8	411	355	239	349
Total Beryllium	mg/kg	8	8	1.70	1.21	0.390	0.790
Total Cadmium	mg/kg	8	0	0.320	0.320	<0.110	<0.320
Total Calcium	mg/kg	8	8	6,560	4,970	2,280	4,400
Total Chromium	mg/kg	8	8	22.8	15.6	4.00	14.9
Total Cobalt	mg/kg	8	8	21.3	21.3	3.60	21.3
Total Copper	mg/kg	8	8	61.7	36.3	7.90	35.8
Total Iron	mg/kg	8	8	37,700	27,800	11,600	28,600
Total Lead	mg/kg	8	8	13.0	11.9	9.10	11.5
Total Magnesium	mg/kg	8	8	3,520	2,980	1,600	2,150
Total Manganese	mg/kg	8	8	1,510	1,200	379	1,300
Total Molybdenum	mg/kg	8	7	6.73	2.92	<0.520	2.40
Total Nickel	mg/kg	8	8	22.2	16.2	5.50	15.1
Total Potassium	mg/kg	8	8	2,950	2,600	1,330	1,900
Total Selenium	mg/kg	8	3	0.560	0.560	<0.390	0.560
Total Silver	mg/kg	8	0	0.180	0.180	<0.140	<0.180
Total Sodium	mg/kg	8	8	282	207	85.7	221
Total Thallium	mg/kg	8	8	0.224	0.187	0.100	0.200
Total Uranium, Calculated	mg/kg	8	8	43.3	43.3	2.52	6.78
Total Vanadium	mg/kg	8	8	41.8	32.8	13.3	34.9
Total Zinc	mg/kg	8	8	51.5	46.5	26.6	44.4
Other Parameters							
Cation Exchange Capacity	meq/g	5	5	NA	NA	0.218	0.366
pH	SU	20	20	NA	NA	6.11	7.18
Total Organic Carbon	mg/kg	20	20	NA	NA	16,100	51,300
Radionuclides							
Lead 210	pCi/g	8	1	8.21	5.66	<1.20	4.40
Polonium 210	pCi/g	8	0	5.98	4.24	-0.37	<3.69
Radium 226, Calculated	pCi/g	8	8	4.94	3.82	1.56	3.87
Radium 228	pCi/g	8	8	4.89	3.67	1.27	3.23
Thorium 227	pCi/g	8	8	0.466	0.348	0.109	0.267
Thorium 228	pCi/g	8	8	4.39	3.30	1.16	2.95
Thorium 230	pCi/g	8	8	4.68	3.27	0.919	2.94

Table 5-115
SUMMARY OF ANALYTICAL RESULTS FOR BACKGROUND AREA A SUBSURFACE MATERIAL SAMPLES

Parameter	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (1)	RBL (2)		
Thorium 232	pCi/g	8	8	4.48	3.29	1.08	2.51
Uranium 234	pCi/g	8	8	18.4	18.4	0.876	2.26
Uranium 235	pCi/g	8	8	0.898	0.898	0.0761	0.129
Uranium 238	pCi/g	8	8	14.4	14.4	0.834	2.26

Notes:
(1) 99% Upper Tolerance Limit for the URS background subsurface sample data set
(2) 95% Upper Prediction Limit for the URS background subsurface sample data set
NA = Not Applicable

Table 5-116
SUMMARY OF ANALYTICAL RESULTS FOR BACKGROUND AREA B SUBSURFACE MATERIAL SAMPLES

Parameter	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (1)	RBL (2)		
Metals							
Total Aluminum	mg/kg	8	8	18,800	16,800	7,720	13,000
Total Antimony	mg/kg	8	6	1.32	1.20	0.690	1.00
Total Arsenic	mg/kg	8	8	86.1	86.1	0.780	2.50
Total Barium	mg/kg	8	8	411	355	150	246
Total Beryllium	mg/kg	8	8	1.70	1.21	0.310	1.40
Total Cadmium	mg/kg	8	0	0.320	0.320	<0.0300	<0.170
Total Calcium	mg/kg	8	8	6,560	4,970	1,660	3,390
Total Chromium	mg/kg	8	8	22.8	15.6	2.80	10.6
Total Cobalt	mg/kg	8	8	21.3	21.3	3.80	7.70
Total Copper	mg/kg	8	8	61.7	36.3	4.90	14.7
Total Iron	mg/kg	8	8	37,700	27,800	9,220	14,800
Total Lead	mg/kg	8	8	13.0	11.9	8.20	12.3
Total Magnesium	mg/kg	8	8	3,520	2,980	1,970	2,780
Total Manganese	mg/kg	8	8	1,510	1,200	588	823
Total Molybdenum	mg/kg	8	3	6.73	2.92	<0.230	0.540
Total Nickel	mg/kg	8	8	22.2	16.2	4.80	10.3
Total Potassium	mg/kg	8	8	2,950	2,600	1,760	2,640
Total Selenium	mg/kg	8	0	0.560	0.560	<0.360	<0.420
Total Silver	mg/kg	8	0	0.180	0.180	<0.140	<0.160
Total Sodium	mg/kg	8	8	282	207	62.7	199
Total Thallium	mg/kg	8	8	0.224	0.187	0.100	0.170
Total Uranium, Calculated	mg/kg	8	8	43.3	43.3	3.63	43.3
Total Vanadium	mg/kg	8	8	41.8	32.8	12.9	25.3
Total Zinc	mg/kg	8	8	51.5	46.5	30.2	44.9
Other Parameters							
Cation Exchange Capacity	meq/g	5	5	NA	NA	0.0671	0.160
pH	SU	20	20	NA	NA	5.55	6.70
Total Organic Carbon	mg/kg	20	20	NA	NA	8,110	41,400
Radionuclides							
Lead 210	pCi/g	8	3	8.21	5.66	<1.60	5.10
Polonium 210	pCi/g	8	1	5.98	4.24	-2.65	2.99
Radium 226, Calculated	pCi/g	8	8	4.94	3.82	1.40	3.18
Radium 228	pCi/g	8	8	4.89	3.67	1.64	3.59
Thorium 227	pCi/g	8	8	0.466	0.348	0.131	0.459
Thorium 228	pCi/g	8	8	4.39	3.30	1.62	3.10

Table 5-116
SUMMARY OF ANALYTICAL RESULTS FOR BACKGROUND AREA B SUBSURFACE MATERIAL SAMPLES

Parameter	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (1)	RBL (2)		
Thorium 230	pCi/g	8	8	4.68	3.27	0.987	2.94
Thorium 232	pCi/g	8	8	4.48	3.29	1.59	3.10
Uranium 234	pCi/g	8	8	18.4	18.4	1.02	18.4
Uranium 235	pCi/g	8	7	0.898	0.898	<0.0493	0.898
Uranium 238	pCi/g	8	8	14.4	14.4	1.21	14.4

Notes:
(1) 99% Upper Tolerance Limit for the URS background subsurface sample data set
(2) 95% Upper Prediction Limit for the URS background subsurface sample data set
NA = Not Applicable

Table 5-117
SUMMARY OF ANALYTICAL RESULTS FOR SUBSURFACE MATERIAL COMPOSITE SAMPLES ADJACENT TO EAST AND WEST HAUL ROAD

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Metals							
Total Aluminum	mg/kg	6	6	18,800	16,800	9,990	17,200
Total Antimony	mg/kg	6	1	1.32	1.20	<0.280	1.2
Total Arsenic	mg/kg	6	6	86.1	86.1	1.70	64.2
Total Barium	mg/kg	6	6	411	355	118	212
Total Beryllium	mg/kg	6	6	1.70	1.21	0.600	0.980
Total Cadmium	mg/kg	6	0	0.320	0.320	<0.0300	<0.260
Total Calcium	mg/kg	6	6	6,560	4,970	1,950	3,210
Total Chromium	mg/kg	6	6	22.8	15.6	4.10	18.8
Total Cobalt	mg/kg	6	6	21.3	21.3	4.00	10.5
Total Copper	mg/kg	6	6	61.7	36.3	7.60	30.6
Total Iron	mg/kg	6	6	37,700	27,800	11,200	30,300
Total Lead	mg/kg	6	6	13.0	11.9	9.50	14.2
Total Magnesium	mg/kg	6	6	3,520	2,980	2,210	6,600
Total Manganese	mg/kg	6	6	1,510	1,200	452	652
Total Molybdenum	mg/kg	6	6	6.73	2.92	0.130	4.40
Total Nickel	mg/kg	6	5	22.2	16.2	4.70	15.4
Total Potassium	mg/kg	6	6	2,950	2,600	1,850	2,760
Total Selenium	mg/kg	6	1	0.560	0.560	<0.380	0.560
Total Silver	mg/kg	6	0	0.180	0.180	<0.150	<0.170
Total Sodium	mg/kg	6	6	282	207	101	228
Total Thallium	mg/kg	6	6	0.224	0.187	0.100	0.220
Total Uranium, Calculated	mg/kg	6	6	43.3	43.3	3.41	47.8
Total Vanadium	mg/kg	6	6	41.8	32.8	15.3	34.5
Total Zinc	mg/kg	6	6	51.5	46.5	29.3	47.6
Other Parameters							
Cation Exchange Capacity	meq/g	3	3	NA	NA	0.147	0.221
pH	SU	13	13	NA	NA	4.80	7.50
Total Organic Carbon	mg/kg	13	13	NA	NA	10,150	19,700
Radionuclides							
Lead 210	pCi/g	6	6	8.21	5.66	3.70	45.0
Polonium 210	pCi/g	6	1	5.98	4.24	-5.50	33.9

Table 5-117
SUMMARY OF ANALYTICAL RESULTS FOR SUBSURFACE MATERIAL COMPOSITE SAMPLES ADJACENT TO EAST AND WEST HAUL ROAD

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Radium 226, Calculated	pCi/g	6	6	4.94	3.82	1.36	43.6
Radium 228	pCi/g	6	6	4.89	3.67	1.73	3.36
Thorium 227	pCi/g	6	6	0.466	0.348	0.186	1.04
Thorium 228	pCi/g	6	5	4.39	3.30	<0.0910	4.26
Thorium 230	pCi/g	6	6	4.68	3.27	1.17	15.0
Thorium 232	pCi/g	6	6	4.48	3.29	0.731	4.71
Uranium 234	pCi/g	6	6	18.4	18.4	1.09	15.2
Uranium 235	pCi/g	6	5	0.898	0.898	0.105	0.917
Uranium 238	pCi/g	6	6	14.4	14.4	1.13	15.9

Notes:
(1) Parameters in bold exceed background limits for the URS samples
(2) 99% Upper Tolerance Limit for the URS background subsurface sample data set
(3) 95% Upper Prediction Limit for the URS background subsurface sample data set
NA = Not Applicable

Table 5-118
SUMMARY OF ANALYTICAL RESULTS FOR SMI MINED AREA SUBSURFACE MATERIAL SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Metals							
Total Aluminum	mg/kg	19	19	18,800	16,800	9,480	28,000
Total Arsenic	mg/kg	19	18	86.1	86.1	<4.00	77.0
Total Barium	mg/kg	19	19	411	355	34.1	267
Total Beryllium	mg/kg	19	19	1.70	1.21	0.720	6.41
Total Cadmium	mg/kg	19	19	0.320	0.320	0.100	3.50
Total Chromium	mg/kg	19	19	22.8	15.6	5.70	66.0
Total Cobalt	mg/kg	19	19	21.3	21.3	6.65	19.0
Total Copper	mg/kg	19	18	61.7	36.3	9.70	64.9
Total Iron	mg/kg	19	19	37,700	27,800	16,400	35,200
Total Lead	mg/kg	19	19	13.0	11.9	6.00	84.0
Total Manganese	mg/kg	19	19	1,510	1,200	511	5,190
Total Mercury	mg/kg	19	1	NA	NA	<0.0200	0.0500
Total Nickel	mg/kg	19	19	22.2	16.2	7.00	44.0
Total Selenium	mg/kg	19	16	0.560	0.560	<4.00	90.0
Total Silver	mg/kg	19	19	0.180	0.180	0.0700	1.18
Total Thallium	mg/kg	19	19	0.224	0.187	0.180	1.24
Total Zinc	mg/kg	19	19	51.5	46.5	29.0	381
Radionuclides							
Total Uranium 234	pCi/g	19	19	18.4	18.4	0.540	51.0
Total Uranium 235	pCi/g	19	19	0.898	0.898	0.00	2.30
Total Uranium 238	pCi/g	19	19	14.4	14.4	0.580	48.0

Notes:
(1) Concentrations or activities of parameters in bold are greater than the RBL for SMI samples
(2) 99% Upper Tolerance Limit for the URS background subsurface sample data set
(3) 95% Upper Prediction Limit for the URS background subsurface sample data set
NA = Not Applicable

Table 5-119
SUMMARY OF ANALYTICAL RESULTS FOR SOUTHWEST DOWNWIND AREA SUBSURFACE MATERIAL SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Metals							
Total Aluminum	mg/kg	6	6	18,800	16,800	11,500	15,000
Total Antimony	mg/kg	6	0	1.32	1.20	<0.600	<1.20
Total Arsenic	mg/kg	6	6	86.1	86.1	2.20	4.60
Total Barium	mg/kg	6	6	411	355	111	217
Total Beryllium	mg/kg	6	6	1.70	1.21	0.560	0.660
Total Cadmium	mg/kg	6	0	0.320	0.320	<0.0500	<0.110
Total Calcium	mg/kg	6	6	6,560	4,970	2,280	2,820
Total Chromium	mg/kg	6	6	22.8	15.6	5.40	10.2
Total Cobalt	mg/kg	6	6	21.3	21.3	5.10	8.60
Total Copper	mg/kg	6	6	61.7	36.3	10.1	16.1
Total Iron	mg/kg	6	6	37,700	27,800	12,800	15,100
Total Lead	mg/kg	6	6	13.0	11.9	10.1	12.5
Total Magnesium	mg/kg	6	6	3,520	2,980	2,300	2,780
Total Manganese	mg/kg	6	6	1,510	1,200	441	652
Total Molybdenum	mg/kg	6	4	6.73	2.92	<0.270	1.10
Total Nickel	mg/kg	6	6	22.2	16.2	5.80	10.7
Total Potassium	mg/kg	6	6	2,950	2,600	2,270	2,640
Total Selenium	mg/kg	6	0	0.560	0.560	<0.400	<0.430
Total Silver	mg/kg	6	0	0.180	0.180	<0.160	<0.170
Total Sodium	mg/kg	6	6	282	207	127	172
Total Thallium	mg/kg	6	6	0.224	0.187	0.110	0.140
Total Uranium, Calculated	mg/kg	6	6	43.3	43.3	2.30	6.71
Total Vanadium	mg/kg	6	6	41.8	32.8	18.3	24.4
Total Zinc	mg/kg	6	6	51.5	46.5	35.2	38.1
Other Parameters							
Cation Exchange Capacity	meq/g	4	4	NA	NA	0.182	0.383
pH	SU	16	16	NA	NA	6.25	6.83
Total Organic Carbon	mg/kg	16	16	NA	NA	7,830	16,800
Radionuclides							
Lead 210	pCi/g	6	6	8.21	5.66	2.80	5.50
Polonium 210	pCi/g	6	0	5.98	4.24	-9.84	<0.624
Radium 226, Calculated	pCi/g	6	6	4.94	3.82	1.27	2.93
Radium 228	pCi/g	6	6	4.89	3.67	1.56	2.89
Thorium 227	pCi/g	6	6	0.466	0.348	0.106	0.281
Thorium 228	pCi/g	6	6	4.39	3.30	1.26	2.32
Thorium 230	pCi/g	6	6	4.68	3.27	0.991	2.29

Table 5-119
SUMMARY OF ANALYTICAL RESULTS FOR SOUTHWEST DOWNWIND AREA SUBSURFACE MATERIAL SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Thorium 232	pCi/g	6	6	4.48	3.29	1.07	2.20
Uranium 234	pCi/g	6	6	18.4	18.4	0.833	2.43
Uranium 235	pCi/g	6	6	0.898	0.898	0.0607	0.150
Uranium 238	pCi/g	6	6	14.4	14.4	0.763	2.23

Notes:
(1) Parameters in bold exceed background limits for the URS samples
(2) 99% Upper Tolerance Limit for the URS background subsurface sample data set
(3) 95% Upper Prediction Limit for the URS background subsurface sample data set
NA = Not Applicable

Table 5-120
SUMMARY OF ANALYTICAL RESULTS FOR NORTHEAST DOWNWIND AREA SUBSURFACE MATERIAL SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Metals							
Total Aluminum	mg/kg	6	6	18,800	16,800	12,800	22,100
Total Antimony	mg/kg	6	0	1.32	1.20	<0.510	<1.40 (4)
Total Arsenic	mg/kg	6	6	86.1	86.1	1.70	31.2
Total Barium	mg/kg	6	6	411	355	177	255
Total Beryllium	mg/kg	6	6	1.70	1.21	0.490	1.10
Total Cadmium	mg/kg	6	0	0.320	0.320	<0.0600	<0.260
Total Calcium	mg/kg	6	6	6,560	4,970	2,660	6,080
Total Chromium	mg/kg	6	6	22.8	15.6	12.8	24.0
Total Cobalt	mg/kg	6	6	21.3	21.3	11.0	14.8
Total Copper	mg/kg	6	6	61.7	36.3	10.6	23.1
Total Iron	mg/kg	6	6	37,700	27,800	14,300	21,700
Total Lead	mg/kg	6	6	13.0	11.9	7.40	10.9
Total Magnesium	mg/kg	6	6	3,520	2,980	2,770	8,360
Total Manganese	mg/kg	6	6	1,510	1,200	525	1,270
Total Molybdenum	mg/kg	6	4	6.73	2.92	0.230	0.930
Total Nickel	mg/kg	6	6	22.2	16.2	10.4	13.9
Total Potassium	mg/kg	6	6	2,950	2,600	2,370	4,230
Total Selenium	mg/kg	6	0	0.560	0.560	<0.410	<0.440
Total Silver	mg/kg	6	0	0.180	0.180	<0.160	<0.170
Total Sodium	mg/kg	6	6	282	207	97.4	381
Total Thallium	mg/kg	6	6	0.224	0.187	0.130	0.160
Total Uranium, Calculated	mg/kg	6	6	43.3	43.3	2.06	10.1
Total Vanadium	mg/kg	6	6	41.8	32.8	22.4	35.2
Total Zinc	mg/kg	6	6	51.5	46.5	25.4	40.1
Other Parameters							
Cation Exchange Capacity	meq/g	4	4	NA	NA	0.275	0.487
pH	SU	16	16	NA	NA	6.21	6.70
Total Organic Carbon	mg/kg	16	16	NA	NA	14,550	30,200
Radionuclides							
Lead 210	pCi/g	6	3	8.21	5.66	<1.00	5.30
Polonium 210	pCi/g	6	0	5.98	4.24	-5.50	<1.50
Radium 226, Calculated	pCi/g	6	6	4.94	3.82	1.02	2.91
Radium 228	pCi/g	6	6	4.89	3.67	1.16	1.47
Thorium 227	pCi/g	6	4	0.466	0.348	<0.0915	0.304
Thorium 228	pCi/g	6	6	4.39	3.30	1.05	1.36
Thorium 230	pCi/g	6	6	4.68	3.27	0.741	2.35

Table 5-120
SUMMARY OF ANALYTICAL RESULTS FOR NORTHEAST DOWNWIND AREA SUBSURFACE MATERIAL SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum Detected Value
				BL (2)	RBL (3)		
Thorium 232	pCi/g	6	6	4.48	3.29	1.15	1.38
Uranium 234	pCi/g	6	6	18.4	18.4	0.591	3.09
Uranium 235	pCi/g	6	5	0.898	0.898	<0.0309	0.240
Uranium 238	pCi/g	6	6	14.4	14.4	0.673	3.34

Notes:
(1) Parameters in bold exceed background limits for the URS samples
(2) 99% Upper Tolerance Limit for the URS background subsurface sample data set
(3) 95% Upper Prediction Limit for the URS background subsurface sample data set
(4) The maximum concentration or activity is reported as non-detect value above the RBL
NA = Not Applicable

Table 5-121
SUMMARY OF ANALYTICAL RESULTS FOR SMI TRANSECT SUBSURFACE MATERIAL SAMPLES

Parameter (1)	Units	Number of Samples	Number of Detects	Background Limits		Minimum	Maximum
				BL (2)	RBL (3)		
Radionuclides							
Total Radium 226	pCi/g	25	25	4.94	3.82	0.935	53.8
Total Thorium 230	pCi/g	8	8	4.68	3.27	2.34	52.1
Total Uranium 234	pCi/g	8	8	18.4	18.4	2.64	54.6
Total Uranium 235	pCi/g	8	8	0.898	0.898	0.108	2.27
Total Uranium 238	pCi/g	8	8	14.4	14.4	2.53	55.1

Notes:
(1) Activities of parameters in bold are greater than the RBL for SMI samples
(2) 99% Upper Tolerance Limit for the URS background subsurface sample data set
(3) 95% Upper Prediction Limit for the URS background subsurface sample data set

Table 5-122
AIRBORNE RADON ACTIVITIES MEASURED IN THE BACKGROUND AREAS, MINED AREA, AND POTENTIALLY IMPACTED AREA

Site ID	Radon (pCi/L)	Counting Error (+/- 2 S.D.)
Background Mineralized Area		
ARBKMIN - 01	0.32	0.25
ARBKMIN - 02	2.13	0.29
ARBKMIN - 03	0.33	0.06
ARBKMIN - -04	0.34	0.07
ARBKMIN - 05	0.39	0.07
ARBKMIN - 06	0.51	0.08
ARBKMIN - 07	1.19	0.18
ARBKMIN - 08	0.71	0.17
ARBKMIN - 09	0.58	0.09
Background Non-mineralized Area		
ARBKNON - 01	0.48	0.08
ARBKNON - 02	0.48	0.08
ARBKNON - 03	0.41	0.10
ARBKNON - 04	0.87	0.13
ARBKNON - 05	1.18	0.18
ARBKNON - 06	1.35	0.20
ARBKNON - 07	1.14	0.30
ARBKNON - 08	1.62	0.26
ARBKNON - 09	0.68	0.11
ARBKNON - 10	1.22	0.34
Mined Area		
ARMA - 01	2.37	0.33
ARMA - 02	2.01	0.28
ARMA - 03	11.87	1.64
ARMA - 05	2.22	0.31
ARMA - 06	3.29	0.46
ARMA - 07	8.28	1.15
ARMA - 08	12.66	1.75
ARMA - 09	4.02	0.56
ARMA - 10	11.76	1.63
ARMA - 11	2.10	0.29
ARMA - 12	5.20	0.72
ARMA - 13	1.85	0.26
ARMA - 14	6.30	0.87
ARMA - 15	8.44	1.17
ARMA - 16	15.45	2.14
ARP3 - 01	7.60	1.05
Potentially Impacted Area		
AREHR - 01	0.87	0.13
ARWHR - 01	2.48	0.34
ARDWNE - 01	2.27	0.32
ARDWSW - 01	3.52	0.49

Table 5-123
SUMMARY STATISTICS FOR AIRBORNE RADON MEASUREMENTS IN THE BACKGROUND AREA, MINED AREA, AND POTENTIALLY IMPACTED AREA

Area Description	Range (pCi/L)	Mean +/- 2 S.D. (pCi/L)	Geometric Mean (GSD)[1] (pCi/L)
Mineralized background area	0.32 - 2.13	0.72 +/- 0.14	0.58 (0.06)
Non-mineralized background area	0.41 - 1.62	0.94 +/- 0.18	0.85 (0.08)
Mined Area	1.85 - 15.45	6.59 +/- 0.91	5.17 (0.36)
East Haul Road	0.87	NA	NA
West Haul Road	2.48	NA	NA
Downwind Northeast Area	2.27	NA	NA
Downwind Southwest Area	3.52	NA	NA

Notes:
NA = Not Applicable
(1) Geometric Standard Deviation

Table 5-124
RADON FLUX MEASUREMENTS FOR THE BACKGROUND AREAS AND MINED AREA

Location ID	September 2000 Results		August 2001 Results		September 2001 Results		October 2001 Results		Max. RPD[1] (percent)
	Flux pCi/m^{2}s	Flux Error +/- 2.00 S.D.	Flux pCi/m^{2}s	Flux Error +/- 2.00 S.D.	Flux pCi/m^{2}s	Flux Error +/- 2.00 S.D.	Flux pCi/m^{2}s	Flux Error +/- 2.00 S.D.	
Background Mineralized Area									
RFBKMIN-01	1.75	0.12	NM	NM	NM	NM	NM	NM	
RFBKMIN-02	2.31	0.13	1.70	0.10	2.21	0.11	1.89	0.05	32
RFBKMIN-03	11.78	0.20	6.86	0.14	5.41	0.14	0.69	0.05	178
RFBKMIN-04	1.67	0.12	NM	NM	NM	NM	NM	NM	
RFBKMIN-05	1.03	0.11	0.22	0.08	0.38	0.09	0.82	0.05	130
RFBKMIN-06	4.09	1`	5.40	0.15	5.37	0.14	5.46	0.07	29
RFBKMIN-07	4.20	0.15	2.84	0.12	2.62	0.11	1.59	0.05	90
RFBKMIN-08	0.11 U	0.10	0.18	0.09	0.21	0.09	6.51	0.08	193
RFBKMIN-09	1.92	0.13	NM	NM	NM	NM	NM	NM	
Background Non-mineralized Area									
RFBKNON-01	4.74	0.17	4.39	0.14	5.01	0.14	4.67	0.07	7
RFBKNON-02	1.74	0.13	2.31	0.12	1.86	0.11	1.67	0.05	28
RFBKNON-03	1.59	0.13	1.57	0.11	2.00	0.11	1.93	0.05	23
RFBKNON-04	3.72	0.15	NM	NM	NM	NM	NM	NM	
RFBKNON-05	3.38	0.15	3.22	0.13	3.10	0.12	2.51	0.06	30
RFBKNON-06	5.56	0.17	5.00	0.13	6.63	0.15	6.96	0.08	22
RFBKNON-07	3.59	0.17	2.20	0.11	3.02	0.12	2.47	0.06	48
RFBKNON-08	2.88	0.14	NM	NM	NM	NM	NM	NM	
RFBKNON-09	2.11	0.14	NM	NM	NM	NM	NM	NM	
Mined Area - Disturbed Ground									
RFDG-01	4.90	0.17	NM	NM	NM	NM	NM	NM	
RFDG-02	3.71	0.17	NM	NM	NM	NM	NM	NM	
RFDG-03	23.52	0.62	NM	NM	NM	NM	NM	NM	
RFDG-04	31.41	0.75	NM	NM	NM	NM	NM	NM	
RFDG-05	21.52	0.56	NM	NM	NM	NM	NM	NM	
RFDG-06	56.27	0.74	NM	NM	NM	NM	NM	NM	
RFDG-07	37.72	0.90	NM	NM	NM	NM	NM	NM	
RFDG-08	23.39	0.57	NM	NM	NM	NM	NM	NM	
RFDG-09	97.25	1.19	NM	NM	NM	NM	NM	NM	
RFDG-10	6.16	0.19	NM	NM	NM	NM	NM	NM	
RFDG-11	70.80	1.76	NM	NM	NM	NM	NM	NM	
RFDG-12	8.75	0.19	NM	NM	NM	NM	NM	NM	
RFDG-13	41.86	2.74	NM	NM	NM	NM	NM	NM	
RFDG-14	71.54	1.65	16.44	0.23	33.37	0.30	11.99	0.09	143
RFDG-15	6.20	0.15	NM	NM	NM	NM	NM	NM	
RFDG-16	40.97	1.02	NM	NM	NM	NM	NM	NM	
RFDG-17	371.89	6.48	20.83	0.26	26.07	0.27	8.15	0.08	191
RFDG-18	5.78	0.18	NM	NM	NM	NM	NM	NM	

Table 5-124
RADON FLUX MEASUREMENTS FOR THE BACKGROUND AREAS AND MINED AREA

Location ID	September 2000 Results		August 2001 Results		September 2001 Results		October 2001 Results		Max. RPD[1] (percent)
	Flux pCi/m^{2}s	Flux Error +/- 2.00 S.D.	Flux pCi/m^{2}s	Flux Error +/- 2.00 S.D.	Flux pCi/m^{2}s	Flux Error +/- 2.00 S.D.	Flux pCi/m^{2}s	Flux Error +/- 2.00 S.D.	
Mined Area - Stockpiles									
RFSP-01	21.24	0.47	NM	NM	NM	NM	NM	NM	
RFSP-02	137.13	1.28	NM	NM	NM	NM	NM	NM	
RFSP-03	201.85	1.73	NM	NM	NM	NM	NM	NM	
RFSP-04	118.67	2.03	NM	NM	NM	NM	NM	NM	
RFSP-05	300.05	2.01	72.94	0.44	66.11	0.41	11.72	0.09	185
RFSP-06	167.44	2.48	NM	NM	NM	NM	NM	NM	
RFSP-07	259.60	5.56	NM	NM	NM	NM	NM	NM	
RFSP-08	114.43	2.62	NM	NM	NM	NM	NM	NM	
RFSP-09	100.99	2.42	NM	NM	NM	NM	NM	NM	
RFSP-10	276.33	5.75	NM	NM	NM	NM	NM	NM	
RFSP-11	185.61	4.15	NM	NM	NM	NM	NM	NM	
RFSP-12	62.45	1.51	NM	NM	NM	NM	NM	NM	
RFSP-13	121.91	3.07	NM	NM	NM	NM	NM	NM	
RFSP-14	55.05	1.36	NM	NM	NM	NM	NM	NM	
RFSP-15	77.06	1.82	33.76	0.31	76.11	0.44	13.35	0.10	141
RFSP-16	198.71	4.59	NM	NM	NM	NM	NM	NM	
RFSP-17	114.17	2.68	NM	NM	NM	NM	NM	NM	
RFSP-18	1.65	0.13	3.27	0.13	4.09	0.13	3.44	0.06	85
Mined Area - Waste Rock									
RFWR-01	6.84	0.20	NM	NM	NM	NM	NM	NM	
RFWR-02	1.32	0.13	70.90	0.44	86.95	0.47	56.36	0.19	194
RFWR-03	111.01	2.36	NM	NM	NM	NM	NM	NM	
RFWR-04	24.97	0.49	NM	NM	NM	NM	NM	NM	
RFWR-05	66.05	1.09	NM	NM	NM	NM	NM	NM	
RFWR-06	61.73	1.34	NM	NM	NM	NM	NM	NM	
RFWR-07	18.64	0.31	NM	NM	NM	NM	NM	NM	
RFWR-08	65.39	4.80	NM	NM	NM	NM	NM	NM	
RFWR-09	19.22	0.51	NM	NM	NM	NM	NM	NM	
RFWR-10	37.81	2.95	NM	NM	NM	NM	NM	NM	
RFWR-11	15.63	0.44	NM	NM	NM	NM	NM	NM	
RFWR-12	14.54	0.41	NM	NM	NM	NM	NM	NM	
RFWR-13	13.84	0.38	NM	NM	NM	NM	NM	NM	
RFWR-14	17.26	0.47	NM	NM	NM	NM	NM	NM	
RFWR-15	2.23	0.13	NM	NM	NM	NM	NM	NM	
RFWR-16	55.85	0.80	NM	NM	NM	NM	NM	NM	
RFWR-17	20.18	0.44	NM	NM	NM	NM	NM	NM	
RFWR-18	29.63	0.74	NM	NM	NM	NM	NM	NM	

Note:
NM = Not measured

Table 5-125
SUMMARY STATISTICS[1] FOR RADON FLUX MEASUREMENTS IN THE BACKGROUND AREA AND MINED AREA

Area Description	Flux Range (pCi/m^2s)	Flux Mean +/- S.D. (pCi/m^2s)	Geometric Mean (GSD)[2] (pCi/m^2s)
Mineralized background area	0.1 - 11.8	3.2 +/- 3.5	1.9 (3.6)
Non-mineralized background area	1.6 - 5.6	3.3 +/- 1.3	3.0 (1.5)
Disturbed ground (MA)	3.7 - 372	51.0 +/- 84.0	24.0 (3.5)
Waste rock (MA)	1.3 - 111	32.0 +/- 29.0	20.0 (3.1)
Stockpiles (MA)	1.7 - 300	140.0 +/- 85.0	98.0 (3.3)

Notes:
(1) For the first round of measurements conducted in September 2000 only
(2) Geometric Standard Deviation

Table 5-126
SUMMARY STATISTICS FOR RADON EMANATION MEASUREMENTS IN THE BACKGROUND AREA AND MINED AREA

Area Description	Emanation Range (fraction)	Ra-226 Mean +/- S.D. (pCi/g)	Geometric Mean (GSD[1]) (fraction)
Mineralized background area	0.33 - 0.61	0.46 +/- 0.08	0.45 (1.2)
Non-mineralized background area	0.20 - 0.47	0.32 +/- 0.07	0.31 (1.2)
Mined Area	0.18 - 0.69	0.45 +/- 0.14	0.42 (1.4)

Note:
[1] GSD = geometric standard deviation

Table 5-127
SUMMARY STATISTICS FOR SURFACE GAMMA RADIATION MEASUREMENTS IN THE BACKGROUND AREA AND MINED AREA

Area Description	Range (uR/hr)	Mean +/- S.D. (uR/hr)
Mineralized background area	11.3 - 13.9	12.7 +/- 0.9
Non-mineralized background area	10.6 - 19.2	15.0 +/- 3.0
Disturbed ground (MA)	13.1 - 143	51.0 +/- 30.0
Waste rock (MA)	21.9 - 87.9	51.0 +/- 19.0
Stockpiles (MA)	35.6 - 398	203.0 +/- 111.0

Table 5-128
SUMMARY STATISTICS FOR GAMMA RADIATION SURVEYS CONDUCTED ON MA AND PIA ROADS

Road Surveyed	Range (uR/hr)	Mean +/- S.D. (uR/hr)	Point to Continuous Ratio[1]	Maximum to Continuous Ratio[1]
Pit 4 Road	42.8 - 83.3	57.0 +/- 12.9	1.07 +/- 0.08	1.11 +/- 0.05
Pit 3 Road	33.8 - 138.9	72.2 +/- 26.3	0.97 +/- 0.05	1.07 +/- 0.01
Central Drainage Roads	19.7 - 37.8	25.0 +/- 4.2	1.03 +/- 0.02	1.08 +/- 0.01
West Haul Road	27.4 - 57.8	47.6 +/- 6.0	1.00 +/- 0.03	1.08 +/- 0.01
West Spur Road	15.7 - 22.9	18.9 +/- 2.3	1.03 +/- 0.06	1.27 +/- 0.16
East Haul Road	16.6 - 62.5	31.6 +/- 6.9	0.99 +/- 0.01	1.17 +/- 0.04

Note:

[1] The uncertainties are standard deviations of the mean

Table 5 - 129

Human Health Risk Assessment
95% Upper Tolerance Levels Selected By Media

Groundwater

Aluminum	5,230.6000	ug/l
Antimony	3.9313	ug/l
Chromium	12.2580	ug/l
Cobalt	4.5232	ug/l
Iron	55,035.0000	ug/l
Manganese	1,930.0000	ug/l
Nickel	13.9000	ug/l
Sulfate	119.9800	mg/l
Uranium 234	36.7750	pCi/L
Zinc	181.0000	ug/l

Sediment

Cadmium	1.0100	mg/kg
Chromium	23.2200	mg/kg
Cobalt	14.4920	mg/kg
Lead	20.7220	mg/kg
Manganese	1,178.9000	mg/kg
Nickel	23.4460	mg/kg
Polonium 210	17.4440	pCi/g
Radium 226	13.0450	pCi/g
Sulfate	290.0500	mg/kg
Uranium, Calculated	93.2750	mg/kg

Subsurface Soils

Aluminum	16,753.0000	mg/kg
Arsenic	86.1000	mg/kg
Cadmium	0.3200	mg/kg
Chromium	15.6050	mg/kg
Copper	36.2980	mg/kg
Lead	11.9000	mg/kg
Lead 210	5.6633	pCi/g
Manganese	1,201.7000	mg/kg
Radium 226	3.8203	pCi/g
Selenium	0.1089	mg/kg
Uranium, Calculated	43.3000	mg/kg
Zinc	46.4960	mg/kg

Surface Materials

Aluminum	18,453.0000	mg/kg
Arsenic	86.1000	mg/kg
Cadmium	0.3200	mg/kg
Chromium	17.9030	mg/kg
Copper	41.8000	mg/kg
Lead	12.8000	mg/kg
Lead 210	7.6778	pCi/g
Manganese	1,445.2000	mg/kg
Radium 226	4.7150	pCi/g
Selenium	0.5200	mg/kg
Uranium, Calculated	43.3000	mg/kg
Zinc	50.5820	mg/kg

Surface Water

Antimony	2.2514	ug/l
Cadmium	0.5000	ug/l
Chromium	0.6300	ug/l
Nickel	1.4000	ug/l
Nitrate	0.0200	mg/l
Radium 226	1.8100	pCi/L
Sulfate	8.7554	mg/l
Uranium 238	7.6476	pCi/L
Vanadium	2.4456	ug/l
Zinc	13.6000	ug/l

Table 5 - 130
Midnight Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Surface Materials	**Pages 1 – 13**
Subsurface Soils	**Pages 14 – 16**
Sediment	**Pages 17 – 29**
Groundwater	**Pages 30 – 46**
Surface Water	**Pages 47 - 80**

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Surface Materials - Area: Background

Location	Sample Type	Date	Depth In Feet	Aluminum mg/kg	Arsenic mg/kg	Cadmium mg/kg	Chromium mg/kg	Copper mg/kg	Lead mg/kg	Lead 210 pCi/g	Manganese mg/kg	Radium 226 pCi/g	Selenium mg/kg	U Calc'd mg/kg	Zinc mg/kg
B1412410	ES	10/09/1998	0.05									1.235			
B1424422	ES	10/09/1998	0.05									1.388			
B1428426	ES	10/09/1998	0.05									1.408			
B1444442	ES	10/09/1998	0.05									1.093			
B1464462	ES	10/09/1998	0.05									1.096			
B1480478	ES	10/09/1998	0.05									1.04			
B1484482	ES	10/09/1998	0.05									1.23			
B2240238	ES	10/01/1998	0.05									1.435			
B2256254	ES	10/08/1998	0.05									1.39			
B2260258	ES	10/01/1998	0.05									1.173			
B2268266	ES	10/01/1998	0.05									1.167			
B2272270	ES	10/01/1998	0.05									1.369			
B2276274	ES	10/02/1998	0.05									1.242			
B2280278	ES	10/02/1998	0.05									1.193			
B2304302	ES	10/08/1998	0.05									1.516			
B2312310	ES	10/08/1998	0.05									1.92			
B3124122	ES	10/01/1998	0.05									3.225			
B3136134	ES	10/08/1998	0.05									2.67			
B3140138	ES	10/01/1998	0.05									3.388			
B3148146	ES	10/01/1998	0.05									1.66			
B3164162	ES	10/01/1998	0.05									**6.48**			
B3172170	ES	10/06/1998	0.05									1.81			
B3176174	ES	10/01/1998	0.05									2.528			
B3184182	ES	10/01/1998	0.05									**8.94**			
B3188186	ES	10/06/1998	0.05									1.35			
B3200198	ES	10/01/1998	0.05									2.25			
B3208206	ES	10/06/1998	0.05									3.34			
B3216214	ES	10/06/1998	0.05									1.984			
B3224222	ES	10/01/1998	0.05									1.321			
B3232230	ES	10/08/1998	0.05									0.859			
B3236234	ES	10/01/1998	0.05									1.138			
B3248246	ES	10/07/1998	0.05									1.4			
B3256254	ES	10/07/1998	0.05									1.252			
B3264262	ES	10/07/1998	0.05									1.345			

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Surface Materials - Area: Background

Location	Sample Type	Date	Depth In Feet	Aluminum mg/kg	Arsenic mg/kg	Cadmium mg/kg	Chromium mg/kg	Copper mg/kg	Lead mg/kg	Lead 210 pCi/g	Manganese mg/kg	Radium 226 pCi/g	Selenium mg/kg	U Calc'd mg/kg	Zinc mg/kg
B3268266	ES	10/08/1998	0.05									0.985			
B3272270	ES	10/08/1998	0.05									1.058			
B3288286	ES	10/08/1998	0.05									1.343			
BK01SS	ES	04/01/1998		**20000**	4.7	0.22 U	7.3	12.1	8.9		642		0.9 U		46.1
BK01SS	ES	04/01/1998										0.544 U			
MM-SOI-US4-	CS	09/24/1998	0	11400	10	0.3	13.5	20 U	**17**		628		**5**		40
MM-SOI-US4-	CS	09/24/1998	0.2	11100	10	0.15	17	20	9		545		4 U		27
MM-SOI-US4-	CS	09/24/1998	0	10600	4 U	0.3	7.7	20 U	**15**		544		**42**		40
MM-SOI-US4-	CS	09/24/1998	0.2	14600	7	0.2	10.9	50 U	9		530		**39**		35
MM-SOI-US4-	CS	09/24/1998	0	**19900**	20 U	0.3	8	15.1	9		670		20 U		**51**
MM-SOI-US4-	CS	09/24/1998	0.2	**22300**	4 U	0.2	8.1	13.9	7		620		20 U		42
MM-SOI-US4-	CS	09/24/1998	0	10600	4 U	0.2	3.7	7.8	12		750		4 U		**56**
MM-SOI-US4-	CS	09/24/1998	0.2	11000	4 U	0.1	3.2	6.7	4 U		750		4 U		46
MM-SOI-US4-	CS	09/24/1998	0	16600	20 U	0.3	10.1	14.7	12		707		20 U		42
MM-SOI-US4-	CS	09/24/1998	0.2	**19100**	4 U	0.2	10.2	14.1	6		690		4 U		41
MM-SOI-US4-	CS	09/24/1998	0	17500	20 U	**0.4**	9.7	13.6	**30**		660		20 U		48
MM-SOI-US4-	CS	09/24/1998	0.2	15800	4 U	0.2	11.1	13.3	**30**		650		4 U		43
MM-SOI-USD3	CS	09/24/1998	0	16500	20 U	0.3	9.6	13.5	**24**		630		20 U		47
SMBKMIN-01	CS	09/28/2000	0	14900	30.3	0.32 J	12.2	21	**13.8**		1070		0.66 U	2.6	**52.2**
SMBKMIN-01	CS	09/28/2000	0							3.8					
SMBKMIN-02	CS	09/28/2000	0	15700	31.1	0.26 J	9	22.8	**15.8**		881		0.79 U	2.56	**50.6**
SMBKMIN-02	CS	09/28/2000	0							3.8					
SMBKMIN-03	CS	09/28/2000	0							1.7					
SMBKMIN-03	CS	09/28/2000	0	14600	62.6	0.23 J	10.9	23.7	12.7		761		0.56 U	3.13	32.6
SMBKMIN-04	CS	09/28/2000	0							3					
SMBKMIN-04	CS	09/28/2000	0	**24100**	76.2	0.32 J	**18.2**	**41.8**	**14.7**		758		0.28 U	4.93	46
SMBKMIN-05	CS	09/29/2000	0							3.5					
SMBKMIN-05	CS	09/29/2000	0	**21400**	41.1	**0.34**	13.4	22.3	**16**		718		0.25 U	2.7	44.7
SMBKMIN-06	CS	09/29/2000	0							1.8					
SMBKMIN-06	CS	09/29/2000	0	**22500**	29.3	**0.38**	14.7	26.4	**13.2**		1070		0.27 U	3.17	**51.2**
SMBKMIN-07	CS	09/29/2000	0	**20900**	23.3	**0.44**	13.5	23.8	**18.4**		1260		0.29 U	2.77	**55.3**
SMBKMIN-07	CS	09/29/2000	0							2.8					
SMBKMIN-08	CS	09/29/2000	0							4.2					
SMBKMIN-08	CS	09/29/2000	0	**20100**	17.5	**0.38**	12.4	21	**16.4**		1060		0.27 U	2.32	**52.3**

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Surface Materials - Area: Background

Location	Sample Type	Date	Depth In Feet	Aluminum mg/kg	Arsenic mg/kg	Cadmium mg/kg	Chromium mg/kg	Copper mg/kg	Lead mg/kg	Lead 210 pCi/g	Manganese mg/kg	Radium 226 pCi/g	Selenium mg/kg	U Calc'd mg/kg	Zinc mg/kg
SMBKMIN-09	CS	09/29/2000	0							4.7					
SMBKMIN-09	CS	09/29/2000	0	16100	**94.6**	0.29 J	12.9	36.9	**15.1**		573		0.28 U	3.54	36.3
SMBKMIN-10	CS	09/30/2000	0	**21800**	**89.1**	**0.45**	15	36.8	11.4		666		0.29 U	4.06	38.2
SMBKMIN-10	CS	09/30/2000	0							2.9					
SMBKMIN-11	CS	09/30/2000	0	16300	**234**	0.18 J	14.8	25.4	12		332		0.3 U	13.3	29
SMBKMIN-11	CS	09/30/2000	0							**8.2**					
SMBKMIN-12	CS	10/01/2000	0	8230	**88.2**	0.11 J	6.1	23.1	9.2		254		0.23 U	4.61	17.2
SMBKMIN-12	CS	10/01/2000	0							1.6					
SMBKMIN-13	CS	10/01/2000	0							4					
SMBKMIN-13	CS	10/01/2000	0	**20800**	64.7	**0.38 J**	12.4	21	**20.9**		597		0.31 U	2.45	**51.3**
SMBKMIN-14	CS	10/01/2000	0							**11**					
SMBKMIN-14	CS	10/01/2000	0	13200	**144**	0.28 J	11	20.5	**17.7**		406		0.3 U	22	30.9
SMBKMIN-15	CS	10/01/2000	0							1.6					
SMBKMIN-15	CS	10/01/2000	0	**19100**	3.1 J	0.21 J	11.3	12	12.8		1100		0.27 U	2.89	**57**
SMBKMIN-16	CS	10/02/2000	0	17300	13	0.19 J	13.8	16	**13.7**		1260		0.33 U	6.13	47.1
SMBKMIN-16	CS	10/02/2000	0							2.9					
SMBKMIN-17	CS	10/02/2000	0	**19400**	18.1	0.24 J	11.7	17.1	**14.9**		1020		0.31 U	5.66	45.4
SMBKMIN-17	CS	10/02/2000	0							3.7					
SMBKMIN-18	CS	10/02/2000	0	**20000**	27.5	0.29 J	12.4	18.8	**14.2**		1000		0.34 U	4.03	**56.5**
SMBKMIN-18	CS	10/02/2000	0							2.1					
SMBKMIN-19	CS	10/02/2000	0	17900	2.4 J	0.25 J	6.6	9	**13.1**		**1640**		0.25 U	5.83	**62.4**
SMBKMIN-19	CS	10/02/2000	0							1.9					
SMBKMIN-20	CS	10/03/2000	0							2.3					
SMBKMIN-20	CS	10/03/2000	0	17900	2.4 J	0.22 J	7.3	9.9	**13.8**		1170		0.27 U	3.67	50.5
SMBKNON-01	CS	10/03/2000	0	13800	1.6 J	0.22 J	7	6.1	**13.1**		869		0.26 U	6.1	**55.2**
SMBKNON-01	CS	10/03/2000	0							4.6					
SMBKNON-02	CS	10/03/2000	0							1.7					
SMBKNON-02	CS	10/03/2000	0	**18600**	2.7 J	0.22 J	15.2	11.9	**13.8**		969		0.3 U	3.01	**54.4**
SMBKNON-03	CS	10/02/2000	0	10400	1 J	0.23 J	6.1	5.6	11.3 J		923		0.31 J	5.4	40.7
SMBKNON-03	CS	10/02/2000	0							3.3					
SMBKNON-04	CS	10/02/2000	0							2.8					
SMBKNON-04	CS	10/02/2000	0	9230	0.73 J	0.23 J	4	4.6	9 J		932		0.23 U	4.56	42.2
SMBKNON-05	CS	10/04/2000	0	10800	1.5 J	0.3 J	5.2	7.1	12.6 J		1170		0.31 U	4.87	45.9
SMBKNON-05	CS	10/04/2000	0							2.7					

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Surface Materials - Area: Background

Location	Sample Type	Date	Depth In Feet	Aluminum mg/kg	Arsenic mg/kg	Cadmium mg/kg	Chromium mg/kg	Copper mg/kg	Lead mg/kg	Lead 210 pCi/g	Manganese mg/kg	Radium 226 pCi/g	Selenium mg/kg	U Calc'd mg/kg	Zinc mg/kg
SMBKNON-06	CS	10/04/2000	0	10200	2.2 J	0.2 J	5.7	6.1	10.1 J		792		0.29 U	9.21	44.1
SMBKNON-06	CS	10/04/2000	0							2.4					
SMBKNON-07	CS	10/09/2000	0	**21900**	3.3 J	0.31 J	14	17.6	**15.4 J**		705		0.33 U	**45.7**	**54.3**
SMBKNON-07	CS	10/09/2000	0							5.5					
SMBKNON-08	CS	10/09/2000	0	14200	2.3 J	0.21 J	9.4	11.2	11.4 J		728		0.52 J	16.6	45.7
SMBKNON-08	CS	10/09/2000	0							3.8					
SMBKNON-09	CS	10/09/2000	0	16600	1.5 J	0.24 J	7.4	11.1	11.5 J		870		0.33 J	11.5	48.5
SMBKNON-09	CS	10/09/2000	0							4.3					
SMBKNON-10	CS	10/09/2000	0	8630	1.2 J	0.18 J	4.2	5.4	8.8 J		651		0.3 U	8.8	40.5
SMBKNON-10	CS	10/09/2000	0							3.6					
SMBKNON-11	CS	10/09/2000	0							2.1					
SMBKNON-11	CS	10/09/2000	0	8580	1.4 J	0.11 J	4.8	5.3	7.4 J		489		0.29 U	13.2	28.4
SMBKNON-12	CS	10/10/2000	0							3					
SMBKNON-12	CS	10/10/2000	0	12200	1.8 J	0.32 J	8.1	8.1	11.8 J		933		0.27 U	4.24	42.3
SMBKNON-13	CS	10/10/2000	0							2.1					
SMBKNON-13	CS	10/10/2000	0	10200	1.3 J	0.3 J	6	7.4	11 J		796		0.25 U	4.77	38
SMBKNON-14	CS	10/10/2000	0	10800	1.2 J	0.32 J	4	5.6	**13.3 J**		1110		0.28 U	9.64	**54.7**
SMBKNON-14	CS	10/10/2000	0							3.7					
SMBKNON-15	CS	10/10/2000	0							3.1					
SMBKNON-15	CS	10/10/2000	0	10200	1 J	0.25 J	3.8	5.1	10.3 J		843		0.27 U	6.71	45.3
SMBKNON-16	CS	10/10/2000	0							2					
SMBKNON-16	CS	10/10/2000	0	14000	2 J	**0.36 J**	9.6	8.6	**13.6 J**		979		0.28 U	3.47	43.2
SMBKNON-17	CS	10/11/2000	0							1.9					
SMBKNON-17	CS	10/11/2000	0	11500	1.8 U	0.26 J	9.7	9.2	12.8		1030		0.29 U	2.53	46.7
SMBKNON-18	CS	10/11/2000	0	11400	2 U	0.16 J	7.9	8.1	**15.5**		866		0.29 U	3.43	42.6
SMBKNON-18	CS	10/11/2000	0							2					
SMBKNON-19	CS	10/11/2000	0							3.1					
SMBKNON-19	CS	10/11/2000	0	10000	0.98 U	0.09 J	3.6	6.2	8.8		638		0.28 U	7.91	28.1
SMBKNON-20	CS	10/11/2000	0	11400	1.7 U	0.17 J	6.9	6.8	11.3		941		0.28 U	5.23	40
SMBKNON-20	CS	10/11/2000	0							3.3					

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Surface Materials - Area: Blue Creek & Tributaries

Location	Sample Type	Date	Depth In Feet	Aluminum mg/kg	Arsenic mg/kg	Cadmium mg/kg	Chromium mg/kg	Copper mg/kg	Lead mg/kg	Lead 210 pCi/g	Manganese mg/kg	Radium 226 pCi/g	Selenium mg/kg	U Calc'd mg/kg	Zinc mg/kg
FWRE-N1000-	ES	10/22/1998	0									1.811			
FWRE-N2000-	ES	10/22/1998	0									3.28			
FWRE-N3000-	ES	10/22/1998	0									1.378			
FWRE-N4000-	ES	10/22/1998	0									2.785			
FWRE-N5000-	ES	10/22/1998	0									1.867			
FWRE-S1000-0	ES	10/22/1998	0									4.509			
FWRE-S2000-0	ES	10/22/1998	0									4.14			
FWRE-S3000-0	ES	10/22/1998	0									2.633			
FWRE-S4000-0	ES	10/22/1998	0									**8.6**			
FWRE-S5000-0	ES	10/22/1998	0									**8.27**			
FWR-N0000-0-	ES	10/22/1998	0									2.622			
FWR-NTL-0-6	ES	10/22/1998	0									2.316			
FWR-S0000-0-	ES	10/22/1998	0									**6.03**			
FWR-STL-0-6	ES	10/22/1998	0									**79.94**			
FWRW-N1000-	ES	10/22/1998	0									1.335			
FWRW-N2000-	ES	10/22/1998	0									2.652			
FWRW-N3000-	ES	10/22/1998	0									1.776			
FWRW-N4000-	ES	10/22/1998	0									1.355			
FWRW-N5000-	ES	10/22/1998	0									1.47			
FWRW-S1000-	ES	10/22/1998	0									2.049			
FWRW-S2000-	ES	10/22/1998	0									1.228			
FWRW-S3000-	ES	10/22/1998	0									1.973			
FWRW-S4000-	ES	10/22/1998	0									1.518			
FWRW-S5000-	ES	10/22/1998	0									2.008			

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Surface Materials - Area: Potentially Impacted Area East of Mined Area

Location	Sample Type	Date	Depth In Feet	Aluminum mg/kg	Arsenic mg/kg	Cadmium mg/kg	Chromium mg/kg	Copper mg/kg	Lead mg/kg	Lead 210 pCi/g	Manganese mg/kg	Radium 226 pCi/g	Selenium mg/kg	U Calc'd mg/kg	Zinc mg/kg
B1420418	ES	10/09/1998	0.05									1.337			
B1452450	ES	10/09/1998	0.05									1.061			
B1472470	ES	10/09/1998	0.05									1.069			
B1496494	ES	10/09/1998	0.05									1.174			
B1500498	ES	10/09/1998	0.05									1.183			
B1504502	ES	10/09/1998	0.05									**4.75**			
B1512510	ES	10/10/1998	0.05									1.229			
B1520518	ES	10/09/1998	0.05									0.9719			
B1532530	ES	10/09/1998	0.05									1.194			
B1560558	ES	10/09/1998	0.05									1.1			
B1568566	ES	10/09/1998	0.05									1.048			
B1572570	ES	10/09/1998	0.05									1.181			
B1584582	ES	10/10/1998	0.05									1.076			
SMDWNE-01	CS	10/12/2000	0							3.4					
SMDWNE-01	CS	10/12/2000	0	14300	48	**0.34 J**	**25.6**	22.1	**17.7**		851		0.29 U	5.95	**52.9**
SMDWNE-01	CS	08/15/2001	0	17000	50.5 J	0.38 UJ	**29.1**	28.1 J	11.9		804		0.17 U		48.6
SMDWNE-02	CS	10/12/2000	0	**22400**	2 J	**0.39**	**20.4**	12.5	12.3		612		0.29 U	3.25	39.4
SMDWNE-02	CS	10/12/2000	0							4.9					
SMDWNE-02	CS	08/16/2001	0	**23400**	2.9 J	0.54 UJ	**21.3**	13.6 J	8.2		616		0.2 U		35.2
SMDWNE-03	CS	10/12/2000	0							3.2					
SMDWNE-03	CS	10/12/2000	0	**18900**	3.7 J	**0.39**	14.5	15	**18.9**		872		0.3 U	5.74	**56.6**
SMDWNE-04	CS	10/12/2000	0	13400	2.5 J	**0.35 J**	14.6	12.5	**16.1**		833		0.29 U	4.58	**57.9**
SMDWNE-04	CS	10/12/2000	0							3.6					
SMDWNE-05	CS	10/12/2000	0							4.5					
SMDWNE-05	CS	10/12/2000	0	17200	18.5	0.23 J	**19.9**	21.9	**13.3**		691		0.26 UJ	7.95	48.6
SMDWNE-05	CS	08/16/2001	0	18300	11.7 J	0.37 UJ	**22.1**	21.3 J	12.4		1200		0.18 U		46
SMDWNE-06	CS	10/13/2000	0							5					
SMDWNE-06	CS	10/13/2000	0	**18500**	2.3 J	0.25 J	14.1	10.3	**18.2**		537		0.29 UJ	7.08	37.6
SMDWNE-07	CS	10/13/2000	0							5					
SMDWNE-07	CS	10/13/2000	0	**24500**	8	**0.53**	**18.5**	23	**18.3**		1050		0.28 UJ	6.47	**61.6**
SMDWNE-07	CS	08/16/2001	0	**27200**	11.1 J	0.68 UJ	**23.4**	28.1 J	**17.2**		1110		0.18 U		**59.9**
SMDWNE-08	CS	10/13/2000	0	15500	6.7	0.29 J	16.6	17.5	**19.3**		903		0.3 UJ	15.3	**51.1**
SMDWNE-08	CS	10/13/2000	0							**8.3**					
SMDWNE-09	CS	10/13/2000	0							7.1					

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Surface Materials - Area: Potentially Impacted Area East of Mined Area

Location	Sample Type	Date	Depth In Feet	Aluminum mg/kg	Arsenic mg/kg	Cadmium mg/kg	Chromium mg/kg	Copper mg/kg	Lead mg/kg	Lead 210 pCi/g	Manganese mg/kg	Radium 226 pCi/g	Selenium mg/kg	U Calc'd mg/kg	Zinc mg/kg
SMDWNE-09	CS	10/13/2000	0	14400	5.4	0.31 J	15	16	**21.1**		**1990**		0.3 UJ	10.7	**55.6**
SMDWNE-10	CS	10/14/2000	0	15800	2.4 J	**0.5**	14	16.2	**14.3**		832		0.28 U	4.92	**58.7**
SMDWNE-10	CS	10/14/2000	0							2.7 J					
SMDWNE-10	CS	08/15/2001	0	15700	2.3 J	0.44 UJ	14.2	18.3 J	11.2		858		0.19 U		**56.1**
SMDWNE-11	CS	10/14/2000	0							3.2 J					
SMDWNE-11	CS	10/14/2000	0	18100	3.2 J	**0.6**	12.7	15.3	**17.5**		679		0.37 U	4.76	**57.3**
SMDWNE-11	CS	08/15/2001	0	**20300**	3.5 J	0.52 UJ	14.9	17.6 J	**15.2**		760		0.19 U		**54.6**
SMDWNE-12	CS	10/14/2000	0							5.3 J					
SMDWNE-12	CS	10/14/2000	0	17300	3.8 J	**0.4**	16.7	14.2	**14**		532		0.28 U	8.99	38.3
SMDWNE-13	CS	10/14/2000	0							5.6 J					
SMDWNE-13	CS	10/14/2000	0	**26100**	5.8	**0.58**	17.6	24.8	**14.5**		935		0.29 U	15.3	48.2
SMDWNE-13	CS	08/15/2001	0	**29500**	6.4 J	0.56 UJ	**22.1**	32.2 J	**13.8**		849		0.21 U		46.9
SMDWNE-14	CS	10/15/2000	0							6.4 J					
SMDWNE-14	CS	10/15/2000	0	**20300**	3.3 J	**0.51**	15.4	15	**18.5**		550		0.29 U	2.88	48.5
SMDWNE-14	CS	08/15/2001	0	**23800**	2.9 J	0.46 UJ	**18.5**	15.4 J	**13.2**		547		0.2 U		42.3
SMDWNE-15	CS	10/15/2000	0							5.5 J					
SMDWNE-15	CS	10/15/2000	0	**19700**	2.5 J	**0.42**	13.7	12.7	**14**		574		0.29 U	2.74	38.9
SMDWNE-16	CS	10/15/2000	0							4.3 J					
SMDWNE-16	CS	10/15/2000	0	**19500**	5	**0.8**	16.6	19.9	**23.8**		1060		0.3 U	4.67	**104**
SMDWNE-16	CS	08/15/2001	0	**21800**	5.4 J	0.77 UJ	**20.1**	22.5 J	**27.1**		1110		0.2 U		**116**
SMEHR-01	CS	10/10/2000	0							**17**					
SMEHR-01	CS	10/10/2000	0	**18900**	25	**0.51**	**21.2**	21.9	12.4 J		557		0.26 U	34.9	41.6
SMEHR-01	CS	08/14/2001	0							**13 J**		**19.9**			
SMEHR-01	CS	08/14/2001	0	14800	16.5 J	0.47 UJ	**18.6**	37.3 J	12.5		725		0.2 U		48.1
SMEHR-02	CS	10/10/2000	0							5.8					
SMEHR-02	CS	10/10/2000	0	17500	5.7	**0.46**	16	16.1	**13.2 J**		614		0.28 U	24.1	43.1
SMEHR-02	CS	08/14/2001	0									**14.8**			
SMEHR-03	CS	10/10/2000	0	16000	7.8	**0.85**	15.3	12	11.7 J		728		0.27 U	18.8	40.9
SMEHR-03	CS	10/10/2000	0							**9.5**					
SMEHR-03	CS	08/14/2001	0	**20500**	6.8 J	0.37 UJ	**21.1**	11.6 J	9.8		494		0.19 U		39.4
SMEHR-03	CS	08/14/2001	0							7 J		**11.5**			
SMEHR-04	CS	10/11/2000	0							3.9					
SMEHR-04	CS	10/11/2000	0	16500	4.7	0.2 J	14.7	14.7	**13.1**		688		0.27 U	11.4	48.9
SMEHR-05	CS	10/10/2000	0	11400	35.4	**0.86**	10.5	35.5	**13 J**		1020		0.22 U	**72.7**	**62.8**

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Surface Materials - Area: Potentially Impacted Area East of Mined Area

Location	Sample Type	Date	Depth In Feet	Aluminum mg/kg	Arsenic mg/kg	Cadmium mg/kg	Chromium mg/kg	Copper mg/kg	Lead mg/kg	Lead 210 pCi/g	Manganese mg/kg	Radium 226 pCi/g	Selenium mg/kg	U Calc'd mg/kg	Zinc mg/kg
SMEHR-05	CS	10/10/2000	0							**25**					
SMEHR-05	CS	08/14/2001	0	16700	**92.4 J**	1.3 UJ	17.9	**58.4 J**	**14.6**		1100		0.19 U		**90.3**
SMEHR-05	CS	08/14/2001	0							**21.9 J**		**35.4**			
SMEHR-06	CS	10/11/2000	0	14600	4.3	**0.36**	8.5	11.3	12.6 J		700		0.24 U	22.2	43.5
SMEHR-06	CS	10/11/2000	0							6 J					
SMEHR-07	CS	10/11/2000	0	14300	3.5 J	0.2 J	12.1	13.9	**13.3**		669		0.28 U	11.7	49.6
SMEHR-07	CS	10/11/2000	0							1.9					
SMEHR-08	CS	10/11/2000	0	15800	11.1	**0.37**	10.4	18.8	**14.6**		1160		0.25 U	**51.4**	**71.3**
SMEHR-08	CS	10/11/2000	0							**12 J**					
SMEHR-08	CS	08/14/2001	0	11000	23.6 J	0.73 UJ	8.9	23.9 J	**15.4**		700		0.19 U		**65.5**
SMEHR-08	CS	08/14/2001	0							**19.7 J**		**49.4**			
SMEHR-09	CS	10/11/2000	0	15100	3.9 J	0.13 J	10	11.4	12.3		610		0.27 U	6.98	39.5
SMEHR-09	CS	10/11/2000	0							1.9					
SMEHR-10	CS	10/11/2000	0	11000	14.6	**0.38**	8.2	17.1	8.8		794		0.28 U	**88.6 J**	42.1
SMEHR-10	CS	10/11/2000	0							**12**					
SMEHR-10	CS	08/14/2001	0							**17.6 J**		**24.3**			
SMEHR-11	CS	10/11/2000	0							7.5					
SMEHR-11	CS	10/11/2000	0	14000	3.6 J	0.15 J	5.2	8.6	12.5		670		0.29 U	29.4	**52.9**
SMEHR-11	CS	08/15/2001	0									**14.4**			
SMEHR-12	CS	10/11/2000	0	16200	2.7 J	0.19 J	6.4	8.7	**28.9**		687		0.28 U	12.4	**58.3**
SMEHR-12	CS	10/11/2000	0							2.3					
TA000	ES	10/22/1998	0									3.29			
TA000	ES	10/22/1998	0.5									3.12			
TB000	ES	10/22/1998	0									4.67			
TB000	ES	10/22/1998	0.5									**29.49**			
TE312	ES	10/22/1998	0									**6.85**			
TE312	ES	10/22/1998	0.5									**6.31**			
TF175	ES	10/22/1998	0									**16.1**			
TF175	ES	10/22/1998	0.5									**6.62**			
TG175	ES	10/22/1998	0									**23.07**			
TG175	ES	10/22/1998	0.5									**11.56**			
TH225	ES	10/22/1998	0									**37.48**			
TH225	ES	10/22/1998	0.5									**53.75**			
TI250	ES	10/22/1998	0									2.672			

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Surface Materials - Area: Potentially Impacted Area East of Mined Area

Location	Sample Type	Date	Depth In Feet	Aluminum mg/kg	Arsenic mg/kg	Cadmium mg/kg	Chromium mg/kg	Copper mg/kg	Lead mg/kg	Lead 210 pCi/g	Manganese mg/kg	Radium 226 pCi/g	Selenium mg/kg	U Calc'd mg/kg	Zinc mg/kg
TI250	ES	10/22/1998	0.5									2.728			
TI400	ES	10/22/1998	0									**21.75**			
TI400	ES	10/22/1998	0.5									**47.13**			
TJ400	ES	10/22/1998	0									1.195			
TJ400	ES	10/22/1998	0.5									0.935			
TK325	ES	10/23/1998	0									1.799			
TK325	ES	10/23/1998	0.5									1.731			

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Surface Materials - Area: Potentially Impacted Area South of Mined Area

Location	Sample Type	Date	Depth In Feet	Aluminum mg/kg	Arsenic mg/kg	Cadmium mg/kg	Chromium mg/kg	Copper mg/kg	Lead mg/kg	Lead 210 pCi/g	Manganese mg/kg	Radium 226 pCi/g	Selenium mg/kg	U Calc'd mg/kg	Zinc mg/kg
B1556554	ES	10/10/1998	0.05									1.482			
B1564562	ES	10/10/1998	0.05									1			
B1576574	ES	10/10/1998	0.05									1.092			
B1580578	ES	10/10/1998	0.05									1.121			
B1596594	ES	10/10/1998	0.05									1.411			
TK000	ES	10/23/1998	0									**7.3**			
TK000	ES	10/23/1998	0.5									3.73			
TL100	ES	10/23/1998	0									**9.73**			
TL100	ES	10/27/1998	0.5									2.955			

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Surface Materials - Area: Potentially Impacted Area West of Mined Area

Location	Sample Type	Date	Depth In Feet	Aluminum mg/kg	Arsenic mg/kg	Cadmium mg/kg	Chromium mg/kg	Copper mg/kg	Lead mg/kg	Lead 210 pCi/g	Manganese mg/kg	Radium 226 pCi/g	Selenium mg/kg	U Calc'd mg/kg	Zinc mg/kg
B2228226	ES	10/01/1998	0.05									1.67			
B2232230	ES	10/01/1998	0.05									1.78			
B2236234	ES	10/01/1998	0.05									1.79			
B2244242	ES	10/06/1998	0.05									1.1			
B2248246	ES	10/06/1998	0.05									1.351			
B2252250	ES	10/06/1998	0.05									1.477			
B2264262	ES	10/08/1998	0.05									2.214			
B2284282	ES	10/02/1998	0.05									1.196			
B2292290	ES	10/02/1998	0.05									1.34			
B2296294	ES	10/02/1998	0.05									1.3			
B2300298	ES	10/08/1998	0.05									1.263			
B2308306	ES	10/08/1998	0.05									1.193			
B2316314	ES	10/08/1998	0.05									1.439			
B2320318	ES	10/08/1998	0.05									1.253			
B2324322	ES	10/08/1998	0.05									1.43			
B2456454	ES	10/02/1998	0.05									1.694			
B3244242	ES	10/06/1998	0.05									1.475			
B3276274	ES	10/08/1998	0.05									1.007			
B3292290	ES	10/08/1998	0.05									1.02			
B3296294	ES	10/08/1998	0.05									1.166			
SMDWSW-01	CS	10/13/2000	0	12800	4.5	0.2 J	11.1	12.5	**14.4**		498		0.22 UJ	4.8	37.3
SMDWSW-01	CS	10/13/2000	0							2.8					
SMDWSW-02	CS	10/13/2000	0							1.6					
SMDWSW-02	CS	10/13/2000	0	16300	4.1	0.14 J	12	13.7	**14.1**		602		0.28 UJ	3.16	40.6
SMDWSW-03	CS	10/13/2000	0							1.4					
SMDWSW-03	CS	10/13/2000	0	14600	4.8	0.21 J	10.8	13	**15.4**		551		0.28 UJ	4.72	41.6
SMDWSW-04	CS	10/13/2000	0	14200	5.5	0.16 J	8.5	11.4	**13.6**		485		**0.76 J**	5.11	37.4
SMDWSW-04	CS	10/13/2000	0							3.4					
SMDWSW-05	CS	10/13/2000	0							2.5					
SMDWSW-05	CS	10/13/2000	0	17000	3.7 J	0.18 J	11.3	13.2	**14.4**		612		0.51 J	5.01	43.7
SMDWSW-06	CS	10/13/2000	0							2					
SMDWSW-06	CS	10/13/2000	0	15700	4.2	0.16 J	13.9	13.7	12		585		0.22 UJ	5.76	44.3
SMDWSW-07	CS	10/14/2000	0							4.6 J					
SMDWSW-07	CS	10/14/2000	0	11500	3.2 J	0.07 J	8.4	9.5	12.8		508		0.24 UJ	7.17	32.9

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Surface Materials - Area: Potentially Impacted Area West of Mined Area

Location	Sample Type	Date	Depth In Feet	Aluminum mg/kg	Arsenic mg/kg	Cadmium mg/kg	Chromium mg/kg	Copper mg/kg	Lead mg/kg	Lead 210 pCi/g	Manganese mg/kg	Radium 226 pCi/g	Selenium mg/kg	U Calc'd mg/kg	Zinc mg/kg
SMDWSW-08	CS	10/14/2000	0	15100	3.2 J	0.14 J	9.4	12.1	10.7		458		0.25 UJ	4.89	36.4
SMDWSW-08	CS	10/14/2000	0							2					
SMDWSW-09	CS	10/14/2000	0							2.7 J					
SMDWSW-09	CS	10/14/2000	0	16500	4.2 J	0.17 J	11.9	15.4	**14**		623		0.28 UJ	4.38	44.4
SMDWSW-10	CS	10/14/2000	0	13300	2 J	0.14 J	6.6	9.6	11.4		544		0.28 UJ	5.95	42.2
SMDWSW-10	CS	10/14/2000	0							4 J					
SMDWSW-11	CS	10/14/2000	0							2.9 J					
SMDWSW-11	CS	10/14/2000	0	16600	2.4 J	0.09 J	6.7	10.5	11		536		0.28 UJ	4.37	41.3
SMDWSW-12	CS	10/14/2000	0							2.9 J					
SMDWSW-12	CS	10/14/2000	0	14900	3.2 J	0.29 J	9.4	14.3	**16.1**		614		0.25 UJ	3.28	**58.1**
SMDWSW-13	CS	10/14/2000	0							3 J					
SMDWSW-13	CS	10/14/2000	0	14400	3.8 J	0.15 J	10.9	13.7	12.5		514		0.26 UJ	4.84	39.5
SMDWSW-14	CS	10/15/2000	0	**19900**	4.8	0.27 J	11	14.1	**12.9**		503		0.25 U	15.5	44.8
SMDWSW-14	CS	10/15/2000	0							1.9					
SMDWSW-15	CS	10/15/2000	0	**18500**	4.3	**0.36 J**	10.2	12.9	**15.3**		510		0.28 U	4.75	48
SMDWSW-15	CS	10/15/2000	0							1.9					
SMDWSW-16	CS	10/15/2000	0							1.8					
SMDWSW-16	CS	10/15/2000	0	12400	3.1 J	0.3 J	6.3	10.4	**14.3**		555		0.23 U	14.9	41.7
SMWHR-01	CS	10/12/2000	0							**70**					
SMWHR-01	CS	10/12/2000	0	10900	30	**0.72**	14	**52.2**	**16.3**		1100		0.28 U	**262**	**80.9**
SMWHR-01	CS	08/13/2001	0							**10.6 J**		**15.4**			
SMWHR-01	CS	08/13/2001	0	11800	10.1 J	0.39 UJ	7.7	17 J	**13.7**		613		0.17 U		46.5
SMWHR-02	CS	10/12/2000	0							2.8					
SMWHR-02	CS	10/12/2000	0	15200	4.1	0.09 J	10.2	12.2	11.6		542		0.27 U	7.2	42.7
SMWHR-03	CS	10/12/2000	0							7.1					
SMWHR-03	CS	10/12/2000	0	12400	2.8 J	0.12 J	9.2	8.8	**13.2**		592		0.27 U	12.5	40.1
SMWHR-04	CS	10/11/2000	0							**32 J**					
SMWHR-04	CS	10/11/2000	0	14400	11.5	**0.39**	11.1	15.5	**16.3**		897		0.29 U	**93**	**66.9**
SMWHR-04	CS	08/15/2001	0							**41.9 J**		**59**			
TN125	ES	10/23/1998	0									1.824			
TN125	ES	10/23/1998	0.5									**7.49**			
TO000	ES	10/22/1998	0									**24.9**			
TO000	ES	10/22/1998	0.5									3.752			
TP000	ES	10/22/1998	0									**8.23**			

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Surface Materials - Area: Potentially Impacted Area West of Mined Area

Location	Sample Type	Date	Depth In Feet	Aluminum mg/kg	Arsenic mg/kg	Cadmium mg/kg	Chromium mg/kg	Copper mg/kg	Lead mg/kg	Lead 210 pCi/g	Manganese mg/kg	Radium 226 pCi/g	Selenium mg/kg	U Calc'd mg/kg	Zinc mg/kg
TP000	ES	10/22/1998	0.5									**6.67**			
TQ225	ES	10/22/1998	0									2.513			
TQ225	ES	10/22/1998	0.5									2.792			
TR000	ES	10/22/1998	0									3.84			
TR000	ES	10/22/1998	0.5									3.676			
TS025	ES	10/23/1998	0									2.927			
TS025	ES	10/23/1998	0.5									2.103			
TS175	ES	10/23/1998	0									1.784			
TS175	ES	10/23/1998	0.5									2.651			
TT000	ES	10/22/1998	0									**8.2**			
TT000	ES	10/22/1998	0.5									**9.5**			
TT225	ES	10/22/1998	0									4.6			
TT225	ES	10/22/1998	0.5									**5.65**			

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Subsurface Soils - Area: Background

Location	Sample Type	Date	Depth In Feet	Aluminum mg/kg	Arsenic mg/kg	Cadmium mg/kg	Chromium mg/kg	Copper mg/kg	Lead mg/kg	Lead 210 pCi/g	Manganese mg/kg	Radium 226 pCi/g	Selenium mg/kg	U Calc'd mg/kg	Zinc mg/kg
SSBKMIN-02	CS	09/28/2000	0.2							1.4					
SSBKMIN-02	CS	09/28/2000	0.2	16500 J	37.8 J	0.28 UJ	8.5 J	24.3 J	10.5 J		690 J		0.41 UJ	2.52	43.5 J
SSBKMIN-04	CS	09/28/2000	0.2							1.8					
SSBKMIN-04	CS	09/28/2000	0.2	13500 J	67.2 J	0.29 UJ	14.9 J	35.8 J	10.7 J		749 J		**0.56 J**	4.67	33.3 J
SSBKMIN-05	CS	09/29/2000	0.2							1.1					
SSBKMIN-05	CS	09/29/2000	0.2	13900 J	36.6 J	0.2 UJ	8.7 J	18.9 J	9.1 J		727 J		**0.4 J**	2.89	30.6 J
SSBKMIN-10	CS	09/30/2000	0.2	12200 J	**86.1 J**	0.32 UJ	12.1 J	33.1 J	9.6 J		620 J		**0.39 J**	3.36	26.6 J
SSBKMIN-10	CS	09/30/2000	0.2							1.4					
SSBKMIN-13	CS	10/01/2000	0.2	14500 J	69.4 J	0.14 UJ	8.1 J	17.3 J	9.7 J		379 J		0.44 UJ	2.79	29.7 J
SSBKMIN-13	CS	10/01/2000	0.2							1.4					
SSBKMIN-15	CS	10/01/2000	0.2	15100 J	3 J	0.11 UJ	7.8 J	10.2 J	10.2 J		903 J		0.46 UJ	2.99	41.2 J
SSBKMIN-15	CS	10/01/2000	0.2							1					
SSBKMIN-17	CS	10/02/2000	0.2	14800 J	19.8 J	0.22 UJ	8.8 J	15.6 J	11.5 J		995 J		0.39 UJ	4.85	35 J
SSBKMIN-17	CS	10/02/2000	0.2							1.3					
SSBKMIN-19	CS	10/02/2000	0.2							4.4 J					
SSBKMIN-19	CS	10/02/2000	0.2	12900 J	2.3 J	0.18 UJ	4 J	7.9 J	10.4 J		**1300 J**		0.44 UJ	6.78	44.4 J
SSBKNON-02	CS	10/03/2000	0.2							1.5					
SSBKNON-02	CS	10/03/2000	0.2	11800 J	1.8 J	0.17 UJ	10.6 J	9.5 J	9.9 J		794 J		0.36 UJ	3.65	39.3 J
SSBKNON-04	CS	10/03/2000	0.2	7720 J	0.78 J	0.13 UJ	4.7 J	4.9 J	8.2 J		820 J		0.37 UJ	4.32	36.3 J
SSBKNON-04	CS	10/03/2000	0.2							1.3					
SSBKNON-07	CS	10/09/2000	0.2	12200 J	2.5 J	0.11 UJ	8.6 J	14.7 J	**12.3 J**		588 J		0.41 UJ	**43.3**	35.9 J
SSBKNON-07	CS	10/09/2000	0.2							5.1 J					
SSBKNON-09	CS	10/09/2000	0.2	13000 J	1.5 J	0.14 UJ	6.5 J	12.2 J	10.5 J		802 J		0.41 UJ	17.7	39.1 J
SSBKNON-09	CS	10/09/2000	0.2							1.3					
SSBKNON-12	CS	10/10/2000	0.2	8270 J	1.3 J	0.11 UJ	6.2 J	6.2 J	9 J		727 J		0.36 UJ	5.04	30.6 J
SSBKNON-12	CS	10/10/2000	0.2							1.3					
SSBKNON-15	CS	10/10/2000	0.2	10200 J	0.88 J	0.15 UJ	4.2 J	6.4 J	9.2 J		823 J		0.38 UJ	7.15	44.9 J
SSBKNON-15	CS	10/10/2000	0.2							4.9 J					
SSBKNON-18	CS	10/11/2000	0.2							1.3					
SSBKNON-18	CS	10/11/2000	0.2	11600	1.8 J	0.06 UJ	7 J	8.1	9.3		761		0.39 U	3.63	38.5
SSBKNON-19	CS	10/11/2000	0.2							2.6 J					
SSBKNON-19	CS	10/11/2000	0.2	11300	0.94 J	0.03 UJ	2.8 J	6.9	9.1		713		0.42 U	7.53	30.2

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Subsurface Soils - Area: Potentially Impacted Area East of Mined Area

Location	Sample Type	Date	Depth In Feet	Aluminum mg/kg	Arsenic mg/kg	Cadmium mg/kg	Chromium mg/kg	Copper mg/kg	Lead mg/kg	Lead 210 pCi/g	Manganese mg/kg	Radium 226 pCi/g	Selenium mg/kg	U Calc'd mg/kg	Zinc mg/kg
SSDWNE-01	CS	10/12/2000	0.2							2.8 J					
SSDWNE-01	CS	10/12/2000	0.2	14200	31.2	0.06 UJ	**24 J**	23.1	9.6		788		0.44 U	3.96	40.1
SSDWNE-04	CS	10/12/2000	0.2							1					
SSDWNE-04	CS	10/12/2000	0.2	13600	1.7 J	0.16 UJ	12.8 J	14.3	8.7		813		0.41 U	2.19	38.7
SSDWNE-06	CS	10/13/2000	0.2	**19100**	1.7 J	0.16 UJ	**15.9 J**	10.6	7.4		525		0.43 U	2.06	25.4
SSDWNE-06	CS	10/13/2000	0.2							1.5					
SSDWNE-09	CS	10/13/2000	0.2	12800	4.7	0.14 UJ	13.7 J	17.6	10.3		**1270**		0.41 U	3.31	32.1
SSDWNE-09	CS	10/13/2000	0.2							3.8 J					
SSDWNE-12	CS	10/14/2000	0.2	16400	2.7 J	0.14 UJ	**16.1 J**	14.9	8.6		533		0.43 U	2.7	29
SSDWNE-12	CS	10/14/2000	0.2							1					
SSDWNE-13	CS	10/14/2000	0.2	**22100**	3.8 J	0.26 UJ	13.1 J	22.9	10.9		743		0.43 U	10.1	39.2
SSDWNE-13	CS	10/14/2000	0.2							5.3 J					
SSEHR-01	CS	10/10/2000	0.2							**45 J**					
SSEHR-01	CS	10/10/2000	0.2	13100 J	64.2 J	0.26 UJ	**18.8 J**	30.6 J	**13.1 J**		456 J		**0.56 J**	26.9	34.9 J
SSEHR-02	CS	10/10/2000	0.2	**17200 J**	6.2 J	0.24 UJ	**16.5 J**	20.5 J	10.4 J		598 J		0.38 UJ	22.3	37.4 J
SSEHR-02	CS	10/10/2000	0.2							4.5 J					
SSEHR-06	CS	10/11/2000	0.2	13400	2.7 J	0.09 UJ	7.2 J	10.3	10.3		652		0.43 U	**47.8**	42
SSEHR-06	CS	10/11/2000	0.2							**8.9 J**					
SSEHR-09	CS	10/11/2000	0.2	11100	1.7 J	0.03 UJ	6 J	7.7	9.5		452		0.39 U	3.41	29.3
SSEHR-09	CS	10/11/2000	0.2							3.9 J					
SSEHR-11	CS	10/11/2000	0.2							4.2 J					
SSEHR-11	CS	10/11/2000	0.2	15700	1.9 J	0.07 UJ	4.1 J	8.8	10.6		593		0.43 U	13.9	**47.6**

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Subsurface Soils - Area: Potentially Impacted Area West of Mined Area

Location	Sample Type	Date	Depth In Feet	Aluminum mg/kg	Arsenic mg/kg	Cadmium mg/kg	Chromium mg/kg	Copper mg/kg	Lead mg/kg	Lead 210 pCi/g	Manganese mg/kg	Radium 226 pCi/g	Selenium mg/kg	U Calc'd mg/kg	Zinc mg/kg
SSDWSW-02	CS	10/13/2000	0.2	13300	3.6 J	0.05 UJ	9.6 J	14.2	10.4		595		0.4 U	2.3	35.4
SSDWSW-02	CS	10/13/2000	0.2							5.5 J					
SSDWSW-05	CS	10/13/2000	0.2							4.2 J					
SSDWSW-05	CS	10/13/2000	0.2	14900	3 J	0.05 UJ	10.2 J	13.9	10.6		565		0.43 U	3.4	37.6
SSDWSW-07	CS	10/14/2000	0.2							3.7 J					
SSDWSW-07	CS	10/14/2000	0.2	12200	3.2 J	0.05 UJ	7.9 J	10.1	11		441		0.4 U	6.71	35.8
SSDWSW-09	CS	10/14/2000	0.2	14000	4.6	0.11 UJ	5.9 J	16.1	**12.5**		652		0.42 U	3.19	38.1
SSDWSW-09	CS	10/14/2000	0.2							4.1 J					
SSDWSW-11	CS	10/14/2000	0.2	15000	2.2 J	0.1 UJ	5.4 J	10.5	10.1		526		0.41 U	4.21	37.8
SSDWSW-11	CS	10/14/2000	0.2							2.8 J					
SSDWSW-13	CS	10/14/2000	0.2							3.2 J					
SSDWSW-13	CS	10/14/2000	0.2	11500	3.4 J	0.1 UJ	7.7 J	12.7	11		505		0.41 U	5.32	35.2
SSWHR-03	CS	10/12/2000	0.2	9990	1.9 J	0.04 UJ	6 J	7.6	**14.2**		469		0.42 U	7.27	36.3
SSWHR-03	CS	10/12/2000	0.2							3.7 J					

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Sediment - Area: Background

Location	Sample Type	Date	Depth In Feet	Cadmium mg/kg	Chromium mg/kg	Cobalt mg/kg	Lead mg/kg	Manganese mg/kg	Nickel mg/kg	Polon'm210 pCi/g	Radium 226 pCi/g	Sulfate mg/kg	U Calc'd mg/kg	- - - -
SDBK-01/SWB	ES	09/12/1999	0	0.22 J	20.9	10.5	9.4	429	12.2			4.81	3.97	
SDBK-01/SWB	ES	09/12/1999	0							1.4				
SDBK-01/SWB	CS	09/13/1999	0							0.7				
SDBK-01/SWB	CS	09/13/1999	0	0.19 J	18.8	9.9	8.9	273	10.8			5.01	3.52	
SDBK-02/SWB	CS	09/24/1999	0	0.04 J	1.4	0.91 J	4	88.6	0.89 J			2.34	4.47	
SDBK-02/SWB	CS	09/24/1999	0							4.3	6.99			
SDBK-02/SWB	ES	09/24/1999	0	0.04 J	1.1 J	0.92 J	2.9	97.9	0.72 J			2.17	3.66	
SDBK-02/SWB	ES	09/24/1999	0							0.9				
SDBK-04/SWB	CS	09/25/1999	0	0.14 J	6.3	4.2 J	7	385	4.5			2.24	7.82	
SDBK-04/SWB	CS	09/25/1999	0							5.6				
SDBK-04/SWB	ES	09/25/1999	0							2.9				
SDBK-04/SWB	ES	09/25/1999	0	0.11 J	4	4.6 J	7.3	419	3.3 J			1.25	32.3	
SDBK-05/SWB	CS	09/25/1999	0							3.4				
SDBK-05/SWB	CS	09/25/1999	0	0.02 U	11.8	5.1 J	14.2 J	871	12.8			19.5	62.8	
SDBK-05/SWB	ES	09/25/1999	0							4.6				
SDBK-05/SWB	ES	09/25/1999	0	0.02 U	20.6	5.9 J	20.2 J	**1420**	22.2			26.6	**107**	
SDBK-06/SWB	CS	09/14/1999	0	0.35 J	12.9	10.1	10.8 J	463 J	12.7			38.5	21.6	
SDBK-06/SWB	CS	09/14/1999	0							3.5				
SDBK-06/SWB	ES	09/14/1999	0							6.5				
SDBK-06/SWB	ES	09/14/1999	0	0.37 J	15.4	12.9	12.9 J	536 J	14.7			15.4	62.1	
SDBK-07/SWB	CS	09/23/1999	0	0.23 J	9.8	7.5	11.1 J	695 J	10.3 J			4.02	10.8	
SDBK-07/SWB	CS	09/23/1999	0							4.6				
SDBK-07/SWB	ES	09/23/1999	0							5.3				
SDBK-07/SWB	ES	09/23/1999	0	0.15 J	6.5	4.6 J	13.4 J	508 J	3.9 J			0.656	14.4	
SDBK-08/SWB	ES	09/24/1999	0							4	6.08			
SDBK-08/SWB	ES	09/24/1999	0	0.69	13.5	8.1 J	13.8	759	16.1			6.38	19.5	
SDBK-08/SWB	CS	09/24/1999	0							4.3				
SDBK-08/SWB	CS	09/24/1999	0	0.68	11.9	8.6 J	13.7	639	13.1			5.01	14.7	
SDBK-09/SWB	CS	09/16/1999	0	0.16 J	6	3.9 J	8.7 J	261 J	3.6 J			2.73	3.73	
SDBK-09/SWB	CS	09/16/1999	0							1				
SDBK-09/SWB	ES	09/16/1999	0	0.07 J	6.3	3.6 J	8.2 J	225 J	4 J			1.89	3.41	
SDBK-09/SWB	ES	09/16/1999	0							0.6				
SDBK-10/SWB	CS	09/16/1999	0	0.31 J	15.3	8.4	18.7 J	501 J	11.3 J			4.39	12	
SDBK-10/SWB	CS	09/16/1999	0							1.8				

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Sediment - Area: Background

Location	Sample Type	Date	Depth In Feet	Cadmium mg/kg	Chromium mg/kg	Cobalt mg/kg	Lead mg/kg	Manganese mg/kg	Nickel mg/kg	Polon'm210 pCi/g	Radium 226 pCi/g	Sulfate mg/kg	U Calc'd mg/kg	- - - -
SDBK-10/SWB	ES	09/16/1999	0	0.31 J	19	9.4	12.3 J	674 J	13.7 J			5.97	11	
SDBK-10/SWB	ES	09/16/1999	0							4.1				
SDBK-12/SWB	CS	09/17/1999	0	0.11 J	7.7	4.4 J	11.9 J	228 J	4.9 J			1.56	6.53	
SDBK-12/SWB	CS	09/17/1999	0							1.7				
SDBK-12/SWB	ES	09/17/1999	0	0.08 J	5.1	3 J	9.9 J	189 J	3 J			2.13	2.93	
SDBK-12/SWB	ES	09/17/1999	0							0.8				
SDBK-14/SWB	CS	09/23/1999	0							4.6	5.82			
SDBK-14/SWB	CS	09/23/1999	0	0.14 J	7	4.6 J	9.8	496	5			2.68	66.2	
SDBK-14/SWB	ES	09/23/1999	0	0.13 J	6.4	3.9 J	8.9	447	4.8			2.98	17.2	
SDBK-14/SWB	ES	09/23/1999	0							4.3				
SDBK-15/SWB	CS	09/15/1999	0	0.22 J	9.7	4.9 J	12.6 J	404 J	6.7			11.7	38	
SDBK-15/SWB	CS	09/15/1999	0							6.4				
SDBK-15/SWB	ES	09/15/1999	0	0.29 J	10.8	5 J	14.5 J	708 J	8.7			7.18	57.5	
SDBK-15/SWB	ES	09/15/1999	0							7.9				
SWBK-11/SDB	CS	09/22/1999	0	0.2 J	17	12.9	9.4 J	332 J	18.5 J			168	6.88	
SWBK-11/SDB	CS	09/22/1999	0							3.7				
SWBK-11/SDB	ES	09/22/1999	0	0.16 J	15.2	13	9.4 J	402 J	15.7 J			97.4	6.96	
SWBK-11/SDB	ES	09/22/1999	0							2.3				
SWBK-13/SDB	CS	09/22/1999	0	0.06 J	7.2	5.4 J	6.9 J	235 J	5.1 J			1.08	4.88	
SWBK-13/SDB	CS	09/22/1999	0							1.2	1.76			
SWBK-13/SDB	ES	09/22/1999	0	0.05 J	6.3	4 J	5 J	218 J	5.1 J			1.11	5.2	
SWBK-13/SDB	ES	09/22/1999	0							1.3				
SWBK-16/SDB	CS	09/15/1999	0	0.09 J	4.6	3.2 J	6.6 J	247 J	2.9 J			2.16	8.14	
SWBK-16/SDB	CS	09/15/1999	0							1				
SWBK-16/SDB	ES	09/15/1999	0	0.09 J	4.9	2.9 J	5.2 J	194 J	2.6 J			1.93	6.47	
SWBK-16/SDB	ES	09/15/1999	0							1.8				
SWBK-17	CS	09/30/2000	0	0.12 J	16.2	7 J	14.1	413	17.2			77.6	10.8 J	
SWBK-17	CS	09/30/2000	0							2.1				
SWBK-17	ES	09/30/2000	0	0.25 J	22.9	13.9	13.2	483	**25.6**			119	9.73 J	
SWBK-17	ES	09/30/2000	0							2.3				
SWBK-18	ES	09/30/2000	0							3.1				
SWBK-18	ES	09/30/2000	0	0.05 UJ	12.2	6.6	13.2	178	7.8			9.28	8.92 J	
SWBK-18	CS	09/30/2000	0	0.05 UJ	9.9	9.4	13.4	428	7.1			40.4	9.2 J	
SWBK-18	CS	09/30/2000	0							3.7				

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Sediment - Area: Background

Location	Sample Type	Date	Depth In Feet	Cadmium mg/kg	Chromium mg/kg	Cobalt mg/kg	Lead mg/kg	Manganese mg/kg	Nickel mg/kg	Polon'm210 pCi/g	Radium 226 pCi/g	Sulfate mg/kg	U Calc'd mg/kg	- - - -
SWBK-19	CS	09/30/2000	0	0.05 UJ	22.3	12.7	9.7	259	16.5			6.46	2.85 J	
SWBK-19	CS	09/30/2000	0							1.2				
SWBK-19	ES	09/30/2000	0							1.6				
SWBK-19	ES	09/30/2000	0	0.07 J	23.1	13.1	12	201	19			10.1	3.46 J	
SWBK-23/SDB	ES	09/29/2000	0	0.12 J	9.4	6.3 J	17.9	199	11.4			30.8	16 J	
SWBK-23/SDB	ES	09/29/2000	0							10				
SWBK-23/SDB	CS	09/29/2000	0							**18**				
SWBK-23/SDB	CS	09/29/2000	0	0.31 J	14.6	9.3 J	**21**	181	**23.8**			86.3	17.2 J	
SWNW-01/SD	ES	09/14/1999	0							5.8				
SWNW-01/SD	ES	09/14/1999	0	0.24 J	10.9	7.7	12.5 J	856 J	9.4			12.3	49	
SWNW-01/SD	CS	09/14/1999	0							5	6.48 J			
SWNW-01/SD	CS	09/14/1999	0	0.27 J	12.6	8.4	12.5 J	666 J	9.3			16.9	28.3	
SWNW-02/SD	ES	09/14/1999	0							7.4				
SWNW-02/SD	ES	09/14/1999	0	0.12 J	5.4	2.7 J	8	192	5.3 J			185	49.5	
SWNW-02/SD	CS	09/14/1999	0							3.6				
SWNW-02/SD	CS	09/14/1999	0	0.1 J	5.6	3.4 J	7.2	296	4.3 J			40.3	14.3	
SWNW-03/SD	CS	09/13/1999	0	0.25 J	15	9.5	10	337	12.2			21.1	2.38	
SWNW-03/SD	CS	09/13/1999	0							1.2				
SWNW-03/SD	ES	09/13/1999	0							2.3				
SWNW-03/SD	ES	09/13/1999	0	0.34 J	17.7	12.1	12.9	451	16.6			44.2	3.68	

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Sediment - Area: Blue Creek & Tributaries

Location	Sample Type	Date	Depth In Feet	Cadmium mg/kg	Chromium mg/kg	Cobalt mg/kg	Lead mg/kg	Manganese mg/kg	Nickel mg/kg	Polon'm210 pCi/g	Radium 226 pCi/g	Sulfate mg/kg	U Calc'd mg/kg	- - - -
BC01SW/BC01	ES	04/01/1998									3.33 U			
BC01SW/BC01	ES	04/01/1998		0.27 U	9.9	4.6 J	8.4	447	10.7					
BC01SW/BC01	CS	09/28/1999	0							0.9				
BC01SW/BC01	CS	09/28/1999	0	0.03 J	7.7	5.7 J	6.7	495	12.5			**755**	5.97	
BC02SW/BC02	ES	04/01/1998									0.53 U			
BC02SW/BC02	ES	04/01/1998		0.27 U	11.1	5.9 J	9	593	13.1					
BC03SW/BC03	ES	04/01/1998		0.29 U	8	6.5 J	8	602	16					
BC03SW/BC03	ES	04/01/1998									0.598 U			
BC04SW/BC04	ES	04/01/1998									0.41 U			
BC04SW/BC04	ES	04/01/1998		1 J	10.6	**16.5 J**	10.8	**3670**	**51.4**					
BC04SW/BC04	CS	09/28/1999	0							1.7				
BC04SW/BC04	CS	09/28/1999	0	0.08 J	2.9 U	3.5 J	4.4	585	9.4			**563**	7.93	
BC05SW/BC05	ES	04/01/1998		0.71 J	13	11 J	13.3	**1600**	**38.9**					
BC05SW/BC05	ES	04/01/1998									2.937			
BC05SW/BC05	CS	09/29/1999	0	0.19 J	2.2 U	3.8 J	3.3	915	12.9			**501**	10.1	
BC05SW/BC05	CS	09/29/1999	0							3.2				
BC06SW/BC06	ES	04/01/1998									0.594 U			
BC06SW/BC06	ES	04/01/1998		0.74 J	5.4	7.2 J	6.3	**2510**	**30.9**					
BC07SW/BC07	ES	04/01/1998		0.25 U	3.4	4.1 J	4.9	1090	14.9					
BC07SW/BC07	ES	04/01/1998									2.217			
BC08SW/BC08	ES	04/01/1998		0.42 J	4.4	5.2 J	5.6	**2010**	**24.3**					
BC08SW/BC08	ES	04/01/1998									0.395 U			
BC09SW/BC09	ES	04/01/1998									0.655 U			
BC09SW/BC09	ES	04/01/1998		1 J	4.9	6.2 J	5.6	**3600**	**44.4**					
BC09SW/BC09	CS	09/29/1999	0							3				
BC09SW/BC09	CS	09/29/1999	0	**1.1**	3.3 U	5 J	4.6	**3690**	**41.7**			**710**	13.6	
BC10SW/BC10	ES	04/01/1998									2.692			
BC10SW/BC10	ES	04/01/1998		0.24 U	2.9	2 J	6.1	170	1.9 J					
BC10SW/BC10	CS	09/30/1999	0							1.7				
BC10SW/BC10	CS	09/30/1999	0	0.02 U	2.3	1.2 J	3.9 J	126	1.1 J			2.43	10.2	
MMSED-BD1/	ES	10/25/1998	0	0.3	2	2.8	4 U	**1570**	9				8.72	
MMSED-BD1/	ES	10/25/1998	0.2	0.3	2.2	2.3	4	660	5				14.7	
MM-SED-BD1/	ES	09/26/1998	0	**9.6**	10.3	**139**	40 U	**63300**	**460**				89.9	
MM-SED-BD1	ES	09/26/1998	0	0.4	2.9	2.75	5	**1370**	13				13.2	

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Sediment - Area: Blue Creek & Tributaries

Location	Sample Type	Date	Depth In Feet	Cadmium mg/kg	Chromium mg/kg	Cobalt mg/kg	Lead mg/kg	Manganese mg/kg	Nickel mg/kg	Polon'm210 pCi/g	Radium 226 pCi/g	Sulfate mg/kg	U Calc'd mg/kg	- - - -
MM-SED-BD1	ES	09/26/1998	0.2	0.6	2.4	2.96	5	**1400**	**30**				12.9	
MMSED-BD2/	ES	10/25/1998	0	0.3	1.9	2	4	560	10				3.58	
MMSED-BD2/	ES	10/25/1998	0.2	0.3	1.4	2	4 U	560	10				7.21	
MMSED-BD2-	ES	10/25/1998	0	0.5	2.9	3.5	5	**1480**	21				18.6	
MMSED-BD2-	ES	10/25/1998	0	0.3	2.1	2.4	4 U	790	11				6.61	
MMSED-BD2-	ES	10/25/1998	0.2	0.5	2.4	3.5	5	1130	14				8	
MMSED-BD3-	ES	10/26/1998	0	0.5	3	4.3	4 U	**1600**	19				10.2	
MMSED-BD3-	ES	10/26/1998	0.2	0.5	2.8	4	4	**1240**	14				9.28	
MMSED-BU1/	ES	10/27/1998	0.2	0.2 U	1.6	1.2	4 U	116	1 U				2.68	
MMSED-BU1-	ES	10/27/1998	0	0.2 U	2.4	1.5	4 U	168	2				5.37	
MMSED-BU1-	ES	10/27/1998	0.2	0.2 U	1.6	1.3	5	116	1				5.12	
MMSED-BU2/	ES	10/27/1998	0	0.2 U	1.6	1	4 U	102	1 U				5.17	
MMSED-BU2-	ES	10/26/1998	0	0.2 U	1.8	1	7	124	1				10.2	
MMSED-BU2-	ES	10/26/1998	0.2	0.2 U	3	3.4	4	141	1				12	
MMSED-BU3/	ES	10/26/1998	0	0.2 U	1.8	1.1	4 U	150	1 U				6.86	
MMSED-BU3/	ES	10/26/1998	0.2	0.2 U	1.9	1.1	4 U	131	1 U				11.7	
MM-SED-BU3	ES	09/26/1998	0	1	3.1	**15**	4	**7480**	**32**				18.9	
MM-SED-BU3	ES	09/26/1998	0	0.1 U	2.7	1.52	4 U	147	1				6.63	
MM-SED-BU3	ES	09/26/1998	0.2	0.1 U	2.1	1.22	6	119	2				6.27	
RSBC-01	CS	10/01/2000	0	0.78 J	7.6	9.1	11	**2940**	**36.4**			**1347**	38.8 J	
RSBC-01	CS	10/01/2000	0							4.7				
RSBC-01	CS	08/13/2001	0	**1.1 J**	9.4	13.4	9.4	**1410**	**37.3**					
RSBC-02	CS	10/01/2000	0							3.8				
RSBC-02	CS	10/01/2000	0	**1.2 J**	8.9	13.6	13.2	**3780**	**53**			**1591**	45 J	
RSBC-02	CS	08/13/2001	0	1	5.7	5.4 J	5.3	**1580**	**34.8**					
RSBC-03	CS	10/01/2000	0							2.7				
RSBC-03	CS	10/01/2000	0	0.29 J	7	6.8	13.5	743	11.4			**1468**	37.2 J	
RSBC-04	CS	10/01/2000	0							2.5				
RSBC-04	CS	10/01/2000	0	0.91 J	7.5	**17.9**	12.4	**3210**	**42.5**			**584**	42.7 J	
RSBC-04	CS	08/13/2001	0	0.38 J	3.5	4.4 J	5.1	959	15.9					
RSBC-05	CS	10/01/2000	0							0.9				
RSBC-05	CS	10/01/2000	0	0.13 J	8.8	4.7	8.5	414	9.9			2.3	8.65 J	
SDBC-01/SWB	CS	09/28/1999	0							1				
SDBC-01/SWB	CS	09/28/1999	0	0.02 U	10.7	5.3	8.9	323	8.4			1.74	2.24	

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Sediment - Area: Blue Creek & Tributaries

Location	Sample Type	Date	Depth In Feet	Cadmium mg/kg	Chromium mg/kg	Cobalt mg/kg	Lead mg/kg	Manganese mg/kg	Nickel mg/kg	Polon'm210 pCi/g	Radium 226 pCi/g	Sulfate mg/kg	U Calc'd mg/kg	- - - -
SDBC-02/SWB	CS	09/27/1999	0	0.02 U	11.1	4.6 J	8.4 J	241	8.9			29.9	1.91	
SDBC-02/SWB	CS	09/27/1999	0							0.7				
TR01SD	ES	04/01/1998									0.415 U			
TR01SD	ES	04/01/1998		0.2 U	11.6	6.1 J	11.5	368	9.6					
TR02SD	ES	04/01/1998									0.451 U			
TR02SD	ES	04/01/1998		0.2 U	10.7	5.4 J	10.4	326	9					
TR03SD	ES	04/01/1998									1.71 U			
TR03SD	ES	04/01/1998		0.2 U	9.8	4.7 J	9.9	283	8.3					
TR04SD/TR04	ES	04/01/1998									0.358 U			
TR04SD/TR04	ES	04/01/1998		0.96 J	11.8	**20.2 J**	12.4	**2980**	**57.5**					
TR04SD/TR04	CS	09/28/1999	0							1.4				
TR04SD/TR04	CS	09/28/1999	0	0.02 U	9.6	5	14.3	369	7.5			2.76	5.89	
TR05SD/TR05	ES	04/01/1998		0.2 U	9.7	5.4 J	8.9	262	8.2					
TR05SD/TR05	ES	04/01/1998									1.8 U			
TR05SD/TR05	CS	09/28/1999	0	0.02 U	11.2	5.3	9.1	268	8.6			1.16	3.15	
TR05SD/TR05	CS	09/28/1999	0							1.5				
TR06SW/TR06	ES	04/01/1998		0.57 U	10.3	4.7 J	12.3	538	8.4 J					
TR06SW/TR06	ES	04/01/1998									0.43 U			
TR06SW/TR06	CS	09/29/1999	0	0.02 U	4.6	2.6 J	5.1	150	3.2 J			3.15	4.93	
TR06SW/TR06	CS	09/29/1999	0							1.2				
TR07SD	ES	04/01/1998									0.213 U			
TR07SD	ES	04/01/1998		0.25 U	2.4 J	2.9 J	9.1	314	2.1 J					

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Sediment - Area: Lake Roosevelt

Location	Sample Type	Date	Depth In Feet	Cadmium mg/kg	Chromium mg/kg	Cobalt mg/kg	Lead mg/kg	Manganese mg/kg	Nickel mg/kg	Polon'm210 pCi/g	Radium 226 pCi/g	Sulfate mg/kg	U Calc'd mg/kg	- -	- -
RL01SW/RL01	ES	04/01/1998		0.24 U	17.3	6.9 J	13.7	274	11.5						
RL01SW/RL01	ES	04/01/1998									1.738				
RL02SW/RL02	ES	04/01/1998									0.357 U				
RL02SW/RL02	ES	04/01/1998		0.25 U	13.8	4.6 J	9	141	9.9 J						

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Sediment - Area: Potentially Impacted Area East of Mined Area

Location	Sample Type	Date	Depth In Feet	Cadmium mg/kg	Chromium mg/kg	Cobalt mg/kg	Lead mg/kg	Manganese mg/kg	Nickel mg/kg	Polon'm210 pCi/g	Radium 226 pCi/g	Sulfate mg/kg	U Calc'd mg/kg	- - - -
EAST SEEP/S	CS	09/26/1999	0	0.31 J	20	**33.6**	**22.1 J**	**1220**	**40.1**			250	**1159**	
EAST SEEP/S	CS	09/26/1999	0							8.5				
ED02SW/ED02	ES	04/01/1998									7.42			
ED02SW/ED02	ES	04/01/1998		**7.1**	22.9	**29.1**	13.3	**16200**	**195**					
ED03SW/ED03	ES	04/01/1998		0.25 U	11.3	9.9 J	7.5	**1180**	12					
ED03SW/ED03	ES	04/01/1998									3.379			
ED04-SD/ED-2	CS	09/25/1999	0	0.84	20.7	**23.3**	11.6 J	**2490**	**30.7**			**1650**	57.4	
ED04-SD/ED-2	CS	09/25/1999	0							12				
ED04SW/ED04	ES	04/01/1998		0.41 U	**24.2**	**23.3**	15.3	524	**34.9**					
ED04SW/ED04	ES	04/01/1998									1.87 U			
ED05SW/ED05	ES	04/01/1998		0.5 J	18.3	**19.2**	12.2	**2240**	23.4					
ED05SW/ED05	ES	04/01/1998									0.751 U			
ED-4A/SDED-	CS	09/10/1999	0	0.72	16.2	14	9.8	**1450 J**	21.6			**940**	24.2	
ED-4A/SDED-	CS	09/10/1999	0							6.2				
ED-4A/SDED-	CS	10/02/2000	0							5.8				
ED-4A/SDED-	CS	10/02/2000	0	0.57 J	12.2	11.2	7.7	**1590**	16.4			**823**	18.5 J	
ES01SP/ES01S	ES	04/01/1998									1.38 U			
ES01SP/ES01S	ES	04/01/1998		0.69 U	**24.7**	7.5 J	15.4	199	20.6 J					
ES02SP/ES02S	ES	04/01/1998									12.93			
ES02SP/ES02S	ES	04/01/1998		0.37 J	16.1	13	8	889	17.8					
MM-SED-E1/E	ES	09/30/1998	0	0.4	7.2	6.02	4	924	13				8.7	
MM-SED-E1/E	ES	09/30/1998	0.2	0.4	5.4	5.19	4 U	804	9				5.4	
MM-SED-E1-D	ES	09/29/1998	0	0.7	12.3	9.4	5	**1250**	14				12.6	
MM-SED-E1-D	ES	09/29/1998	0.2	0.4	9.6	7.94	4 U	970	12				9.84	
MM-SED-E2-D	ES	09/30/1998	0	**1.7**	8.2	9.93	4 U	**6040**	**64**				17.1	
MM-SED-E2-D	ES	09/30/1998	0.2	**6.1**	9.8	**17.9**	6	**18600**	**169 J**				50.9	
OF01SW/OF01	ES	04/01/1998									1.63 U			
OF01SW/OF01	ES	04/01/1998		0.75 J	**39.2**	**23.1**	**32.7**	**3090**	**37.1**					
RSED-01	CS	10/02/2000	0							9.4				
RSED-01	CS	10/02/2000	0	0.51 UJ	22.3	8.4	14.3	347	16.9			**952 J**	22.3 J	
RSED-02	CS	10/02/2000	0							6.9				
RSED-02	CS	10/02/2000	0	0.5 J	12.1	4.9 J	**21.3**	614	9			**1551 J**	21.4 J	
RSED-03	CS	10/01/2000	0							13				
RSED-03	CS	10/01/2000	0	**3.8 J**	16.9	**21.8**	16.8	**7500**	**129**			**1784**	**126 J**	

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Sediment - Area: Potentially Impacted Area East of Mined Area

Location	Sample Type	Date	Depth In Feet	Cadmium mg/kg	Chromium mg/kg	Cobalt mg/kg	Lead mg/kg	Manganese mg/kg	Nickel mg/kg	Polon'm210 pCi/g	Radium 226 pCi/g	Sulfate mg/kg	U Calc'd mg/kg	- - - -
RSED-03	CS	08/13/2001	0	**10.8**	**26.2**	**29.5**	18	**17100**	**237**					
RSED-04	CS	10/09/2000	0	0.61 UJ	9.5	12.2	16.7	1090	**24.3**			**2130 J**	35.4 J	
RSED-04	CS	10/09/2000	0							1				
RSED-05	CS	10/10/2000	0	0.5 UJ	19.4	9.2 J	14.4	477	18.5			**1775 J**	20.4 J	
RSED-05	CS	10/10/2000	0							9.5				
SDBK-03/SWB	CS	09/27/1999	0							1.6				
SDBK-03/SWB	CS	09/27/1999	0	0.02 U	5	4.6	7.8 J	298	3.8			9.11	34.1	
SDBK-03/SWB	ES	09/27/1999	0							2.6				
SDBK-03/SWB	ES	09/27/1999	0	0.02 U	5.2	3.4 J	6.3 J	331	4			2.47	16.1	
SDED-01	CS	09/26/1999	0							12				
SDED-01	CS	09/26/1999	0	0.75	19.5	**20**	11.8 J	**1960**	**26.7**			**1780**	57.5	
SDED-07	CS	09/27/1999	0							9.5				
SDED-07	CS	09/27/1999	0	0.14 J	18.1	10.2	15.5 J	485	14.6			**1310**	31.9	
SDND-01/SWN	CS	09/11/1999	0							6.9				
SDND-01/SWN	CS	09/11/1999	0	0.34 J	20.8	**14.9**	9.3	487 J	15.1			5.92	19.8	
SDND-01/SWN	CS	10/03/2000	0							6.9				
SDND-01/SWN	CS	10/03/2000	0	0.41 UJ	21.3	**17.3**	10.6	722	18.6			3.6 J	19.3 J	
SDNE-01/SWN	CS	09/11/1999	0							**48**				
SDNE-01/SWN	CS	09/11/1999	0	0.35 J	**32.7**	**18.6**	15.3	548 J	**36.4**			3.95	**190**	
SDNE-01/SWN	CS	10/03/2000	0	0.37 UJ	**25.3**	**18.3**	14.7	562	**32**			4.7 J	**174 J**	
SDNE-01/SWN	CS	10/03/2000	0							**69**				
SDNE-02/SWN	CS	09/27/1999	0	0.02 U	22.2	**15.2**	**23.8 J**	766	19.3			4.69	41.9	
SDNE-02/SWN	CS	09/27/1999	0							14				
SDNE-02/SWN	CS	10/03/2000	0	0.51 UJ	21.3	**23.1**	19.9	806	21			5.72 J	34.3 J	
SDNE-02/SWN	CS	10/03/2000	0							15				
SW-02/SDED-	CS	09/26/1999	0	0.71	22.6	**20.9**	11.3 J	**2140**	**32**			**1650**	53.7	
SW-02/SDED-	CS	09/26/1999	0							8.9				
SW-02/SDED-	CS	10/02/2000	0	**1.1 J**	19.5	**19**	11.4	**2280**	**27.5**			**1128 J**	47.4 J	
SW-02/SDED-	CS	10/02/2000	0							9.9				
SW-06/ED01-S	ES	04/01/1998		**9.6**	**27**	**35.9**	16.5	**24300**	**309**					
SW-06/ED01-S	ES	04/01/1998									0.123 U			
SW-06/ED01-S	CS	09/09/1999	0							8.3	**20 J**			
SW-06/ED01-S	CS	09/09/1999	0	**14.4**	23.1	**31.9**	16.1	**33600 J**	**516**			**1620**	**138**	
SWED-01/SDE	CS	09/10/1999	0	0.65	13.6	9.6	8.1	923 J	16			**1250**	20.4	

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Sediment - Area: Potentially Impacted Area East of Mined Area

Location	Sample Type	Date	Depth In Feet	Cadmium mg/kg	Chromium mg/kg	Cobalt mg/kg	Lead mg/kg	Manganese mg/kg	Nickel mg/kg	Polon'm210 pCi/g	Radium 226 pCi/g	Sulfate mg/kg	U Calc'd mg/kg	- - - -
SWED-01/SDE	CS	09/10/1999	0							5.8				
SWED-01/SDE	CS	10/02/2000	0	0.48 J	9	7.5	7.3	**1190**	13.9			**640**	10.5 J	
SWED-01/SDE	CS	10/02/2000	0							2.9				
SWED-02/SDE	CS	09/10/1999	0	**9.7**	17.3	**20.9**	10.4	**21200 J**	**289**			**1330**	38.6	
SWED-02/SDE	CS	09/10/1999	0							4.1				
SWEHR/SDEH	CS	09/30/2000	0	0.05 UJ	6.9	3 J	8.1	261	4.9			6.32	21.1 J	
SWEHR/SDEH	CS	09/30/2000	0							4.9				
TC050	ES	10/22/1998	0.5								**38.81**			
TC050	ES	10/27/1998	0								**43.61**			
TD000	ES	10/22/1998	0								**16.88**			
TD000	ES	10/22/1998	0.5								12.67			
TF400	ES	10/22/1998	0								**25.85**			
TF400	ES	10/22/1998	0.5								8.33			

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Sediment - Area: Potentially Impacted Area South of Mined Area

Location	Sample Type	Date	Depth In Feet	Cadmium mg/kg	Chromium mg/kg	Cobalt mg/kg	Lead mg/kg	Manganese mg/kg	Nickel mg/kg	Polon'm210 pCi/g	Radium 226 pCi/g	Sulfate mg/kg	U Calc'd mg/kg	- - - -
CD SEEP/SDC	ES	04/01/1998		**10.2**	**33.1**	**382**	**49.9**	**6910**	**502**					
CD SEEP/SDC	ES	04/01/1998									**262.7**			
CD SEEP/SDC	CS	09/09/1999	0							**94**				
CD SEEP/SDC	CS	09/09/1999	0	**5.3**	19.1	**144**	**30**	**4650 J**	**230**			**2400**	**1808**	
CD01SD	ES	04/01/1998		**1.6**	11.2	**99.2**	15	**1220**	**230**					
CD01SD	ES	04/01/1998									1.08 U			
CD02SD	ES	04/01/1998		**2.8**	**25**	**20.3 J**	13.4	**4710**	**81.5**					
CD02SD	ES	04/01/1998									0.913 U			
CD03SD	ES	04/01/1998									5.974			
CD03SD	ES	04/01/1998		**1.4 J**	**23.7**	**142**	13.3	**5200**	**98**					
CD-11	ES	04/01/1998		0.25 U	6.1	11.8 J	9.4	983	14					
CD-11	ES	04/01/1998									0.545 U			
MM-SED-W1/	ES	10/01/1998	0	1	7.3	7.2	5	910	23				**234**	
MM-SED-W1/	ES	10/01/1998	0.2	0.8	3.6	4.05	10	550	18				**330**	
MM-SED-W1-	ES	09/25/1998	0	0.9	5.2	11.2	10	800	19				**293**	
MM-SED-W1-	ES	09/25/1998	0.2	0.4	3.5	6.24	5	540	**26**				**153**	
MM-SED-W2-	ES	10/01/1998	0	0.9	7	9.78	7	**2910**	**28**				**177**	
MM-SED-W2-	ES	10/01/1998	0.2	0.6	6.1	10.3	20	**3130**	20				**180**	
RSCD-01	CS	10/03/2000	0	**3.6**	18.2	**84.5**	**22.4**	**2090**	**170**			28.4 J	**2271 J**	
RSCD-01	CS	10/03/2000	0							**31**				
RSCD-01	CS	08/14/2001	0	**4.3**	21.6	**114**	**23.4**	**1550**	**281**					
RSCD-01	CS	08/14/2001	0								**41.1**			
RSCD-02	CS	10/03/2000	0	**1.6 J**	11.4	**28.9**	13.4	**3970**	**43.6**			**511 J**	**460 J**	
RSCD-02	CS	10/03/2000	0							9.1				
RSCD-02	CS	08/14/2001	0	**1.5 J**	15.9	**47.5**	18.7	**3180**	**57.2**					
RSWD-01	CS	10/09/2000	0							3.6				
RSWD-01	CS	10/09/2000	0	0.22 UJ	6.1	5.4	8.1	563	7.5			18.3 J	35.4 J	
RSWD-02	CS	10/04/2000	0							14				
RSWD-02	CS	10/04/2000	0	0.49 UJ	11.7	8.2	15.6	**1270**	18.1			**2404 J**	84.7 J	
RSWD-02	CS	08/15/2001	0								8.6			
RSWD-03	CS	10/09/2000	0	0.51 J	**27.9**	4.9 J	9	72.3	8.9 U			**579 J**	**113 J**	
RSWD-03	CS	10/09/2000	0							16				
RSWD-03	CS	08/15/2001	0								**16.1**			
RSWD-03	CS	08/15/2001	0	0.41 UJ	7.9	**17.5**	13.2	**1810**	20.1					

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Sediment - Area: Potentially Impacted Area South of Mined Area

Location	Sample Type	Date	Depth In Feet	Cadmium mg/kg	Chromium mg/kg	Cobalt mg/kg	Lead mg/kg	Manganese mg/kg	Nickel mg/kg	Polon'm210 pCi/g	Radium 226 pCi/g	Sulfate mg/kg	U Calc'd mg/kg	- - - -
RSWD-04	CS	10/09/2000	0							14				
RSWD-04	CS	10/09/2000	0	0.38 UJ	7.4	**16.7**	11.2	**2500**	14.3			**640 J**	**113 J**	
RSWD-04	CS	08/15/2001	0	0.26 UJ	9.2	6	11.5	718	10.1					
SDCD-02/SW-	CS	09/12/1999	0	**1.4**	7.6	12.3	15.1	**1620**	**23.7**			**438**	**228**	
SDCD-02/SW-	CS	09/12/1999	0							2.5				
SDCD-03	CS	09/11/1999	0	**1.6**	13.6	**24.9**	**20.9**	**2470**	**39**			205	**1017**	
SDCD-03	CS	09/11/1999	0							6.7				
SWWD-01/SD	CS	09/11/1999	0	0.19 J	3.6	7.1	7.3	661	9.6			15.5	62.4	
SWWD-01/SD	CS	09/11/1999	0							4.6				
WD01SD	ES	04/01/1998		0.22 U	4.6	7.3 J	6.3	533	6.9 J					
WD01SD	ES	04/01/1998									0.593 U			
WD02SD	ES	04/01/1998		0.2 U	2.6	5.2 J	6.4	443	5.9 J					
WD02SD	ES	04/01/1998									0.453 U			
WDAC/SDWD	CS	09/12/1999	0							3.8				
WDAC/SDWD	CS	09/12/1999	0	**1.2**	10.8	**33.5**	15.4	**12900**	**39**			**972**	**185**	
WDSEEP/SDW	ES	04/01/1998									3.001			
WDSEEP/SDW	ES	04/01/1998		0.26 U	3.4	10.9 J	8.5	509	3.6 J					
WDSEEP/SDW	CS	09/08/1999	0							5.3				
WDSEEP/SDW	CS	09/08/1999	0	0.12 J	3.7	**21.3**	10	789 J	6.1			**770**	**294**	

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Sediment - Area: Potentially Impacted Area West of Mined Area

Location	Sample Type	Date	Depth In Feet	Cadmium mg/kg	Chromium mg/kg	Cobalt mg/kg	Lead mg/kg	Manganese mg/kg	Nickel mg/kg	Polon'm210 pCi/g	Radium 226 pCi/g	Sulfate mg/kg	U Calc'd mg/kg	- - - -
SDFW-01/SWF	CS	09/09/1999	0							**18**	**21.3 J**			
SDFW-01/SWF	CS	09/09/1999	0	0.25 J	6.5	5 J	11.9	469 J	6.7			20.4	57.6	
SDSW-01/SWS	CS	09/11/1999	0	0.26 J	6.1	4.8 J	11.2	598 J	5.6			20.6	22.1	
SDSW-01/SWS	CS	09/11/1999	0							9.3				
SDSW-01/SWS	ES	10/02/2000	0	0.3 UJ	7.3	5 J	11.4	592	8.6			21.7 J	22.8 J	
SDSW-01/SWS	ES	10/02/2000	0							11				
TM250	ES	10/22/1998	0								**14.61**			
TM250	ES	10/22/1998	0.5								**17.42**			

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Groundwater - Area: Background

Location	Sample Type	Date	Depth In Feet	D.Aluminum ug/l	D.Antimony ug/l	D.Chromium ug/l	D.Cobalt ug/l	D.Iron ug/l	D.Mang'nse ug/l	D.Nickel ug/l	D.Zinc ug/l	Sulfate mg/l	U234 pCi/l	- -	- -
MWBA-02	ES	09/28/1999											12.6		
MWBA-02	ES	09/28/1999		4.8 J	2.8 J	0.4 UJ	1.4 UJ	8.4 UJ	37.9 J	0.5 UJ	1.4 UJ				
MWBA-02	ES	04/15/2000											1.28		
MWBA-02	ES	04/15/2000		35.3 J	2.7 U	1.1 U	1.2 U	17.6 U	1.6 J	0.9 UJ	0.4 U				
MWBA-02	ES	10/16/2000		8.4 UJ	0.12 J	1.1 U	1 U	16.2 U	254	1.8 U	1.8 U				
MWBA-02	ES	10/16/2000											7.63		
MWBA-03	ES	09/28/1999		26.6 U	2.2 U	1.3 J	0.5 U	25.2 J	14.6 J	5.5 J	5.5 UJ				
MWBA-03	ES	09/28/1999											2.13		
MWBA-03	ES	04/17/2000		554 U	2.7	3.9 J	1.2 U	402	5.9 J	3.6 J	2 J				
MWBA-03	ES	04/17/2000											2.71		
MWBA-03	ES	10/18/2000		8.4 UJ	0.12 J	6.2 J	1 U	33.9 J	4.2 J	7.1 J	1 U				
MWBA-03	ES	10/18/2000											0.468		
MWBA-04	ES	10/07/1999		33.2 UJ	2.2 U	0.4 U	0.5 U	74.3 J	53	0.5 U	68.7				
MWBA-04	ES	10/07/1999											5.48 J		
MWBA-04	ES	04/15/2000											2.15		
MWBA-04	ES	04/15/2000		18.5 J	2.7 U	1.1 U	1.2 U	37.4 J	84.7	0.9 UJ	2 J				
MWBA-04	ES	10/16/2000											1.24		
MWBA-04	ES	10/16/2000		8.4 UJ	0.12 J	1.1 U	1 U	16.2 U	18.7	1.8 U	1 U				
MWBA-05	ES	10/13/1999		365	2.2 U	0.43 U	0.5 U	236	53.2	0.5 UJ	3.8 UJ				
MWBA-05	ES	10/13/1999											4.77		
MWBA-05	ES	04/21/2000		3000	2.7 U	1.1 J	1.2 U	1880	16.8	2 J	2.7 J				
MWBA-05	ES	04/21/2000											4.4		
MWBA-05	ES	10/16/2000		884	0.13 J	1.1 U	1 U	469	20.8	1.8 U	4.3 J				
MWBA-05	ES	10/16/2000											3.23		
MWBA-06	ES	10/07/1999		18 UJ	2.2 U	4.6 J	2.1 UJ	83.1 J	1930	4.4 U	98.3				
MWBA-06	ES	10/07/1999											2.18		
MWBA-06	ES	04/20/2000											2.04		
MWBA-06	ES	04/20/2000		3280	2.7 U	1.2 J	1.2 U	2350	20.6	2 J	5.9 J				
MWBA-06	ES	10/17/2000											2		
MWBA-06	ES	10/17/2000		8.4 UJ	0.1 U	1.1 U	1 U	17.3 J	725	1.8 U	3.6 J				
MWBA-07	ES	10/11/1999		1400	2.2 U	1.5 J	**7.2 J**	2070	907	2.1 U	17.5 UJ				
MWBA-07	ES	10/11/1999											0.54		
MWBA-07	ES	04/20/2000											1.16		
MWBA-07	ES	04/20/2000		3780	3.8	1.9 J	1.2 U	2860	24.4	3.4 J	5 J				

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Groundwater - Area: Background

Location	Sample Type	Date	Depth In Feet	D.Aluminum ug/l	D.Antimony ug/l	D.Chromium ug/l	D.Cobalt ug/l	D.Iron ug/l	D.Mang'nse ug/l	D.Nickel ug/l	D.Zinc ug/l	Sulfate mg/l	U234 pCi/l	- -	- -
MWBA-07	ES	10/17/2000		802	0.1 U	1.1 U	1 U	465	44	1.8 U	0.57 U				
MWBA-07	ES	10/17/2000											0.297		
MWBA-08	ES	10/11/1999											2.47		
MWBA-08	ES	10/11/1999		90.2 U	2.2 U	0.4 U	1.1 U	59.3 U	124	1.4 U	5.2 UJ				
MWBA-08	ES	04/16/2000		2860 U	2.7	1.8 J	1.2 U	2360	15.9	1.9 J	6.6 J				
MWBA-08	ES	04/16/2000											2.77		
MWBA-08	ES	10/24/2000		103	0.19 J	1.1 U	1 U	100	9.4 J	1.8 U	0.66 U				
MWBA-08	ES	10/24/2000											2.88		
MWBA-09	ES	04/16/2000		189	3.1	1.1 U	1.2 U	176	4.8 J	0.9 U	1 J				
MWBA-09	ES	04/16/2000											0.248		
MWBA-09	ES	10/24/2000		1650	0.25 J	1.1 J	1 U	1050	22.4	1.8 U	4.2 J				
MWBA-09	ES	10/24/2000											1.67		
MWBA-10	ES	10/11/1999											0.651		
MWBA-10	ES	10/11/1999		47.2 U	2.2 U	0.4 U	4.1 J	22.8 U	611	3.5 J	36.6 U				
MWBA-10	ES	04/16/2000		1550	**5.2**	1.8 J	1.2 U	1340	11.2 J	1.5 U	2.9 J				
MWBA-10	ES	04/16/2000											3.33		
MWBA-10	ES	10/24/2000		248	0.1 U	1.1 U	1 U	184	4 J	1.8 U	2.7 J				
MWBA-10	ES	10/24/2000											0.172		
MWBB-01	ES	10/08/1999											**37.2**		
MWBB-01	ES	10/08/1999		583 J	2.2 U	2.2 J	0.5 U	549 J	34.6	2.3 U	33.4 U				
MWBB-01	ES	04/19/2000		302	2.7 U	1.1 U	1.2 U	185	10.2 J	1.2 UJ	8.5 J				
MWBB-01	ES	04/19/2000											3.32		
MWBB-01	ES	10/23/2000		88.5	0.1 U	1.1 U	1 U	51.7 J	5 J	1.8 U	7.1 J				
MWBB-01	ES	10/23/2000											1.85		
MWBB-02	ES	10/08/1999		21.2 J	2.2 U	0.4 U	0.5 U	10.3 J	27.6	0.78 U	22.6 U				
MWBB-02	ES	10/08/1999											1.77		
MWBB-02	ES	04/20/2000		26.2 U	2.7 U	1.1 U	1.2 U	17.6 U	1 J	0.9 U	0.4 U				
MWBB-02	ES	04/20/2000											2.09		
MWBB-02	ES	10/17/2000											1.98		
MWBB-02	ES	10/17/2000		8.4 UJ	0.1 U	1.1 U	1 U	16.2 U	1.4 J	1.8 U	0.3 U				
MWBB-03	ES	10/09/1999		1550 J	2.2 UJ	11.4 J	1.4 J	1530 J	151 J	13.9 J	76.5 J				
MWBB-03	ES	10/09/1999											27.6		
MWBB-03	ES	04/19/2000		52.3 U	2.7 U	1.1 U	1.2 U	17.6 U	10.8 J	0.9 U	0.4 U				
MWBB-03	ES	04/19/2000											20		

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Groundwater - Area: Background

Location	Sample Type	Date	Depth In Feet	D.Aluminum ug/l	D.Antimony ug/l	D.Chromium ug/l	D.Cobalt ug/l	D.Iron ug/l	D.Mang'nse ug/l	D.Nickel ug/l	D.Zinc ug/l	Sulfate mg/l	U234 pCi/l	- -	- -
MWBB-03	ES	10/24/2000		8.4 UJ	0.13 J	2.2 J	1 U	16.2 U	8 J	1.8 UJ	2.7 J				
MWBB-03	ES	10/24/2000											19		
MWBB-04	ES	10/08/1999		26 J	2.2 U	7 J	1 J	16000 J	743	8.3 J	181				
MWBB-04	ES	10/08/1999											0.734		
MWBB-04	ES	04/19/2000		5.4 UJ	2.7 U	1.1 U	1.2 U	15500	605	0.9 UJ	0.73 J				
MWBB-04	ES	04/19/2000											0.117		
MWBB-04	ES	10/23/2000		8.4 UJ	0.1 U	1.1 U	2.3 J	23200	861	1.8 U	0.3 U				
MWBB-04	ES	10/23/2000											0.118		
MWBB-05	ES	10/13/1999		55.4 J	2.2 UJ	1.6 UJ	2.4 UJ	28300 J	1330 J	2.1 J	38.2 UJ				
MWBB-05	ES	10/13/1999											0.255		
MWBB-05	ES	04/20/2000		18.1 U	2.7 U	1.1 U	1.2 U	23200	816	1.6 J	0.4 U				
MWBB-05	ES	04/20/2000											0.117		
MWBB-05	ES	10/23/2000		8.4 UJ	0.1 U	1.1 U	1 U	27400	914	1.8 U	0.3 U				
MWBB-05	ES	10/23/2000											0.112		
MWNW-01	ES	09/28/1999											7.9		
MWNW-01	ES	09/28/1999		16.1 U	2.2 U	1.6 J	0.52 U	24.4 J	61.8	7.4 J	13.8 UJ				
MWNW-01	ES	04/19/2000											8.76		
MWNW-01	ES	04/19/2000		12.1 J	2.7 U	11.7	1.2 U	54.5 J	16.5	8.7 J	8.8 J				
MWNW-01	ES	10/25/2000											10.1		
MWNW-01	ES	10/25/2000		8.4 UJ	0.12 J	6.1 J	3.9 J	16.2 U	7.5 J	6.5 J	5.1 J				
MWNW-02	ES	09/29/1999											0.327		
MWNW-02	ES	09/29/1999		3.9 U	2.2 U	0.53 J	1.2 U	1100	428	1.8 J	7.4 UJ				
MWNW-02	ES	04/17/2000		18.2 J	2.7 U	2.9 J	1.2 U	2750	479	3.5 J	5.4 J				
MWNW-02	ES	04/17/2000											0.287		
MWNW-02	ES	10/26/2000		8.4 UJ	0.1 U	7.6	4.2 J	3910	629	11.7 J	4.4 J				
MWNW-02	ES	10/26/2000											0.358		
MWNW-03	ES	09/30/1999		108 J	2.2 UJ	1.8 UJ	2.9 UJ	92.1 UJ	52.2 J	7.2 J	6.8 UJ				
MWNW-03	ES	09/30/1999											0.783		
MWNW-03	ES	04/18/2000											2.9		
MWNW-03	ES	04/18/2000		47.5	2.7 U	1.5 J	1.2 U	48.7 J	56.1	3.5 U	3.3 J				
MWNW-03	ES	10/25/2000											0.14		
MWNW-03	ES	10/25/2000		16.9 J	0.11 J	3.7 J	1 U	61.2 J	36.9	8 J	3.2 J				
MWNW-04	ES	09/29/1999											0.28		
MWNW-04	ES	09/29/1999		37.5 J	2.2 UJ	4 J	1.8 UJ	30.8 UJ	53.4 J	11.7 J	162 J				

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Groundwater - Area: Background

Location	Sample Type	Date	Depth In Feet	D.Aluminum ug/l	D.Antimony ug/l	D.Chromium ug/l	D.Cobalt ug/l	D.Iron ug/l	D.Mang'nse ug/l	D.Nickel ug/l	D.Zinc ug/l	Sulfate mg/l	U234 pCi/l	- -	- -
MWNW-04	ES	04/18/2000											9.87		
MWNW-04	ES	04/18/2000		8.4 J	2.7 U	3.2 J	1.2 U	17.6 U	11.7 J	3.2 U	11.6 J				
MWNW-04	ES	10/25/2000		8.4 UJ	0.2 J	1.4 J	1 U	16.2 U	12.3 J	1.8 UJ	6.3 J				
MWNW-04	ES	10/25/2000											0.142		
MWNW-06	ES	09/30/1999		250	2.2 U	1.8 U	3.5 U	224	241	4.6 J	172				
MWNW-06	ES	09/30/1999											16.9		
MWNW-06	ES	04/18/2000											1.01		
MWNW-06	ES	04/18/2000		48.3	2.7 U	3.9 J	3.5 J	1280	662	1.8 U	1.5 J				
MWNW-06	ES	10/26/2000											1.61		
MWNW-06	ES	10/26/2000		8.4 UJ	0.1 U	1.1 U	1 J	568	476	2.4 J	1.7 J				

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Groundwater - Area: Blue Creek & Tributaries

Location	Sample Type	Date	Depth In Feet	D.Aluminum ug/l	D.Antimony ug/l	D.Chromium ug/l	D.Cobalt ug/l	D.Iron ug/l	D.Mang'nse ug/l	D.Nickel ug/l	D.Zinc ug/l	Sulfate mg/l	U234 pCi/l	- -	- -
MWBC-01	ES	10/29/2000											14.4		
MWBC-01	ES	10/29/2000		8.4 UJ	0.11 J	1.1 U	1 U	16.2 U	166	2.7 J	6.1 J				

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Groundwater - Area: Potentially Impacted Area East of Mined Area

Location	Sample Type	Date	Depth In Feet	D.Aluminum ug/l	D.Antimony ug/l	D.Chromium ug/l	D.Cobalt ug/l	D.Iron ug/l	D.Mang'nse ug/l	D.Nickel ug/l	D.Zinc ug/l	Sulfate mg/l	U234 pCi/l	- - - -
EAST SEEP/S	ES	12/08/1998											1500 J	
EAST SEEP/S	ES	12/08/1998		16900 J		1 U		30 J	24600	420 J	1000 J			
EAST SEEP/S	ES	01/12/1999											1700	
EAST SEEP/S	ES	01/12/1999		23300		1 U		150 J	30000	580	1700 J			
EAST SEEP/S	ES	02/17/1999		29200		0.4 U		20 U	34200	730	2100			
EAST SEEP/S	ES	02/17/1999											2600	
EAST SEEP/S	ES	03/11/1999		24600		0.4 U		20 U	21600	530	1500			
EAST SEEP/S	ES	03/11/1999											2000	
EAST SEEP/S	ES	10/13/1998		16300		0.4 U		120 J	22000	380	1300			
EAST SEEP/S	ES	10/13/1998											2000	
EAST SEEP/S	ES	11/10/1998		16600 J		2 U		120 J	23500 J	400 J	1170			
EAST SEEP/S	ES	11/10/1998											1700	
EAST SEEP/S	ES	04/19/1999											2000	
EAST SEEP/S	ES	04/19/1999		25200		10 U		20 J	29500 J	570	1600			
EAST SEEP/S	ES	05/18/1999		28500		4 J		40 J	25900	580	1550 J			
EAST SEEP/S	ES	05/18/1999											2100	
EAST SEEP/S	ES	06/16/1999											2200	
EAST SEEP/S	ES	06/16/1999		25200		30 U		40 J	25800	520	1770 J			
EAST SEEP/S	ES	09/27/1999		18200	2.2 U	1.5 J	89.4	8.4 U	23600	459	1280			
EAST SEEP/S	ES	09/27/1999											1970	
EAST SEEP/S	ES	04/06/2000		29100 J	2.7 U	1.1 U	273	70.4 U	25100	606	1600			
EAST SEEP/S	ES	04/06/2000											2130	
ES01SP/ES01S	ES	04/01/1998											6.4	
ES02SP/ES02S	ES	04/01/1998											26.9	
GW-34	ES	01/12/1999											1.6 U	
GW-34	ES	01/12/1999		60 U		20 U		3440 J	1450	20 UJ	20 UJ			
GW-34	ES	02/19/1999											4.3	
GW-34	ES	02/19/1999		60 U		20 U		2250	1630	20 U	20 J			
GW-34	ES	03/13/1999		30 U		10 J		1240	1890	20 J	10 U			
GW-34	ES	03/13/1999											3.2 U	
GW-34	ES	04/20/1999											1.9	
GW-34	ES	04/20/1999		30 U		10 U		1340	616	10 U	10 U			
GW-34	ES	05/17/1999											4	
GW-34	ES	05/17/1999		30 U		10 U		1560	1170	10 U	10 J			

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Groundwater - Area: Potentially Impacted Area East of Mined Area

Location	Sample Type	Date	Depth In Feet	D.Aluminum ug/l	D.Antimony ug/l	D.Chromium ug/l	D.Cobalt ug/l	D.Iron ug/l	D.Mang'nse ug/l	D.Nickel ug/l	D.Zinc ug/l	Sulfate mg/l	U234 pCi/l	- -	- -
GW-34	ES	06/15/1999		30 U		10 U		2150	1430	10 U	40 J				
GW-34	ES	06/15/1999											2.8		
MW-4	ES	04/01/1998											6.3		
MW-4	ES	09/23/1999		4.5 J	2.2 U	0.4 U	0.5 U	8.4 U	0.1 U	1.5 U	1.1 U				
MW-4	ES	09/23/1999											9.14		
MW-4	ES	04/05/2000											10.3		
MW-4	ES	04/05/2000		5.4 UJ	2.7 UJ	1.1 UJ	1.2 UJ	17.6 UJ	0.42 UJ	0.9 UJ	0.4 UJ				
MW-5	ES	04/01/1998											8		
MW-5	ES	09/24/1999											9.4		
MW-5	ES	09/24/1999		5.4 J	2.2 UJ	0.4 UJ	1.3 UJ	8.4 UJ	0.1 UJ	0.62 UJ	1.1 UJ				
MW-5	ES	04/04/2000		22.6 UJ	2.7 U	1.1 U	1.2 U	17.6 U	0.2 U	1.3 U	0.4 U				
MW-5	ES	04/04/2000											8.69		
MW-6	ES	04/01/1998											0.6		
MW-6	ES	10/09/1999		17.8 J	2.2 U	0.93 J	0.5 U	8.5 J	0.27 U	1.1 U	155				
MW-6	ES	10/09/1999											1.68		
MW-6	ES	04/17/2000		5.4 UJ	2.7 U	1.1 U	1.2 U	17.6 U	0.2 U	0.9 UJ	0.4 U				
MW-6	ES	04/17/2000											1.03		
MWBA-01	ES	10/07/1999											6.22		
MWBA-01	ES	10/07/1999		21.3 UJ	2.2 UJ	0.4 UJ	0.5 UJ	8.4 UJ	24.8 J	0.5 UJ	8.3 UJ				
MWBA-01	ES	04/20/2000		16.9 U	2.7 U	1.1 U	1.2 U	17.6 U	0.58 J	0.9 U	0.4 U				
MWBA-01	ES	04/20/2000											5.44		
MWED-02	ES	10/09/1999											1.02		
MWED-02	ES	10/09/1999		27.4 U	2.2 U	2.6 J	0.5 U	8.4 U	3.4 J	2.8 J	24.2 U				
MWED-02	ES	04/10/2000		5.4 UJ	3.6	1.1 U	1.2 U	17.6 U	0.23 J	0.9 U	0.4 U				
MWED-02	ES	04/10/2000											1.77		
MWED-03	ES	10/09/1999		39.9 J	**5.2**	**16.9**	1.6 J	8.4 UJ	18.7	10.9 J	16.8 U				
MWED-03	ES	10/09/1999											3.62		
MWED-03	ES	04/04/2000		36.4 UJ	2.7 U	1.3 J	1.2 U	17.6 U	19.9	1.5 U	0.4 U				
MWED-03	ES	04/04/2000											4.34		
MWED-04	ES	10/09/1999		52.6 U	2.2 U	1.8 J	0.5 U	11.6 U	51.4	2.8 J	63.5				
MWED-04	ES	10/09/1999											24.6		
MWED-04	ES	04/05/2000											26.2		
MWED-04	ES	04/05/2000		5.5 UJ	**4.1**	1.1 U	1.2 U	17.6 UJ	82.6	1.1 UJ	9.5 J				
MWED-05	ES	04/13/2000		2900	2.7 U	1.1 U	**107**	70.4 U	**28800**	**467**	**737**				

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Groundwater - Area: Potentially Impacted Area East of Mined Area

Location	Sample Type	Date	Depth In Feet	D.Aluminum ug/l	D.Antimony ug/l	D.Chromium ug/l	D.Cobalt ug/l	D.Iron ug/l	D.Mang'nse ug/l	D.Nickel ug/l	D.Zinc ug/l	Sulfate mg/l	U234 pCi/l	- - - -
MWED-05	ES	04/13/2000											**3280**	
MWED-06	ES	10/13/1999		212 J	2.2 UJ	1.3 UJ	**5.1 J**	136 J	**11500 J**	**252 J**	**499 J**			
MWED-06	ES	10/13/1999											**1070**	
MWED-06	ES	04/13/2000		762	2.7 U	1.1 U	**8.4 J**	70.4 U	**17600**	**379**	**537**			
MWED-07	ES	10/12/1999											27.8	
MWED-07	ES	10/12/1999		13.7 UJ	2.2 U	0.4 U	1.5 U	8.4 U	41.1	2.2 J	17.4 UJ			
MWED-07	ES	04/13/2000		5.4 UJ	2.7 U	1.1 U	1.2 U	35.2 U	20.4	3.8 U	0.4 U			
MWED-07	ES	04/13/2000											25.5	
MWED-08	ES	10/12/1999		30.6 U	2.2 U	0.4 U	3 J	8.4 U	0.1 U	1.2 U	1.9 UJ			
MWED-08	ES	10/12/1999											21.2	
MWED-08	ES	04/13/2000		5.4 UJ	2.7 U	1.1 U	1.2 U	35.2 U	0.2 U	1.4 U	0.4 U			
MWED-08	ES	04/13/2000											25.9	
MWED-09	ES	10/11/1999											6.04	
MWED-09	ES	10/11/1999		35.5 U	2.2 U	1.2 J	2.2 U	8.4 U	34	5.8 J	16.3 UJ			
MWED-09	ES	04/19/2000		5.4 UJ	2.7 U	1.2 J	1.2 U	17.6 U	42.9	12.6 J	0.4 U			
MWED-09	ES	04/19/2000											5.73	
MWED-10	ES	10/14/1999		12.2 UJ	2.2 UJ	0.4 UJ	0.8 UJ	8.4 UJ	1470 J	**24.8 J**	13.2 UJ			
MWED-10	ES	10/14/1999											15.2	
MWED-10	ES	04/04/2000		35.4 UJ	**5.8**	1.1 U	1.2 U	17.6 U	64.4	4.5 J	0.4 U			
MWED-10	ES	04/04/2000											13.6	
MWED-11	ES	10/14/1999		4.8 UJ	2.2 U	0.4 U	2 U	8.4 U	31.1	0.5 UJ	15.8 UJ			
MWED-11	ES	10/14/1999											**37.7**	
MWED-11	ES	04/04/2000											**42**	
MWED-11	ES	04/04/2000		44.4 UJ	2.7 U	1.1 U	1.2 U	30.3 U	47.2	1.3 U	10.1 J			
MWND-01	ES	10/08/1999											0.287	
MWND-01	ES	10/08/1999		58.8 J	2.2 U	4.4 J	**6.5 J**	193 J	159	13.1 J	79.7			
MWND-01	ES	04/06/2000											0.0693	
MWND-01	ES	04/06/2000		11.2 UJ	3 J	1.9 J	**9.9 J**	17.6 UJ	101 J	**18.7 J**	156 J			
MWNE-01	ES	10/06/1999											0.166	
MWNE-01	ES	10/06/1999		33.2 J	2.2 U	0.43 J	**5.2 J**	787 J	252	1.8 U	9.5 U			
MWNE-01	ES	04/06/2000		68.1 UJ	2.7 U	1.1 U	1.2 U	69.4 J	143	2.2 UJ	1.6			
MWNE-01	ES	04/06/2000											0.224	
MWNE-02	ES	10/06/1999		24.5 J	2.2 UJ	0.55 UJ	1.8 UJ	3080 J	343 J	0.5 UJ	6.6 UJ			
MWNE-02	ES	10/06/1999											0.356	

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

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Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Groundwater - Area: Potentially Impacted Area East of Mined Area

Location	Sample Type	Date	Depth In Feet	D.Aluminum ug/l	D.Antimony ug/l	D.Chromium ug/l	D.Cobalt ug/l	D.Iron ug/l	D.Mang'nse ug/l	D.Nickel ug/l	D.Zinc ug/l	Sulfate mg/l	U234 pCi/l	- -	- -
MWNE-02	ES	04/06/2000											0.0803		
MWNE-02	ES	04/06/2000		5.4 UJ	2.7 UJ	1.1 UJ	1.2 UJ	3460 J	286 J	0.9 UJ	0.94 J				
MWNE-03	ES	10/07/1999											4.98		
MWNE-03	ES	10/07/1999		4390 J	2.2 U	**23.2**	3.5 UJ	3960 J	213	**26 J**	112				
MWNE-03	ES	04/06/2000											2.49		
MWNE-03	ES	04/06/2000		66.5 UJ	**4.5 J**	1.1 UJ	1.2 UJ	41.5 J	63.1 J	7.1 J	14.3 J				
MWNE-04	ES	10/01/1999											0.928		
MWNE-04	ES	10/01/1999		39.5	2.2 U	4.2 J	**10.3 J**	243	306	7.1 J	13.4 U				
MWNE-04	ES	04/06/2000											1.18		
MWNE-04	ES	04/06/2000		5.4 UJ	**4.7 J**	1.1 UJ	1.2 UJ	18.1 J	192 J	0.9 UJ	0.4 UJ				
MWNE-05	ES	10/10/1999											15.4		
MWNE-05	ES	10/10/1999		14.6 U	2.2 U	0.47 J	0.5 U	8.4 U	6.7 J	1 U	33.2 U				
MWNE-05	ES	04/18/2000											0.683		
MWNE-05	ES	04/18/2000		5.4 UJ	2.7 U	1.1 U	1.2 U	17.6 U	8.2 J	0.9 UJ	0.4 U				
MWNE-06	ES	10/10/1999											2.96		
MWNE-06	ES	10/10/1999		32.6 U	2.2 U	0.49 J	0.5 U	8.4 U	13.6 J	0.8 U	12.5 UJ				
MWNE-06	ES	04/18/2000											3.85		
MWNE-06	ES	04/18/2000		8.1 J	2.7 U	1.3 J	1.2 U	17.6 U	7.8 J	1.4 U	0.4 U				
MWNE-07	ES	10/12/1999											**43.2**		
MWNE-07	ES	10/12/1999		170	2.2 U	4.3 J	3.8 J	172	21.4	2.7 J	5 UJ				
MWNE-07	ES	04/19/2000											**97.8**		
MWNE-07	ES	04/19/2000		22.4 U	2.7 U	1.4 J	1.2 U	17.6 U	1.1 J	4.7 J	0.4 U				

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Groundwater - Area: Potentially Impacted Area South of Mined Area

Location	Sample Type	Date	Depth In Feet	D.Aluminum ug/l	D.Antimony ug/l	D.Chromium ug/l	D.Cobalt ug/l	D.Iron ug/l	D.Mang'nse ug/l	D.Nickel ug/l	D.Zinc ug/l	Sulfate mg/l	U234 pCi/l	- - - -
CD SEEP/SDC	ES	12/08/1998											* 10000 J	
CD SEEP/SDC	ES	12/08/1998		1100		1 U		50 U	125000	* 1430	3000 J			
CD SEEP/SDC	ES	01/12/1999											* 7700	
CD SEEP/SDC	ES	01/12/1999		800		1 U		410 J	119000	* 1430	2800			
CD SEEP/SDC	ES	02/17/1999		900		0.4 U		50 U	114000	1370	3000 J			
CD SEEP/SDC	ES	02/17/1999											* 10000	
CD SEEP/SDC	ES	03/11/1999		700 J		1 U		50 U	94000	1290 J	2300			
CD SEEP/SDC	ES	03/11/1999											* 8600	
CD SEEP/SDC	ES	10/13/1998											* 10000	
CD SEEP/SDC	ES	10/13/1998		1000		0.4 U		480 J	125000	* 1400	3000 J			
CD SEEP/SDC	ES	11/10/1998											* 11000	
CD SEEP/SDC	ES	11/10/1998		1010		2 U		500 J	127000	* 1500	4000 J			
CD SEEP/SDC	ES	04/19/1999											* 11000	
CD SEEP/SDC	ES	04/19/1999		680		40 U		360 J	126000	1250	2600			
CD SEEP/SDC	ES	05/18/1999		1000 J		4 J		50 U	133000 J	* 1620	2700			
CD SEEP/SDC	ES	05/18/1999											* 9100	
CD SEEP/SDC	ES	06/16/1999		630 J		100 U		10 U	130000	* 1400	2820			
CD SEEP/SDC	ES	06/16/1999											* 9400	
CD SEEP/SDC	ES	04/01/1998											* 6290	
CD SEEP/SDC	ES	08/05/1999		600 J		0.8		50 U	117000	1390	2510			
CD SEEP/SDC	ES	08/05/1999											* 12000	
CD SEEP/SDC	ES	12/08/1999											* 8200	
CD SEEP/SDC	ES	12/08/1999		500 J	13 J	5 J	* 830 J	450 J	110000	1270 J	2310			
CD SEEP/SDC	ES	01/09/2000		400 J		1 U		480 J	120000 J	* 1460 J	2680 J			
CD SEEP/SDC	ES	01/09/2000											* 29000	
CD SEEP/SDC	ES	02/01/2000		540		50 U		360 J	103000	1330 J	2750 J			
CD SEEP/SDC	ES	02/01/2000											* 9000	
CD SEEP/SDC	ES	09/09/1999		190 J	2.2 UJ	9 J	* 862 J	8.4 UJ	115000 J	1330 J	2390 J			
CD SEEP/SDC	ES	09/09/1999											* 9930	
CD SEEP/SDC	ES	09/11/1999											* 8680	
CD SEEP/SDC	ES	04/08/2000		350	2.7 U	3.6 J	* 827	35.2 U	110000	1230	2140			
CD SEEP/SDC	ES	04/08/2000											* 8650	
CD-11	ES	04/01/1998											35.3	
GW-19	ES	01/13/1999											110	

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Groundwater - Area: Potentially Impacted Area South of Mined Area

Location	Sample Type	Date	Depth In Feet	D.Aluminum ug/l	D.Antimony ug/l	D.Chromium ug/l	D.Cobalt ug/l	D.Iron ug/l	D.Mang'nse ug/l	D.Nickel ug/l	D.Zinc ug/l	Sulfate mg/l	U234 pCi/l	- - - -
GW-19	ES	01/13/1999		1100		20 U		400 J	60200	* 1870 J	1610 J			
GW-19	ES	02/21/1999											82	
GW-19	ES	02/21/1999		750		20 U		20 U	52300	840	670			
GW-19	ES	03/14/1999		720		20 U		20 U	47600	790	630			
GW-19	ES	03/14/1999											69	
GW-19	ES	04/22/1999		280 J		20 U		20 U	34800	560	400			
GW-19	ES	04/22/1999											72	
GW-19	ES	05/19/1999											45	
GW-19	ES	05/19/1999		370		20 U		20 U	39500	620	460			
GW-19	ES	06/13/1999											78	
GW-19	ES	06/13/1999		410		10 U		10 U	37300	620	480			
GW-19	ES	10/06/1999											65.9 J	
GW-19	ES	10/06/1999		131	2.2 U	2.2 U	7.2 J	8.4 U	24800	353	184			
GW-19	ES	04/05/2000											41.3	
GW-19	ES	04/05/2000		381 J	2.7 U	1.1 U	11.3 J	70.4 U	28800	455	294			
GW-35	ES	01/13/1999		1040		20 U		20 UJ	12400	210 J	340 J			
GW-35	ES	01/13/1999											220	
GW-35	ES	02/21/1999		90 J		10 U		10 U	3440	70	100			
GW-35	ES	02/21/1999											140	
GW-35	ES	03/13/1999		110 J		10 U		10 U	4840	90	150			
GW-35	ES	03/13/1999											90	
GW-35	ES	04/22/1999											88	
GW-35	ES	04/22/1999		50 J		10 U		10 U	2760	60	100			
GW-35	ES	05/17/1999											100	
GW-35	ES	05/17/1999		160 J		10 U		10 U	4320	80	130			
GW-35	ES	06/13/1999		40 J		10 U		10 U	3210	60	100			
GW-35	ES	06/13/1999											73	
GW-35A	ES	10/07/1999											673	
GW-35A	ES	10/07/1999		5400	2.2 U	3.2 U	27.7 J	8.4 U	39600	590	991			
GW-35A	ES	04/08/2000											28.7	
GW-35A	ES	04/08/2000		2380	2.7 U	1.1 U	7.4 J	35.2 U	15400	287	428			
GW-36	ES	01/12/1999											17	
GW-36	ES	01/12/1999		30 U		10 U		10 UJ	5 U	10 UJ	10 UJ			
GW-36	ES	02/21/1999											18	

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

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Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Groundwater - Area: Potentially Impacted Area South of Mined Area

Location	Sample Type	Date	Depth In Feet	D.Aluminum ug/l	D.Antimony ug/l	D.Chromium ug/l	D.Cobalt ug/l	D.Iron ug/l	D.Mang'nse ug/l	D.Nickel ug/l	D.Zinc ug/l	Sulfate mg/l	U234 pCi/l	- -	- -
GW-36	ES	02/21/1999		30 U		10 U		10 U	9 J	10 U	10 U				
GW-36	ES	03/14/1999											20		
GW-36	ES	03/14/1999		30 U		10 U		10 J	5 U	10 U	10 U				
GW-36	ES	04/22/1999											16		
GW-36	ES	04/22/1999		30 U		10 U		10 U	5 U	10 U	10 J				
GW-36	ES	05/19/1999											16		
GW-36	ES	05/19/1999		30 U		10 U		10 U	5 U	10 U	10 U				
GW-36	ES	06/13/1999											18		
GW-36	ES	06/13/1999		30 U		10 U		10 U	5 U	10 U	10 U				
GW-36A	ES	10/06/1999											**970**		
GW-36A	ES	10/06/1999		61.4	2.7 J	4 J	**9.6 J**	8.4 U	**33500**	**377**	**300**				
GW-36A	ES	04/08/2000											**871**		
GW-36A	ES	04/08/2000		56.3 J	2.7 U	1.1 U	**20.9 J**	35.2 U	**32900**	**365**	**206**				
GW-50	ES	03/14/1999											**100**		
GW-50	ES	03/14/1999		30 U		10 U		70	420	10 U	10 U				
GW-50	ES	01/17/1999		30 U		10 U		30 J	279	10 UJ	10 UJ				
GW-50	ES	01/17/1999											**89**		
GW-50	ES	02/20/1999		30 U		10 U		120	431	10 U	10 U				
GW-50	ES	02/20/1999											**98**		
GW-50	ES	04/21/1999		30 U		10 U		120	340	10 U	10 U				
GW-50	ES	04/21/1999											**110**		
GW-50	ES	05/18/1999		30 U		10 U		110	240	10 U	10 U				
GW-50	ES	05/18/1999											**120**		
GW-50	ES	06/14/1999		30 U		10 U		280	313	10 U	30 J				
GW-50	ES	06/14/1999											**120**		
GW-50	ES	08/01/1999		30 U		10 U		120	177	10 U	10 U				
GW-50	ES	08/01/1999											**120**		
GW-50	ES	12/10/1999											**130**		
GW-50	ES	12/10/1999		30 U	1 U	10 U	10 U	60	895 J	10 U	10 U				
GW-50	ES	01/08/2000		30 U		10 U		50 J	447	10 U	10 U				
GW-50	ES	01/08/2000											**88**		
GW-50	ES	02/04/2000		30 U		10 U		60	264	10 U	10 U				
GW-50	ES	02/04/2000											95 U		
GW-50	ES	10/10/1999											**65.8**		

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Groundwater - Area: Potentially Impacted Area South of Mined Area

Location	Sample Type	Date	Depth In Feet	D.Aluminum ug/l	D.Antimony ug/l	D.Chromium ug/l	D.Cobalt ug/l	D.Iron ug/l	D.Mang'nse ug/l	D.Nickel ug/l	D.Zinc ug/l	Sulfate mg/l	U234 pCi/l	- -	- -
GW-50	ES	10/10/1999		26.1 J	2.2 U	0.4 U	2.4 J	1180 J	570	3.4 U	7.9 U				
GW-50	ES	04/06/2000											**77.3**		
GW-50	ES	04/06/2000		8 UJ	**4.8 J**	1.1 UJ	1.2 UJ	17.6 UJ	116 J	2.2 UJ	0.4 UJ				
GW-51	ES	03/14/1999											34		
GW-51	ES	03/14/1999		30 U		10 U		20 J	9 J	10 U	10 U				
GW-51	ES	01/16/1999		30 U		10 U		10 UJ	22 J	10 UJ	10 UJ				
GW-51	ES	01/16/1999											32		
GW-51	ES	02/18/1999		30 U		10 U		20 J	11 J	10 U	10 U				
GW-51	ES	02/18/1999											**37**		
GW-51	ES	04/20/1999		30 U		10 U		10 U	9 J	10 U	10 U				
GW-51	ES	04/20/1999											32		
GW-51	ES	05/18/1999											26		
GW-51	ES	05/18/1999		30 U		20 U		10 U	5 U	10 U	10 U				
GW-51	ES	06/15/1999		30 U		10 U		10 U	5 U	10 U	10 U				
GW-51	ES	06/15/1999											33		
GW-51	ES	07/30/1999		30 U		10 U		50	5 J	10 U	10 U				
GW-51	ES	07/30/1999											36		
GW-51	ES	12/09/1999		30 U	0.2 U	10 U	10 U	70 J	22 U	10 U	10 U				
GW-51	ES	12/09/1999											23 J		
GW-51	ES	01/07/2000		40 U		10 U		20 J	28 J	10 U	10 U				
GW-51	ES	01/07/2000											26		
GW-51	ES	02/03/2000		30 U		10 U		20 J	6 J	10 U	10 U				
GW-51	ES	02/03/2000											27 U		
GW-51	ES	10/10/1999		30.4 U	2.2 U	0.4 U	1.5 U	621	295	2.7 J	2.3 UJ				
GW-51	ES	10/10/1999											28.1		
GW-51	ES	04/05/2000											25.3		
GW-51	ES	04/05/2000		5.4 UJ	2.8 J	1.1 UJ	1.2 UJ	48600 UJ	6.9 J	0.9 UJ	0.4 UJ				
MW-1	ES	01/15/1999		**8230**		20 U		160 J	**39100**	**520 J**	**920 J**				
MW-1	ES	01/15/1999											**470**		
MW-1	ES	02/20/1999											**1000**		
MW-1	ES	02/20/1999		**8440**		50 U		50 U	**39000**	**610**	**940**				
MW-1	ES	03/11/1999		**7890**		20 U		20 U	**35300**	**520**	**880**				
MW-1	ES	03/11/1999											**950**		
MW-1	ES	04/19/1999											**1100**		

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Groundwater - Area: Potentially Impacted Area South of Mined Area

Location	Sample Type	Date	Depth In Feet	D.Aluminum ug/l	D.Antimony ug/l	D.Chromium ug/l	D.Cobalt ug/l	D.Iron ug/l	D.Mang'nse ug/l	D.Nickel ug/l	D.Zinc ug/l	Sulfate mg/l	U234 pCi/l	- -	- -
MW-1	ES	04/19/1999		**6430**		20 U		130	**31500**	**510**	**780**				
MW-1	ES	05/18/1999											**1000**		
MW-1	ES	05/18/1999		**8630**		20 U		20 U	**38600**	**610**	**1020**				
MW-1	ES	06/16/1999		**9300**		20 U		30 J	**39700**	**670**	**1170**				
MW-1	ES	06/16/1999											**1100**		
MW-1	ES	04/01/1998											**1210**		
MW-1	ES	09/23/1999		**10200 J**	2.2 UJ	2.7 J	**217 J**	8.4 UJ	**39500 J**	**611 J**	**1080 J**				
MW-1	ES	09/23/1999											**962**		
MW-1	ES	04/14/2000		**8070**	2.7 U	1.1 U	**158**	70.4 U	**34900**	**573**	**899**				
MW-1	ES	04/14/2000											**863**		
MW-2	ES	02/20/1999		60 U		20 U		2750	1900	20 U	40 J				
MW-2	ES	02/20/1999											**260**		
MW-2	ES	03/11/1999		60 U		20 U		1060	**2050**	20 U	20 U				
MW-2	ES	03/11/1999											**79**		
MW-2	ES	01/16/1999											26		
MW-2	ES	01/16/1999		60 U		20 U		4590 J	1300	20 UJ	20 UJ				
MW-2	ES	04/19/1999											**38**		
MW-2	ES	04/19/1999		60 U		20 U		1220	1690	20 U	20 U				
MW-2	ES	05/18/1999											24		
MW-2	ES	05/18/1999		60 U		20 U		1970	1520	20 U	20 U				
MW-2	ES	06/16/1999											**140**		
MW-2	ES	06/16/1999		60 U		20 U		2240	1640	20 U	50 J				
MW-2	ES	04/01/1998											**247**		
MW-2	ES	09/22/1999											**734**		
MW-2	ES	09/22/1999		3.9 UJ	2.2 U	0.4 U	0.9 U	4830	**2160**	2.2 U	2.4 UJ				
MW-2	ES	04/07/2000											**68.6**		
MW-2	ES	04/07/2000		5.4 UJ	2.7 U	1.1 U	1.6 J	4660	**2200**	1.3 J	0.4 U				
MW-3	ES	04/01/1998											**2005**		
MWCD-01	ES	10/14/1999		133 J	2.2 UJ	0.66 UJ	0.5 UJ	39.2 UJ	29.7 J	1.2 J	1.1 UJ				
MWCD-01	ES	10/14/1999											**71.5**		
MWCD-01	ES	04/08/2000											**93.2**		
MWCD-01	ES	04/08/2000		5.4 UJ	2.7 U	1.1 U	1.2 U	17.6 U	0.89 J	0.9 U	2.6 J				
MWCD-02	ES	10/10/1999		11.8 UJ	2.2 U	0.4 U	0.5 U	8.4 U	138	2 J	4 UJ				
MWCD-02	ES	10/10/1999											**50.1**		

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Groundwater - Area: Potentially Impacted Area South of Mined Area

Location	Sample Type	Date	Depth In Feet	D.Aluminum ug/l	D.Antimony ug/l	D.Chromium ug/l	D.Cobalt ug/l	D.Iron ug/l	D.Mang'nse ug/l	D.Nickel ug/l	D.Zinc ug/l	Sulfate mg/l	U234 pCi/l	- -	- -
MWCD-02	ES	04/05/2000		7.4 UJ	3 J	1.1 UJ	1.2 UJ	17.6 UJ	6.8 J	1.3 UJ	2 J				
MWCD-02	ES	04/05/2000											29.5		
MWWD-01	ES	10/12/1999											**40.7**		
MWWD-01	ES	10/12/1999		39.1 U	2.2 U	1.4 J	2 U	8.4 U	56.9	1.9 U	8.8 UJ				
MWWD-01	ES	04/14/2000		5.4 UJ	2.7 U	1.1 U	1.2 U	17.6 U	5.5 J	0.94 U	4.4 J				
MWWD-01	ES	04/14/2000											**40.6**		
WDJWEST	ES	12/08/1999											**905**		
WDJWEST	ES	08/04/1999		**10300**		0.5 U		50 U	**40600**	**650 J**	**1190 J**				
WDJWEST	ES	08/04/1999											**100**		
WDJWEST	ES	12/08/1999		**10100**	5 U	6 J	**230 J**	180 J	**40600**	**590**	**1050**				
WDJWEST	ES	12/08/1999											**820**		
WDJWEST	ES	01/09/2000											**850**		
WDJWEST	ES	01/09/2000		**8620**		10 U		190 J	**41700**	**620 J**	**1140 J**				
WDJWEST	ES	02/01/2000		**8810 J**		**80 J**		130 J	**35200**	**590 J**	**1080 J**				
WDJWEST	ES	02/01/2000											**960**		
WDSEEP/SDW	ES	12/08/1998											**1100 J**		
WDSEEP/SDW	ES	12/08/1998		**5720**		1 U		40 J	**34200**	**480**	**780**				
WDSEEP/SDW	ES	01/12/1999											**1500**		
WDSEEP/SDW	ES	01/12/1999		**8500 J**		1 U		150 J	**31000**	**520 J**	**890**				
WDSEEP/SDW	ES	02/17/1999		**16500**		0.4 U		30 J	**32700**	**620**	**1300 J**				
WDSEEP/SDW	ES	02/17/1999											**2000**		
WDSEEP/SDW	ES	03/11/1999		**23300**		0.5 J		120	**26400**	**630**	**1400**				
WDSEEP/SDW	ES	03/11/1999											**1800**		
WDSEEP/SDW	ES	10/13/1998		5010		0.4 U		160 J	**31900**	**480**	**800 J**				
WDSEEP/SDW	ES	10/13/1998											**1100**		
WDSEEP/SDW	ES	11/10/1998		5000 J		2 U		670 J	**33800**	**530**	**760**				
WDSEEP/SDW	ES	11/10/1998											**970**		
WDSEEP/SDW	ES	04/19/1999		**16800**		10 U		170	**31300**	**590**	**1100**				
WDSEEP/SDW	ES	04/19/1999											**1700**		
WDSEEP/SDW	ES	05/18/1999		**13900**		4 J		70 J	**31900**	**620**	**1110**				
WDSEEP/SDW	ES	05/18/1999											**1500**		
WDSEEP/SDW	ES	06/16/1999											**1400**		
WDSEEP/SDW	ES	06/16/1999		**11100**		30 U		50	**32900**	**570**	**1080**				
WDSEEP/SDW	ES	04/01/1998											**1260**		

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Groundwater - Area: Potentially Impacted Area South of Mined Area

Location	Sample Type	Date	Depth In Feet	D.Aluminum ug/l	D.Antimony ug/l	D.Chromium ug/l	D.Cobalt ug/l	D.Iron ug/l	D.Mang'nse ug/l	D.Nickel ug/l	D.Zinc ug/l	Sulfate mg/l	U234 pCi/l	- -	- -
WDSEEP/SDW	ES	08/04/1999											950		
WDSEEP/SDW	ES	08/04/1999		6560		0.5 U		20 U	26700	440	720				
WDSEEP/SDW	ES	08/04/1999											1100		
WDSEEP/SDW	ES	08/04/1999		6770		0.5 U		30 U	28100	470	760				
WDSEEP/SDW	ES	12/08/1999											750		
WDSEEP/SDW	ES	12/08/1999		5560	5 U	7 J	200 J	200 J	31300	470	750				
WDSEEP/SDW	ES	12/08/1999		5470	5 U	6 J	190	210 J	31000 J	460	750				
WDSEEP/SDW	ES	12/08/1999											740		
WDSEEP/SDW	ES	01/09/2000		6220		10 U		170 J	30900 J	530 J	910 J				
WDSEEP/SDW	ES	01/09/2000											1100		
WDSEEP/SDW	ES	02/01/2000											950		
WDSEEP/SDW	ES	02/01/2000		5610		50 U		130 J	26400	470 J	820 J				
WDSEEP/SDW	ES	09/08/1999		6470 J	2.2 U	1.2 J	204	8.4 U	32800	503	776				
WDSEEP/SDW	ES	09/08/1999											938		
WDSEEP/SDW	ES	09/11/1999											537		
WDSEEP/SDW	ES	04/08/2000		19100	2.7 U	1.1 U	279	35.2 U	27600	589	1090				
WDSEEP/SDW	ES	04/08/2000											1510		

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Groundwater - Area: Potentially Impacted Area West of Mined Area

Location	Sample Type	Date	Depth In Feet	D.Aluminum ug/l	D.Antimony ug/l	D.Chromium ug/l	D.Cobalt ug/l	D.Iron ug/l	D.Mang'nse ug/l	D.Nickel ug/l	D.Zinc ug/l	Sulfate mg/l	U234 pCi/l	- -	- -
MWFW-01	ES	09/26/1999		3.9 UJ	2.2 U	0.4 U	3.9 U	224	1340	**19.2 J**	8.1 UJ				
MWFW-01	ES	09/26/1999											1.44		
MWFW-01	ES	04/07/2000											1.61		
MWFW-01	ES	04/07/2000		244	2.7 U	1.1 U	1.2 U	188	82.2	2.6 J	2.4 J				
MWFW-02	ES	09/25/1999											4.41		
MWFW-02	ES	09/25/1999		3.9 UJ	2.2 U	**42**	0.99 U	183 U	100	**22.9 J**	29.3 U				
MWFW-02	ES	04/07/2000											3.34		
MWFW-02	ES	04/07/2000		5.4 UJ	2.7 U	1.1 U	1.2 U	17.6 U	4 J	0.9 U	4.5 J				
MWFW-03	ES	10/12/1999		4.1 UJ	2.2 U	0.43 U	0.67 U	19.4 U	203	1.4 J	3.6 UJ				
MWFW-03	ES	10/12/1999											2.92		
MWFW-03	ES	04/10/2000		5.4 UJ	2.7 U	1.1 U	1.2 U	17.6 U	20.1	1.4 U	0.9 J				
MWFW-03	ES	04/10/2000											4.07		
MWFW-04	ES	10/13/1999		13 UJ	2.2 U	1 U	2.8 U	8.4 U	415	7.9 J	99.5				
MWFW-04	ES	10/13/1999											3.48		
MWFW-04	ES	04/10/2000		5.4 UJ	2.7 U	1.1 U	1.2 U	17.6 U	130	1.5 J	2.9 J				
MWFW-04	ES	04/10/2000											4.51		
MWFW-05	ES	10/11/1999		22.9 U	2.2 U	0.4 U	0.5 U	8.4 U	21.5	0.5 U	6.5 UJ				
MWFW-05	ES	10/11/1999											5		
MWFW-05	ES	04/15/2000		5.4 UJ	2.7 U	1.1 U	1.2 U	17.6 U	2.8 J	0.9 UJ	0.4 U				
MWFW-05	ES	04/15/2000											5.51		
MWNW-07	ES	10/09/1999		56.3 J	2.2 UJ	3.6 J	**7.8 J**	37 J	397 J	4.6 UJ	54.3 J				
MWNW-07	ES	10/09/1999											**41.8**		
MWNW-07	ES	04/18/2000											2.81		
MWNW-07	ES	04/18/2000		5.4 UJ	2.7 U	1.9 J	1.2 U	17.6 U	477	2.6 U	35.7				
MWSW-01	ES	10/13/1999											8.93		
MWSW-01	ES	10/13/1999		3.9 UJ	2.2 U	0.84 U	3.1 U	8.4 U	1690	4.4 J	7.9 UJ				
MWSW-01	ES	04/07/2000		5.4 UJ	2.7 UJ	1.1 UJ	1.2 UJ	17.6 UJ	2.2 J	1.1 UJ	0.4 UJ				
MWSW-01	ES	04/07/2000											0.0969		
MWSW-02	ES	10/13/1999		37.2 U	2.2 U	0.89 J	0.64 U	8.4 U	168	2 U	102				
MWSW-02	ES	10/13/1999											**48**		
MWSW-02	ES	04/07/2000		7.9 UJ	**4**	1.1 U	1.2 U	17.6 UJ	262	0.9 UJ	25.3				
MWSW-02	ES	04/07/2000											**43.7**		

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Surface Water - Area: Background

Location	Sample Type	Date	Depth In Feet	D.Antimony ug/l	D.Cadmium ug/l	D.Chromium ug/l	D.Nickel ug/l	D.Vanadium ug/l	D.Zinc ug/l	Nitrate mg/l	Radium 226 pCi/l	Sulfate mg/l	U238 pCi/l	-	-
SDBK-01/SWB	ES	09/13/1999		2.2 U	0.2 U	0.4 UJ	0.5 U	0.5 UJ	1.8 U						
SDBK-01/SWB	ES	09/13/1999											1.7 J		
SDBK-01/SWB	ES	04/05/2000									0.135		0.248		
SDBK-01/SWB	ES	04/05/2000		2.7 U	0.5 U	1.1 U	0.9 U	1 U	0.48 J						
SDBK-01/SWB	ES	09/26/2000											1.23		
SDBK-01/SWB	ES	09/26/2000		0.1 UJ	0.4 U	1.1 U	1.8 U	1.3 U	1.1 J						
SDBK-02/SWB	ES	09/24/1999											0.568		
SDBK-02/SWB	ES	09/24/1999		2.2 U	0.2 U	0.4 U	0.5 U	1.2 J	2.1 U						
SDBK-02/SWB	ES	04/05/2000		2.7 U	0.5 U	**2 J**	2 U	**4.6 J**	6.2 J						
SDBK-02/SWB	ES	04/05/2000									0.623		1.08		
SDBK-02/SWB	ES	09/28/2000											0.696		
SDBK-02/SWB	ES	09/28/2000		0.1 UJ	0.4 U	1.1 UJ	1.8 U	1.8 U	0.85 J						
SDBK-04/SWB	ES	09/25/1999		2.2 U	0.2 U	0.4 U	1.4 U	0.5 U	2.4 U						
SDBK-04/SWB	ES	09/25/1999									0.404		2.8		
SDBK-04/SWB	ES	04/05/2000		2.7 U	0.5 U	**3.2 J**	3.1 U	**7.6 J**	8.6 J						
SDBK-04/SWB	ES	04/05/2000									0.404		1.32		
SDBK-04/SWB	ES	09/28/2000		0.1 UJ	0.4 U	1.1 UJ	1.8 U	1.7 U	1.8 J						
SDBK-04/SWB	ES	09/28/2000											1.55		
SDBK-06/SWB	ES	09/27/2000		0.1 UJ	0.4 U	1.1 U	1.8 U	1.3 U	0.79 J						
SDBK-06/SWB	ES	09/27/2000											4.66		
SDBK-09/SWB	ES	09/16/1999									0.117		0.148		
SDBK-09/SWB	ES	09/16/1999		2.2 U	0.2 U	0.4 U	0.5 UJ	0.5 U	1.5 U						
SDBK-09/SWB	ES	04/07/2000		2.7 U	0.5 U	1.1 U	1.1 UJ	1.6 U	1.3 J						
SDBK-09/SWB	ES	04/07/2000									0.48		0.905		
SDBK-09/SWB	ES	09/27/2000		0.1 UJ	0.4 U	1.1 U	1.8 U	1.2 U	0.32 J						
SDBK-09/SWB	ES	09/27/2000											2.08		
SDBK-12/SWB	ES	09/17/1999											0.175		
SDBK-12/SWB	ES	09/17/1999		2.2 U	0.2 U	0.4 U	5 U	0.5 U	1.1 U						
SDBK-12/SWB	ES	04/11/2000		2.7 UJ	0.5 UJ	1.1 UJ	1.6 UJ	1.2 J	1.7 J						
SDBK-12/SWB	ES	04/11/2000									0.389		0.725		
SDBK-12/SWB	ES	09/27/2000											0.162		
SDBK-12/SWB	ES	09/27/2000		0.1 J	0.4 U	1.1 U	1.8 U	0.91 J	17.3 U						
SWBK-11/SDB	ES	09/22/1999									0.118		0.258		
SWBK-11/SDB	ES	09/22/1999		2.2 U	0.2 U	0.4 U	5 U	0.5 U	3.1 U						

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Surface Water - Area: Background

Location	Sample Type	Date	Depth In Feet	D.Antimony ug/l	D.Cadmium ug/l	D.Chromium ug/l	D.Nickel ug/l	D.Vanadium ug/l	D.Zinc ug/l	Nitrate mg/l	Radium 226 pCi/l	Sulfate mg/l	U238 pCi/l	- -	- -
SWBK-11/SDB	ES	04/11/2000		**4.1**	0.5 U	**1.2 J**	2.5 U	**3.7 J**	3.6 J						
SWBK-11/SDB	ES	04/11/2000									0.416		0.5		
SWBK-11/SDB	ES	09/27/2000											0.0893		
SWBK-11/SDB	ES	09/27/2000		0.1 UJ	0.4 U	1.1 UJ	1.8 U	1.3 U	0.3 U						
SWBK-13/SDB	ES	09/22/1999									0.191		0.226		
SWBK-13/SDB	ES	09/22/1999		2.2 U	0.2 U	0.4 U	5 U	0.5 U	1.5 U						
SWBK-13/SDB	ES	04/10/2000									0.378		0.806		
SWBK-13/SDB	ES	04/10/2000		2.7 U	0.5 U	**1.2 J**	0.9 U	2.2 J	1.7 J						
SWBK-13/SDB	ES	09/28/2000		0.1 UJ	0.4 U	1.1 UJ	1.8 U	0.8 U	0.3 U						
SWBK-13/SDB	ES	09/28/2000											0.0698		
SWBK-16/SDB	ES	09/15/1999		2.2 U	0.2 U	0.4 U	0.5 UJ	0.5 U	1.8 U						
SWBK-16/SDB	ES	09/15/1999									0.138		0.485 J		
SWBK-16/SDB	ES	04/13/2000									0.697		2.76		
SWBK-16/SDB	ES	04/13/2000		2.7 U	0.5 U	1.1 U	0.9 U	1 U	1.2 J						
SWBK-16/SDB	ES	09/28/2000											0.327		
SWBK-16/SDB	ES	09/28/2000		0.1 UJ	**9.2**	1.1 UJ	1.8 U	1.3 U	3.9 J						
SWBK-17	ES	09/23/1999									1.81		5.48		
SWBK-17	ES	09/23/1999		2.2 U	0.2 U	0.4 U	0.61 U	0.5 U	2.4 U						
SWBK-17	ES	04/12/2000									0.411		0.538		
SWBK-17	ES	04/12/2000		2.7 U	0.5 U	1.1 U	2.3 U	2.2 J	2.5 J						
SWBK-17	ES	09/29/2000											0.0596		
SWBK-17	ES	09/29/2000		0.1 U	0.4 U	1.1 U	1.8 U	0.8 U	6.6 U						
SWBK-18	ES	09/23/1999		2.2 U	0.2 U	0.63 J	1.1 U	**3.3 J**	2.9 U						
SWBK-18	ES	09/23/1999									1.18		1.3		
SWBK-18	ES	04/12/2000									0.713		1.03		
SWBK-18	ES	04/12/2000		2.7 U	0.5 U	**1.6 J**	3.4 U	2.4 J	2.2 J						
SWBK-18	ES	09/29/2000		0.27 J	0.4 U	1.1 U	2 U	**3.3 J**	15.1 U						
SWBK-18	ES	09/29/2000											1.22		
SWBK-19	ES	09/30/1999									0.347 J		0.179		
SWBK-19	ES	09/30/1999		2.2 U	0.2 U	0.4 U	0.76 U	0.5 U	2.9 U						
SWBK-19	ES	04/12/2000		2.7 U	0.5 U	1.1 U	1.3 U	1 J	0.4 U						
SWBK-19	ES	04/12/2000									0.127		0.0564		
SWBK-19	ES	09/29/2000											0.05		
SWBK-19	ES	09/29/2000		0.1 U	0.4 U	1.1 U	1.9 U	0.95 J	0.3 U						

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Surface Water - Area: Background

Location	Sample Type	Date	Depth In Feet	D.Antimony ug/l	D.Cadmium ug/l	D.Chromium ug/l	D.Nickel ug/l	D.Vanadium ug/l	D.Zinc ug/l	Nitrate mg/l	Radium 226 pCi/l	Sulfate mg/l	U238 pCi/l	- - - -
SWBK-20	ES	09/30/1999											0.161	
SWBK-20	ES	09/30/1999		2.2 U	0.2 U	0.4 U	0.5 U	0.5 U	2.2 U					
SWBK-20	ES	04/12/2000		2.7 U	0.5 U	1.1 U	2.2 U	1.2 J	2.2 J					
SWBK-20	ES	04/12/2000									0.345		0.708	
SWBK-21	ES	09/30/1999		2.2 U	0.2 U	0.41 U	0.5 U	0.5 U	13.4 U					
SWBK-21	ES	09/30/1999									0.138 J		1.86	
SWBK-21	ES	04/07/2000		2.7 U	0.5 U	1.1 U	1.2 J	**2.8 J**	3.4 J					
SWBK-21	ES	04/07/2000											0.398	
SWBK-21	ES	09/27/2000		0.1 UJ	**2**	1.1 UJ	1.8 U	1.2 U	0.3 U					
SWBK-21	ES	09/27/2000											0.138	
SWBK-22	ES	09/30/1999		2.2 U	0.2 U	0.4 U	0.5 U	0.5 U	1.4 U					
SWBK-22	ES	09/30/1999											0.125	
SWBK-22	ES	04/07/2000		2.7 U	0.5 U	1.1 U	**1.4 J**	1.7 J	0.4 U					
SWBK-22	ES	04/07/2000									0.174		0.198	
SWBK-22	ES	09/27/2000		1.4 J	0.4 U	1.1 UJ	1.8 U	1.2 U	0.3 U					
SWBK-22	ES	09/27/2000											0.131	
SWBK-23/SDB	ES	09/30/1999											0.597	
SWBK-23/SDB	ES	09/30/1999		2.2 U	0.2 U	0.42 U	1 U	0.58 U	3 U					
SWBK-23/SDB	ES	04/13/2000		**5.3**	0.5 U	**1.2 J**	3 U	1.8 J	4.7 J					
SWBK-23/SDB	ES	04/13/2000									**4.36**		2.03	
SWBK-23/SDB	ES	09/29/2000		0.15 J	0.4 U	1.1 U	2.3 U	0.8 U	2.9 U					
SWBK-23/SDB	ES	09/29/2000											1.34	
SWBK-24	ES	10/29/1999									0.0939 J		0.225	
SWBK-24	ES	10/29/1999		2.2 U	0.2 U	0.4 U	0.5 U	0.5 U	1.1 U					
SWBK-24	ES	04/12/2000		2.7 U	0.5 U	1.1 U	1.7 U	1 U	1.2 J					
SWBK-24	ES	04/12/2000									0.559		1.21	
SWBK-24	ES	09/28/2000											0.378	
SWBK-24	ES	09/28/2000		0.1 UJ	0.4 U	1.1 UJ	1.8 U	0.8 U	0.45 J					
SWNW-01/SD	ES	09/14/1999									1.42		2.68	
SWNW-01/SD	ES	09/14/1999		2.2 U	0.2 U	0.4 UJ	0.5 U	0.5 UJ	13.6 J					
SWNW-01/SD	ES	04/11/2000									1.77		1.94	
SWNW-01/SD	ES	04/11/2000		**4.6**	0.5 U	1.1 U	2.9 U	2.2 J	2.8 J					
SWNW-01/SD	ES	09/26/2000		0.1 UJ	0.4 U	1.1 U	1.8 U	1.2 U	0.3 U					
SWNW-01/SD	ES	09/26/2000											0.879	

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Surface Water - Area: Background

Location	Sample Type	Date	Depth In Feet	D.Antimony ug/l	D.Cadmium ug/l	D.Chromium ug/l	D.Nickel ug/l	D.Vanadium ug/l	D.Zinc ug/l	Nitrate mg/l	Radium 226 pCi/l	Sulfate mg/l	U238 pCi/l	- -	- -
SWNW-02/SD	ES	09/14/1999		2.2 U	0.2 U	0.4 UJ	0.5 U	0.5 UJ	1.6 U						
SWNW-02/SD	ES	09/14/1999									0.315		0.772 J		
SWNW-02/SD	ES	04/11/2000									**2.65**		2.46		
SWNW-02/SD	ES	04/11/2000		**5.8**	0.5 U	**1.6 J**	2.2 U	**3.2 J**	3.6 J						
SWNW-02/SD	ES	09/26/2000		0.1 UJ	**0.78**	1.1 U	1.8 U	1.2 U	0.46 J						
SWNW-02/SD	ES	09/26/2000											0.243		
SWNW-03/SD	ES	09/13/1999		2.2 U	0.2 U	0.4 UJ	0.5 U	0.5 UJ	4.8 U						
SWNW-03/SD	ES	09/13/1999											1.78		
SWNW-03/SD	ES	04/11/2000									0.418		0.2		
SWNW-03/SD	ES	04/11/2000		2.7 U	0.5 U	1.1 U	3.6 U	2.2 J	1.9 J						
SWNW-03/SD	ES	09/26/2000		0.1 UJ	0.4 U	1.1 U	1.8 U	0.92 U	3.2 J						
SWNW-03/SD	ES	09/26/2000											1.5		

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Surface Water - Area: Blue Creek & Tributaries

Location	Sample Type	Date	Depth In Feet	D.Antimony ug/l	D.Cadmium ug/l	D.Chromium ug/l	D.Nickel ug/l	D.Vanadium ug/l	D.Zinc ug/l	Nitrate mg/l	Radium 226 pCi/l	Sulfate mg/l	U238 pCi/l	- - - -
BC01SW/BC01	ES	04/01/1998									0.8 U		4	
BC01SW/BC01	ES	09/28/1999		2.2 U	0.2 U	0.4 U	4.4 U	0.5 U	2.5 U					
BC01SW/BC01	ES	09/28/1999									0.356 J		**8.81**	
BC01SW/BC01	ES	04/04/2000		**2.8 J**	0.5 U	**3.7 J**	**4.4 J**	**4.7 J**	6.5 J					
BC01SW/BC01	ES	04/04/2000									0.398		2.44	
BC02SW/BC02	ES	04/01/1998									0.8 U		3.9	
BC03SW/BC03	ES	04/01/1998									0.8 U		4.4	
BC04SW/BC04	ES	04/01/1998									0.8 U		3.3	
BC04SW/BC04	ES	09/28/1999		2.2 U	0.2 U	0.4 U	4.3 U	0.5 U	2.3 U					
BC04SW/BC04	ES	09/28/1999									0.426 J		5.93	
BC04SW/BC04	ES	04/04/2000											2.33	
BC04SW/BC04	ES	04/04/2000		2.7 U	0.5 U	**2.1 J**	3.4 U	**3.8 J**	5.8 J					
BC05SW/BC05	ES	04/01/1998									0.7 U		4.6	
BC05SW/BC05	ES	09/29/1999		2.2 U	0.2 U	0.4 U	**3.3 J**	0.5 U	3 U					
BC05SW/BC05	ES	09/29/1999									0.473 J		**10.1**	
BC05SW/BC05	ES	04/04/2000		2.7 U	0.5 U	**1.9 J**	4.3 U	**4.2 J**	7.2 J					
BC05SW/BC05	ES	04/04/2000									0.46		2.42	
BC06SW/BC06	ES	04/01/1998									0.6 U		4.6	
BC07SW/BC07	ES	04/01/1998									0.7 U		4.6	
BC08SW/BC08	ES	04/01/1998									0.6 U		3.4	
BC09SW/BC09	ES	04/01/1998									0.6 U		**11.1**	
BC09SW/BC09	ES	09/29/1999									0.638 J		**8.26**	
BC09SW/BC09	ES	09/29/1999		2.2 U	0.2 U	**7.4 J**	**4 J**	0.5 U	5.2 U					
BC09SW/BC09	ES	04/05/2000		2.7 U	0.5 U	**1.5 J**	**7.3 J**	**2.9 J**	8 J					
BC09SW/BC09	ES	04/05/2000									0.471		3.05	
BC10SW/BC10	ES	04/01/1998									0.6 U		0.9	
BC10SW/BC10	ES	09/30/1999		2.2 U	0.2 U	0.4 U	0.5 U	0.79 U	1.9 U					
BC10SW/BC10	ES	09/30/1999									0.18 J		0.752	
BC10SW/BC10	ES	04/05/2000											1.12	
BC10SW/BC10	ES	04/05/2000		**6.2**	0.5 U	**2.9 J**	2.5 U	**5.1 J**	6.5 J					
SW-4	ES	10/19/1978									**2.3**			
SW-4	ES	11/02/1978									0.5			
SW-4	ES	12/07/1978									0.5 U			
SW-4	ES	03/15/1979									**3.6**			

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Surface Water - Area: Blue Creek & Tributaries

Location	Sample Type	Date	Depth In Feet	D.Antimony ug/l	D.Cadmium ug/l	D.Chromium ug/l	D.Nickel ug/l	D.Vanadium ug/l	D.Zinc ug/l	Nitrate mg/l	Radium 226 pCi/l	Sulfate mg/l	U238 pCi/l	- -	- -
SW-4	ES	03/30/1979									**2.1**				
SW-4	ES	04/16/1979									1.1				
SW-4	ES	04/30/1979									1.1				
SW-4	ES	05/14/1979									1.6				
SW-4	ES	05/31/1979									1.6				
SW-4	ES	06/15/1979									1.1				
SW-4	ES	06/29/1979									1.1				
SW-4	ES	07/29/1979									0.8				
SW-4	ES	08/30/1979									1.7				
SW-4	ES	09/25/1979									1.7				
SW-4	ES	10/30/1979									1.8				
SW-4	ES	12/27/1979									**2**				
SW-4	ES	02/29/1980									0.82				
SW-4	ES	03/25/1980									0.64				
SW-4	ES	04/07/1980									0.55				
SW-4	ES	04/21/1980									**3.1**				
SW-4	ES	05/05/1980									0.5				
SW-4	ES	05/19/1980									**2.8**				
SW-4	ES	06/03/1980									0.32				
SW-4	ES	06/16/1980									0.37				
SW-4	ES	07/16/1980									1.7				
SW-4	ES	08/19/1980									0.1 U				
SW-4	ES	09/16/1980									0.59				
SW-4	ES	10/27/1980									0.25				
SW-4	ES	11/20/1980									0.06				
SW-4	ES	12/16/1980									0.22				
SW-4	ES	06/17/1981									0.028				
SW-4	ES	07/31/1981									0.11				
SW-4	ES	08/26/1981									0.06				
SW-4	ES	10/20/1981									0.21				
SW-4	ES	03/12/1982									0.1				
SW-4	ES	03/26/1982									0.6				
SW-4	ES	04/12/1982									0.3				
SW-4	ES	04/26/1982									0.2				

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Surface Water - Area: Blue Creek & Tributaries

Location	Sample Type	Date	Depth In Feet	D.Antimony ug/l	D.Cadmium ug/l	D.Chromium ug/l	D.Nickel ug/l	D.Vanadium ug/l	D.Zinc ug/l	Nitrate mg/l	Radium 226 pCi/l	Sulfate mg/l	U238 pCi/l	- -	- -
SW-4	ES	05/24/1982									**2.1**				
SW-4	ES	07/26/1982									0.8				
SW-4	ES	10/06/1982									0.2				
SW-4	ES	04/19/1983									0.17				
SW-4	ES	07/19/1983									0.08				
SW-4	ES	10/25/1983									0.09				
SW-4	ES	04/24/1984									0.08				
SW-4	ES	07/30/1984									0.55				
SW-4	ES	10/31/1984									0.09				
SW-4	ES	02/05/1985									0.13				
SW-4	ES	04/29/1985									0.19				
SW-4	ES	08/09/1985									0.06				
SW-4	ES	10/29/1985									0.5				
SW-4	ES	02/05/1986									0.12				
SW-4	ES	04/29/1986									0.1				
SW-4	ES	07/17/1986									0.05				
SW-4	ES	01/26/1987									0.12				
SW-4	ES	04/16/1987									0.09				
SW-4	ES	02/25/1988									0.06				
SW-4	ES	04/26/1988									0.11				
SW-4	ES	10/18/1988									0.08				
SW-4	ES	02/24/1989									0.2 U				
SW-4	ES	04/24/1989									0.1 U				
SW-4	ES	07/19/1989									0.52				
SW-4	ES	10/04/1989									0.1 U				
SW-4	ES	04/17/1990									0.1				
SW-4	ES	07/30/1990									0.1				
SW-4	ES	07/15/1992									0.3				
SW-4	ES	03/03/1993									0.3				
SW-4	ES	04/20/1993									0.2				
SW-4	ES	07/06/1993									0.2				
SW-4	ES	10/07/1993									0.2				
SW-4	ES	04/12/1995									0.3				
SW-4	ES	10/13/1995									0.1				

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Surface Water - Area: Blue Creek & Tributaries

Location	Sample Type	Date	Depth In Feet	D.Antimony ug/l	D.Cadmium ug/l	D.Chromium ug/l	D.Nickel ug/l	D.Vanadium ug/l	D.Zinc ug/l	Nitrate mg/l	Radium 226 pCi/l	Sulfate mg/l	U238 pCi/l	- -	- -
SW-4	ES	01/16/1996									0.2				
SW-4	ES	05/13/1996									0.2				
SW-4	ES	07/24/1996									1.2				
SW-4	ES	01/08/1997									0.6				
SW-4	ES	03/21/1997									0.4				
SW-4	ES	03/23/1997									0.5				
SW-4	ES	04/07/1997									0.5				
SW-4	ES	07/22/1997									0.1				
SW-4	ES	10/22/1997									0.1				
SW-4	ES	01/26/1981									0.2				
SW-4	ES	02/23/1981									0.23				
SW-4	ES	04/16/1981									0.22				
SW-4	ES	05/01/1981									0.19				
SW-4	ES	05/20/1981									0.07				
SW-4	ES	06/04/1981									0.06				
SW-4	ES	04/27/1998									0.5				
SW-4	ES	12/09/1998									0.08		**23 J**		
SW-4	ES	12/09/1998			0.4 U	0.4 U	10 U		5 J						
SW-4	ES	01/13/1999									1.3		1 U		
SW-4	ES	01/13/1999			0.4 U	0.4 U	10 U		4 U						
SW-4	ES	02/18/1999			1 U	1 U	10 U		10 U						
SW-4	ES	02/18/1999									0.31		0.92		
SW-4	ES	03/12/1999			0.2 U	0.5 J	10 U		6 J						
SW-4	ES	03/12/1999									0.76		7.3		
SW-4	ES	10/15/1998									0.13		**11 J**		
SW-4	ES	10/15/1998			0.4 U	0.7 U	10 U		4 U						
SW-4	ES	11/12/1998									0.8		0.97		
SW-4	ES	11/12/1998			0.4 U	0.5 U	10 U		4 U						
SW-4	ES	04/21/1999									0.67		1.3		
SW-4	ES	04/21/1999			1 U	1 U	10 U		**30 J**						
SW-4	ES	05/16/1999			0.4 U	**2**	10 U		4 U						
SW-4	ES	05/16/1999									0.28		1.6		
SW-4	ES	06/14/1999			0.5 U	**1**	10 U		10 U						
SW-4	ES	06/14/1999									0.27		1.9		

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Surface Water - Area: Blue Creek & Tributaries

Location	Sample Type	Date	Depth In Feet	D.Antimony ug/l	D.Cadmium ug/l	D.Chromium ug/l	D.Nickel ug/l	D.Vanadium ug/l	D.Zinc ug/l	Nitrate mg/l	Radium 226 pCi/l	Sulfate mg/l	U238 pCi/l	- -	- -
SW-5	ES	11/02/1978									0.2				
SW-5	ES	12/07/1978									0.4 U				
SW-5	ES	03/15/1979									**34.2**				
SW-5	ES	03/30/1979									**3.9**				
SW-5	ES	04/16/1979									1.8				
SW-5	ES	04/30/1979									1.2				
SW-5	ES	05/14/1979									**2**				
SW-5	ES	05/31/1979									1.3				
SW-5	ES	06/15/1979									1.8				
SW-5	ES	06/29/1979									1.5				
SW-5	ES	07/27/1979									1.8				
SW-5	ES	08/30/1979									**2.3**				
SW-5	ES	09/25/1979									**2.6**				
SW-5	ES	10/30/1979									**2**				
SW-5	ES	12/27/1979									**1.9**				
SW-5	ES	01/27/1980									0.15				
SW-5	ES	02/29/1980									1.7				
SW-5	ES	03/25/1980									0.75				
SW-5	ES	04/07/1980									0.86				
SW-5	ES	04/21/1980									**5.2**				
SW-5	ES	05/05/1980									0.77				
SW-5	ES	05/19/1980									0.69				
SW-5	ES	06/03/1980									0.66				
SW-5	ES	06/16/1980									0.58				
SW-5	ES	07/16/1980									0.2				
SW-5	ES	08/19/1980									0.32				
SW-5	ES	09/16/1980									0.77				
SW-5	ES	10/27/1980									0.45				
SW-5	ES	11/20/1980									0.11				
SW-5	ES	12/16/1980									0.85				
SW-5	ES	01/26/1981									1.5				
SW-5	ES	02/23/1981									**2.8**				
SW-5	ES	04/16/1981									0.34				
SW-5	ES	05/01/1981									**3.4**				

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Surface Water - Area: Blue Creek & Tributaries

Location	Sample Type	Date	Depth In Feet	D.Antimony ug/l	D.Cadmium ug/l	D.Chromium ug/l	D.Nickel ug/l	D.Vanadium ug/l	D.Zinc ug/l	Nitrate mg/l	Radium 226 pCi/l	Sulfate mg/l	U238 pCi/l	- -	- -
SW-5	ES	05/20/1981									0.52				
SW-5	ES	06/04/1981									0.35				
SW-5	ES	06/17/1981									1.3				
SW-5	ES	07/31/1981									**8**				
SW-5	ES	08/26/1981									0.28				
SW-5	ES	09/24/1981									0.41				
SW-5	ES	10/20/1981									**2.3**				
SW-5	ES	11/13/1981									0.5				
SW-5	ES	12/07/1981									1.8				
SW-5	ES	01/25/1982									0.5				
SW-5	ES	02/28/1982									1.2				
SW-5	ES	03/12/1982									0.6				
SW-5	ES	03/26/1982									0.6				
SW-5	ES	04/12/1982									0.2				
SW-5	ES	04/26/1982									0.5				
SW-5	ES	05/10/1982									0.2				
SW-5	ES	05/24/1982									**1.9**				
SW-5	ES	07/26/1982									0.8				
SW-5	ES	10/07/1982									0.7				
SW-5	ES	01/26/1983									0.6				
SW-5	ES	04/19/1983									0.6				
SW-5	ES	07/19/1983									0.6				
SW-5	ES	10/25/1983									0.72				
SW-5	ES	01/31/1984									0.73				
SW-5	ES	04/24/1984									0.26				
SW-5	ES	07/30/1984									1.09				
SW-5	ES	10/31/1984									0.66				
SW-5	ES	02/05/1985									0.69				
SW-5	ES	04/29/1985									0.4				
SW-5	ES	08/09/1985									0.32				
SW-5	ES	10/29/1985									0.39				
SW-5	ES	02/05/1986									**1.9**				
SW-5	ES	04/29/1986									0.3				
SW-5	ES	07/17/1986									0.71				

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Surface Water - Area: Blue Creek & Tributaries

Location	Sample Type	Date	Depth In Feet	D.Antimony ug/l	D.Cadmium ug/l	D.Chromium ug/l	D.Nickel ug/l	D.Vanadium ug/l	D.Zinc ug/l	Nitrate mg/l	Radium 226 pCi/l	Sulfate mg/l	U238 pCi/l	- -	- -
SW-5	ES	10/27/1986									0.2				
SW-5	ES	01/26/1987									0.21				
SW-5	ES	04/16/1987									0.41				
SW-5	ES	07/08/1987									0.08				
SW-5	ES	10/06/1987									0.1				
SW-5	ES	02/25/1988									0.11				
SW-5	ES	02/15/1989									0.2 U				
SW-5	ES	04/24/1989									0.13				
SW-5	ES	07/19/1989									0.2				
SW-5	ES	10/04/1989									0.1 U				
SW-5	ES	01/24/1990									0.1				
SW-5	ES	07/30/1990									1.8				
SW-5	ES	04/23/1992									0.2				
SW-5	ES	07/15/1992									0.1				
SW-5	ES	10/13/1992									0.1				
SW-5	ES	03/03/1993									0.1				
SW-5	ES	04/20/1993									0.3				
SW-5	ES	07/06/1993									0.4				
SW-5	ES	10/11/1993									0.6				
SW-5	ES	01/27/1994									0.2				
SW-5	ES	05/03/1994									0.1				
SW-5	ES	10/17/1994									0.4				
SW-5	ES	10/13/1995									0.4				
SW-5	ES	05/13/1996									0.3				
SW-5	ES	07/24/1996									0.7				
SW-5	ES	10/21/1996									0.5				
SW-5	ES	03/21/1997									0.7				
SW-5	ES	03/23/1997									0.5				
SW-5	ES	04/07/1997									0.4				
SW-5	ES	07/22/1997									0.8				
SW-5	ES	10/22/1997									0.3				
SW-5	ES	01/13/1998									0.3				
SW-5	ES	04/27/1998									0.4				
SW-5	ES	12/09/1998									0.37		**32 J**		

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Surface Water - Area: Blue Creek & Tributaries

Location	Sample Type	Date	Depth In Feet	D.Antimony ug/l	D.Cadmium ug/l	D.Chromium ug/l	D.Nickel ug/l	D.Vanadium ug/l	D.Zinc ug/l	Nitrate mg/l	Radium 226 pCi/l	Sulfate mg/l	U238 pCi/l	- - - -
SW-5	ES	12/09/1998			1 U	1 U	**30 J**		**20 J**					
SW-5	ES	01/13/1999			0.4 U	0.4 U	**10 J**		**36 J**					
SW-5	ES	01/13/1999									0.41		**15**	
SW-5	ES	02/18/1999			1 U	1 U	**20 J**		**20 J**					
SW-5	ES	02/18/1999									0.17		**9.3**	
SW-5	ES	03/12/1999									0.62		4.4	
SW-5	ES	03/12/1999			0.2 U	0.6 J	**10 J**		**16**					
SW-5	ES	10/15/1998									0.65		**10 J**	
SW-5	ES	10/15/1998			1 U	2 U	20 U		**30 J**					
SW-5	ES	11/12/1998									**5.1**		**8.4**	
SW-5	ES	11/12/1998			1 U	**3 J**	**20 J**		**40 J**					
SW-5	ES	04/21/1999									0.82		4.4	
SW-5	ES	04/21/1999			0.4 U	0.6 J	10 U		**33 J**					
SW-5	ES	05/16/1999			0.4 U	**1.2 J**	10 U		13 J					
SW-5	ES	05/16/1999									0.4		6	
SW-5	ES	06/14/1999			0.2 U	**1.1**	10 U		**20**					
SW-5	ES	06/14/1999									0.49		5.3	
SW-7	ES	10/19/1978									**3.4**			
SW-7	ES	11/02/1978									0.2			
SW-7	ES	12/07/1978									1			
SW-7	ES	03/15/1979									**30.2**			
SW-7	ES	03/30/1979									**7.5**			
SW-7	ES	04/16/1979									**4.4**			
SW-7	ES	04/30/1979									**2.7**			
SW-7	ES	05/14/1979									**2.8**			
SW-7	ES	05/31/1979									**2.4**			
SW-7	ES	06/15/1979									1.5			
SW-7	ES	06/29/1979									**2.4**			
SW-7	ES	07/27/1979									**3.4**			
SW-7	ES	08/30/1979									**3.2**			
SW-7	ES	09/25/1979									**2.7**			
SW-7	ES	10/30/1979									**2.1**			
SW-7	ES	12/27/1979									**2**			
SW-7	ES	01/31/1980									0.29			

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Surface Water - Area: Blue Creek & Tributaries

Location	Sample Type	Date	Depth In Feet	D.Antimony ug/l	D.Cadmium ug/l	D.Chromium ug/l	D.Nickel ug/l	D.Vanadium ug/l	D.Zinc ug/l	Nitrate mg/l	Radium 226 pCi/l	Sulfate mg/l	U238 pCi/l	- -	- -
SW-7	ES	02/29/1980									**26**				
SW-7	ES	03/25/1980									1.6				
SW-7	ES	04/07/1980									1.4				
SW-7	ES	04/21/1980									1.2				
SW-7	ES	05/05/1980									0.88				
SW-7	ES	05/19/1980									0.76				
SW-7	ES	06/03/1980									0.58				
SW-7	ES	06/16/1980									0.27				
SW-7	ES	07/16/1980									0.2 U				
SW-7	ES	08/19/1980									0.1 U				
SW-7	ES	09/16/1980									0.58				
SW-7	ES	10/27/1980									0.13				
SW-7	ES	11/20/1980									0.53				
SW-7	ES	12/16/1980									0.31				
SW-7	ES	01/26/1981									0.65				
SW-7	ES	02/23/1981									1.7				
SW-7	ES	04/16/1981									0.45				
SW-7	ES	05/01/1981									**7**				
SW-7	ES	05/20/1981									0.51				
SW-7	ES	06/04/1981									0.46				
SW-7	ES	06/17/1981									0.63				
SW-7	ES	07/31/1981									0.26				
SW-7	ES	08/26/1981									0.12				
SW-7	ES	11/13/1981									0.06				
SW-7	ES	12/07/1981									0.44				
SW-7	ES	01/25/1982									0.16				
SW-7	ES	02/28/1982									**4.2**				
SW-7	ES	03/12/1982									1.4				
SW-7	ES	03/26/1982									0.2				
SW-7	ES	04/12/1982									0.9				
SW-7	ES	04/26/1982									0.2				
SW-7	ES	05/10/1982									0.2				
SW-7	ES	05/24/1982									**5.5**				
SW-7	ES	07/26/1982									1.2				

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Surface Water - Area: Blue Creek & Tributaries

Location	Sample Type	Date	Depth In Feet	D.Antimony ug/l	D.Cadmium ug/l	D.Chromium ug/l	D.Nickel ug/l	D.Vanadium ug/l	D.Zinc ug/l	Nitrate mg/l	Radium 226 pCi/l	Sulfate mg/l	U238 pCi/l	- -	- -
SW-7	ES	10/07/1982									0.4				
SW-7	ES	07/19/1983									0.19				
SW-7	ES	01/31/1984									0.2				
SW-7	ES	07/30/1984									0.16				
SW-7	ES	10/31/1984									0.13				
SW-7	ES	02/05/1985									0.06				
SW-7	ES	04/29/1985									0.28				
SW-7	ES	10/29/1985									0.12				
SW-7	ES	02/05/1986									0.34				
SW-7	ES	04/29/1986									0.2				
SW-7	ES	07/17/1986									0.07				
SW-7	ES	10/27/1986									0.06				
SW-7	ES	01/26/1987									0.13				
SW-7	ES	04/17/1987									0.18				
SW-7	ES	02/15/1989									0.4				
SW-7	ES	04/24/1989									0.1 U				
SW-7	ES	07/19/1989									0.1 U				
SW-7	ES	10/04/1989									0.1 U				
SW-7	ES	01/31/1991									0.3				
SW-7	ES	07/19/1991									0.2				
SW-7	ES	01/29/1992									0.1				
SW-7	ES	07/15/1992									0.1				
SW-7	ES	04/20/1993									0.3				
SW-7	ES	07/06/1993									0.1				
SW-7	ES	10/11/1993									0.1				
SW-7	ES	10/17/1994									0.4				
SW-7	ES	07/20/1995									0.2				
SW-7	ES	10/13/1995									0.3				
SW-7	ES	01/16/1996									0.1				
SW-7	ES	05/13/1996									0.3				
SW-7	ES	07/24/1996									0.3				
SW-7	ES	10/21/1996									0.1				
SW-7	ES	01/07/1997									0.4				
SW-7	ES	04/07/1997									0.5				

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Surface Water - Area: Blue Creek & Tributaries

Location	Sample Type	Date	Depth In Feet	D.Antimony ug/l	D.Cadmium ug/l	D.Chromium ug/l	D.Nickel ug/l	D.Vanadium ug/l	D.Zinc ug/l	Nitrate mg/l	Radium 226 pCi/l	Sulfate mg/l	U238 pCi/l	- - - -
SW-7	ES	07/22/1997									0.4			
SW-7	ES	10/21/1997									0.3			
SW-7	ES	12/09/1998									0.22		**29 J**	
SW-7	ES	12/09/1998			1 U	1 U	10 U		10 U					
SW-7	ES	01/13/1999			0.4 U	0.4 U	10 U		12 U					
SW-7	ES	01/13/1999									0.13		**32**	
SW-7	ES	02/18/1999			1 U	1 U	10 U		10 U					
SW-7	ES	02/18/1999									0.27		**8.1**	
SW-7	ES	03/12/1999			0.2 U	0.4 J	10 U		**19**					
SW-7	ES	03/12/1999									0.74		**8.2**	
SW-7	ES	10/15/1998			1 U	2 U	20 U		**30 J**					
SW-7	ES	10/15/1998									0.82		**11**	
SW-7	ES	11/11/1998			1 U	**2 J**	**10 J**		**30 J**					
SW-7	ES	11/11/1998									0.57		**8.5**	
SW-7	ES	04/21/1999									0.72		4.7	
SW-7	ES	04/21/1999			1 U	1 U	10 U		**40 J**					
SW-7	ES	05/16/1999									0.31		7.5	
SW-7	ES	05/16/1999			1 U	**2 J**	10 U		**20 J**					
SW-7	ES	06/14/1999			0.2 U	0.7 U	10 U		**16 J**					
SW-7	ES	06/14/1999									0.53		**8.7**	
TR04SD/TR04	ES	04/04/2000		**3.5**	0.5 U	1.1 U	1.7 U	**3.5 J**	7.1 J					
TR04SD/TR04	ES	04/04/2000									0.32		0.652	
TR06SW/TR06	ES	04/01/1998									0.8 U		1.6	
TR06SW/TR06	ES	09/29/1999									0.157 J		**9.75**	
TR06SW/TR06	ES	09/29/1999		2.2 U	0.2 U	0.4 U	0.5 U	0.85 J	1.3 U					
TR06SW/TR06	ES	04/04/2000											1.51	
TR06SW/TR06	ES	04/04/2000		2.7 U	0.5 U	**1.9 J**	1.7 U	**3.6 J**	4.4 J					

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Surface Water - Area: Lake Roosevelt

Location	Sample Type	Date	Depth In Feet	D.Antimony ug/l	D.Cadmium ug/l	D.Chromium ug/l	D.Nickel ug/l	D.Vanadium ug/l	D.Zinc ug/l	Nitrate mg/l	Radium 226 pCi/l	Sulfate mg/l	U238 pCi/l	- -	- -
RL01SW/RL01	ES	04/01/1998									1 U		0.2 U		
RL02SW/RL02	ES	04/01/1998									1 U		0.2 U		
SW-13	ES	01/31/1984									**5.4**				
SW-13	ES	04/27/1984									**4**				
SW-13	ES	02/06/1986									**27**				
SW-13	ES	10/06/1987									**32**				
SW-13	ES	02/26/1988									**22**				
SW-14	ES	01/31/1984									1.8				
SW-8	ES	10/19/1978									**2.4**				
SW-8	ES	12/07/1978									0.5 U				
SW-8	ES	03/15/1979									**28.9**				
SW-8	ES	03/30/1979									**4.1**				
SW-8	ES	04/16/1979									**4.3**				
SW-8	ES	04/30/1979									**3.6**				
SW-8	ES	05/14/1979									**2.2**				
SW-8	ES	05/31/1979									**3.3**				
SW-8	ES	06/15/1979									1.1				
SW-8	ES	06/29/1979									1				
SW-8	ES	07/27/1979									**2.2**				
SW-8	ES	08/30/1979									**1.9**				
SW-8	ES	09/25/1979									**1.9**				
SW-8	ES	10/30/1979									1.7				
SW-8	ES	12/27/1979									1.4				
SW-8	ES	01/31/1980									0.54				
SW-8	ES	02/29/1980									**14**				
SW-8	ES	03/25/1980									1.6				
SW-8	ES	04/07/1980									1.4				
SW-8	ES	04/21/1980									1.1				
SW-8	ES	05/05/1980									0.22				
SW-8	ES	05/19/1980									1.1				
SW-8	ES	06/03/1980									0.41				
SW-8	ES	06/16/1980									0.36				
SW-8	ES	07/16/1980									0.2 U				
SW-8	ES	08/19/1980									0.22				

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Surface Water - Area: Lake Roosevelt

Location	Sample Type	Date	Depth In Feet	D.Antimony ug/l	D.Cadmium ug/l	D.Chromium ug/l	D.Nickel ug/l	D.Vanadium ug/l	D.Zinc ug/l	Nitrate mg/l	Radium 226 pCi/l	Sulfate mg/l	U238 pCi/l	- -	- -
SW-8	ES	10/27/1980									0.22				
SW-8	ES	12/16/1980									0.22				
SW-8	ES	06/17/1981									0.66				
SW-8	ES	07/31/1981									0.27				
SW-8	ES	08/26/1981									0.35				
SW-8	ES	09/24/1981									0.16				
SW-8	ES	11/13/1981									0.08				
SW-8	ES	12/07/1981									0.11				
SW-8	ES	01/26/1981									0.33				
SW-8	ES	04/16/1981									0.11				
SW-8	ES	05/01/1981									0.68				
SW-8	ES	05/20/1981									0.17				
SW-8	ES	06/04/1981									0.18				

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Surface Water - Area: Potentially Impacted Area East of Mined Area

Location	Sample Type	Date	Depth In Feet	D.Antimony ug/l	D.Cadmium ug/l	D.Chromium ug/l	D.Nickel ug/l	D.Vanadium ug/l	D.Zinc ug/l	Nitrate mg/l	Radium 226 pCi/l	Sulfate mg/l	U238 pCi/l	- - - -
EAST SEEP/S	ES	08/07/1999			18.8 J	0.3 U	* 440		1270					
EAST SEEP/S	ES	08/07/1999									20		* 2300	
EAST SEEP/S	ES	12/11/1999		10 U	23.9	0.2 U	* 450	30 U	* 1370					
EAST SEEP/S	ES	12/11/1999									17		* 1800	
EAST SEEP/S	ES	01/08/2000			22.7	0.4 J	* 520		* 1430 J					
EAST SEEP/S	ES	01/08/2000									21		* 1500	
EAST SEEP/S	ES	02/01/2000			30 J	1 U	* 530 J		* 1570 J					
EAST SEEP/S	ES	02/01/2000									20		* 1400	
ED02SW/ED02	ES	04/01/1998									1 U		12.5 J	
ED03SW/ED03	ES	04/01/1998									1		11.2	
ED04-SD/ED-2	ES	09/25/1999		4.1	0.55 J	1.9 J	3.5 J	0.5 U	4.9 U					
ED04-SD/ED-2	ES	09/25/1999											13	
ED04-SD/ED-2	ES	03/09/2000		2.2 U	0.2 U	0.4 U	2.4 J	0.77 J	1.1 U					
ED04-SD/ED-2	ES	03/09/2000									0.962		26.9	
ED04-SD/ED-2	ES	04/06/2000		2.7 U	0.5 U	1.1 U	1.2 UJ	1.6 U	0.4 U					
ED04-SD/ED-2	ES	04/06/2000									0.69		25.8	
ED04SW/ED04	ES	04/01/1998									1.2 J		6.5	
ED05SW/ED05	ES	04/01/1998									1		11.2	
ED-4A/SDED-	ES	09/10/1999		3.2	0.3 J	0.4 U	1.4 J	0.5 U	1.2 U					
ED-4A/SDED-	ES	09/10/1999									1.11		10.5	
ED-4A/SDED-	ES	04/06/2000		3.6	0.5 U	1.1 U	2 U	1 U	0.4 U					
ED-4A/SDED-	ES	04/06/2000									2.11		24.5	
OF01SW/OF01	ES	04/01/1998									1 U		12.8 J	
OF01SW/OF01	ES	09/27/1999		2.2 U	0.2 U	0.89 J	3.4 J	0.5 U	9.3 U					
OF01SW/OF01	ES	09/27/1999									0.447 J		21	
OF01SW/OF01	ES	04/07/2000		4.5	0.5 U	1.9 J	2.7 UJ	1 U	0.4 U					
OF01SW/OF01	ES	04/07/2000											85.1	
SDNE-01/SWN	ES	04/07/2000		2.9 J	0.5 U	1.1 U	3.7 UJ	2 U	4.6 J					
SDNE-01/SWN	ES	04/07/2000											357	
SW-02/SDED-	ES	07/26/1982									0.6			
SW-02/SDED-	ES	10/06/1982									0.6			
SW-02/SDED-	ES	01/26/1983									0.13			
SW-02/SDED-	ES	04/19/1983									0.33			
SW-02/SDED-	ES	07/19/1983									0.44			

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Surface Water - Area: Potentially Impacted Area East of Mined Area

Location	Sample Type	Date	Depth In Feet	D.Antimony ug/l	D.Cadmium ug/l	D.Chromium ug/l	D.Nickel ug/l	D.Vanadium ug/l	D.Zinc ug/l	Nitrate mg/l	Radium 226 pCi/l	Sulfate mg/l	U238 pCi/l	- -	- -
SW-02/SDED-	ES	10/25/1983									0.15				
SW-02/SDED-	ES	01/31/1984									0.48				
SW-02/SDED-	ES	04/24/1984									0.71				
SW-02/SDED-	ES	07/30/1984									0.58				
SW-02/SDED-	ES	10/31/1984									0.14				
SW-02/SDED-	ES	02/05/1985									0.36				
SW-02/SDED-	ES	04/29/1985									0.31				
SW-02/SDED-	ES	08/09/1985									0.28				
SW-02/SDED-	ES	10/28/1985									0.37				
SW-02/SDED-	ES	02/06/1986									0.31				
SW-02/SDED-	ES	04/29/1986									0.42				
SW-02/SDED-	ES	07/17/1986									0.24				
SW-02/SDED-	ES	10/28/1986									0.09				
SW-02/SDED-	ES	01/26/1987									0.39				
SW-02/SDED-	ES	04/17/1987									0.54				
SW-02/SDED-	ES	07/08/1987									0.35				
SW-02/SDED-	ES	10/06/1987									0.18				
SW-02/SDED-	ES	02/26/1988									0.27				
SW-02/SDED-	ES	04/26/1988									0.26				
SW-02/SDED-	ES	07/19/1988									0.21				
SW-02/SDED-	ES	10/18/1988									0.14				
SW-02/SDED-	ES	02/15/1989									0.7				
SW-02/SDED-	ES	04/24/1989									0.4				
SW-02/SDED-	ES	07/19/1989									0.28				
SW-02/SDED-	ES	10/04/1989									0.2				
SW-02/SDED-	ES	01/24/1990									0.1				
SW-02/SDED-	ES	04/17/1990									0.4				
SW-02/SDED-	ES	07/30/1990									0.3				
SW-02/SDED-	ES	04/23/1991									0.4				
SW-02/SDED-	ES	07/19/1991									0.2				
SW-02/SDED-	ES	10/28/1991									0.2				
SW-02/SDED-	ES	01/29/1992									0.1				
SW-02/SDED-	ES	04/23/1992									0.1				
SW-02/SDED-	ES	07/15/1992									0.2				

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Surface Water - Area: Potentially Impacted Area East of Mined Area

Location	Sample Type	Date	Depth In Feet	D.Antimony ug/l	D.Cadmium ug/l	D.Chromium ug/l	D.Nickel ug/l	D.Vanadium ug/l	D.Zinc ug/l	Nitrate mg/l	Radium 226 pCi/l	Sulfate mg/l	U238 pCi/l	- -	- -
SW-02/SDED-	ES	09/21/1992									**2.4**				
SW-02/SDED-	ES	09/24/1992									0.1				
SW-02/SDED-	ES	10/13/1992									**3.6**				
SW-02/SDED-	ES	03/05/1993									1.1				
SW-02/SDED-	ES	04/20/1993									0.8				
SW-02/SDED-	ES	07/06/1993									0.3				
SW-02/SDED-	ES	10/07/1993									0.9				
SW-02/SDED-	ES	01/27/1994									0.4				
SW-02/SDED-	ES	05/02/1994									0.7				
SW-02/SDED-	ES	10/17/1994									1.4				
SW-02/SDED-	ES	01/25/1995									0.2				
SW-02/SDED-	ES	04/12/1995									0.7				
SW-02/SDED-	ES	07/25/1995									1.2				
SW-02/SDED-	ES	10/13/1995									0.9				
SW-02/SDED-	ES	01/17/1996									0.4				
SW-02/SDED-	ES	05/15/1996									0.8				
SW-02/SDED-	ES	07/25/1996									0.9				
SW-02/SDED-	ES	10/22/1996									1.2				
SW-02/SDED-	ES	01/06/1997									**7.1**				
SW-02/SDED-	ES	04/08/1997									1				
SW-02/SDED-	ES	07/24/1997									0.9				
SW-02/SDED-	ES	10/21/1997									1				
SW-02/SDED-	ES	09/24/1981									0.08				
SW-02/SDED-	ES	01/12/1998									0.3				
SW-02/SDED-	ES	04/30/1998									0.9				
SW-02/SDED-	ES	12/09/1998			0.4 U	0.4 J	10 U		4 U						
SW-02/SDED-	ES	12/09/1998									0.8		**58 J**		
SW-02/SDED-	ES	01/13/1999			0.4 U	0.5 J	10 U		4 U						
SW-02/SDED-	ES	01/13/1999									0.53		**42**		
SW-02/SDED-	ES	02/19/1999			0.4 U	0.4 U	10 U		12 U						
SW-02/SDED-	ES	02/19/1999									0.36		**26**		
SW-02/SDED-	ES	03/12/1999			0.2 U	0.3 J	10 U		11						
SW-02/SDED-	ES	03/12/1999									0.4		**33**		
SW-02/SDED-	ES	10/16/1998			1 U	**4 J**	20 U		**40 J**						

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Surface Water - Area: Potentially Impacted Area East of Mined Area

Location	Sample Type	Date	Depth In Feet	D.Antimony ug/l	D.Cadmium ug/l	D.Chromium ug/l	D.Nickel ug/l	D.Vanadium ug/l	D.Zinc ug/l	Nitrate mg/l	Radium 226 pCi/l	Sulfate mg/l	U238 pCi/l	- - - -
SW-02/SDED-	ES	10/16/1998									1.4		**27 J**	
SW-02/SDED-	ES	11/12/1998			1 U	**5 J**	**10 J**		**30 J**					
SW-02/SDED-	ES	11/12/1998									0.83		7.4	
SW-02/SDED-	ES	04/20/1999			1 U	**3 J**	20 U		10 J					
SW-02/SDED-	ES	04/20/1999									1.4		**13**	
SW-02/SDED-	ES	05/16/1999			2 U	**8 J**	**20 J**		**40 J**					
SW-02/SDED-	ES	05/16/1999									1.1		**12**	
SW-02/SDED-	ES	06/14/1999			1 U	0.5 U	10 U		**20 J**					
SW-02/SDED-	ES	06/14/1999									1.4		**11**	
SW-02/SDED-	ES	09/26/1999		2.2 U	0.2 U	0.4 U	0.74 J	0.5 U	4.2 U					
SW-02/SDED-	ES	09/26/1999											**15.6**	
SW-02/SDED-	ES	04/06/2000		2.7 U	0.5 U	1.1 U	1.5 UJ	1.6 U	0.4 U					
SW-02/SDED-	ES	04/06/2000									0.636		**24.6**	
SW-06/ED01-S	ES	10/19/1978									**15.7**			
SW-06/ED01-S	ES	11/02/1978									**2.2**			
SW-06/ED01-S	ES	12/07/1978									1.8			
SW-06/ED01-S	ES	03/15/1979									**8.13**			
SW-06/ED01-S	ES	03/30/1979									**6.3**			
SW-06/ED01-S	ES	04/16/1979									1.7			
SW-06/ED01-S	ES	04/30/1979									1.2			
SW-06/ED01-S	ES	05/14/1979									1			
SW-06/ED01-S	ES	05/31/1979									1.8			
SW-06/ED01-S	ES	06/15/1979									1.4			
SW-06/ED01-S	ES	06/29/1979									**2.3**			
SW-06/ED01-S	ES	07/27/1979									1.2			
SW-06/ED01-S	ES	08/30/1979									0.9			
SW-06/ED01-S	ES	09/25/1979									1.3			
SW-06/ED01-S	ES	10/30/1979									1.5			
SW-06/ED01-S	ES	12/27/1979									1.4			
SW-06/ED01-S	ES	03/25/1980									**2.3**			
SW-06/ED01-S	ES	04/07/1980									**3.1**			
SW-06/ED01-S	ES	04/21/1980									1.6			
SW-06/ED01-S	ES	05/05/1980									**3.4**			
SW-06/ED01-S	ES	05/19/1980									**2.8**			

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Surface Water - Area: Potentially Impacted Area East of Mined Area

Location	Sample Type	Date	Depth In Feet	D.Antimony ug/l	D.Cadmium ug/l	D.Chromium ug/l	D.Nickel ug/l	D.Vanadium ug/l	D.Zinc ug/l	Nitrate mg/l	Radium 226 pCi/l	Sulfate mg/l	U238 pCi/l	- -	- -
SW-06/ED01-S	ES	06/03/1980									**2.4**				
SW-06/ED01-S	ES	06/16/1980									**2.1**				
SW-06/ED01-S	ES	07/16/1980									1.2				
SW-06/ED01-S	ES	08/19/1980									0.42				
SW-06/ED01-S	ES	09/19/1980									0.08				
SW-06/ED01-S	ES	10/27/1980									0.35				
SW-06/ED01-S	ES	11/18/1980									0.59				
SW-06/ED01-S	ES	12/16/1980									**2.2**				
SW-06/ED01-S	ES	01/26/1981									**5.1**				
SW-06/ED01-S	ES	02/23/1981									**7.9**				
SW-06/ED01-S	ES	04/16/1981									**2.2**				
SW-06/ED01-S	ES	05/01/1981									**17**				
SW-06/ED01-S	ES	05/20/1981									**2**				
SW-06/ED01-S	ES	06/03/1981									1.5				
SW-06/ED01-S	ES	06/17/1981									**5.6**				
SW-06/ED01-S	ES	08/26/1981									**2.5**				
SW-06/ED01-S	ES	09/24/1981									0.5				
SW-06/ED01-S	ES	10/20/1981									**6.1**				
SW-06/ED01-S	ES	11/13/1981									1.1				
SW-06/ED01-S	ES	12/07/1981									**2.2**				
SW-06/ED01-S	ES	01/25/1982									0.3				
SW-06/ED01-S	ES	02/28/1982									1.6				
SW-06/ED01-S	ES	03/12/1982									**22**				
SW-06/ED01-S	ES	03/26/1982									**4.6**				
SW-06/ED01-S	ES	04/12/1982									0.7				
SW-06/ED01-S	ES	04/26/1982									0.9				
SW-06/ED01-S	ES	05/10/1982									**2.6**				
SW-06/ED01-S	ES	05/24/1982									**8.9**				
SW-06/ED01-S	ES	07/26/1982									1.3				
SW-06/ED01-S	ES	10/07/1982									0.6				
SW-06/ED01-S	ES	01/26/1983									0.5				
SW-06/ED01-S	ES	04/19/1983									**3.8**				
SW-06/ED01-S	ES	07/19/1983									**3.6**				
SW-06/ED01-S	ES	10/25/1983									0.23				

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Surface Water - Area: Potentially Impacted Area East of Mined Area

Location	Sample Type	Date	Depth In Feet	D.Antimony ug/l	D.Cadmium ug/l	D.Chromium ug/l	D.Nickel ug/l	D.Vanadium ug/l	D.Zinc ug/l	Nitrate mg/l	Radium 226 pCi/l	Sulfate mg/l	U238 pCi/l	- -	- -
SW-06/ED01-S	ES	01/31/1984									**2.1**				
SW-06/ED01-S	ES	04/24/1984									**2**				
SW-06/ED01-S	ES	07/30/1984									**4.2**				
SW-06/ED01-S	ES	10/31/1984									1				
SW-06/ED01-S	ES	02/05/1985									1.24				
SW-06/ED01-S	ES	04/29/1985									**2.9**				
SW-06/ED01-S	ES	08/09/1985									0.79				
SW-06/ED01-S	ES	10/29/1985									0.74				
SW-06/ED01-S	ES	02/05/1986									**3.3**				
SW-06/ED01-S	ES	04/29/1986									**2.2**				
SW-06/ED01-S	ES	07/17/1986									1.28				
SW-06/ED01-S	ES	10/27/1986									1.29				
SW-06/ED01-S	ES	01/26/1987									0.36				
SW-06/ED01-S	ES	04/16/1987									**3.1**				
SW-06/ED01-S	ES	07/08/1987									0.54				
SW-06/ED01-S	ES	10/06/1987									0.07				
SW-06/ED01-S	ES	02/25/1988									0.16				
SW-06/ED01-S	ES	04/26/1988									0.14				
SW-06/ED01-S	ES	07/19/1988									0.14				
SW-06/ED01-S	ES	02/24/1989									0.2 U				
SW-06/ED01-S	ES	04/24/1989									0.17				
SW-06/ED01-S	ES	07/19/1989									0.2				
SW-06/ED01-S	ES	10/04/1989									0.2				
SW-06/ED01-S	ES	01/24/1990									0.1				
SW-06/ED01-S	ES	04/17/1990									0.1				
SW-06/ED01-S	ES	07/30/1990									0.1				
SW-06/ED01-S	ES	01/31/1991									0.5				
SW-06/ED01-S	ES	04/23/1991									0.2				
SW-06/ED01-S	ES	07/19/1991									0.1				
SW-06/ED01-S	ES	10/28/1991									0.1				
SW-06/ED01-S	ES	01/29/1992									0.2				
SW-06/ED01-S	ES	10/13/1992									0.6				
SW-06/ED01-S	ES	03/03/1993									0.2				
SW-06/ED01-S	ES	04/20/1993									0.2				

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Surface Water - Area: Potentially Impacted Area East of Mined Area

Location	Sample Type	Date	Depth In Feet	D.Antimony ug/l	D.Cadmium ug/l	D.Chromium ug/l	D.Nickel ug/l	D.Vanadium ug/l	D.Zinc ug/l	Nitrate mg/l	Radium 226 pCi/l	Sulfate mg/l	U238 pCi/l	- -	- -
SW-06/ED01-S	ES	10/07/1993									0.4				
SW-06/ED01-S	ES	01/27/1994									0.2				
SW-06/ED01-S	ES	05/02/1994									0.5				
SW-06/ED01-S	ES	10/17/1994									0.6				
SW-06/ED01-S	ES	04/12/1995									0.8				
SW-06/ED01-S	ES	07/20/1995									0.5				
SW-06/ED01-S	ES	10/13/1995									1				
SW-06/ED01-S	ES	01/16/1996									0.2				
SW-06/ED01-S	ES	05/13/1996									0.5				
SW-06/ED01-S	ES	07/25/1996									0.7				
SW-06/ED01-S	ES	10/21/1996									0.6				
SW-06/ED01-S	ES	01/06/1997									1.1				
SW-06/ED01-S	ES	03/21/1997									0.9				
SW-06/ED01-S	ES	03/23/1997									0.3				
SW-06/ED01-S	ES	04/07/1997									0.7				
SW-06/ED01-S	ES	07/24/1997									1				
SW-06/ED01-S	ES	10/21/1997									0.4				
SW-06/ED01-S	ES	01/12/1998									0.1				
SW-06/ED01-S	ES	04/27/1998									0.9				
SW-06/ED01-S	ES	12/09/1998			**2 J**	1 U	**100**		**80**						
SW-06/ED01-S	ES	12/09/1998									0.32		**72 J**		
SW-06/ED01-S	ES	01/13/1999			**2.2**	0.4 U	* **190 J**		**78**						
SW-06/ED01-S	ES	01/13/1999									0.32		**48**		
SW-06/ED01-S	ES	02/17/1999			**2.8 J**	0.4 U	**110**		**115 J**						
SW-06/ED01-S	ES	02/17/1999									0.12		**29**		
SW-06/ED01-S	ES	03/12/1999			**2.6**	0.2 U	**110**		**95**						
SW-06/ED01-S	ES	03/12/1999									0.36		**30**		
SW-06/ED01-S	ES	10/15/1998			1 U	3 U	20 U		**40 J**						
SW-06/ED01-S	ES	10/15/1998									0.97		**9.1**		
SW-06/ED01-S	ES	11/12/1998			1 U	**3 J**	**20 J**		**40 J**						
SW-06/ED01-S	ES	04/20/1999			1 U	**2 J**	20 U		**50 J**						
SW-06/ED01-S	ES	04/20/1999									0.84		**12**		
SW-06/ED01-S	ES	05/16/1999			2 U	**7 J**	20 U		**40 J**						
SW-06/ED01-S	ES	05/16/1999									0.64		**14**		

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Surface Water - Area: Potentially Impacted Area East of Mined Area

Location	Sample Type	Date	Depth In Feet	D.Antimony ug/l	D.Cadmium ug/l	D.Chromium ug/l	D.Nickel ug/l	D.Vanadium ug/l	D.Zinc ug/l	Nitrate mg/l	Radium 226 pCi/l	Sulfate mg/l	U238 pCi/l	- - - -
SW-06/ED01-S	ES	06/14/1999			0.5 J	0.5 U	10 U		**20 J**					
SW-06/ED01-S	ES	06/14/1999									0.9		**10**	
SW-06/ED01-S	ES	04/01/1998									1 U		**10.4 J**	
SW-06/ED01-S	ES	09/09/1999		2.2 U	0.24 J	**1.1 J**	**10.4 J**	0.9 J	5.1 U					
SW-06/ED01-S	ES	09/09/1999									0.94		**12.2**	
SW-06/ED01-S	ES	03/09/2000		**2.4 J**	**2.2 J**	0.4 U	**88.5**	0.5 U	**73.1**					
SW-06/ED01-S	ES	03/09/2000									0.499		**19.4**	
SW-06/ED01-S	ES	04/05/2000		**3 J**	**1.8 J**	1.1 U	**82.3**	1 U	**46.8**					
SW-06/ED01-S	ES	04/05/2000									0.262		**26.1**	
SW-11	ES	11/02/1978									0.7			
SW-11	ES	12/07/1978									1.3			
SW-11	ES	03/15/1979									**11.3**			
SW-11	ES	03/30/1979									**2.1**			
SW-11	ES	04/16/1979									0.2			
SW-11	ES	04/30/1979									1.3			
SW-11	ES	05/14/1979									1.3			
SW-11	ES	05/31/1979									1.8			
SW-11	ES	06/15/1979									1.3			
SW-11	ES	06/29/1979									**2.1**			
SW-11	ES	07/27/1979									1.4			
SW-11	ES	08/30/1979									1.2			
SW-11	ES	09/25/1979									1.2			
SW-11	ES	10/30/1979									1.4			
SW-11	ES	12/27/1979									**1.9**			
SW-11	ES	03/25/1980									1			
SW-11	ES	04/07/1980									0.53			
SW-11	ES	04/21/1980									0.68			
SW-11	ES	05/05/1980									0.93			
SW-11	ES	05/19/1980									**2.5**			
SW-11	ES	06/03/1980									1.6			
SW-11	ES	06/16/1980									1.1			
SW-11	ES	07/16/1980									0.47			
SW-11	ES	08/19/1980									1.2			
SW-11	ES	09/16/1980									0.68			

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Surface Water - Area: Potentially Impacted Area East of Mined Area

Location	Sample Type	Date	Depth In Feet	D.Antimony ug/l	D.Cadmium ug/l	D.Chromium ug/l	D.Nickel ug/l	D.Vanadium ug/l	D.Zinc ug/l	Nitrate mg/l	Radium 226 pCi/l	Sulfate mg/l	U238 pCi/l	- -	- -
SW-11	ES	10/27/1980									1.4				
SW-11	ES	11/18/1980									1				
SW-11	ES	12/16/1980									0.69				
SW-11	ES	01/26/1981									0.85				
SW-11	ES	02/23/1981									**2.2**				
SW-11	ES	04/16/1981									0.76				
SW-11	ES	05/01/1981									**1.9**				
SW-11	ES	05/20/1981									1.1				
SW-11	ES	06/04/1981									1.1				
SW-11	ES	06/17/1981									0.97				
SW-11	ES	07/31/1981									**5.9**				
SW-11	ES	08/26/1981									1.5				
SW-11	ES	09/24/1981									0.58				
SW-11	ES	10/20/1981									0.72				
SW-11	ES	11/13/1981									0.9				
SW-11	ES	12/07/1981									0.27				
SW-11	ES	01/25/1982									1.4				
SW-11	ES	02/28/1982									0.5				
SW-11	ES	03/12/1982									0.3				
SW-11	ES	03/26/1982									0.7				
SW-11	ES	04/12/1982									**2.3**				
SW-11	ES	04/26/1982									0.8				
SW-11	ES	05/10/1982									0.3				
SW-11	ES	05/24/1982									1.6				
SW-11	ES	07/26/1982									**2.1**				
SW-11	ES	10/07/1982									0.2				
SW-11	ES	01/26/1983									0.5				
SW-11	ES	04/19/1983									0.7				
SW-11	ES	07/19/1983									0.11				
SW-11	ES	10/25/1983									0.19				
SW-11	ES	04/27/1984									0.19				
SW-11	ES	07/31/1984									1.3				
SW-11	ES	10/31/1984									0.8				
SW-11	ES	04/29/1985									0.5				

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Surface Water - Area: Potentially Impacted Area East of Mined Area

Location	Sample Type	Date	Depth In Feet	D.Antimony ug/l	D.Cadmium ug/l	D.Chromium ug/l	D.Nickel ug/l	D.Vanadium ug/l	D.Zinc ug/l	Nitrate mg/l	Radium 226 pCi/l	Sulfate mg/l	U238 pCi/l	- -	- -
SW-11	ES	08/09/1985									0.5				
SW-11	ES	10/29/1985									0.71				
SW-11	ES	02/06/1986									0.37				
SW-11	ES	04/29/1986									0.62				
SW-11	ES	07/17/1986									0.97				
SW-11	ES	10/28/1986									0.72				
SW-11	ES	01/26/1987									0.56				
SW-11	ES	04/17/1987									0.69				
SW-11	ES	07/08/1987									0.54				
SW-11	ES	10/06/1987									0.53				
SW-11	ES	02/26/1988									0.34				
SW-11	ES	04/26/1988									0.1				
SW-11	ES	07/19/1988									0.23				
SW-11	ES	10/18/1988									0.22				
SW-11	ES	02/15/1989									0.5				
SW-11	ES	04/24/1989									0.3				
SW-11	ES	07/19/1989									0.69				
SW-11	ES	10/04/1989									0.8				
SW-11	ES	01/24/1990									0.4				
SW-11	ES	04/17/1990									0.6				
SW-11	ES	07/30/1990									0.6				
SW-11	ES	04/23/1991									0.3				
SW-11	ES	07/19/1991									0.5				
SW-11	ES	10/28/1991									0.2				
SW-11	ES	01/29/1992									0.4				
SW-11	ES	04/23/1992									0.4				
SW-11	ES	07/15/1992									1.2				
SW-11	ES	10/14/1992									**2.5**				
SW-11	ES	04/20/1993									0.8				
SW-11	ES	07/07/1993									0.1				
SW-11	ES	11/30/1993									0.7				
SW-11	ES	01/27/1994									0.7				
SW-11	ES	05/02/1994									1				
SW-11	ES	10/24/1994									1.5				

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Surface Water - Area: Potentially Impacted Area East of Mined Area

Location	Sample Type	Date	Depth In Feet	D.Antimony ug/l	D.Cadmium ug/l	D.Chromium ug/l	D.Nickel ug/l	D.Vanadium ug/l	D.Zinc ug/l	Nitrate mg/l	Radium 226 pCi/l	Sulfate mg/l	U238 pCi/l	- -	- -
SW-11	ES	04/12/1995									0.9				
SW-11	ES	07/20/1995									1.1				
SW-11	ES	10/13/1995									0.9				
SW-11	ES	01/16/1996									0.6				
SW-11	ES	05/13/1996									1				
SW-11	ES	07/25/1996									1.1				
SW-11	ES	10/21/1996									0.9				
SW-11	ES	01/07/1997									0.4				
SW-11	ES	04/07/1997									0.7				
SW-11	ES	07/23/1997									1				
SW-11	ES	10/21/1997									0.9				
SW-11	ES	10/19/1978									**2.7**				
SW-11	ES	01/12/1998									0.4				
SW-11	ES	04/27/1998									0.8				
SW-11	ES	12/09/1998			0.4 U	0.5 J	10 U		5 J						
SW-11	ES	12/09/1998									0.57		**43 J**		
SW-11	ES	01/13/1999									0.54		**29**		
SW-11	ES	01/13/1999			0.4 U	0.5 J	10 U		4 U						
SW-11	ES	02/18/1999			0.4 U	0.4 U	10 U		12 U						
SW-11	ES	02/18/1999									0.58		**26**		
SW-11	ES	03/12/1999									0.5		**25**		
SW-11	ES	03/12/1999			0.4 U	0.4 U	10 U		7 J						
SW-11	ES	10/16/1998									**2.03**		**26**		
SW-11	ES	10/16/1998			**4 J**	1 U	* **340**		**370**						
SW-11	ES	11/12/1998									1.51		**8.7**		
SW-11	ES	11/12/1998			1 U	**4 J**	10 U		**30 J**						
SW-11	ES	04/20/1999			1 U	**2 J**	20 U		**50 J**						
SW-11	ES	04/20/1999									1.4		**10**		
SW-11	ES	05/16/1999			2 U	**7 J**	20 U		**30 J**						
SW-11	ES	05/16/1999									1.1		**14**		
SW-11	ES	06/14/1999			**0.9 J**	0.7 U	10 U		**20 J**						
SW-11	ES	06/14/1999									1.4		**14**		
SWED-01/SDE	ES	09/10/1999									1.34		**11**		
SWED-01/SDE	ES	09/10/1999		2.2 U	**0.63 J**	0.41 J	**3.6 J**	0.5 U	1.2 U						

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Surface Water - Area: Potentially Impacted Area East of Mined Area

Location	Sample Type	Date	Depth In Feet	D.Antimony ug/l	D.Cadmium ug/l	D.Chromium ug/l	D.Nickel ug/l	D.Vanadium ug/l	D.Zinc ug/l	Nitrate mg/l	Radium 226 pCi/l	Sulfate mg/l	U238 pCi/l	- -	- -
SWED-01/SDE	ES	04/06/2000		**2.8 J**	0.5 U	1.1 U	1.6 U	1 U	0.4 U						
SWED-01/SDE	ES	04/06/2000									0.561		**18**		
SWED-02/SDE	ES	09/10/1999		2.2 U	0.2 U	0.4 U	**7.1 J**	0.5 U	4 U						
SWED-02/SDE	ES	09/10/1999									0.634		**11.3**		
SWED-02/SDE	ES	03/09/2000											**23.6**		
SWED-02/SDE	ES	03/09/2000		2.2 U	**4**	0.4 U	* **142**	0.5 U	**109**						
SWED-02/SDE	ES	04/05/2000									0.465		**27.1**		
SWED-02/SDE	ES	04/05/2000		2.7 U	**3.9**	1.1 U	**130**	1 U	**92.3**						
SWEHR/SDEH	ES	09/30/2000											6.67 J		
SWEHR/SDEH	ES	09/30/2000		0.18 J	0.4 U	1.1 U	1.8 U	**2.5 J**	26.3 U						

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Surface Water - Area: Potentially Impacted Area South of Mined Area

Location	Sample Type	Date	Depth In Feet	D.Antimony ug/l	D.Cadmium ug/l	D.Chromium ug/l	D.Nickel ug/l	D.Vanadium ug/l	D.Zinc ug/l	Nitrate mg/l	Radium 226 pCi/l	Sulfate mg/l	U238 pCi/l	- -	- -
SDCD-02/SW-	ES	09/24/1981									0.9				
SDCD-02/SW-	ES	10/20/1981									0.7				
SDCD-02/SW-	ES	11/13/1981									0.44				
SDCD-02/SW-	ES	12/07/1981									1.6				
SDCD-02/SW-	ES	01/25/1982									0.5				
SDCD-02/SW-	ES	02/28/1982									0.2				
SDCD-02/SW-	ES	04/30/1986									0.3				
SDCD-02/SW-	ES	07/07/1993									0.2				
SDCD-02/SW-	ES	10/11/1993									0.4				
SDCD-02/SW-	ES	05/05/1994									0.5				
SDCD-02/SW-	ES	10/17/1994									0.4				
SDCD-02/SW-	ES	04/17/1995									0.5				
SDCD-02/SW-	ES	07/20/1995									0.4				
SDCD-02/SW-	ES	01/17/1996									0.4				
SDCD-02/SW-	ES	05/15/1996									0.2				
SDCD-02/SW-	ES	07/25/1996									0.2				
SDCD-02/SW-	ES	10/21/1996									0.1				
SDCD-02/SW-	ES	01/06/1997									0.7				
SDCD-02/SW-	ES	04/08/1997									0.6				
SDCD-02/SW-	ES	10/21/1997									0.2				
SDCD-02/SW-	ES	01/12/1998									0.3				
SDCD-02/SW-	ES	04/29/1998									0.2				
SDCD-02/SW-	ES	12/08/1998									0.79		360 J		
SDCD-02/SW-	ES	12/08/1998			* 54	1 U	* 1400		1000 J						
SDCD-02/SW-	ES	01/12/1999									0.9		340		
SDCD-02/SW-	ES	01/12/1999			* 54	1 U	* 1390 J		* 1480						
SDCD-02/SW-	ES	02/17/1999									0.62		280		
SDCD-02/SW-	ES	02/17/1999			* 52.2	0.4 U	* 1370		2000 U						
SDCD-02/SW-	ES	03/11/1999			28.3	0.4 U	* 820		740						
SDCD-02/SW-	ES	03/11/1999									0.88		180		
SDCD-02/SW-	ES	10/16/1998			50 J	1 U	* 1270		1000 J						
SDCD-02/SW-	ES	10/16/1998									1.52		300		
SDCD-02/SW-	ES	11/10/1998			50	2 U	* 1370		1240						
SDCD-02/SW-	ES	11/10/1998									1.28		320		

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Surface Water - Area: Potentially Impacted Area South of Mined Area

Location	Sample Type	Date	Depth In Feet	D.Antimony ug/l	D.Cadmium ug/l	D.Chromium ug/l	D.Nickel ug/l	D.Vanadium ug/l	D.Zinc ug/l	Nitrate mg/l	Radium 226 pCi/l	Sulfate mg/l	U238 pCi/l	- -	- -
SDCD-02/SW-	ES	04/22/1999			28	1 U	* 730		830						
SDCD-02/SW-	ES	04/22/1999									0.35		200		
SDCD-02/SW-	ES	05/19/1999									0.41		230		
SDCD-02/SW-	ES	05/19/1999			37 J	1 U	* 1010 J		770						
SDCD-02/SW-	ES	06/13/1999			38.7	0.6 U	* 1030 J		970						
SDCD-02/SW-	ES	06/13/1999									0.43		240		
SDCD-02/SW-	ES	12/09/1999									0.307		274		
SDCD-02/SW-	ES	08/06/1999			40.5	0.3 U	* 940		890						
SDCD-02/SW-	ES	08/06/1999									0.48		290		
SDCD-02/SW-	ES	12/09/1999		0.4 J	43.4	0.5 J	* 1240	5 U	1220						
SDCD-02/SW-	ES	12/09/1999									0.8		230		
SDCD-02/SW-	ES	01/07/2000			50 J	2 U	* 1290		1340 J						
SDCD-02/SW-	ES	01/07/2000									0.7		270		
SDCD-02/SW-	ES	02/03/2000									0.6		280		
SDCD-02/SW-	ES	02/03/2000			* 50.8 J	1 U	* 1180		1280						
SDCD-02/SW-	ES	09/12/1999											0.91		
SDCD-02/SW-	ES	09/12/1999		2.2 U	44.1	9.4	* 1190	2.1 J	1160						
SDCD-02/SW-	ES	04/08/2000		2.7 U	29.9	1.1 U	* 859	1 U	756						
SDCD-02/SW-	ES	04/08/2000											242		
WDAC/SDWD	ES	07/07/1993									0.7				
WDAC/SDWD	ES	10/07/1993									0.9				
WDAC/SDWD	ES	01/27/1994									0.4				
WDAC/SDWD	ES	05/03/1994									0.3				
WDAC/SDWD	ES	10/21/1994									0.5				
WDAC/SDWD	ES	01/25/1995									0.2				
WDAC/SDWD	ES	04/12/1995									0.3				
WDAC/SDWD	ES	07/20/1995									0.3				
WDAC/SDWD	ES	10/13/1995									1.2				
WDAC/SDWD	ES	01/16/1996									0.4				
WDAC/SDWD	ES	05/13/1996									0.4				
WDAC/SDWD	ES	07/25/1996									0.6				
WDAC/SDWD	ES	10/21/1996									0.3				
WDAC/SDWD	ES	01/06/1997									2.3				
WDAC/SDWD	ES	04/08/1997									1.2				

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Surface Water - Area: Potentially Impacted Area South of Mined Area

Location	Sample Type	Date	Depth In Feet	D.Antimony ug/l	D.Cadmium ug/l	D.Chromium ug/l	D.Nickel ug/l	D.Vanadium ug/l	D.Zinc ug/l	Nitrate mg/l	Radium 226 pCi/l	Sulfate mg/l	U238 pCi/l	- - - -
WDAC/SDWD	ES	07/23/1997									0.3			
WDAC/SDWD	ES	10/21/1997									0.4			
WDAC/SDWD	ES	01/13/1998									0.1			
WDAC/SDWD	ES	04/27/1998									0.2			
WDAC/SDWD	ES	12/09/1998									0.78		1.6 J	
WDAC/SDWD	ES	12/09/1998			5	1 U	* 380		410					
WDAC/SDWD	ES	01/12/1999			5	1 U	* 350		460					
WDAC/SDWD	ES	01/12/1999									0.8		25	
WDAC/SDWD	ES	02/17/1999									0.43		14	
WDAC/SDWD	ES	02/17/1999			4.2	0.4 U	* 280		388 J					
WDAC/SDWD	ES	03/12/1999									2.52		22	
WDAC/SDWD	ES	03/12/1999			1.2	0.2 U	90		116					
WDAC/SDWD	ES	10/16/1998									1.34		24 J	
WDAC/SDWD	ES	10/16/1998			1 U	3 U	20 U		30 J					
WDAC/SDWD	ES	11/12/1998									2.35		23	
WDAC/SDWD	ES	11/12/1998			4 J	2 J	* 370		430 J					
WDAC/SDWD	ES	04/20/1999			2 J	1 U	90		120 J					
WDAC/SDWD	ES	04/20/1999									0.31		8.7	
WDAC/SDWD	ES	05/17/1999									0.31		8.4	
WDAC/SDWD	ES	05/17/1999			1.4 J	0.6 J	120		136					
WDAC/SDWD	ES	06/15/1999									0.61		8.1	
WDAC/SDWD	ES	06/15/1999			2.4 J	0.1 U	* 150		230					
WDAC/SDWD	ES	12/11/1999											16.3	
WDAC/SDWD	ES	08/06/1999									0.55		25	
WDAC/SDWD	ES	08/06/1999			3.2 J	0.3 UJ	* 200 J		230 J					
WDAC/SDWD	ES	12/11/1999		0.5 U	5.2 J	0.5 U	* 310	10 U	400					
WDAC/SDWD	ES	12/11/1999									0.6		27	
WDAC/SDWD	ES	01/06/2000			10 U	10 U	* 310		420 J					
WDAC/SDWD	ES	01/06/2000									0.8		19	
WDAC/SDWD	ES	02/05/2000			5 U	5 U	* 320		380					
WDAC/SDWD	ES	02/05/2000									0.6		6.1 U	
WDAC/SDWD	ES	09/12/1999		4.8 U	3.7	1.7 J	* 336	2.6 J	352					
WDAC/SDWD	ES	09/12/1999									1.02		34.4	
WDAC/SDWD	ES	04/08/2000											32.4	

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Surface Water - Area: Potentially Impacted Area South of Mined Area

Location	Sample Type	Date	Depth In Feet	D.Antimony ug/l	D.Cadmium ug/l	D.Chromium ug/l	D.Nickel ug/l	D.Vanadium ug/l	D.Zinc ug/l	Nitrate mg/l	Radium 226 pCi/l	Sulfate mg/l	U238 pCi/l	- -	- -
WDAC/SDWD	ES	04/08/2000		2.7 U	**0.99 J**	1.1 U	**89.6**	1 U	**109**						
WDSEEP/SDW	ES	12/08/1999									**3.79**		* **827**		

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 130

Midnite Mine Site Data Screened Using Human Health Risk Assessment 95% Upper Tolerance Limits

Boxed Sample Results Exceed Screening Level By More Than 1X	Shaded Sample Results Exceed Screening Level By More Than 10X	Shaded Results With (*) Exceed Screening Level By More Than 100X

Matrix: Surface Water - Area: Potentially Impacted Area West of Mined Area

Location	Sample Type	Date	Depth In Feet	D.Antimony ug/l	D.Cadmium ug/l	D.Chromium ug/l	D.Nickel ug/l	D.Vanadium ug/l	D.Zinc ug/l	Nitrate mg/l	Radium 226 pCi/l	Sulfate mg/l	U238 pCi/l	- -	- -
SDFW-01/SWF	ES	04/11/2000									1.61		3.25		
SDFW-01/SWF	ES	04/11/2000		2.7 U	0.5 U	1.1 U	0.92 U	2.4 J	3.8 J						

NOTE: Data are not included for locations having only nitrate and/or sulfate sample results
Sample Types: CS = environmental composite sample; ES = environmental grab sample

Table 5 - 131

Midnight Mine Summary Statistics by Area, Selected Analyte and Matrix

Analyte	Matrix	Average	UOM	Minimum	Maximum	Std Dev	Method	Locn's	Samples	Detects
Upper Blue Creek										
Antimony	Surface Water	3.65	ug/l	<2.2	6.2	3.61	DIN	1	2	1
Cadmium	Surface Water	0.25	ug/l	<0.2	<1	0.14	DIN	2	11	0
	Sediment	0.16	mg/kg	<0.02	1	0.26	TIN	12	13	1
Chromium	Surface Water	0.78	ug/l	<0.4	2.9	0.88	DIN	2	11	4
	Sediment	2.22	mg/kg	1.6	3.1	0.56	TIN	12	13	13
Cobalt	Sediment	2.50	mg/kg	1	15	3.81	TIN	12	13	13
Lead	Sediment	3.69	mg/kg	<4	7	1.85	TIN	12	13	7
Manganese	Sediment	699.23	mg/kg	102	7480	2,037.47	TIN	12	13	13
Nickel	Surface Water	4.23	ug/l	<0.5	<10	1.73	DIN	2	11	0
	Sediment	3.46	mg/kg	<1	32	8.59	TIN	12	13	9
Nitrate	Surface Water	0.13	mg/l	<0.05	0.34	0.10	WQ	2	11	9
Polonium 210	Sediment	1.70	pCi/g	1.7	1.7	0.00	TRAD	1	1	1
Radium 226	Surface Water	0.47	pCi/L	0.04	1.3	0.37	TRAD	2	12	11
	Sediment	3.06	pCi/g	2.692	3.42	0.51	TRAD	1	2	2
Sulfate	Surface Water	25.59	mg/l	2.88	70	21.78	WQ	2	11	10
	Sediment	2.43	mg/kg	2.43	2.43	0.00	WQ	1	1	1
Uranium 238	Surface Water	4.27	pCi/L	<1	23	6.72	TRAD	2	12	11
	Sediment	2.93	pCi/g	0.89	6.3	1.52	TRAD	12	13	13
Vanadium	Surface Water	2.75	ug/l	<0.79	5.1	3.33	DIN	1	2	1
Zinc	Surface Water	6.04	ug/l	<1.9	30	8.18	DIN	2	11	4
Middle Blue Creek										
Aluminum	Groundwater	4.20	ug/l	<8.4	<8.4	0.00	DIN	1	1	0
Antimony	Surface Water	1.23	ug/l	<2.2	<2.7	0.14	DIN	2	4	0
	Groundwater	0.11	ug/l	0.11	0.11	0.00	DIN	1	1	1
Cadmium	Surface Water	0.31	ug/l	<0.2	<1	0.18	DIN	4	22	0
	Sediment	0.97	mg/kg	<0.25	9.6	2.11	TIN	17	19	18
Chromium	Surface Water	1.23	ug/l	<0.4	7.4	1.56	DIN	4	22	11
	Sediment	3.69	mg/kg	<2.2	13	3.06	TIN	17	19	17
	Groundwater	0.55	ug/l	<1.1	<1.1	0.00	DIN	1	1	0
Cobalt	Sediment	11.26	mg/kg	2	139	31.01	TIN	17	19	19
	Groundwater	0.50	ug/l	<1	<1	0.00	DIN	1	1	0
Iron	Groundwater	8.10	ug/l	<16.2	<16.2	0.00	DIN	1	1	0
Lead	Sediment	5.45	mg/kg	<4	13.3	4.31	TIN	17	19	14
Manganese	Sediment	4,793.42	mg/kg	560	63300	14,195.82	TIN	17	19	19
	Groundwater	166.00	ug/l	166	166	0.00	DIN	1	1	1
Nickel	Surface Water	8.49	ug/l	<4.3	30	6.72	DIN	4	22	9
	Sediment	43.37	mg/kg	5	460	101.57	TIN	17	19	19
	Groundwater	2.70	ug/l	2.7	2.7	0.00	DIN	1	1	1
Nitrate	Surface Water	0.58	mg/l	<0.03	1.74	0.52	WQ	4	22	21
Polonium 210	Sediment	3.10	pCi/g	3	3.2	0.14	TRAD	2	2	2

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Midnight Mine Summary Statistics by Area, Selected Analyte and Matrix

Analyte	Matrix	Average	UOM	Minimum	Maximum	Std Dev	Method	Locn's	Samples	Detects
Middle Blue Creek										
Radium 226	Surface Water	0.61	pCi/L	0.13	5.1	0.91	TRAD	7	27	22
	Sediment	2.23	pCi/g	<0.395	7.25	2.49	TRAD	5	7	4
Sulfate	Surface Water	881.37	mg/l	6.48	2120	768.89	WQ	4	22	22
	Sediment	605.50	mg/kg	501	710	147.79	WQ	2	2	2
	Groundwater	787.00	mg/l	787	787	0.00	WQ	1	1	1
Uranium 234	Groundwater	14.40	pCi/L	14.4	14.4	0.00	TRAD	1	1	1
Uranium 238	Surface Water	9.80	pCi/L	2.42	32	8.19	TRAD	7	27	27
	Sediment	5.67	pCi/g	1.2	30	6.51	TRAD	17	19	19
Vanadium	Surface Water	1.90	ug/l	<0.5	4.2	1.98	DIN	2	4	2
Zinc	Surface Water	19.01	ug/l	<3	40	12.31	DIN	4	22	17
	Groundwater	6.10	ug/l	6.1	6.1	0.00	DIN	1	1	1
Middle Blue Creek Riparian										
Cadmium	Sediment	0.81	mg/kg	0.29	1.2	0.35	TIN	4	7	7
Chromium	Sediment	7.09	mg/kg	3.5	9.4	1.99	TIN	4	7	7
Cobalt	Sediment	10.09	mg/kg	4.4	17.9	5.01	TIN	4	7	7
Lead	Sediment	9.99	mg/kg	5.1	13.5	3.55	TIN	4	7	7
Manganese	Sediment	2,088.86	mg/kg	743	3780	1,200.63	TIN	4	7	7
Nickel	Sediment	33.04	mg/kg	11.4	53	14.62	TIN	4	7	7
Polonium 210	Sediment	3.43	pCi/g	2.5	4.7	1.02	TRAD	4	4	4
Sulfate	Sediment	1,247.50	mg/kg	584	1591	453.41	WQ	4	4	4
Uranium 238	Sediment	13.58	pCi/g	12.3	14.9	1.19	TRAD	4	4	4
Lower Blue Creek										
Antimony	Surface Water	1.76	ug/l	<2.2	3.5	0.98	DIN	4	7	2
Cadmium	Surface Water	0.19	ug/l	<0.2	<0.5	0.08	DIN	4	7	0
	Sediment	0.22	mg/kg	<0.02	1	0.35	TIN	5	7	3
Chromium	Surface Water	1.26	ug/l	<0.4	3.7	1.35	DIN	4	7	3
	Sediment	8.55	mg/kg	<2.9	11.1	3.43	TIN	5	7	6
Cobalt	Sediment	6.76	mg/kg	3.5	16.5	4.41	TIN	5	7	7
Lead	Sediment	7.96	mg/kg	4.4	10.8	1.99	TIN	5	7	7
Manganese	Sediment	947.57	mg/kg	241	3670	1,207.12	TIN	5	7	7
Nickel	Surface Water	1.77	ug/l	<0.5	4.4	1.37	DIN	4	7	1
	Sediment	17.43	mg/kg	8.9	51.4	15.17	TIN	5	7	7
Nitrate	Surface Water	0.26	mg/l	<0.03	0.817	0.34	WQ	4	7	5
Polonium 210	Sediment	1.10	pCi/g	0.7	1.7	0.53	TRAD	3	3	3
Radium 226	Surface Water	0.37	pCi/L	0.157	0.471	0.08	TRAD	6	12	7
	Sediment	1.01	pCi/g	<0.41	1.95	0.73	TRAD	5	7	3
Sulfate	Surface Water	574.62	mg/l	2.67	1950	936.23	WQ	4	7	7
	Sediment	449.30	mg/kg	29.9	755	375.68	WQ	3	3	3
Uranium 238	Surface Water	4.05	pCi/L	0.652	9.75	2.84	TRAD	6	12	12
	Sediment	2.89	pCi/g	<0.648	8.26	3.07	TRAD	5	7	5

Table 5 - 131

Midnight Mine Summary Statistics by Area, Selected Analyte and Matrix

Analyte	Matrix	Average	UOM	Minimum	Maximum	Std Dev	Method	Locn's	Samples	Detects
Lower Blue Creek										
Vanadium	Surface Water	2.42	ug/l	<0.5	4.7	1.89	DIN	4	7	5
Zinc	Surface Water	3.84	ug/l	<1.3	7.1	2.77	DIN	4	7	4
Lower Blue Creek Tributaries										
Cadmium	Sediment	0.17	mg/kg	<0.02	0.96	0.29	TIN	7	10	1
Chromium	Sediment	10.00	mg/kg	4.6	11.8	2.05	TIN	7	10	10
Cobalt	Sediment	6.47	mg/kg	2.6	20.2	4.91	TIN	7	10	10
Lead	Sediment	10.28	mg/kg	5.1	14.3	2.55	TIN	7	10	10
Manganese	Sediment	586.70	mg/kg	150	2980	846.75	TIN	7	10	10
Nickel	Sediment	12.87	mg/kg	3.2	57.5	15.78	TIN	7	10	10
Polonium 210	Sediment	1.28	pCi/g	1	1.5	0.22	TRAD	4	4	4
Radium 226	Sediment	0.92	pCi/g	<0.358	2.01	0.70	TRAD	7	10	4
Sulfate	Sediment	2.20	mg/kg	1.16	3.15	0.91	WQ	4	4	4
Uranium 238	Sediment	1.42	pCi/g	<0.323	2.298	1.64	TRAD	7	10	5
Lower Blue Creek Riparian										
Cadmium	Sediment	0.13	mg/kg	0.13	0.13	0.00	TIN	1	1	1
Chromium	Sediment	8.80	mg/kg	8.8	8.8	0.00	TIN	1	1	1
Cobalt	Sediment	4.70	mg/kg	4.7	4.7	0.00	TIN	1	1	1
Lead	Sediment	8.50	mg/kg	8.5	8.5	0.00	TIN	1	1	1
Manganese	Sediment	414.00	mg/kg	414	414	0.00	TIN	1	1	1
Nickel	Sediment	9.90	mg/kg	9.9	9.9	0.00	TIN	1	1	1
Polonium 210	Sediment	0.90	pCi/g	0.9	0.9	0.00	TRAD	1	1	1
Sulfate	Sediment	2.30	mg/kg	2.3	2.3	0.00	WQ	1	1	1
Uranium 238	Sediment	2.88	pCi/g	2.88	2.88	0.00	TRAD	1	1	1
Northern Drainage										
Aluminum	Groundwater	20.88	ug/l	<11.2	58.8	25.37	DIN	2	4	1
Antimony	Surface Water	0.18	ug/l	0.18	0.18	0.00	DIN	1	1	1
	Groundwater	1.64	ug/l	<2.2	3	0.92	DIN	2	4	1
Cadmium	Surface Water	0.20	ug/l	<0.4	<0.4	0.00	DIN	1	1	0
	Sediment	0.12	mg/kg	<0.02	0.34	0.15	TIN	3	5	1
Chromium	Surface Water	0.55	ug/l	<1.1	<1.1	0.00	DIN	1	1	0
	Sediment	11.84	mg/kg	5	21.3	8.44	TIN	3	5	5
	Groundwater	1.76	ug/l	<0.4	4.4	1.90	DIN	2	4	2
Cobalt	Sediment	8.64	mg/kg	3	17.3	6.89	TIN	3	5	5
	Groundwater	4.31	ug/l	<0.5	9.9	4.70	DIN	2	4	2
Iron	Groundwater	53.70	ug/l	<8.4	193	92.89	DIN	2	4	1
Lead	Sediment	8.42	mg/kg	6.3	10.6	1.62	TIN	3	5	5
Manganese	Sediment	419.80	mg/kg	261	722	189.59	TIN	3	5	5
	Groundwater	71.35	ug/l	0.58	159	72.43	DIN	2	4	4

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Midnight Mine Summary Statistics by Area, Selected Analyte and Matrix

Analyte	Matrix	Average	UOM	Minimum	Maximum	Std Dev	Method	Locn's	Samples	Detects
Northern Drainage										
Nickel	Surface Water	0.90	ug/l	<1.8	<1.8	0.00	DIN	1	1	0
	Sediment	9.28	mg/kg	3.8	18.6	7.03	TIN	3	5	5
	Groundwater	8.13	ug/l	<0.5	18.7	9.26	DIN	2	4	2
Nitrate	Surface Water	0.84	mg/l	0.837	0.837	0.00	WQ	1	1	1
Polonium 210	Sediment	4.58	pCi/g	1.6	6.9	2.43	TRAD	3	5	5
Radium 226	Surface Water	1.79	pCi/L	1.79	1.79	0.00	TRAD	1	1	1
	Sediment	4.41	pCi/g	1.97	8.35	3.45	TRAD	2	3	3
Sulfate	Surface Water	20.40	mg/l	20.4	20.4	0.00	WQ	1	1	1
	Sediment	5.48	mg/kg	2.47	9.11	2.58	WQ	3	5	5
	Groundwater	20.93	mg/l	17.8	25.6	3.78	WQ	2	4	4
Uranium 234	Groundwater	3.00	pCi/L	0.0693	6.22	3.28	TRAD	2	4	4
Uranium 238	Surface Water	6.67	pCi/L	6.67	6.67	0.00	TRAD	1	1	1
	Sediment	7.31	pCi/g	5.35	11.3	2.31	TRAD	3	5	5
Vanadium	Surface Water	2.50	ug/l	2.5	2.5	0.00	DIN	1	1	1
Zinc	Surface Water	13.15	ug/l	<26.3	<26.3	0.00	DIN	1	1	0
	Groundwater	60.01	ug/l	<0.4	156	73.71	DIN	2	4	2
Northeastern Drainage										
Aluminum	Groundwater	341.11	ug/l	<5.4	4390	1,166.13	DIN	7	14	6
Antimony	Surface Water	2.90	ug/l	2.9	2.9	0.00	DIN	1	1	1
	Groundwater	1.69	ug/l	<2.2	4.7	1.24	DIN	7	14	2
Cadmium	Surface Water	0.25	ug/l	<0.5	<0.5	0.00	DIN	1	1	0
	Sediment	0.20	mg/kg	<0.02	0.35	0.14	TIN	2	4	1
Chromium	Surface Water	0.55	ug/l	<1.1	<1.1	0.00	DIN	1	1	0
	Sediment	25.38	mg/kg	21.3	32.7	5.18	TIN	2	4	4
	Groundwater	2.77	ug/l	<0.55	23.2	6.03	DIN	7	14	8
Cobalt	Sediment	18.80	mg/kg	15.2	23.1	3.25	TIN	2	4	4
	Groundwater	1.90	ug/l	<0.5	10.3	2.82	DIN	7	14	3
Iron	Groundwater	847.56	ug/l	<8.4	3960	1,462.29	DIN	7	14	9
Lead	Sediment	18.43	mg/kg	14.7	23.8	4.27	TIN	2	4	4
Manganese	Sediment	670.50	mg/kg	548	806	134.49	TIN	2	4	4
	Groundwater	132.64	ug/l	1.1	343	129.43	DIN	7	14	14
Nickel	Surface Water	1.85	ug/l	<3.7	<3.7	0.00	DIN	1	1	0
	Sediment	27.18	mg/kg	19.3	36.4	8.34	TIN	2	4	4
	Groundwater	3.77	ug/l	<0.5	26	6.85	DIN	7	14	5
Nitrate	Surface Water	0.02	mg/l	<0.03	<0.03	0.00	WQ	1	1	0
Polonium 210	Sediment	36.50	pCi/g	14	69	26.81	TRAD	2	4	4
Radium 226	Surface Water	13.40	pCi/L	13.4	13.4	0.00	TRAD	1	1	1
	Sediment	39.25	pCi/g	16.4	62.1	32.31	TRAD	2	2	2
Sulfate	Surface Water	4.19	mg/l	4.19	4.19	0.00	WQ	1	1	1
	Sediment	4.77	mg/kg	3.95	5.72	0.73	WQ	2	4	4
	Groundwater	69.71	mg/l	15.5	462	122.28	WQ	7	14	14
Uranium 234	Groundwater	12.45	pCi/L	0.0803	97.8	27.11	TRAD	7	14	14

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Midnight Mine Summary Statistics by Area, Selected Analyte and Matrix

Analyte	Matrix	Average	UOM	Minimum	Maximum	Std Dev	Method	Locn's	Samples	Detects
Northeastern Drainage										
Uranium 238	Surface Water	357.00	pCi/L	357	357	0.00	TRAD	1	1	1
	Sediment	36.63	pCi/g	11.4	63.3	27.79	TRAD	2	4	4
Vanadium	Surface Water	1.00	ug/l	<2	<2	0.00	DIN	1	1	0
Zinc	Surface Water	4.60	ug/l	4.6	4.6	0.00	DIN	1	1	1
	Groundwater	12.12	ug/l	<0.4	112	29.21	DIN	7	14	4
Eastern Drainage										
Aluminum	Groundwater	14.03	ug/l	<4.8	39.9	10.37	DIN	10	24	4
Antimony	Groundwater	1.98	ug/l	<2.2	5.8	1.55	DIN	9	18	4
Chromium	Groundwater	3.15	ug/l	<0.4	16.9	4.38	DIN	10	24	8
Cobalt	Groundwater	0.62	ug/l	<0.5	1.6	0.34	DIN	9	18	1
Iron	Groundwater	504.55	ug/l	<8.4	3440	959.55	DIN	10	24	7
Manganese	Groundwater	418.85	ug/l	<0.1	1890	662.53	DIN	10	24	18
Nickel	Groundwater	5.21	ug/l	<0.5	24.8	6.56	DIN	10	24	8
Sulfate	Groundwater	729.07	mg/l	8.59	2170	718.13	WQ	10	24	24
Uranium 234	Groundwater	2.57	pCi/L	<1.6	4.3	1.39	DRAD	1	6	4
	Groundwater	11.28	pCi/L	0.6	42	11.80	TRAD	9	21	21
Zinc	Groundwater	15.57	ug/l	<0.4	155	33.01	DIN	10	24	7
Upper Eastern Drainage										
Antimony	Surface Water	2.19	ug/l	<2.2	4.1	1.22	DIN	4	9	4
Cadmium	Surface Water	0.52	ug/l	<0.2	4	0.74	DIN	5	27	5
	Sediment	0.55	mg/kg	<0.25	1.1	0.25	TIN	14	17	14
Chromium	Surface Water	1.56	ug/l	<0.4	8	2.19	DIN	5	27	14
	Sediment	15.44	mg/kg	5.4	24.7	5.96	TIN	14	17	17
Cobalt	Sediment	13.35	mg/kg	5.19	23.3	6.28	TIN	14	17	17
Lead	Sediment	8.85	mg/kg	<4	15.4	4.07	TIN	14	17	15
Manganese	Sediment	1,353.12	mg/kg	199	2490	666.65	TIN	14	17	17
Nickel	Surface Water	17.77	ug/l	<1.2	340	64.54	DIN	5	27	8
	Sediment	20.09	mg/kg	9	34.9	7.91	TIN	14	17	17
Nitrate	Surface Water	1.05	mg/l	0.158	2.27	0.62	WQ	5	27	27
Polonium 210	Sediment	7.94	pCi/g	2.9	12	3.28	TRAD	5	8	8
Radium 226	Surface Water	1.01	pCi/L	0.36	2.11	0.45	TRAD	8	30	30
	Sediment	6.52	pCi/g	<0.751	12.93	4.81	TRAD	10	10	7
Sulfate	Surface Water	1,524.33	mg/l	458	2540	778.57	WQ	5	27	27
	Sediment	1,232.63	mg/kg	640	1780	424.92	WQ	5	8	8
Uranium 234	Groundwater	16.65	pCi/L	6.4	26.9	14.50	TRAD	2	2	2
Uranium 238	Surface Water	20.13	pCi/L	6.5	58	12.10	TRAD	8	30	30
	Sediment	10.45	pCi/g	1.8	19.67	7.11	TRAD	14	17	17
Vanadium	Surface Water	0.49	ug/l	<0.5	0.77	0.25	DIN	4	9	1
Zinc	Surface Water	25.49	ug/l	<0.4	370	70.43	DIN	5	27	13

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Midnight Mine Summary Statistics by Area, Selected Analyte and Matrix

Analyte	Matrix	Average	UOM	Minimum	Maximum	Std Dev	Method	Locn's	Samples	Detects
Upper Eastern Drainage Riparian										
Cadmium	Sediment	0.33	mg/kg	<0.5	0.5	0.12	TIN	4	4	1
Chromium	Sediment	15.83	mg/kg	9.5	22.3	6.02	TIN	4	4	4
Cobalt	Sediment	8.68	mg/kg	4.9	12.2	3.00	TIN	4	4	4
Lead	Sediment	16.68	mg/kg	14.3	21.3	3.28	TIN	4	4	4
Manganese	Sediment	632.00	mg/kg	347	1090	324.21	TIN	4	4	4
Nickel	Sediment	17.18	mg/kg	9	24.3	6.31	TIN	4	4	4
Polonium 210	Sediment	6.50	pCi/g	0.2	9.5	4.37	TRAD	4	4	4
Sulfate	Sediment	1,602.00	mg/kg	952	2130	494.58	WQ	4	4	4
Uranium 238	Sediment	8.28	pCi/g	6.79	11.8	2.36	TRAD	4	4	4
Lower Eastern Drainage										
Antimony	Surface Water	1.68	ug/l	<2.2	3	0.82	DIN	2	6	2
Cadmium	Surface Water	1.66	ug/l	<0.2	4	1.30	DIN	2	15	10
	Sediment	8.10	mg/kg	1.7	14.4	4.25	TIN	5	6	6
Chromium	Surface Water	1.17	ug/l	<0.2	7	1.81	DIN	2	15	4
	Sediment	18.05	mg/kg	8.2	27	7.68	TIN	5	6	6
Cobalt	Sediment	24.27	mg/kg	9.93	35.9	9.74	TIN	5	6	6
Lead	Sediment	10.72	mg/kg	<4	16.5	5.79	TIN	5	6	5
Manganese	Sediment	19,990.00	mg/kg	6040	33600	9,123.28	TIN	5	6	6
Nickel	Surface Water	68.35	ug/l	<10	190	61.39	DIN	2	15	11
	Sediment	257.00	mg/kg	64	516	154.69	TIN	5	6	6
Nitrate	Surface Water	1.02	mg/l	0.167	2.02	0.48	WQ	2	15	15
Polonium 210	Sediment	6.20	pCi/g	4.1	8.3	2.97	TRAD	2	2	2
Radium 226	Surface Water	0.53	pCi/L	0.12	0.94	0.23	TRAD	3	16	14
	Sediment	10.90	pCi/g	<0.123	20	8.93	TRAD	3	4	3
Sulfate	Surface Water	1,574.87	mg/l	649	2490	680.47	WQ	2	15	15
	Sediment	1,475.00	mg/kg	1330	1620	205.06	WQ	2	2	2
Uranium 238	Surface Water	22.91	pCi/L	8.9	72	16.82	TRAD	3	16	16
	Sediment	21.51	pCi/g	5.7	45.7	14.22	TRAD	5	6	6
Vanadium	Surface Water	0.44	ug/l	<0.5	0.9	0.26	DIN	2	6	1
Zinc	Surface Water	58.92	ug/l	<4	115	36.17	DIN	2	15	13
Lower Eastern Drainage Riparian										
Cadmium	Sediment	7.30	mg/kg	3.8	10.8	4.95	TIN	1	2	2
Chromium	Sediment	21.55	mg/kg	16.9	26.2	6.58	TIN	1	2	2
Cobalt	Sediment	25.65	mg/kg	21.8	29.5	5.44	TIN	1	2	2
Lead	Sediment	17.40	mg/kg	16.8	18	0.85	TIN	1	2	2
Manganese	Sediment	12,300.00	mg/kg	7500	17100	6,788.23	TIN	1	2	2
Nickel	Sediment	183.00	mg/kg	129	237	76.37	TIN	1	2	2
Polonium 210	Sediment	13.00	pCi/g	13	13	0.00	TRAD	1	1	1
Sulfate	Sediment	1,784.00	mg/kg	1784	1784	0.00	WQ	1	1	1

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Midnight Mine Summary Statistics by Area, Selected Analyte and Matrix

Analyte	Matrix	Average	UOM	Minimum	Maximum	Std Dev	Method	Locn's	Samples	Detects
Lower Eastern Drainage Riparian										
Uranium 238	Sediment	41.45	pCi/g	41	41.9	0.64	TRAD	1	2	2
Central Drainage										
Aluminum	Groundwater	277.32	ug/l	<3.9	1100	357.21	DIN	8	55	26
Antimony	Surface Water	0.95	ug/l	0.4	0.4	0.49	DIN	1	3	1
	Groundwater	2.18	ug/l	<0.2	13	2.98	DIN	7	16	4
Cadmium	Surface Water	43.39	ug/l	28	54	9.29	DIN	1	15	15
	Sediment	2.95	mg/kg	<0.25	10.2	2.71	TIN	9	12	11
Chromium	Surface Water	1.09	ug/l	<0.3	9.4	2.31	DIN	1	15	2
	Sediment	17.21	mg/kg	6.1	33.1	7.86	TIN	9	12	12
	Groundwater	6.00	ug/l	<0.4	9	7.82	DIN	8	55	6
Cobalt	Sediment	92.62	mg/kg	11.8	382	103.70	TIN	9	12	12
	Groundwater	161.13	ug/l	<0.5	862	336.77	DIN	7	16	8
Iron	Groundwater	949.73	ug/l	<8.4	4830	3,410.14	DIN	8	55	24
Lead	Sediment	20.41	mg/kg	9.4	49.9	10.89	TIN	9	12	12
Manganese	Sediment	3,212.75	mg/kg	983	6910	1,872.22	TIN	9	12	12
	Groundwater	39,541.18	ug/l	0.89	133000	50,995.83	DIN	8	55	47
Nickel	Surface Water	1,139.27	ug/l	730	1400	224.86	DIN	1	15	15
	Sediment	147.50	mg/kg	14	502	144.06	TIN	9	12	12
	Groundwater	503.63	ug/l	<0.9	1870	627.77	DIN	8	55	29
Nitrate	Surface Water	3.92	mg/l	0.802	6.33	1.86	WQ	1	14	14
Polonium 210	Sediment	28.66	pCi/g	2.5	94	38.16	TRAD	5	5	5
Radium 226	Surface Water	0.79	pCi/L	0.3	1.75	0.43	TRAD	1	15	15
	Sediment	62.86	pCi/g	<0.545	262.7	108.31	TRAD	8	9	6
Sulfate	Surface Water	2,156.00	mg/l	1400	2580	412.27	WQ	1	15	15
	Sediment	716.48	mg/kg	28.4	2400	960.35	WQ	5	5	5
	Groundwater	1,500.01	mg/l	18	2990	970.67	WQ	8	55	55
Uranium 234	Groundwater	394.16	pCi/L	<27	10000	1,848.16	DRAD	5	29	27
	Groundwater	5,368.82	pCi/L	23	29000	6,199.42	TRAD	9	34	34
Uranium 238	Surface Water	250.16	pCi/L	<0.735	360	85.01	TRAD	1	15	14
	Sediment	552.25	pCi/g	40.69	1550	544.45	TRAD	9	12	12
Vanadium	Surface Water	1.70	ug/l	<1	2.1	1.06	DIN	1	3	1
Zinc	Surface Water	1,045.07	ug/l	740	1480	231.06	DIN	1	15	14
	Groundwater	844.71	ug/l	<0.4	4000	1,216.09	DIN	8	55	30
Western Drainage										
Aluminum	Groundwater	3,367.42	ug/l	<5.4	10300	4,203.65	DIN	6	34	21
Antimony	Surface Water	1.33	ug/l	<0.5	<4.8	1.08	DIN	1	3	0
	Groundwater	1.63	ug/l	<1	4.8	1.22	DIN	5	10	1
Cadmium	Surface Water	3.09	ug/l	<1	5.2	1.63	DIN	1	15	12
	Sediment	0.62	mg/kg	<0.2	1.2	0.40	TIN	10	10	8

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Midnight Mine Summary Statistics by Area, Selected Analyte and Matrix

Analyte	Matrix	Average	UOM	Minimum	Maximum	Std Dev	Method	Locn's	Samples	Detects
Western Drainage										
Chromium	Surface Water	1.07	ug/l	<0.1	2	1.33	DIN	1	15	3
	Sediment	5.43	mg/kg	2.6	10.8	2.46	TIN	10	10	10
	Groundwater	7.63	ug/l	<0.4	80	13.59	DIN	6	34	4
Cobalt	Sediment	10.19	mg/kg	4.05	33.5	8.50	TIN	10	10	10
	Groundwater	64.97	ug/l	<1.2	230	96.38	DIN	5	10	6
Iron	Groundwater	94.35	ug/l	<8.4	1180	203.84	DIN	6	34	17
Lead	Sediment	9.24	mg/kg	5	20	4.90	TIN	10	10	10
Manganese	Sediment	2,337.70	mg/kg	443	12900	3,844.27	TIN	10	10	10
	Groundwater	16,065.42	ug/l	5.5	41700	17,977.14	DIN	6	34	34
Nickel	Surface Water	227.04	ug/l	<20	380	124.70	DIN	1	15	14
	Sediment	19.54	mg/kg	5.9	39	10.28	TIN	10	10	10
	Groundwater	252.21	ug/l	<0.94	670	277.29	DIN	6	34	20
Nitrate	Surface Water	0.09	mg/l	<0.02	0.3	0.09	WQ	1	13	6
Polonium 210	Sediment	4.20	pCi/g	3.8	4.6	0.57	TRAD	2	2	2
Radium 226	Surface Water	0.93	pCi/L	0.31	2.52	0.67	TRAD	1	15	15
	Sediment	3.26	pCi/g	<0.453	8.31	3.84	TRAD	4	4	2
Sulfate	Surface Water	1,726.07	mg/l	640	2410	638.45	WQ	1	15	15
	Sediment	493.75	mg/kg	15.5	972	676.35	WQ	2	2	2
	Groundwater	1,321.01	mg/l	95.2	2750	1,044.85	WQ	6	34	34
Uranium 234	Groundwater	333.11	pCi/L	<95	1100	396.72	DRAD	3	22	20
	Groundwater	460.67	pCi/L	28.7	1210	444.79	TRAD	5	15	15
Uranium 238	Surface Water	18.38	pCi/L	1.6	34.4	10.41	TRAD	1	15	14
	Sediment	55.65	pCi/g	6.4	110	34.80	TRAD	10	10	10
Vanadium	Surface Water	2.70	ug/l	<1	2.6	2.25	DIN	1	3	1
Zinc	Surface Water	280.73	ug/l	30	460	147.02	DIN	1	15	15
	Groundwater	428.70	ug/l	<0.4	1190	479.39	DIN	6	34	22
Western Draianage Seep										
Aluminum	Groundwater	9,858.24	ug/l	5000	23300	5,826.98	DIN	1	17	17
Antimony	Groundwater	1.86	ug/l	<2.2	<5	0.74	DIN	1	4	0
Cadmium	Sediment	0.13	mg/kg	0.12	0.12	0.01	TIN	1	2	1
Chromium	Sediment	3.55	mg/kg	3.4	3.7	0.21	TIN	1	2	2
	Groundwater	4.24	ug/l	<0.4	7	6.61	DIN	1	17	5
Cobalt	Sediment	16.10	mg/kg	10.9	21.3	7.35	TIN	1	2	2
	Groundwater	218.25	ug/l	190	279	40.93	DIN	1	4	4
Iron	Groundwater	130.40	ug/l	<8.4	670	156.46	DIN	1	17	13
Lead	Sediment	9.25	mg/kg	8.5	10	1.06	TIN	1	2	2
Manganese	Sediment	649.00	mg/kg	509	789	197.99	TIN	1	2	2
	Groundwater	30,641.18	ug/l	26400	34200	2,600.74	DIN	1	17	17
Nickel	Sediment	4.85	mg/kg	3.6	6.1	1.77	TIN	1	2	2
	Groundwater	527.76	ug/l	440	630	63.46	DIN	1	17	17
Polonium 210	Sediment	5.30	pCi/g	5.3	5.3	0.00	TRAD	1	1	1

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Midnight Mine Summary Statistics by Area, Selected Analyte and Matrix

Analyte	Matrix	Average	UOM	Minimum	Maximum	Std Dev	Method	Locn's	Samples	Detects
Western Draianage Seep										
Radium 226	Sediment	5.41	pCi/g	3.001	7.81	3.40	TRAD	1	2	2
Sulfate	Sediment	770.00	mg/kg	770	770	0.00	WQ	1	1	1
	Groundwater	2,450.00	mg/l	2130	2600	123.19	WQ	1	17	17
Uranium 234	Groundwater	1,205.53	pCi/L	537	2000	387.97	TRAD	1	19	19
	Groundwater	960.00	pCi/L	960	960	0.00	DRAD	1	1	1
Uranium 238	Sediment	66.19	pCi/g	34.47	97.9	44.85	TRAD	1	2	2
Zinc	Groundwater	929.18	ug/l	720	1400	210.82	DIN	1	17	17
Western Drainage Riparian										
Cadmium	Sediment	0.23	mg/kg	<0.22	0.51	0.15	TIN	4	6	1
Chromium	Sediment	11.70	mg/kg	6.1	27.9	8.16	TIN	4	6	6
Cobalt	Sediment	9.78	mg/kg	4.9	17.5	5.78	TIN	4	6	6
Lead	Sediment	11.43	mg/kg	8.1	15.6	2.74	TIN	4	6	6
Manganese	Sediment	1,155.55	mg/kg	72.3	2500	890.50	TIN	4	6	6
Nickel	Sediment	12.43	mg/kg	<8.9	20.1	6.13	TIN	4	6	5
Polonium 210	Sediment	11.90	pCi/g	3.6	16	5.61	TRAD	4	4	4
Radium 226	Sediment	12.35	pCi/g	8.6	16.1	5.30	TRAD	2	2	2
Sulfate	Sediment	910.33	mg/kg	18.3	2404	1,034.35	WQ	4	4	4
Uranium 238	Sediment	28.75	pCi/g	11.8	37.5	12.12	TRAD	4	4	4
Southwestern Drainage										
Aluminum	Groundwater	6.80	ug/l	<3.9	<37.2	7.91	DIN	2	4	0
Antimony	Groundwater	1.89	ug/l	<2.2	4	1.41	DIN	2	4	1
Cadmium	Sediment	0.18	mg/kg	<0.25	0.26	0.07	TIN	2	3	1
Chromium	Sediment	5.27	mg/kg	2.4	7.3	2.55	TIN	2	3	3
	Groundwater	0.60	ug/l	<0.84	0.89	0.20	DIN	2	4	1
Cobalt	Sediment	4.23	mg/kg	2.9	5	1.16	TIN	2	3	3
	Groundwater	0.77	ug/l	<0.64	<3.1	0.54	DIN	2	4	0
Iron	Groundwater	6.50	ug/l	<8.4	<17.6	2.66	DIN	2	4	0
Lead	Sediment	10.57	mg/kg	9.1	11.4	1.27	TIN	2	3	3
Manganese	Sediment	501.33	mg/kg	314	598	162.26	TIN	2	3	3
	Groundwater	530.55	ug/l	2.2	1690	780.39	DIN	2	4	4
Nickel	Sediment	5.43	mg/kg	2.1	8.6	3.25	TIN	2	3	3
	Groundwater	1.60	ug/l	<0.9	4.4	1.88	DIN	2	4	1
Polonium 210	Sediment	10.15	pCi/g	9.3	11	1.20	TRAD	1	2	2
Radium 226	Sediment	2.45	pCi/g	<0.213	4.8	3.32	TRAD	2	2	1
Sulfate	Sediment	21.15	mg/kg	20.6	21.7	0.78	WQ	1	2	2
	Groundwater	107.30	mg/l	23.5	213	94.05	WQ	2	4	4
Uranium 234	Groundwater	25.18	pCi/L	0.0969	48	24.20	TRAD	2	4	4
Uranium 238	Sediment	5.43	pCi/g	1.292	7.57	3.58	TRAD	2	3	3
Zinc	Groundwater	32.86	ug/l	<0.4	102	47.40	DIN	2	4	2

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Midnight Mine Summary Statistics by Area, Selected Analyte and Matrix

Analyte	Matrix	Average	UOM	Minimum	Maximum	Std Dev	Method	Locn's	Samples	Detects
Northwest Drainage										
Aluminum	Groundwater	29.50	ug/l	<5.4	56.3	37.90	DIN	1	2	1
Antimony	Groundwater	1.23	ug/l	<2.2	<2.7	0.18	DIN	1	2	0
Chromium	Groundwater	2.75	ug/l	1.9	3.6	1.20	DIN	1	2	2
Cobalt	Groundwater	4.20	ug/l	<1.2	7.8	5.09	DIN	1	2	1
Iron	Groundwater	22.90	ug/l	<17.6	37	19.94	DIN	1	2	1
Manganese	Groundwater	437.00	ug/l	397	477	56.57	DIN	1	2	2
Nickel	Groundwater	1.80	ug/l	<2.6	<4.6	0.71	DIN	1	2	0
Sulfate	Groundwater	13.65	mg/l	12.8	14.5	1.20	WQ	1	2	2
Uranium 234	Groundwater	22.31	pCi/L	2.81	41.8	27.57	TRAD	1	2	2
Zinc	Groundwater	45.00	ug/l	35.7	54.3	13.15	DIN	1	2	2
Farwestern Drainage										
Aluminum	Groundwater	27.87	ug/l	<3.9	244	76.00	DIN	5	10	1
Antimony	Surface Water	1.35	ug/l	<2.7	<2.7	0.00	DIN	1	1	0
	Groundwater	1.23	ug/l	<2.2	<2.7	0.13	DIN	5	10	0
Cadmium	Surface Water	0.25	ug/l	<0.5	<0.5	0.00	DIN	1	1	0
	Sediment	0.25	mg/kg	0.25	0.25	0.00	TIN	1	1	1
Chromium	Surface Water	0.55	ug/l	<1.1	<1.1	0.00	DIN	1	1	0
	Sediment	6.50	mg/kg	6.5	6.5	0.00	TIN	1	1	1
	Groundwater	4.59	ug/l	<0.4	42	13.15	DIN	5	10	1
Cobalt	Sediment	5.00	mg/kg	5	5	0.00	TIN	1	1	1
	Groundwater	0.74	ug/l	<0.5	<3.9	0.52	DIN	5	10	0
Iron	Groundwater	55.68	ug/l	<8.4	224	83.88	DIN	5	10	2
Lead	Sediment	11.90	mg/kg	11.9	11.9	0.00	TIN	1	1	1
Manganese	Sediment	469.00	mg/kg	469	469	0.00	TIN	1	1	1
	Groundwater	231.86	ug/l	2.8	1340	409.06	DIN	5	10	10
Nickel	Surface Water	0.46	ug/l	<0.92	<0.92	0.00	DIN	1	1	0
	Sediment	6.70	mg/kg	6.7	6.7	0.00	TIN	1	1	1
	Groundwater	5.74	ug/l	<0.5	22.9	8.42	DIN	5	10	6
Nitrate	Surface Water	0.09	mg/l	0.086	0.086	0.00	WQ	1	1	1
Polonium 210	Sediment	18.00	pCi/g	18	18	0.00	TRAD	1	1	1
Radium 226	Surface Water	1.61	pCi/L	1.61	1.61	0.00	TRAD	1	1	1
	Sediment	21.30	pCi/g	21.3	21.3	0.00	TRAD	1	1	1
Sulfate	Surface Water	16.60	mg/l	16.6	16.6	0.00	WQ	1	1	1
	Sediment	20.40	mg/kg	20.4	20.4	0.00	WQ	1	1	1
	Groundwater	44.37	mg/l	7.66	116	32.81	WQ	5	10	10
Uranium 234	Groundwater	3.63	pCi/L	1.44	5.51	1.35	TRAD	5	10	10
Uranium 238	Surface Water	3.25	pCi/L	3.25	3.25	0.00	TRAD	1	1	1
	Sediment	19.10	pCi/g	19.1	19.1	0.00	TRAD	1	1	1
Vanadium	Surface Water	2.40	ug/l	2.4	2.4	0.00	DIN	1	1	1
Zinc	Surface Water	3.80	ug/l	3.8	3.8	0.00	DIN	1	1	1
	Groundwater	13.42	ug/l	<0.4	99.5	30.52	DIN	5	10	5

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Midnight Mine Summary Statistics by Area, Selected Analyte and Matrix

Analyte	Matrix	Average	UOM	Minimum	Maximum	Std Dev	Method	Locn's	Samples	Detects
Farwestern Drainage										
Pit 3										
Antimony	Surface Water	12.60	ug/l	0.2	0.2	17.54	DIN	2	2	1
Cadmium	Surface Water	50.99	ug/l	28	97.8	20.65	DIN	2	9	9
	Sediment	0.51	mg/kg	<0.31	1	0.44	TIN	3	3	1
Chromium	Surface Water	8.01	ug/l	<1	3.1	16.00	DIN	2	9	5
	Sediment	12.83	mg/kg	7.2	19.6	6.28	TIN	3	3	3
Cobalt	Sediment	51.37	mg/kg	34.9	62.1	14.48	TIN	3	3	3
Lead	Sediment	23.10	mg/kg	11.7	32.4	10.51	TIN	3	3	3
Manganese	Sediment	1,603.33	mg/kg	1300	2160	482.74	TIN	3	3	3
Nickel	Surface Water	1,772.22	ug/l	1300	2690	497.92	DIN	2	9	9
	Sediment	71.47	mg/kg	54.6	87.6	16.51	TIN	3	3	3
Nitrate	Surface Water	1.62	mg/l	0.94	2.46	0.61	WQ	2	9	9
Polonium 210	Sediment	61.00	pCi/g	61	61	0.00	TRAD	1	1	1
Radium 226	Surface Water	36.25	pCi/L	23	63.2	14.13	TRAD	5	11	11
	Sediment	0.72	pCi/g	<0.912	<1.98	0.38	TRAD	2	2	0
Sulfate	Surface Water	2,890.67	mg/l	2310	3406	366.60	WQ	2	9	9
	Sediment	1,947.00	mg/kg	1947	1947	0.00	WQ	1	1	1
Uranium 238	Surface Water	5,724.17	pCi/L	670	9630	2,242.13	TRAD	5	12	12
	Sediment	230.00	pCi/g	92	305	119.66	TRAD	3	3	3
Vanadium	Surface Water	7.70	ug/l	<0.8	<30	10.32	DIN	2	2	0
Zinc	Surface Water	3,975.56	ug/l	2700	5850	1,081.62	DIN	2	9	9
Pit 4										
Antimony	Surface Water	0.05	ug/l	<0.1	<0.1	0.00	DIN	1	1	0
Cadmium	Surface Water	0.25	ug/l	<0.4	0.3	0.10	DIN	2	9	1
	Sediment	0.14	mg/kg	<0.23	0.16	0.03	TIN	4	4	1
Chromium	Surface Water	0.47	ug/l	<0.1	<4	0.60	DIN	2	9	0
	Sediment	19.25	mg/kg	7.4	30.5	9.44	TIN	4	4	4
Cobalt	Sediment	18.08	mg/kg	9.1	23.1	6.16	TIN	4	4	4
Lead	Sediment	18.55	mg/kg	7.6	29.7	9.11	TIN	4	4	4
Manganese	Sediment	1,070.50	mg/kg	629	1820	530.81	TIN	4	4	4
Nickel	Surface Water	13.17	ug/l	3.5	30	9.53	DIN	2	9	6
	Sediment	28.68	mg/kg	16.1	38.6	9.45	TIN	4	4	4
Nitrate	Surface Water	0.04	mg/l	<0.02	0.11	0.03	WQ	2	9	2
Polonium 210	Sediment	160.00	pCi/g	160	160	0.00	TRAD	1	1	1
Radium 226	Surface Water	4.33	pCi/L	1.83	8.76	2.15	TRAD	5	12	12
	Sediment	19.32	pCi/g	9.95	38.05	16.22	TRAD	3	3	3
Sulfate	Surface Water	258.44	mg/l	110	330	78.97	WQ	2	9	9
	Sediment	671.00	mg/kg	671	671	0.00	WQ	1	1	1
Uranium 238	Surface Water	821.25	pCi/L	440	1100	213.98	TRAD	5	12	12
	Sediment	133.45	pCi/g	56.3	236.8	77.66	TRAD	4	4	4

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Midnight Mine Summary Statistics by Area, Selected Analyte and Matrix

Analyte	Matrix	Average	UOM	Minimum	Maximum	Std Dev	Method	Locn's	Samples	Detects
Pit 4										
Vanadium	Surface Water	0.40	ug/l	<0.8	<0.8	0.00	DIN	1	1	0
Zinc	Surface Water	15.01	ug/l	1.6	28	8.75	DIN	2	9	8
Outfall Pond										
Antimony	Surface Water	2.80	ug/l	<2.2	4.5	2.40	DIN	1	2	1
Cadmium	Surface Water	0.18	ug/l	<0.2	<0.5	0.11	DIN	1	2	0
	Sediment	0.45	mg/kg	0.14	0.75	0.43	TIN	2	2	2
Chromium	Surface Water	1.40	ug/l	0.89	1.9	0.71	DIN	1	2	2
	Sediment	28.65	mg/kg	18.1	39.2	14.92	TIN	2	2	2
Cobalt	Sediment	16.65	mg/kg	10.2	23.1	9.12	TIN	2	2	2
Lead	Sediment	24.10	mg/kg	15.5	32.7	12.16	TIN	2	2	2
Manganese	Sediment	1,787.50	mg/kg	485	3090	1,842.01	TIN	2	2	2
Nickel	Surface Water	2.38	ug/l	<2.7	3.4	1.45	DIN	1	2	1
	Sediment	25.85	mg/kg	14.6	37.1	15.91	TIN	2	2	2
Nitrate	Surface Water	1.23	mg/l	0.622	1.83	0.85	WQ	1	2	2
Polonium 210	Sediment	9.50	pCi/g	9.5	9.5	0.00	TRAD	1	1	1
Radium 226	Surface Water	0.43	pCi/L	0.35	0.447	0.08	TRAD	1	3	2
	Sediment	3.86	pCi/g	<1.63	6.91	4.31	TRAD	2	2	1
Sulfate	Surface Water	2,085.00	mg/l	1650	2520	615.18	WQ	1	2	2
	Sediment	1,310.00	mg/kg	1310	1310	0.00	WQ	1	1	1
Uranium 238	Surface Water	39.63	pCi/L	12.8	85.1	39.59	TRAD	1	3	3
	Sediment	73.60	pCi/g	10.6	136.6	89.10	TRAD	2	2	2
Vanadium	Surface Water	0.38	ug/l	<0.5	<1	0.18	DIN	1	2	0
Zinc	Surface Water	2.43	ug/l	<0.4	<9.3	3.15	DIN	1	2	0
Pollution Control Pond										
Antimony	Surface Water	2.50	ug/l	<5	<5	0.00	DIN	1	1	0
Cadmium	Surface Water	47.51	ug/l	29.1	69	11.10	DIN	1	13	13
	Sediment	5.67	mg/kg	<0.26	11.2	7.83	TIN	2	2	1
Chromium	Surface Water	7.31	ug/l	<1	7	13.82	DIN	1	13	9
	Sediment	19.00	mg/kg	7.6	30.4	16.12	TIN	2	2	2
Cobalt	Sediment	86.95	mg/kg	7.9	166	111.79	TIN	2	2	2
Lead	Sediment	15.95	mg/kg	6.5	25.4	13.36	TIN	2	2	2
Manganese	Sediment	2,386.00	mg/kg	442	4330	2,749.23	TIN	2	2	2
Nickel	Surface Water	1,852.31	ug/l	900	2690	448.85	DIN	1	13	13
	Sediment	387.25	mg/kg	17.5	757	522.91	TIN	2	2	2
Nitrate	Surface Water	1.40	mg/l	1.17	1.64	0.14	WQ	1	12	12
Radium 226	Surface Water	18.07	pCi/L	6.4	49.4	11.59	TRAD	3	15	15
	Sediment	3.67	pCi/g	<2.86	5.919	3.17	TRAD	2	2	1
Sulfate	Surface Water	3,261.54	mg/l	2780	4110	371.35	WQ	1	13	13
Uranium 238	Surface Water	6,074.67	pCi/L	2500	10000	1,731.92	TRAD	3	15	15
	Sediment	1,178.63	pCi/g	21.26	2336	1,636.77	TRAD	2	2	2

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Midnight Mine Summary Statistics by Area, Selected Analyte and Matrix

Analyte	Matrix	Average	UOM	Minimum	Maximum	Std Dev	Method	Locn's	Samples	Detects
Pollution Control Pond										
Vanadium	Surface Water	15.00	ug/l	<30	<30	0.00	DIN	1	1	0
Zinc	Surface Water	4,027.69	ug/l	1830	5930	1,105.94	DIN	1	13	13
Mined Area										
Aluminum	Groundwater	158,785.15	ug/l	<8.4	1460000	382,851.17	DIN	19	111	58
	Surface Soil	14,787.66	mg/kg	4140	33700	5,174.56	TIN	47	47	47
	Subsurface Soil	18,851.58	mg/kg	9480	28000	4,813.53	TIN	19	19	19
Antimony	Groundwater	48.66	ug/l	<0.1	15	91.09	DIN	12	13	5
Arsenic	Surface Soil	39.68	mg/kg	<4	239	51.84	TIN	47	47	41
	Subsurface Soil	20.26	mg/kg	<4	77	19.03	TIN	19	19	18
Cadmium	Surface Soil	0.30	mg/kg	<0.04	1.8	0.29	TIN	47	47	34
	Subsurface Soil	0.50	mg/kg	0.1	3.5	0.75	TIN	19	19	19
Chromium	Groundwater	38.41	ug/l	<1.1	15.2	60.64	DIN	19	111	4
	Surface Soil	15.78	mg/kg	2.9	33.7	5.98	TIN	47	47	47
	Subsurface Soil	18.65	mg/kg	5.7	66	12.54	TIN	19	19	19
Cobalt	Groundwater	3,930.27	ug/l	1.2	20700	7,599.98	DIN	12	13	9
Copper	Surface Soil	28.91	mg/kg	5.7	83	15.81	TIN	47	47	47
	Subsurface Soil	27.23	mg/kg	9.7	64.9	13.08	TIN	19	19	18
Iron	Groundwater	50,471.82	ug/l	<10	526000	138,209.75	DIN	19	111	84
Lead	Surface Soil	20.52	mg/kg	8	73.5	13.55	TIN	47	47	47
	Subsurface Soil	17.95	mg/kg	6	84	16.71	TIN	19	19	19
Lead 210	Surface Soil	74.75	pCi/g	20	260	83.85	TRAD	16	16	16
Manganese	Groundwater	201,163.23	ug/l	<10	1430000	401,917.13	DIN	19	111	108
	Surface Soil	873.96	mg/kg	309	2750	472.74	TIN	47	47	47
	Subsurface Soil	1,101.74	mg/kg	511	5190	1,036.88	TIN	19	19	19
Nickel	Groundwater	3,894.89	ug/l	<1.8	31000	8,501.00	DIN	19	111	63
Radium 226	Surface Soil	63.45	pCi/g	0.074	879.8	104.93	TRAD	103	103	98
Selenium	Surface Soil	9.66	mg/kg	<0.24	64	16.53	TIN	47	47	16
	Subsurface Soil	30.21	mg/kg	<4	90	28.41	TIN	19	19	16
Sulfate	Groundwater	3,917.15	mg/l	1.11	22600	5,634.25	WQ	19	111	109
Uranium 234	Groundwater	14,221.72	pCi/L	<5	120000	29,298.52	DRAD	13	102	100
	Groundwater	21,629.05	pCi/L	0.423	130000	36,710.06	TRAD	12	23	23
Uranium 238	Surface Soil	45.36	pCi/g	0.65	417	73.89	TRAD	65	65	65
	Subsurface Soil	14.88	pCi/g	0.58	48	15.95	TRAD	19	19	19
Zinc	Groundwater	8,197.73	ug/l	3.8	75700	20,113.50	DIN	19	111	79
	Surface Soil	60.78	mg/kg	31.4	204	30.35	TIN	47	47	47
	Subsurface Soil	71.89	mg/kg	29	381	77.03	TIN	19	19	19
Blood Pool										
Cadmium	Surface Water	5.14	ug/l	1.4	9	3.43	DIN	1	5	5
	Sediment	0.14	mg/kg	<0.28	<0.28	0.00	TIN	2	2	0
Chromium	Surface Water	12.76	ug/l	<1	26	12.18	DIN	1	5	4
	Sediment	43.05	mg/kg	35.4	50.7	10.82	TIN	2	2	2

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Midnight Mine Summary Statistics by Area, Selected Analyte and Matrix

Analyte	Matrix	Average	UOM	Minimum	Maximum	Std Dev	Method	Locn's	Samples	Detects
Blood Pool										
Cobalt	Sediment	8.60	mg/kg	5.9	11.3	3.82	TIN	2	2	2
Lead	Sediment	19.80	mg/kg	18.5	21.1	1.84	TIN	2	2	2
Manganese	Sediment	331.00	mg/kg	310	352	29.70	TIN	2	2	2
Nickel	Surface Water	596.00	ug/l	90	1090	455.61	DIN	1	5	5
	Sediment	24.30	mg/kg	19.6	29	6.65	TIN	2	2	2
Nitrate	Surface Water	0.45	mg/l	<0.05	1.73	0.73	WQ	1	5	3
Radium 226	Surface Water	4.05	pCi/L	1.37	7.3	2.38	TRAD	3	7	7
	Sediment	17.93	pCi/g	<1.31	35.2	24.43	TRAD	2	2	1
Sulfate	Surface Water	1,638.00	mg/l	630	2260	657.62	WQ	1	5	5
Uranium 238	Surface Water	1,643.29	pCi/L	660	2670	759.53	TRAD	3	7	7
	Sediment	22.74	pCi/g	13.37	32.1	13.24	TRAD	2	2	2
Zinc	Surface Water	572.00	ug/l	130	970	377.12	DIN	1	5	5
Downwind Northeast Area										
Aluminum	Surface Soil	19,716.00	mg/kg	13400	29500	4,237.40	TIN	16	25	25
	Subsurface Soil	16,366.67	mg/kg	12800	22100	3,617.00	TIN	6	6	6
Arsenic	Surface Soil	8.79	mg/kg	2	50.5	12.75	TIN	16	25	25
	Subsurface Soil	7.63	mg/kg	1.7	31.2	11.61	TIN	6	6	6
Cadmium	Surface Soil	0.37	mg/kg	<0.37	0.8	0.15	TIN	16	25	16
	Subsurface Soil	0.08	mg/kg	<0.06	<0.26	0.03	TIN	6	6	0
Chromium	Surface Soil	18.06	mg/kg	12.7	29.1	4.16	TIN	16	25	25
	Subsurface Soil	15.93	mg/kg	12.8	24	4.19	TIN	6	6	6
Copper	Surface Soil	18.64	mg/kg	10.3	32.2	5.61	TIN	16	25	25
	Subsurface Soil	17.23	mg/kg	10.6	23.1	4.99	TIN	6	6	6
Lead	Surface Soil	16.08	mg/kg	8.2	27.1	4.15	TIN	16	25	25
	Subsurface Soil	9.25	mg/kg	7.4	10.9	1.27	TIN	6	6	6
Lead 210	Surface Soil	4.88	pCi/g	2.7	8.3	1.52	TRAD	16	16	16
	Subsurface Soil	2.28	pCi/g	<1	5.3	2.02	TRAD	6	6	3
Manganese	Surface Soil	854.20	mg/kg	532	1990	308.58	TIN	16	25	25
	Subsurface Soil	778.67	mg/kg	525	1270	271.53	TIN	6	6	6
Radium 226	Subsurface Soil	1.34	pCi/g	1.337	1.337	0.00	TRAD	1	1	0
Selenium	Surface Soil	0.13	mg/kg	<0.17	<0.37	0.03	TIN	16	25	0
	Subsurface Soil	0.21	mg/kg	<0.41	<0.44	0.01	TIN	6	6	0
Uranium 238	Surface Soil	2.31	pCi/g	0.908	5.11	1.31	TRAD	16	16	16
	Subsurface Soil	1.34	pCi/g	0.673	3.34	1.01	TRAD	6	6	6
Zinc	Surface Soil	54.43	mg/kg	35.2	116	18.47	TIN	16	25	25
	Subsurface Soil	34.08	mg/kg	25.4	40.1	6.15	TIN	6	6	6
Downwind Sothwest Area										
Aluminum	Surface Soil	15,231.25	mg/kg	11500	19900	2,225.82	TIN	16	16	16
	Subsurface Soil	13,483.33	mg/kg	11500	15000	1,427.47	TIN	6	6	6
Arsenic	Surface Soil	3.81	mg/kg	2	5.5	0.92	TIN	16	16	16
	Subsurface Soil	3.33	mg/kg	2.2	4.6	0.79	TIN	6	6	6

Table 5 - 131

Midnight Mine Summary Statistics by Area, Selected Analyte and Matrix

Analyte	Matrix	Average	UOM	Minimum	Maximum	Std Dev	Method	Locn's	Samples	Detects
Downwind Sothwest Area										
Cadmium	Surface Soil	0.19	mg/kg	0.07	0.36	0.08	TIN	16	16	16
	Subsurface Soil	0.04	mg/kg	<0.05	<0.11	0.01	TIN	6	6	0
Chromium	Surface Soil	9.90	mg/kg	6.3	13.9	2.16	TIN	16	16	16
	Subsurface Soil	7.78	mg/kg	5.4	10.2	1.92	TIN	6	6	6
Copper	Surface Soil	12.50	mg/kg	9.5	15.4	1.76	TIN	16	16	16
	Subsurface Soil	12.92	mg/kg	10.1	16.1	2.31	TIN	6	6	6
Lead	Surface Soil	13.43	mg/kg	10.7	16.1	1.61	TIN	16	16	16
	Subsurface Soil	10.93	mg/kg	10.1	12.5	0.84	TIN	6	6	6
Lead 210	Surface Soil	2.20	pCi/g	<1.4	4.6	1.28	TRAD	16	16	9
	Subsurface Soil	3.92	pCi/g	2.8	5.5	0.94	TRAD	6	6	6
Manganese	Surface Soil	543.63	mg/kg	458	623	51.03	TIN	16	16	16
	Subsurface Soil	547.33	mg/kg	441	652	73.61	TIN	6	6	6
Selenium	Surface Soil	0.19	mg/kg	<0.22	0.76	0.18	TIN	16	16	2
	Subsurface Soil	0.21	mg/kg	<0.4	<0.43	0.01	TIN	6	6	0
Uranium 238	Surface Soil	2.05	pCi/g	1.05	5.18	1.22	TRAD	16	16	16
	Subsurface Soil	1.39	pCi/g	0.763	2.23	0.54	TRAD	6	6	6
Zinc	Surface Soil	42.14	mg/kg	32.9	58.1	5.68	TIN	16	16	16
	Subsurface Soil	36.65	mg/kg	35.2	38.1	1.32	TIN	6	6	6
Adjacent to Haul Road										
Aluminum	Surface Soil	15,450.00	mg/kg	11000	20500	2,289.98	TIN	13	16	16
	Subsurface Soil	13,415.00	mg/kg	9990	17200	2,710.60	TIN	6	6	6
Arsenic	Surface Soil	8.60	mg/kg	2.7	25	7.21	TIN	13	16	16
	Subsurface Soil	13.10	mg/kg	1.7	64.2	25.09	TIN	6	6	6
Cadmium	Surface Soil	0.30	mg/kg	0.09	0.85	0.20	TIN	13	16	13
	Subsurface Soil	0.06	mg/kg	<0.03	<0.26	0.05	TIN	6	6	0
Chromium	Surface Soil	12.43	mg/kg	5.2	21.2	4.90	TIN	13	16	16
	Subsurface Soil	9.77	mg/kg	4.1	18.8	6.23	TIN	6	6	6
Copper	Surface Soil	15.42	mg/kg	8.6	37.3	7.36	TIN	13	16	16
	Subsurface Soil	14.25	mg/kg	7.6	30.6	9.37	TIN	6	6	6
Lead	Surface Soil	13.96	mg/kg	9.8	28.9	4.26	TIN	13	16	16
	Subsurface Soil	11.35	mg/kg	9.5	14.2	1.85	TIN	6	6	6
Lead 210	Surface Soil	11.12	pCi/g	<1.2	41.9	11.22	TRAD	13	17	14
	Subsurface Soil	11.70	pCi/g	3.7	45	16.43	TRAD	6	6	6
Manganese	Surface Soil	689.56	mg/kg	494	1160	156.47	TIN	13	16	16
	Subsurface Soil	536.67	mg/kg	452	652	87.74	TIN	6	6	6
Radium 226	Surface Soil	28.17	pCi/g	11.5	59	20.57	TRAD	6	6	6
	Subsurface Soil	1.10	pCi/g	1.048	1.183	0.06	TRAD	7	7	7
Selenium	Surface Soil	0.13	mg/kg	<0.19	<0.29	0.02	TIN	13	16	0
	Subsurface Soil	0.26	mg/kg	<0.38	0.56	0.15	TIN	6	6	1
Uranium 238	Surface Soil	11.83	pCi/g	2.32	51	12.48	TRAD	13	17	17
	Subsurface Soil	5.41	pCi/g	1.13	15.9	5.18	TRAD	8	8	8

Table 5 - 131

Midnight Mine Summary Statistics by Area, Selected Analyte and Matrix

Analyte	Matrix	Average	UOM	Minimum	Maximum	Std Dev	Method	Locn's	Samples	Detects
Adjacent to Haul Road										
Zinc	Surface Soil	49.52	mg/kg	39.4	71.3	10.57	TIN	13	16	16
	Subsurface Soil	37.92	mg/kg	29.3	47.6	6.27	TIN	6	6	6
On Haul Road										
Aluminum	Surface Soil	12,360.00	mg/kg	10900	16700	2,452.14	TIN	3	5	5
Arsenic	Surface Soil	36.50	mg/kg	10.1	92.4	32.96	TIN	3	5	5
Cadmium	Surface Soil	0.56	mg/kg	<0.39	0.86	0.27	TIN	3	5	3
Chromium	Surface Soil	11.66	mg/kg	7.7	17.9	4.28	TIN	3	5	5
Copper	Surface Soil	36.04	mg/kg	17	58.4	19.25	TIN	3	5	5
Lead	Surface Soil	13.28	mg/kg	8.8	16.3	2.79	TIN	3	5	5
Lead 210	Surface Soil	26.18	pCi/g	10.6	70	22.17	TRAD	3	6	6
Manganese	Surface Soil	925.40	mg/kg	613	1100	214.93	TIN	3	5	5
Radium 226	Surface Soil	25.03	pCi/g	15.4	35.4	10.02	TRAD	3	3	3
Selenium	Surface Soil	0.11	mg/kg	<0.17	<0.28	0.03	TIN	3	5	0
Uranium 238	Surface Soil	34.15	pCi/g	15.7	86.8	26.37	TRAD	3	6	6
Zinc	Surface Soil	64.52	mg/kg	42.1	90.3	21.00	TIN	3	5	5

Table 5-132
Summary of Mine-Impacted Areas by Medium

Area	Medium									
	Surface Water		Sediment		Groundwater		Surface and Subsurface Materials		Air	
	Affected	Unaffected	Affected	Unaffected	Affected	Unaffected	Affected	Unaffected	Affected	Unaffected
Mined Area	●		●		●		●		●	
Eastern Drainage	●		●		●			●		
Northeastern Drainage	●		●							
West Fork Eastern Drainage				●		●				
Central Drainage			●		●		●			
Western Drainage			●		●					
Southwestern Drainage		●		●	●					
Far West Drainage		● [1]	●			●				
Upper Blue Creek		●		●		●				
Middle Blue Creek			●			● [1]				
Lower Blue Creek			●			●				
Blood Pool	●		●							
WTP Outfall Pond	●		●							
Pollution Control Pond	●		●							
Southwest Downwind Area				●		●		●		●
Northeast Downwind Area				●		●		●		●
East and West Haul Roads						●	●		●	
Central Drainage Area						●	●			
Franklin D. Roosevelt Lake		●		●						

[1]Affected for sulfate only.
Blank boxes indicate not applicable

Table 5 - 133

Midnite Mine Summary Statistics by Area Compared with Background Values

Indicator	Matrix	UOM	Background Values Minimum	Background Values Maximum	Background Values Std Dev	Background Values Average	Site Sampling Results Average	Site Sampling Results Minimum	Site Sampling Results Maximum	Site Sampling Results Std Dev	Method	Locn's	Samples	Detects
Upper Blue Creek														
Antimony	Surface Water	ug/l	<0.1	1.40	0.03	0.09	3.65	<2.2	6.2	3.61	DIN	1	2	1
Cadmium	Surface Water	ug/l	<0.2	9.20	1.52	0.32	0.25	<0.2	<1	0.14	DIN	2	11	0
	Sediment	mg/kg	0.02	0.68	0.15	0.18	0.16	<0.02	1	0.26	TIN	12	13	1
Chromium	Surface Water	ug/l	0.4	0.63	0.12	0.52	0.78	<0.4	2.9	0.88	DIN	2	11	4
	Sediment	mg/kg	1.4	22.30	5.21	10.81	2.22	1.6	3.1	0.56	TIN	12	13	13
Cobalt	Sediment	mg/kg	0.91	12.90	3.16	6.88	2.50	1	15	3.81	TIN	12	13	13
Lead	Sediment	mg/kg	4	21.00	3.93	10.87	3.69	<4	7	1.85	TIN	12	13	7
Manganese	Sediment	mg/kg	88.6	871.00	187.06	391.16	699.23	102	7480	2,037.47	TIN	12	13	13
Nickel	Surface Water	ug/l	0.5	5.00	1.18	1.59	4.23	<0.5	<10	1.73	DIN	2	11	0
	Sediment	mg/kg	0.89	23.80	5.85	9.45	3.46	<1	32	8.59	TIN	12	13	9
Nitrate	Surface Water	mg/l	0.0002	2.98	0.48	0.11	0.13	<0.05	0.34	0.10	WQ	2	11	9
Polonium 210	Sediment	pCi/g	0.7	18.00	3.54	3.66	1.70	1.7	1.7	0.00	TRAD	1	1	1
Radium 226	Surface Water	pCi/L	0.0939	1.81	0.56	0.51	0.47	0.04	1.3	0.37	TRAD	2	12	11
	Sediment	pCi/g	1.36	8.21	2.11	3.49	3.06	2.692	3.42	0.51	TRAD	1	2	2
Sulfate	Surface Water	mg/l	1.84	30.00	7.22	8.41	25.59	2.88	70	21.78	WQ	2	11	10
	Sediment	mg/kg	1.08	168.00	39.22	24.74	2.43	2.43	2.43	0.00	WQ	1	1	1
Uranium 238	Surface Water	pCi/L	0.0485	5.48	1.24	1.01	4.27	<1	23	6.72	TRAD	2	12	11
	Sediment	pCi/g	0.79	22.00	5.94	5.65	2.93	0.89	6.3	1.52	TRAD	12	13	13
Vanadium	Surface Water	ug/l	0.0141	3.30	0.74	0.40	2.75	<0.79	5.1	3.33	DIN	1	2	1
Zinc	Surface Water	ug/l	0.026	13.60	2.27	0.87	6.04	<1.9	30	8.18	DIN	2	11	4
Middle Blue Creek														
Aluminum	Groundwater	ug/l	0.0965	3,780.00	832.94	367.62	4.20	<8.4	<8.4	0.00	DIN	1	1	0
Antimony	Surface Water	ug/l	<0.1	1.40	0.03	0.09	1.23	<2.2	<2.7	0.14	DIN	2	4	0
	Groundwater	ug/l	0.0018	5.20	1.07	0.46	0.11	0.11	0.11	0.00	DIN	1	1	1
Cadmium	Surface Water	ug/l	<0.2	9.20	1.52	0.32	0.31	<0.2	<1	0.18	DIN	4	22	0
	Sediment	mg/kg	0.02	0.68	0.15	0.18	0.97	<0.25	9.6	2.11	TIN	17	19	18

Table 5 - 133

Midnite Mine Summary Statistics by Area Compared with Background Values

Indicator	Matrix	UOM	Background Values Minimum	Background Values Maximum	Background Values Std Dev	Background Values Average	Site Sampling Results Average	Site Sampling Results Minimum	Site Sampling Results Maximum	Site Sampling Results Std Dev	Method	Locn's	Samples	Detects
Middle Blue Creek														
Chromium	Surface Water	ug/l	0.4	0.63	0.12	0.52	1.23	<0.4	7.4	1.56	DIN	4	22	11
	Sediment	mg/kg	1.4	22.30	5.21	10.81	3.69	<2.2	13	3.06	TIN	17	19	17
	Groundwater	ug/l	0.0621	11.70	2.62	1.95	0.55	<1.1	<1.1	0.00	DIN	1	1	0
Cobalt	Sediment	mg/kg	0.91	12.90	3.16	6.88	11.26	2	139	31.01	TIN	17	19	19
	Groundwater	ug/l	0.0144	7.20	1.35	0.72	0.50	<1	<1	0.00	DIN	1	1	0
Iron	Groundwater	ug/l	0.4946	28,300.00	7,024.30	2,897.40	8.10	<16.2	<16.2	0.00	DIN	1	1	0
Lead	Sediment	mg/kg	4	21.00	3.93	10.87	5.45	<4	13.3	4.31	TIN	17	19	14
Manganese	Sediment	mg/kg	88.6	871.00	187.06	391.16	4,793.42	560	63300	14,195.82	TIN	17	19	19
	Groundwater	ug/l	1	1,930.00	396.91	245.73	166.00	166	166	0.00	DIN	1	1	1
Nickel	Surface Water	ug/l	0.5	5.00	1.18	1.59	8.49	<4.3	30	6.72	DIN	4	22	9
	Sediment	mg/kg	0.89	23.80	5.85	9.45	43.37	5	460	101.57	TIN	17	19	19
	Groundwater	ug/l	0.1558	13.90	3.32	2.73	2.70	2.7	2.7	0.00	DIN	1	1	1
Nitrate	Surface Water	mg/l	0.0002	2.98	0.48	0.11	0.58	<0.03	1.74	0.52	WQ	4	22	21
Polonium 210	Sediment	pCi/g	0.7	18.00	3.54	3.66	3.10	3	3.2	0.14	TRAD	2	2	2
Radium 226	Surface Water	pCi/L	0.0939	1.81	0.56	0.51	0.61	0.13	5.1	0.91	TRAD	7	27	22
	Sediment	pCi/g	1.36	8.21	2.11	3.49	2.23	<0.395	7.25	2.49	TRAD	5	7	4
Sulfate	Surface Water	mg/l	1.84	30.00	7.22	8.41	881.37	6.48	2120	768.89	WQ	4	22	22
	Sediment	mg/kg	1.08	168.00	39.22	24.74	605.50	501	710	147.79	WQ	2	2	2
	Groundwater	mg/l	0.87	187.00	37.58	22.02	787.00	787	787	0.00	WQ	1	1	1
Uranium 234	Groundwater	pCi/L	0.112	37.20	7.19	4.43	14.40	14.4	14.4	0.00	TRAD	1	1	1
Uranium 238	Surface Water	pCi/L	0.0485	5.48	1.24	1.01	9.80	2.42	32	8.19	TRAD	7	27	27
	Sediment	pCi/g	0.79	22.00	5.94	5.65	5.67	1.2	30	6.51	TRAD	17	19	19
Vanadium	Surface Water	ug/l	0.0141	3.30	0.74	0.40	1.90	<0.5	4.2	1.98	DIN	2	4	2
Zinc	Surface Water	ug/l	0.026	13.60	2.27	0.87	19.01	<3	40	12.31	DIN	4	22	17
	Groundwater	ug/l	0.0889	181.00	41.64	15.91	6.10	6.1	6.1	0.00	DIN	1	1	1
Middle Blue Creek Riparian														
Cadmium	Sediment	mg/kg	0.02	0.68	0.15	0.18	0.81	0.29	1.2	0.35	TIN	4	7	7
Chromium	Sediment	mg/kg	1.4	22.30	5.21	10.81	7.09	3.5	9.4	1.99	TIN	4	7	7

Table 5 - 133

Midnite Mine Summary Statistics by Area Compared with Background Values

Indicator	Matrix	UOM	Background Values Minimum	Background Values Maximum	Background Values Std Dev	Background Values Average	Site Sampling Results Average	Site Sampling Results Minimum	Site Sampling Results Maximum	Site Sampling Results Std Dev	Method	Locn's	Samples	Detects
Middle Blue Creek Riparian														
Cobalt	Sediment	mg/kg	0.91	12.90	3.16	6.88	10.09	4.4	17.9	5.01	TIN	4	7	7
Lead	Sediment	mg/kg	4	21.00	3.93	10.87	9.99	5.1	13.5	3.55	TIN	4	7	7
Manganese	Sediment	mg/kg	88.6	871.00	187.06	391.16	2,088.86	743	3780	1,200.63	TIN	4	7	7
Nickel	Sediment	mg/kg	0.89	23.80	5.85	9.45	33.04	11.4	53	14.62	TIN	4	7	7
Polonium 210	Sediment	pCi/g	0.7	18.00	3.54	3.66	3.43	2.5	4.7	1.02	TRAD	4	4	4
Sulfate	Sediment	mg/kg	1.08	168.00	39.22	24.74	1,247.50	584	1591	453.41	WQ	4	4	4
Uranium 238	Sediment	pCi/g	0.79	22.00	5.94	5.65	13.58	12.3	14.9	1.19	TRAD	4	4	4
Lower Blue Creek														
Antimony	Surface Water	ug/l	<0.1	1.40	0.03	0.09	1.76	<2.2	3.5	0.98	DIN	4	7	2
Cadmium	Surface Water	ug/l	<0.2	9.20	1.52	0.32	0.19	<0.2	<0.5	0.08	DIN	4	7	0
	Sediment	mg/kg	0.02	0.68	0.15	0.18	0.22	<0.02	1	0.35	TIN	5	7	3
Chromium	Surface Water	ug/l	0.4	0.63	0.12	0.52	1.26	<0.4	3.7	1.35	DIN	4	7	3
	Sediment	mg/kg	1.4	22.30	5.21	10.81	8.55	<2.9	11.1	3.43	TIN	5	7	6
Cobalt	Sediment	mg/kg	0.91	12.90	3.16	6.88	6.76	3.5	16.5	4.41	TIN	5	7	7
Lead	Sediment	mg/kg	4	21.00	3.93	10.87	7.96	4.4	10.8	1.99	TIN	5	7	7
Manganese	Sediment	mg/kg	88.6	871.00	187.06	391.16	947.57	241	3670	1,207.12	TIN	5	7	7
Nickel	Surface Water	ug/l	0.5	5.00	1.18	1.59	1.77	<0.5	4.4	1.37	DIN	4	7	1
	Sediment	mg/kg	0.89	23.80	5.85	9.45	17.43	8.9	51.4	15.17	TIN	5	7	7
Nitrate	Surface Water	mg/l	0.0002	2.98	0.48	0.11	0.26	<0.03	0.817	0.34	WQ	4	7	5
Polonium 210	Sediment	pCi/g	0.7	18.00	3.54	3.66	1.10	0.7	1.7	0.53	TRAD	3	3	3
Radium 226	Surface Water	pCi/L	0.0939	1.81	0.56	0.51	0.37	0.157	0.471	0.08	TRAD	6	12	7
	Sediment	pCi/g	1.36	8.21	2.11	3.49	1.01	<0.41	1.95	0.73	TRAD	5	7	3
Sulfate	Surface Water	mg/l	1.84	30.00	7.22	8.41	574.62	2.67	1950	936.23	WQ	4	7	7
	Sediment	mg/kg	1.08	168.00	39.22	24.74	449.30	29.9	755	375.68	WQ	3	3	3
Uranium 238	Surface Water	pCi/L	0.0485	5.48	1.24	1.01	4.05	0.652	9.75	2.84	TRAD	6	12	12
	Sediment	pCi/g	0.79	22.00	5.94	5.65	2.89	<0.648	8.26	3.07	TRAD	5	7	5
Vanadium	Surface Water	ug/l	0.0141	3.30	0.74	0.40	2.42	<0.5	4.7	1.89	DIN	4	7	5

- Please see explanation of abbreviations and terms at end of table -

Table 5 - 133

Midnite Mine Summary Statistics by Area Compared with Background Values

Indicator	Matrix	UOM	Background Values Minimum	Background Values Maximum	Background Values Std Dev	Background Values Average	Site Sampling Results Average	Site Sampling Results Minimum	Site Sampling Results Maximum	Site Sampling Results Std Dev	Method	Locn's	Samples	Detects
Lower Blue Creek														
Zinc	Surface Water	ug/l	0.026	13.60	2.27	0.87	3.84	<1.3	7.1	2.77	DIN	4	7	4
Lower Blue Creek Tributaries														
Cadmium	Sediment	mg/kg	0.02	0.68	0.15	0.18	0.17	<0.02	0.96	0.29	TIN	7	10	1
Chromium	Sediment	mg/kg	1.4	22.30	5.21	10.81	10.00	4.6	11.8	2.05	TIN	7	10	10
Cobalt	Sediment	mg/kg	0.91	12.90	3.16	6.88	6.47	2.6	20.2	4.91	TIN	7	10	10
Lead	Sediment	mg/kg	4	21.00	3.93	10.87	10.28	5.1	14.3	2.55	TIN	7	10	10
Manganese	Sediment	mg/kg	88.6	871.00	187.06	391.16	586.70	150	2980	846.75	TIN	7	10	10
Nickel	Sediment	mg/kg	0.89	23.80	5.85	9.45	12.87	3.2	57.5	15.78	TIN	7	10	10
Polonium 210	Sediment	pCi/g	0.7	18.00	3.54	3.66	1.28	1	1.5	0.22	TRAD	4	4	4
Radium 226	Sediment	pCi/g	1.36	8.21	2.11	3.49	0.92	<0.358	2.01	0.70	TRAD	7	10	4
Sulfate	Sediment	mg/kg	1.08	168.00	39.22	24.74	2.20	1.16	3.15	0.91	WQ	4	4	4
Uranium 238	Sediment	pCi/g	0.79	22.00	5.94	5.65	1.42	<0.323	2.298	1.64	TRAD	7	10	5
Lower Blue Creek Riparian														
Cadmium	Sediment	mg/kg	0.02	0.68	0.15	0.18	0.13	0.13	0.13	0.00	TIN	1	1	1
Chromium	Sediment	mg/kg	1.4	22.30	5.21	10.81	8.80	8.8	8.8	0.00	TIN	1	1	1
Cobalt	Sediment	mg/kg	0.91	12.90	3.16	6.88	4.70	4.7	4.7	0.00	TIN	1	1	1
Lead	Sediment	mg/kg	4	21.00	3.93	10.87	8.50	8.5	8.5	0.00	TIN	1	1	1
Manganese	Sediment	mg/kg	88.6	871.00	187.06	391.16	414.00	414	414	0.00	TIN	1	1	1
Nickel	Sediment	mg/kg	0.89	23.80	5.85	9.45	9.90	9.9	9.9	0.00	TIN	1	1	1
Polonium 210	Sediment	pCi/g	0.7	18.00	3.54	3.66	0.90	0.9	0.9	0.00	TRAD	1	1	1
Sulfate	Sediment	mg/kg	1.08	168.00	39.22	24.74	2.30	2.3	2.3	0.00	WQ	1	1	1
Uranium 238	Sediment	pCi/g	0.79	22.00	5.94	5.65	2.88	2.88	2.88	0.00	TRAD	1	1	1
Northern Drainage														
Aluminum	Groundwater	ug/l	0.0965	3,780.00	832.94	367.62	20.88	<11.2	58.8	25.37	DIN	2	4	1

- Please see explanation of abbreviations and terms at end of table -

Table 5 - 133

Midnite Mine Summary Statistics by Area Compared with Background Values

Indicator	Matrix	UOM	Background Values Minimum	Background Values Maximum	Background Values Std Dev	Background Values Average	Site Sampling Results Average	Site Sampling Results Minimum	Site Sampling Results Maximum	Site Sampling Results Std Dev	Method	Locn's	Samples	Detects
Northern Drainage														
Antimony	Surface Water	ug/l	<0.1	1.40	0.03	0.09	0.18	0.18	0.18	0.00	DIN	1	1	1
	Groundwater	ug/l	0.0018	5.20	1.07	0.46	1.64	<2.2	3	0.92	DIN	2	4	1
Cadmium	Surface Water	ug/l	<0.2	9.20	1.52	0.32	0.20	<0.4	<0.4	0.00	DIN	1	1	0
	Sediment	mg/kg	0.02	0.68	0.15	0.18	0.12	<0.02	0.34	0.15	TIN	3	5	1
Chromium	Surface Water	ug/l	0.4	0.63	0.12	0.52	0.55	<1.1	<1.1	0.00	DIN	1	1	0
	Sediment	mg/kg	1.4	22.30	5.21	10.81	11.84	5	21.3	8.44	TIN	3	5	5
	Groundwater	ug/l	0.0621	11.70	2.62	1.95	1.76	<0.4	4.4	1.90	DIN	2	4	2
Cobalt	Sediment	mg/kg	0.91	12.90	3.16	6.88	8.64	3	17.3	6.89	TIN	3	5	5
	Groundwater	ug/l	0.0144	7.20	1.35	0.72	4.31	<0.5	9.9	4.70	DIN	2	4	2
Iron	Groundwater	ug/l	0.4946	28,300.00	7,024.30	2,897.40	53.70	<8.4	193	92.89	DIN	2	4	1
Lead	Sediment	mg/kg	4	21.00	3.93	10.87	8.42	6.3	10.6	1.62	TIN	3	5	5
Manganese	Sediment	mg/kg	88.6	871.00	187.06	391.16	419.80	261	722	189.59	TIN	3	5	5
	Groundwater	ug/l	1	1,930.00	396.91	245.73	71.35	0.58	159	72.43	DIN	2	4	4
Nickel	Surface Water	ug/l	0.5	5.00	1.18	1.59	0.90	<1.8	<1.8	0.00	DIN	1	1	0
	Sediment	mg/kg	0.89	23.80	5.85	9.45	9.28	3.8	18.6	7.03	TIN	3	5	5
	Groundwater	ug/l	0.1558	13.90	3.32	2.73	8.13	<0.5	18.7	9.26	DIN	2	4	2
Nitrate	Surface Water	mg/l	0.0002	2.98	0.48	0.11	0.84	0.837	0.837	0.00	WQ	1	1	1
Polonium 210	Sediment	pCi/g	0.7	18.00	3.54	3.66	4.58	1.6	6.9	2.43	TRAD	3	5	5
Radium 226	Surface Water	pCi/L	0.0939	1.81	0.56	0.51	1.79	1.79	1.79	0.00	TRAD	1	1	1
	Sediment	pCi/g	1.36	8.21	2.11	3.49	4.41	1.97	8.35	3.45	TRAD	2	3	3
Sulfate	Surface Water	mg/l	1.84	30.00	7.22	8.41	20.40	20.4	20.4	0.00	WQ	1	1	1
	Sediment	mg/kg	1.08	168.00	39.22	24.74	5.48	2.47	9.11	2.58	WQ	3	5	5
	Groundwater	mg/l	0.87	187.00	37.58	22.02	20.93	17.8	25.6	3.78	WQ	2	4	4
Uranium 234	Groundwater	pCi/L	0.112	37.20	7.19	4.43	3.00	0.0693	6.22	3.28	TRAD	2	4	4
Uranium 238	Surface Water	pCi/L	0.0485	5.48	1.24	1.01	6.67	6.67	6.67	0.00	TRAD	1	1	1
	Sediment	pCi/g	0.79	22.00	5.94	5.65	7.31	5.35	11.3	2.31	TRAD	3	5	5
Vanadium	Surface Water	ug/l	0.0141	3.30	0.74	0.40	2.50	2.5	2.5	0.00	DIN	1	1	1
Zinc	Surface Water	ug/l	0.026	13.60	2.27	0.87	13.15	<26.3	<26.3	0.00	DIN	1	1	0
	Groundwater	ug/l	0.0889	181.00	41.64	15.91	60.01	<0.4	156	73.71	DIN	2	4	2

- Please see explanation of abbreviations and terms at end of table -

Table 5 - 133

Midnite Mine Summary Statistics by Area Compared with Background Values

			Background Values				Site Sampling Results							
Indicator	Matrix	UOM	Minimum	Maximum	Std Dev	Average	Average	Minimum	Maximum	Std Dev	Method	Locn's	Samples	Detects
Northeastern Drainage														
Aluminum	Groundwater	ug/l	0.0965	3,780.00	832.94	367.62	341.11	<5.4	4390	1,166.13	DIN	7	14	6
Antimony	Surface Water	ug/l	<0.1	1.40	0.03	0.09	2.90	2.9	2.9	0.00	DIN	1	1	1
	Groundwater	ug/l	0.0018	5.20	1.07	0.46	1.69	<2.2	4.7	1.24	DIN	7	14	2
Cadmium	Surface Water	ug/l	<0.2	9.20	1.52	0.32	0.25	<0.5	<0.5	0.00	DIN	1	1	0
	Sediment	mg/kg	0.02	0.68	0.15	0.18	0.20	<0.02	0.35	0.14	TIN	2	4	1
Chromium	Surface Water	ug/l	0.4	0.63	0.12	0.52	0.55	<1.1	<1.1	0.00	DIN	1	1	0
	Sediment	mg/kg	1.4	22.30	5.21	10.81	25.38	21.3	32.7	5.18	TIN	2	4	4
	Groundwater	ug/l	0.0621	11.70	2.62	1.95	2.77	<0.55	23.2	6.03	DIN	7	14	8
Cobalt	Sediment	mg/kg	0.91	12.90	3.16	6.88	18.80	15.2	23.1	3.25	TIN	2	4	4
	Groundwater	ug/l	0.0144	7.20	1.35	0.72	1.90	<0.5	10.3	2.82	DIN	7	14	3
Iron	Groundwater	ug/l	0.4946	28,300.00	7,024.30	2,897.40	847.56	<8.4	3960	1,462.29	DIN	7	14	9
Lead	Sediment	mg/kg	4	21.00	3.93	10.87	18.43	14.7	23.8	4.27	TIN	2	4	4
Manganese	Sediment	mg/kg	88.6	871.00	187.06	391.16	670.50	548	806	134.49	TIN	2	4	4
	Groundwater	ug/l	1	1,930.00	396.91	245.73	132.64	1.1	343	129.43	DIN	7	14	14
Nickel	Surface Water	ug/l	0.5	5.00	1.18	1.59	1.85	<3.7	<3.7	0.00	DIN	1	1	0
	Sediment	mg/kg	0.89	23.80	5.85	9.45	27.18	19.3	36.4	8.34	TIN	2	4	4
	Groundwater	ug/l	0.1558	13.90	3.32	2.73	3.77	<0.5	26	6.85	DIN	7	14	5
Nitrate	Surface Water	mg/l	0.0002	2.98	0.48	0.11	0.02	<0.03	<0.03	0.00	WQ	1	1	0
Polonium 210	Sediment	pCi/g	0.7	18.00	3.54	3.66	36.50	14	69	26.81	TRAD	2	4	4
Radium 226	Surface Water	pCi/L	0.0939	1.81	0.56	0.51	13.40	13.4	13.4	0.00	TRAD	1	1	1
	Sediment	pCi/g	1.36	8.21	2.11	3.49	39.25	16.4	62.1	32.31	TRAD	2	2	2
Sulfate	Surface Water	mg/l	1.84	30.00	7.22	8.41	4.19	4.19	4.19	0.00	WQ	1	1	1
	Sediment	mg/kg	1.08	168.00	39.22	24.74	4.77	3.95	5.72	0.73	WQ	2	4	4
	Groundwater	mg/l	0.87	187.00	37.58	22.02	69.71	15.5	462	122.28	WQ	7	14	14
Uranium 234	Groundwater	pCi/L	0.112	37.20	7.19	4.43	12.45	0.0803	97.8	27.11	TRAD	7	14	14
Uranium 238	Surface Water	pCi/L	0.0485	5.48	1.24	1.01	357.00	357	357	0.00	TRAD	1	1	1
	Sediment	pCi/g	0.79	22.00	5.94	5.65	36.63	11.4	63.3	27.79	TRAD	2	4	4
Vanadium	Surface Water	ug/l	0.0141	3.30	0.74	0.40	1.00	<2	<2	0.00	DIN	1	1	0

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Midnite Mine Summary Statistics by Area Compared with Background Values

Indicator	Matrix	UOM	Background Values Minimum	Background Values Maximum	Background Values Std Dev	Background Values Average	Site Sampling Results Average	Site Sampling Results Minimum	Site Sampling Results Maximum	Site Sampling Results Std Dev	Method	Locn's	Samples	Detects
Northeastern Drainage														
Zinc	Surface Water	ug/l	0.026	13.60	2.27	0.87	4.60	4.6	4.6	0.00	DIN	1	1	1
	Groundwater	ug/l	0.0889	181.00	41.64	15.91	12.12	<0.4	112	29.21	DIN	7	14	4
Eastern Drainage														
Aluminum	Groundwater	ug/l	0.0965	3,780.00	832.94	367.62	14.03	<4.8	39.9	10.37	DIN	10	24	4
Antimony	Groundwater	ug/l	0.0018	5.20	1.07	0.46	1.98	<2.2	5.8	1.55	DIN	9	18	4
Chromium	Groundwater	ug/l	0.0621	11.70	2.62	1.95	3.15	<0.4	16.9	4.38	DIN	10	24	8
Cobalt	Groundwater	ug/l	0.0144	7.20	1.35	0.72	0.62	<0.5	1.6	0.34	DIN	9	18	1
Iron	Groundwater	ug/l	0.4946	28,300.00	7,024.30	2,897.40	504.55	<8.4	3440	959.55	DIN	10	24	7
Manganese	Groundwater	ug/l	1	1,930.00	396.91	245.73	418.85	<0.1	1890	662.53	DIN	10	24	18
Nickel	Groundwater	ug/l	0.1558	13.90	3.32	2.73	5.21	<0.5	24.8	6.56	DIN	10	24	8
Sulfate	Groundwater	mg/l	0.87	187.00	37.58	22.02	729.07	8.59	2170	718.13	WQ	10	24	24
Uranium 234	Groundwater	pCi/L	0.112	37.20	7.19	4.43	2.57	<1.6	4.3	1.39	DRAD	1	6	4
	Groundwater	pCi/L	0.112	37.20	7.19	4.43	11.28	0.6	42	11.80	TRAD	9	21	21
Zinc	Groundwater	ug/l	0.0889	181.00	41.64	15.91	15.57	<0.4	155	33.01	DIN	10	24	7
Upper Eastern Drainage														
Antimony	Surface Water	ug/l	<0.1	1.40	0.03	0.09	2.19	<2.2	4.1	1.22	DIN	4	9	4
Cadmium	Surface Water	ug/l	<0.2	9.20	1.52	0.32	0.52	<0.2	4	0.74	DIN	5	27	5
	Sediment	mg/kg	0.02	0.68	0.15	0.18	0.55	<0.25	1.1	0.25	TIN	14	17	14
Chromium	Surface Water	ug/l	0.4	0.63	0.12	0.52	1.56	<0.4	8	2.19	DIN	5	27	14
	Sediment	mg/kg	1.4	22.30	5.21	10.81	15.44	5.4	24.7	5.96	TIN	14	17	17
Cobalt	Sediment	mg/kg	0.91	12.90	3.16	6.88	13.35	5.19	23.3	6.28	TIN	14	17	17
Lead	Sediment	mg/kg	4	21.00	3.93	10.87	8.85	<4	15.4	4.07	TIN	14	17	15
Manganese	Sediment	mg/kg	88.6	871.00	187.06	391.16	1,353.12	199	2490	666.65	TIN	14	17	17
Nickel	Surface Water	ug/l	0.5	5.00	1.18	1.59	17.77	<1.2	340	64.54	DIN	5	27	8
	Sediment	mg/kg	0.89	23.80	5.85	9.45	20.09	9	34.9	7.91	TIN	14	17	17
Nitrate	Surface Water	mg/l	0.0002	2.98	0.48	0.11	1.05	0.158	2.27	0.62	WQ	5	27	27

- Please see explanation of abbreviations and terms at end of table -

Table 5 - 133

Midnite Mine Summary Statistics by Area Compared with Background Values

Indicator	Matrix	UOM	Background Values Minimum	Background Values Maximum	Background Values Std Dev	Background Values Average	Site Sampling Results Average	Site Sampling Results Minimum	Site Sampling Results Maximum	Site Sampling Results Std Dev	Method	Locn's	Samples	Detects
Upper Eastern Drainage														
Polonium 210	Sediment	pCi/g	0.7	18.00	3.54	3.66	7.94	2.9	12	3.28	TRAD	5	8	8
Radium 226	Surface Water	pCi/L	0.0939	1.81	0.56	0.51	1.01	0.36	2.11	0.45	TRAD	8	30	30
	Sediment	pCi/g	1.36	8.21	2.11	3.49	6.52	<0.751	12.93	4.81	TRAD	10	10	7
Sulfate	Surface Water	mg/l	1.84	30.00	7.22	8.41	1,524.33	458	2540	778.57	WQ	5	27	27
	Sediment	mg/kg	1.08	168.00	39.22	24.74	1,232.63	640	1780	424.92	WQ	5	8	8
Uranium 234	Groundwater	pCi/L	0.112	37.20	7.19	4.43	16.65	6.4	26.9	14.50	TRAD	2	2	2
Uranium 238	Surface Water	pCi/L	0.0485	5.48	1.24	1.01	20.13	6.5	58	12.10	TRAD	8	30	30
	Sediment	pCi/g	0.79	22.00	5.94	5.65	10.45	1.8	19.67	7.11	TRAD	14	17	17
Vanadium	Surface Water	ug/l	0.0141	3.30	0.74	0.40	0.49	<0.5	0.77	0.25	DIN	4	9	1
Zinc	Surface Water	ug/l	0.026	13.60	2.27	0.87	25.49	<0.4	370	70.43	DIN	5	27	13
Upper Eastern Drainage Riparian														
Cadmium	Sediment	mg/kg	0.02	0.68	0.15	0.18	0.33	<0.5	0.5	0.12	TIN	4	4	1
Chromium	Sediment	mg/kg	1.4	22.30	5.21	10.81	15.83	9.5	22.3	6.02	TIN	4	4	4
Cobalt	Sediment	mg/kg	0.91	12.90	3.16	6.88	8.68	4.9	12.2	3.00	TIN	4	4	4
Lead	Sediment	mg/kg	4	21.00	3.93	10.87	16.68	14.3	21.3	3.28	TIN	4	4	4
Manganese	Sediment	mg/kg	88.6	871.00	187.06	391.16	632.00	347	1090	324.21	TIN	4	4	4
Nickel	Sediment	mg/kg	0.89	23.80	5.85	9.45	17.18	9	24.3	6.31	TIN	4	4	4
Polonium 210	Sediment	pCi/g	0.7	18.00	3.54	3.66	6.50	0.2	9.5	4.37	TRAD	4	4	4
Sulfate	Sediment	mg/kg	1.08	168.00	39.22	24.74	1,602.00	952	2130	494.58	WQ	4	4	4
Uranium 238	Sediment	pCi/g	0.79	22.00	5.94	5.65	8.28	6.79	11.8	2.36	TRAD	4	4	4
Lower Eastern Drainage														
Antimony	Surface Water	ug/l	<0.1	1.40	0.03	0.09	1.68	<2.2	3	0.82	DIN	2	6	2
Cadmium	Surface Water	ug/l	<0.2	9.20	1.52	0.32	1.66	<0.2	4	1.30	DIN	2	15	10
	Sediment	mg/kg	0.02	0.68	0.15	0.18	8.10	1.7	14.4	4.25	TIN	5	6	6
Chromium	Surface Water	ug/l	0.4	0.63	0.12	0.52	1.17	<0.2	7	1.81	DIN	2	15	4
	Sediment	mg/kg	1.4	22.30	5.21	10.81	18.05	8.2	27	7.68	TIN	5	6	6

- Please see explanation of abbreviations and terms at end of table -

Table 5 - 133

Midnite Mine Summary Statistics by Area Compared with Background Values

Indicator	Matrix	UOM	Background Values Minimum	Background Values Maximum	Background Values Std Dev	Background Values Average	Site Sampling Results Average	Site Sampling Results Minimum	Site Sampling Results Maximum	Site Sampling Results Std Dev	Method	Locn's	Samples	Detects
Lower Eastern Drainage														
Cobalt	Sediment	mg/kg	0.91	12.90	3.16	6.88	24.27	9.93	35.9	9.74	TIN	5	6	6
Lead	Sediment	mg/kg	4	21.00	3.93	10.87	10.72	<4	16.5	5.79	TIN	5	6	5
Manganese	Sediment	mg/kg	88.6	871.00	187.06	391.16	19,990.00	6040	33600	9,123.28	TIN	5	6	6
Nickel	Surface Water	ug/l	0.5	5.00	1.18	1.59	68.35	<10	190	61.39	DIN	2	15	11
	Sediment	mg/kg	0.89	23.80	5.85	9.45	257.00	64	516	154.69	TIN	5	6	6
Nitrate	Surface Water	mg/l	0.0002	2.98	0.48	0.11	1.02	0.167	2.02	0.48	WQ	2	15	15
Polonium 210	Sediment	pCi/g	0.7	18.00	3.54	3.66	6.20	4.1	8.3	2.97	TRAD	2	2	2
Radium 226	Surface Water	pCi/L	0.0939	1.81	0.56	0.51	0.53	0.12	0.94	0.23	TRAD	3	16	14
	Sediment	pCi/g	1.36	8.21	2.11	3.49	10.90	<0.123	20	8.93	TRAD	3	4	3
Sulfate	Surface Water	mg/l	1.84	30.00	7.22	8.41	1,574.87	649	2490	680.47	WQ	2	15	15
	Sediment	mg/kg	1.08	168.00	39.22	24.74	1,475.00	1330	1620	205.06	WQ	2	2	2
Uranium 238	Surface Water	pCi/L	0.0485	5.48	1.24	1.01	22.91	8.9	72	16.82	TRAD	3	16	16
	Sediment	pCi/g	0.79	22.00	5.94	5.65	21.51	5.7	45.7	14.22	TRAD	5	6	6
Vanadium	Surface Water	ug/l	0.0141	3.30	0.74	0.40	0.44	<0.5	0.9	0.26	DIN	2	6	1
Zinc	Surface Water	ug/l	0.026	13.60	2.27	0.87	58.92	<4	115	36.17	DIN	2	15	13
Lower Eastern Drainage Riparian														
Cadmium	Sediment	mg/kg	0.02	0.68	0.15	0.18	7.30	3.8	10.8	4.95	TIN	1	2	2
Chromium	Sediment	mg/kg	1.4	22.30	5.21	10.81	21.55	16.9	26.2	6.58	TIN	1	2	2
Cobalt	Sediment	mg/kg	0.91	12.90	3.16	6.88	25.65	21.8	29.5	5.44	TIN	1	2	2
Lead	Sediment	mg/kg	4	21.00	3.93	10.87	17.40	16.8	18	0.85	TIN	1	2	2
Manganese	Sediment	mg/kg	88.6	871.00	187.06	391.16	12,300.00	7500	17100	6,788.23	TIN	1	2	2
Nickel	Sediment	mg/kg	0.89	23.80	5.85	9.45	183.00	129	237	76.37	TIN	1	2	2
Polonium 210	Sediment	pCi/g	0.7	18.00	3.54	3.66	13.00	13	13	0.00	TRAD	1	1	1
Sulfate	Sediment	mg/kg	1.08	168.00	39.22	24.74	1,784.00	1784	1784	0.00	WQ	1	1	1
Uranium 238	Sediment	pCi/g	0.79	22.00	5.94	5.65	41.45	41	41.9	0.64	TRAD	1	2	2

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Midnite Mine Summary Statistics by Area Compared with Background Values

Indicator	Matrix	UOM	Background Values Minimum	Background Values Maximum	Background Values Std Dev	Background Values Average	Site Sampling Results Average	Site Sampling Results Minimum	Site Sampling Results Maximum	Site Sampling Results Std Dev	Method	Locn's	Samples	Detects
Central Drainage														
Aluminum	Groundwater	ug/l	0.0965	3,780.00	832.94	367.62	277.32	<3.9	1100	357.21	DIN	8	55	26
Antimony	Surface Water	ug/l	<0.1	1.40	0.03	0.09	0.95	0.4	0.4	0.49	DIN	1	3	1
	Groundwater	ug/l	0.0018	5.20	1.07	0.46	2.18	<0.2	13	2.98	DIN	7	16	4
Cadmium	Surface Water	ug/l	<0.2	9.20	1.52	0.32	43.39	28	54	9.29	DIN	1	15	15
	Sediment	mg/kg	0.02	0.68	0.15	0.18	2.95	<0.25	10.2	2.71	TIN	9	12	11
Chromium	Surface Water	ug/l	0.4	0.63	0.12	0.52	1.09	<0.3	9.4	2.31	DIN	1	15	2
	Sediment	mg/kg	1.4	22.30	5.21	10.81	17.21	6.1	33.1	7.86	TIN	9	12	12
	Groundwater	ug/l	0.0621	11.70	2.62	1.95	6.00	<0.4	9	7.82	DIN	8	55	6
Cobalt	Sediment	mg/kg	0.91	12.90	3.16	6.88	92.62	11.8	382	103.70	TIN	9	12	12
	Groundwater	ug/l	0.0144	7.20	1.35	0.72	161.13	<0.5	862	336.77	DIN	7	16	8
Iron	Groundwater	ug/l	0.4946	28,300.00	7,024.30	2,897.40	949.73	<8.4	4830	3,410.14	DIN	8	55	24
Lead	Sediment	mg/kg	4	21.00	3.93	10.87	20.41	9.4	49.9	10.89	TIN	9	12	12
Manganese	Sediment	mg/kg	88.6	871.00	187.06	391.16	3,212.75	983	6910	1,872.22	TIN	9	12	12
	Groundwater	ug/l	1	1,930.00	396.91	245.73	39,541.18	0.89	133000	50,995.83	DIN	8	55	47
Nickel	Surface Water	ug/l	0.5	5.00	1.18	1.59	1,139.27	730	1400	224.86	DIN	1	15	15
	Sediment	mg/kg	0.89	23.80	5.85	9.45	147.50	14	502	144.06	TIN	9	12	12
	Groundwater	ug/l	0.1558	13.90	3.32	2.73	503.63	<0.9	1870	627.77	DIN	8	55	29
Nitrate	Surface Water	mg/l	0.0002	2.98	0.48	0.11	3.92	0.802	6.33	1.86	WQ	1	14	14
Polonium 210	Sediment	pCi/g	0.7	18.00	3.54	3.66	28.66	2.5	94	38.16	TRAD	5	5	5
Radium 226	Surface Water	pCi/L	0.0939	1.81	0.56	0.51	0.79	0.3	1.75	0.43	TRAD	1	15	15
	Sediment	pCi/g	1.36	8.21	2.11	3.49	62.86	<0.545	262.7	108.31	TRAD	8	9	6
Sulfate	Surface Water	mg/l	1.84	30.00	7.22	8.41	2,156.00	1400	2580	412.27	WQ	1	15	15
	Sediment	mg/kg	1.08	168.00	39.22	24.74	716.48	28.4	2400	960.35	WQ	5	5	5
	Groundwater	mg/l	0.87	187.00	37.58	22.02	1,500.01	18	2990	970.67	WQ	8	55	55
Uranium 234	Groundwater	pCi/L	0.112	37.20	7.19	4.43	394.16	<27	10000	1,848.16	DRAD	5	29	27
	Groundwater	pCi/L	0.112	37.20	7.19	4.43	5,368.82	23	29000	6,199.42	TRAD	9	34	34
Uranium 238	Surface Water	pCi/L	0.0485	5.48	1.24	1.01	250.16	<0.735	360	85.01	TRAD	1	15	14
	Sediment	pCi/g	0.79	22.00	5.94	5.65	552.25	40.69	1550	544.45	TRAD	9	12	12
Vanadium	Surface Water	ug/l	0.0141	3.30	0.74	0.40	1.70	<1	2.1	1.06	DIN	1	3	1

- Please see explanation of abbreviations and terms at end of table -

Table 5 - 133

Midnite Mine Summary Statistics by Area Compared with Background Values

Indicator	Matrix	UOM	Background Values Minimum	Background Values Maximum	Background Values Std Dev	Background Values Average	Site Sampling Results Average	Site Sampling Results Minimum	Site Sampling Results Maximum	Site Sampling Results Std Dev	Method	Locn's	Samples	Detects
Central Drainage														
Zinc	Surface Water	ug/l	0.026	13.60	2.27	0.87	1,045.07	740	1480	231.06	DIN	1	15	14
	Groundwater	ug/l	0.0889	181.00	41.64	15.91	844.71	<0.4	4000	1,216.09	DIN	8	55	30
Western Drainage														
Aluminum	Groundwater	ug/l	0.0965	3,780.00	832.94	367.62	3,367.42	<5.4	10300	4,203.65	DIN	6	34	21
Antimony	Surface Water	ug/l	<0.1	1.40	0.03	0.09	1.33	<0.5	<4.8	1.08	DIN	1	3	0
	Groundwater	ug/l	0.0018	5.20	1.07	0.46	1.63	<1	4.8	1.22	DIN	5	10	1
Cadmium	Surface Water	ug/l	<0.2	9.20	1.52	0.32	3.09	<1	5.2	1.63	DIN	1	15	12
	Sediment	mg/kg	0.02	0.68	0.15	0.18	0.62	<0.2	1.2	0.40	TIN	10	10	8
Chromium	Surface Water	ug/l	0.4	0.63	0.12	0.52	1.07	<0.1	2	1.33	DIN	1	15	3
	Sediment	mg/kg	1.4	22.30	5.21	10.81	5.43	2.6	10.8	2.46	TIN	10	10	10
	Groundwater	ug/l	0.0621	11.70	2.62	1.95	7.63	<0.4	80	13.59	DIN	6	34	4
Cobalt	Sediment	mg/kg	0.91	12.90	3.16	6.88	10.19	4.05	33.5	8.50	TIN	10	10	10
	Groundwater	ug/l	0.0144	7.20	1.35	0.72	64.97	<1.2	230	96.38	DIN	5	10	6
Iron	Groundwater	ug/l	0.4946	28,300.00	7,024.30	2,897.40	94.35	<8.4	1180	203.84	DIN	6	34	17
Lead	Sediment	mg/kg	4	21.00	3.93	10.87	9.24	5	20	4.90	TIN	10	10	10
Manganese	Sediment	mg/kg	88.6	871.00	187.06	391.16	2,337.70	443	12900	3,844.27	TIN	10	10	10
	Groundwater	ug/l	1	1,930.00	396.91	245.73	16,065.42	5.5	41700	17,977.14	DIN	6	34	34
Nickel	Surface Water	ug/l	0.5	5.00	1.18	1.59	227.04	<20	380	124.70	DIN	1	15	14
	Sediment	mg/kg	0.89	23.80	5.85	9.45	19.54	5.9	39	10.28	TIN	10	10	10
	Groundwater	ug/l	0.1558	13.90	3.32	2.73	252.21	<0.94	670	277.29	DIN	6	34	20
Nitrate	Surface Water	mg/l	0.0002	2.98	0.48	0.11	0.09	<0.02	0.3	0.09	WQ	1	13	6
Polonium 210	Sediment	pCi/g	0.7	18.00	3.54	3.66	4.20	3.8	4.6	0.57	TRAD	2	2	2
Radium 226	Surface Water	pCi/L	0.0939	1.81	0.56	0.51	0.93	0.31	2.52	0.67	TRAD	1	15	15
	Sediment	pCi/g	1.36	8.21	2.11	3.49	3.26	<0.453	8.31	3.84	TRAD	4	4	2
Sulfate	Surface Water	mg/l	1.84	30.00	7.22	8.41	1,726.07	640	2410	638.45	WQ	1	15	15
	Sediment	mg/kg	1.08	168.00	39.22	24.74	493.75	15.5	972	676.35	WQ	2	2	2
	Groundwater	mg/l	0.87	187.00	37.58	22.02	1,321.01	95.2	2750	1,044.85	WQ	6	34	34

- Please see explanation of abbreviations and terms at end of table -

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Midnite Mine Summary Statistics by Area Compared with Background Values

Indicator	Matrix	UOM	Background Values Minimum	Background Values Maximum	Background Values Std Dev	Background Values Average	Site Sampling Results Average	Site Sampling Results Minimum	Site Sampling Results Maximum	Site Sampling Results Std Dev	Method	Locn's	Samples	Detects
Western Drainage														
Uranium 234	Groundwater	pCi/L	0.112	37.20	7.19	4.43	333.11	<95	1100	396.72	DRAD	3	22	20
	Groundwater	pCi/L	0.112	37.20	7.19	4.43	460.67	28.7	1210	444.79	TRAD	5	15	15
Uranium 238	Surface Water	pCi/L	0.0485	5.48	1.24	1.01	18.38	1.6	34.4	10.41	TRAD	1	15	14
	Sediment	pCi/g	0.79	22.00	5.94	5.65	55.65	6.4	110	34.80	TRAD	10	10	10
Vanadium	Surface Water	ug/l	0.0141	3.30	0.74	0.40	2.70	<1	2.6	2.25	DIN	1	3	1
Zinc	Surface Water	ug/l	0.026	13.60	2.27	0.87	280.73	30	460	147.02	DIN	1	15	15
	Groundwater	ug/l	0.0889	181.00	41.64	15.91	428.70	<0.4	1190	479.39	DIN	6	34	22
Western Draianage Seep														
Aluminum	Groundwater	ug/l	0.0965	3,780.00	832.94	367.62	9,858.24	5000	23300	5,826.98	DIN	1	17	17
Antimony	Groundwater	ug/l	0.0018	5.20	1.07	0.46	1.86	<2.2	<5	0.74	DIN	1	4	0
Cadmium	Sediment	mg/kg	0.02	0.68	0.15	0.18	0.13	0.12	0.12	0.01	TIN	1	2	1
Chromium	Sediment	mg/kg	1.4	22.30	5.21	10.81	3.55	3.4	3.7	0.21	TIN	1	2	2
	Groundwater	ug/l	0.0621	11.70	2.62	1.95	4.24	<0.4	7	6.61	DIN	1	17	5
Cobalt	Sediment	mg/kg	0.91	12.90	3.16	6.88	16.10	10.9	21.3	7.35	TIN	1	2	2
	Groundwater	ug/l	0.0144	7.20	1.35	0.72	218.25	190	279	40.93	DIN	1	4	4
Iron	Groundwater	ug/l	0.4946	28,300.00	7,024.30	2,897.40	130.40	<8.4	670	156.46	DIN	1	17	13
Lead	Sediment	mg/kg	4	21.00	3.93	10.87	9.25	8.5	10	1.06	TIN	1	2	2
Manganese	Sediment	mg/kg	88.6	871.00	187.06	391.16	649.00	509	789	197.99	TIN	1	2	2
	Groundwater	ug/l	1	1,930.00	396.91	245.73	30,641.18	26400	34200	2,600.74	DIN	1	17	17
Nickel	Sediment	mg/kg	0.89	23.80	5.85	9.45	4.85	3.6	6.1	1.77	TIN	1	2	2
	Groundwater	ug/l	0.1558	13.90	3.32	2.73	527.76	440	630	63.46	DIN	1	17	17
Polonium 210	Sediment	pCi/g	0.7	18.00	3.54	3.66	5.30	5.3	5.3	0.00	TRAD	1	1	1
Radium 226	Sediment	pCi/g	1.36	8.21	2.11	3.49	5.41	3.001	7.81	3.40	TRAD	1	2	2
Sulfate	Sediment	mg/kg	1.08	168.00	39.22	24.74	770.00	770	770	0.00	WQ	1	1	1
	Groundwater	mg/l	0.87	187.00	37.58	22.02	2,450.00	2130	2600	123.19	WQ	1	17	17
Uranium 234	Groundwater	pCi/L	0.112	37.20	7.19	4.43	1,205.53	537	2000	387.97	TRAD	1	19	19
	Groundwater	pCi/L	0.112	37.20	7.19	4.43	960.00	960	960	0.00	DRAD	1	1	1

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Midnite Mine Summary Statistics by Area Compared with Background Values

Indicator	Matrix	UOM	Background Values Minimum	Background Values Maximum	Background Values Std Dev	Background Values Average	Site Sampling Results Average	Site Sampling Results Minimum	Site Sampling Results Maximum	Site Sampling Results Std Dev	Method	Locn's	Samples	Detects
Western Draianage Seep														
Uranium 238	Sediment	pCi/g	0.79	22.00	5.94	5.65	66.19	34.47	97.9	44.85	TRAD	1	2	2
Zinc	Groundwater	ug/l	0.0889	181.00	41.64	15.91	929.18	720	1400	210.82	DIN	1	17	17
Western Drainage Riparian														
Cadmium	Sediment	mg/kg	0.02	0.68	0.15	0.18	0.23	<0.22	0.51	0.15	TIN	4	6	1
Chromium	Sediment	mg/kg	1.4	22.30	5.21	10.81	11.70	6.1	27.9	8.16	TIN	4	6	6
Cobalt	Sediment	mg/kg	0.91	12.90	3.16	6.88	9.78	4.9	17.5	5.78	TIN	4	6	6
Lead	Sediment	mg/kg	4	21.00	3.93	10.87	11.43	8.1	15.6	2.74	TIN	4	6	6
Manganese	Sediment	mg/kg	88.6	871.00	187.06	391.16	1,155.55	72.3	2500	890.50	TIN	4	6	6
Nickel	Sediment	mg/kg	0.89	23.80	5.85	9.45	12.43	<8.9	20.1	6.13	TIN	4	6	5
Polonium 210	Sediment	pCi/g	0.7	18.00	3.54	3.66	11.90	3.6	16	5.61	TRAD	4	4	4
Radium 226	Sediment	pCi/g	1.36	8.21	2.11	3.49	12.35	8.6	16.1	5.30	TRAD	2	2	2
Sulfate	Sediment	mg/kg	1.08	168.00	39.22	24.74	910.33	18.3	2404	1,034.35	WQ	4	4	4
Uranium 238	Sediment	pCi/g	0.79	22.00	5.94	5.65	28.75	11.8	37.5	12.12	TRAD	4	4	4
Southwestern Drainage														
Aluminum	Groundwater	ug/l	0.0965	3,780.00	832.94	367.62	6.80	<3.9	<37.2	7.91	DIN	2	4	0
Antimony	Groundwater	ug/l	0.0018	5.20	1.07	0.46	1.89	<2.2	4	1.41	DIN	2	4	1
Cadmium	Sediment	mg/kg	0.02	0.68	0.15	0.18	0.18	<0.25	0.26	0.07	TIN	2	3	1
Chromium	Sediment	mg/kg	1.4	22.30	5.21	10.81	5.27	2.4	7.3	2.55	TIN	2	3	3
	Groundwater	ug/l	0.0621	11.70	2.62	1.95	0.60	<0.84	0.89	0.20	DIN	2	4	1
Cobalt	Sediment	mg/kg	0.91	12.90	3.16	6.88	4.23	2.9	5	1.16	TIN	2	3	3
	Groundwater	ug/l	0.0144	7.20	1.35	0.72	0.77	<0.64	<3.1	0.54	DIN	2	4	0
Iron	Groundwater	ug/l	0.4946	28,300.00	7,024.30	2,897.40	6.50	<8.4	<17.6	2.66	DIN	2	4	0
Lead	Sediment	mg/kg	4	21.00	3.93	10.87	10.57	9.1	11.4	1.27	TIN	2	3	3
Manganese	Sediment	mg/kg	88.6	871.00	187.06	391.16	501.33	314	598	162.26	TIN	2	3	3
	Groundwater	ug/l	1	1,930.00	396.91	245.73	530.55	2.2	1690	780.39	DIN	2	4	4

Table 5 - 133

Midnite Mine Summary Statistics by Area Compared with Background Values

Indicator	Matrix	UOM	Background Values Minimum	Background Values Maximum	Background Values Std Dev	Background Values Average	Site Sampling Results Average	Site Sampling Results Minimum	Site Sampling Results Maximum	Site Sampling Results Std Dev	Method	Locn's	Samples	Detects
Southwestern Drainage														
Nickel	Sediment	mg/kg	0.89	23.80	5.85	9.45	5.43	2.1	8.6	3.25	TIN	2	3	3
	Groundwater	ug/l	0.1558	13.90	3.32	2.73	1.60	<0.9	4.4	1.88	DIN	2	4	1
Polonium 210	Sediment	pCi/g	0.7	18.00	3.54	3.66	10.15	9.3	11	1.20	TRAD	1	2	2
Radium 226	Sediment	pCi/g	1.36	8.21	2.11	3.49	2.45	<0.213	4.8	3.32	TRAD	2	2	1
Sulfate	Sediment	mg/kg	1.08	168.00	39.22	24.74	21.15	20.6	21.7	0.78	WQ	1	2	2
	Groundwater	mg/l	0.87	187.00	37.58	22.02	107.30	23.5	213	94.05	WQ	2	4	4
Uranium 234	Groundwater	pCi/L	0.112	37.20	7.19	4.43	25.18	0.0969	48	24.20	TRAD	2	4	4
Uranium 238	Sediment	pCi/g	0.79	22.00	5.94	5.65	5.43	1.292	7.57	3.58	TRAD	2	3	3
Zinc	Groundwater	ug/l	0.0889	181.00	41.64	15.91	32.86	<0.4	102	47.40	DIN	2	4	2
Northwest Drainage														
Aluminum	Groundwater	ug/l	0.0965	3,780.00	832.94	367.62	29.50	<5.4	56.3	37.90	DIN	1	2	1
Antimony	Groundwater	ug/l	0.0018	5.20	1.07	0.46	1.23	<2.2	<2.7	0.18	DIN	1	2	0
Chromium	Groundwater	ug/l	0.0621	11.70	2.62	1.95	2.75	1.9	3.6	1.20	DIN	1	2	2
Cobalt	Groundwater	ug/l	0.0144	7.20	1.35	0.72	4.20	<1.2	7.8	5.09	DIN	1	2	1
Iron	Groundwater	ug/l	0.4946	28,300.00	7,024.30	2,897.40	22.90	<17.6	37	19.94	DIN	1	2	1
Manganese	Groundwater	ug/l	1	1,930.00	396.91	245.73	437.00	397	477	56.57	DIN	1	2	2
Nickel	Groundwater	ug/l	0.1558	13.90	3.32	2.73	1.80	<2.6	<4.6	0.71	DIN	1	2	0
Sulfate	Groundwater	mg/l	0.87	187.00	37.58	22.02	13.65	12.8	14.5	1.20	WQ	1	2	2
Uranium 234	Groundwater	pCi/L	0.112	37.20	7.19	4.43	22.31	2.81	41.8	27.57	TRAD	1	2	2
Zinc	Groundwater	ug/l	0.0889	181.00	41.64	15.91	45.00	35.7	54.3	13.15	DIN	1	2	2
Farwestern Drainage														
Aluminum	Groundwater	ug/l	0.0965	3,780.00	832.94	367.62	27.87	<3.9	244	76.00	DIN	5	10	1
Antimony	Surface Water	ug/l	<0.1	1.40	0.03	0.09	1.35	<2.7	<2.7	0.00	DIN	1	1	0
	Groundwater	ug/l	0.0018	5.20	1.07	0.46	1.23	<2.2	<2.7	0.13	DIN	5	10	0
Cadmium	Surface Water	ug/l	<0.2	9.20	1.52	0.32	0.25	<0.5	<0.5	0.00	DIN	1	1	0
	Sediment	mg/kg	0.02	0.68	0.15	0.18	0.25	0.25	0.25	0.00	TIN	1	1	1

- Please see explanation of abbreviations and terms at end of table -

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Midnite Mine Summary Statistics by Area Compared with Background Values

Indicator	Matrix	UOM	Background Values Minimum	Background Values Maximum	Background Values Std Dev	Background Values Average	Site Sampling Results Average	Site Sampling Results Minimum	Site Sampling Results Maximum	Site Sampling Results Std Dev	Method	Locn's	Samples	Detects
Farwestern Drainage														
Chromium	Surface Water	ug/l	0.4	0.63	0.12	0.52	0.55	<1.1	<1.1	0.00	DIN	1	1	0
	Sediment	mg/kg	1.4	22.30	5.21	10.81	6.50	6.5	6.5	0.00	TIN	1	1	1
	Groundwater	ug/l	0.0621	11.70	2.62	1.95	4.59	<0.4	42	13.15	DIN	5	10	1
Cobalt	Sediment	mg/kg	0.91	12.90	3.16	6.88	5.00	5	5	0.00	TIN	1	1	1
	Groundwater	ug/l	0.0144	7.20	1.35	0.72	0.74	<0.5	<3.9	0.52	DIN	5	10	0
Iron	Groundwater	ug/l	0.4946	28,300.00	7,024.30	2,897.40	55.68	<8.4	224	83.88	DIN	5	10	2
Lead	Sediment	mg/kg	4	21.00	3.93	10.87	11.90	11.9	11.9	0.00	TIN	1	1	1
Manganese	Sediment	mg/kg	88.6	871.00	187.06	391.16	469.00	469	469	0.00	TIN	1	1	1
	Groundwater	ug/l	1	1,930.00	396.91	245.73	231.86	2.8	1340	409.06	DIN	5	10	10
Nickel	Surface Water	ug/l	0.5	5.00	1.18	1.59	0.46	<0.92	<0.92	0.00	DIN	1	1	0
	Sediment	mg/kg	0.89	23.80	5.85	9.45	6.70	6.7	6.7	0.00	TIN	1	1	1
	Groundwater	ug/l	0.1558	13.90	3.32	2.73	5.74	<0.5	22.9	8.42	DIN	5	10	6
Nitrate	Surface Water	mg/l	0.0002	2.98	0.48	0.11	0.09	0.086	0.086	0.00	WQ	1	1	1
Polonium 210	Sediment	pCi/g	0.7	18.00	3.54	3.66	18.00	18	18	0.00	TRAD	1	1	1
Radium 226	Surface Water	pCi/L	0.0939	1.81	0.56	0.51	1.61	1.61	1.61	0.00	TRAD	1	1	1
	Sediment	pCi/g	1.36	8.21	2.11	3.49	21.30	21.3	21.3	0.00	TRAD	1	1	1
Sulfate	Surface Water	mg/l	1.84	30.00	7.22	8.41	16.60	16.6	16.6	0.00	WQ	1	1	1
	Sediment	mg/kg	1.08	168.00	39.22	24.74	20.40	20.4	20.4	0.00	WQ	1	1	1
	Groundwater	mg/l	0.87	187.00	37.58	22.02	44.37	7.66	116	32.81	WQ	5	10	10
Uranium 234	Groundwater	pCi/L	0.112	37.20	7.19	4.43	3.63	1.44	5.51	1.35	TRAD	5	10	10
Uranium 238	Surface Water	pCi/L	0.0485	5.48	1.24	1.01	3.25	3.25	3.25	0.00	TRAD	1	1	1
	Sediment	pCi/g	0.79	22.00	5.94	5.65	19.10	19.1	19.1	0.00	TRAD	1	1	1
Vanadium	Surface Water	ug/l	0.0141	3.30	0.74	0.40	2.40	2.4	2.4	0.00	DIN	1	1	1
Zinc	Surface Water	ug/l	0.026	13.60	2.27	0.87	3.80	3.8	3.8	0.00	DIN	1	1	1
	Groundwater	ug/l	0.0889	181.00	41.64	15.91	13.42	<0.4	99.5	30.52	DIN	5	10	5
Pit 3														
Antimony	Surface Water	ug/l	<0.1	1.40	0.03	0.09	12.60	0.2	0.2	17.54	DIN	2	2	1

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Midnite Mine Summary Statistics by Area Compared with Background Values

Indicator	Matrix	UOM	Background Values Minimum	Background Values Maximum	Background Values Std Dev	Background Values Average	Site Sampling Results Average	Site Sampling Results Minimum	Site Sampling Results Maximum	Site Sampling Results Std Dev	Method	Locn's	Samples	Detects
Pit 3														
Cadmium	Surface Water	ug/l	<0.2	9.20	1.52	0.32	50.99	28	97.8	20.65	DIN	2	9	9
	Sediment	mg/kg	0.02	0.68	0.15	0.18	0.51	<0.31	1	0.44	TIN	3	3	1
Chromium	Surface Water	ug/l	0.4	0.63	0.12	0.52	8.01	<1	3.1	16.00	DIN	2	9	5
	Sediment	mg/kg	1.4	22.30	5.21	10.81	12.83	7.2	19.6	6.28	TIN	3	3	3
Cobalt	Sediment	mg/kg	0.91	12.90	3.16	6.88	51.37	34.9	62.1	14.48	TIN	3	3	3
Lead	Sediment	mg/kg	4	21.00	3.93	10.87	23.10	11.7	32.4	10.51	TIN	3	3	3
Manganese	Sediment	mg/kg	88.6	871.00	187.06	391.16	1,603.33	1300	2160	482.74	TIN	3	3	3
Nickel	Surface Water	ug/l	0.5	5.00	1.18	1.59	1,772.22	1300	2690	497.92	DIN	2	9	9
	Sediment	mg/kg	0.89	23.80	5.85	9.45	71.47	54.6	87.6	16.51	TIN	3	3	3
Nitrate	Surface Water	mg/l	0.0002	2.98	0.48	0.11	1.62	0.94	2.46	0.61	WQ	2	9	9
Polonium 210	Sediment	pCi/g	0.7	18.00	3.54	3.66	61.00	61	61	0.00	TRAD	1	1	1
Radium 226	Surface Water	pCi/L	0.0939	1.81	0.56	0.51	36.25	23	63.2	14.13	TRAD	5	11	11
	Sediment	pCi/g	1.36	8.21	2.11	3.49	0.72	<0.912	<1.98	0.38	TRAD	2	2	0
Sulfate	Surface Water	mg/l	1.84	30.00	7.22	8.41	2,890.67	2310	3406	366.60	WQ	2	9	9
	Sediment	mg/kg	1.08	168.00	39.22	24.74	1,947.00	1947	1947	0.00	WQ	1	1	1
Uranium 238	Surface Water	pCi/L	0.0485	5.48	1.24	1.01	5,724.17	670	9630	2,242.13	TRAD	5	12	12
	Sediment	pCi/g	0.79	22.00	5.94	5.65	230.00	92	305	119.66	TRAD	3	3	3
Vanadium	Surface Water	ug/l	0.0141	3.30	0.74	0.40	7.70	<0.8	<30	10.32	DIN	2	2	0
Zinc	Surface Water	ug/l	0.026	13.60	2.27	0.87	3,975.56	2700	5850	1,081.62	DIN	2	9	9
Pit 4														
Antimony	Surface Water	ug/l	<0.1	1.40	0.03	0.09	0.05	<0.1	<0.1	0.00	DIN	1	1	0
Cadmium	Surface Water	ug/l	<0.2	9.20	1.52	0.32	0.25	<0.4	0.3	0.10	DIN	2	9	1
	Sediment	mg/kg	0.02	0.68	0.15	0.18	0.14	<0.23	0.16	0.03	TIN	4	4	1
Chromium	Surface Water	ug/l	0.4	0.63	0.12	0.52	0.47	<0.1	<4	0.60	DIN	2	9	0
	Sediment	mg/kg	1.4	22.30	5.21	10.81	19.25	7.4	30.5	9.44	TIN	4	4	4
Cobalt	Sediment	mg/kg	0.91	12.90	3.16	6.88	18.08	9.1	23.1	6.16	TIN	4	4	4
Lead	Sediment	mg/kg	4	21.00	3.93	10.87	18.55	7.6	29.7	9.11	TIN	4	4	4

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Midnite Mine Summary Statistics by Area Compared with Background Values

Indicator	Matrix	UOM	Background Values Minimum	Background Values Maximum	Background Values Std Dev	Background Values Average	Site Sampling Results Average	Site Sampling Results Minimum	Site Sampling Results Maximum	Site Sampling Results Std Dev	Method	Locn's	Samples	Detects
Pit 4														
Manganese	Sediment	mg/kg	88.6	871.00	187.06	391.16	1,070.50	629	1820	530.81	TIN	4	4	4
Nickel	Surface Water	ug/l	0.5	5.00	1.18	1.59	13.17	3.5	30	9.53	DIN	2	9	6
	Sediment	mg/kg	0.89	23.80	5.85	9.45	28.68	16.1	38.6	9.45	TIN	4	4	4
Nitrate	Surface Water	mg/l	0.0002	2.98	0.48	0.11	0.04	<0.02	0.11	0.03	WQ	2	9	2
Polonium 210	Sediment	pCi/g	0.7	18.00	3.54	3.66	160.00	160	160	0.00	TRAD	1	1	1
Radium 226	Surface Water	pCi/L	0.0939	1.81	0.56	0.51	4.33	1.83	8.76	2.15	TRAD	5	12	12
	Sediment	pCi/g	1.36	8.21	2.11	3.49	19.32	9.95	38.05	16.22	TRAD	3	3	3
Sulfate	Surface Water	mg/l	1.84	30.00	7.22	8.41	258.44	110	330	78.97	WQ	2	9	9
	Sediment	mg/kg	1.08	168.00	39.22	24.74	671.00	671	671	0.00	WQ	1	1	1
Uranium 238	Surface Water	pCi/L	0.0485	5.48	1.24	1.01	821.25	440	1100	213.98	TRAD	5	12	12
	Sediment	pCi/g	0.79	22.00	5.94	5.65	133.45	56.3	236.8	77.66	TRAD	4	4	4
Vanadium	Surface Water	ug/l	0.0141	3.30	0.74	0.40	0.40	<0.8	<0.8	0.00	DIN	1	1	0
Zinc	Surface Water	ug/l	0.026	13.60	2.27	0.87	15.01	1.6	28	8.75	DIN	2	9	8
Outfall Pond														
Antimony	Surface Water	ug/l	<0.1	1.40	0.03	0.09	2.80	<2.2	4.5	2.40	DIN	1	2	1
Cadmium	Surface Water	ug/l	<0.2	9.20	1.52	0.32	0.18	<0.2	<0.5	0.11	DIN	1	2	0
	Sediment	mg/kg	0.02	0.68	0.15	0.18	0.45	0.14	0.75	0.43	TIN	2	2	2
Chromium	Surface Water	ug/l	0.4	0.63	0.12	0.52	1.40	0.89	1.9	0.71	DIN	1	2	2
	Sediment	mg/kg	1.4	22.30	5.21	10.81	28.65	18.1	39.2	14.92	TIN	2	2	2
Cobalt	Sediment	mg/kg	0.91	12.90	3.16	6.88	16.65	10.2	23.1	9.12	TIN	2	2	2
Lead	Sediment	mg/kg	4	21.00	3.93	10.87	24.10	15.5	32.7	12.16	TIN	2	2	2
Manganese	Sediment	mg/kg	88.6	871.00	187.06	391.16	1,787.50	485	3090	1,842.01	TIN	2	2	2
Nickel	Surface Water	ug/l	0.5	5.00	1.18	1.59	2.38	<2.7	3.4	1.45	DIN	1	2	1
	Sediment	mg/kg	0.89	23.80	5.85	9.45	25.85	14.6	37.1	15.91	TIN	2	2	2
Nitrate	Surface Water	mg/l	0.0002	2.98	0.48	0.11	1.23	0.622	1.83	0.85	WQ	1	2	2
Polonium 210	Sediment	pCi/g	0.7	18.00	3.54	3.66	9.50	9.5	9.5	0.00	TRAD	1	1	1

- Please see explanation of abbreviations and terms at end of table -

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Midnite Mine Summary Statistics by Area Compared with Background Values

Indicator	Matrix	UOM	Background Values Minimum	Background Values Maximum	Background Values Std Dev	Background Values Average	Site Sampling Results Average	Site Sampling Results Minimum	Site Sampling Results Maximum	Site Sampling Results Std Dev	Method	Locn's	Samples	Detects
Outfall Pond														
Radium 226	Surface Water	pCi/L	0.0939	1.81	0.56	0.51	0.43	0.35	0.447	0.08	TRAD	1	3	2
	Sediment	pCi/g	1.36	8.21	2.11	3.49	3.86	<1.63	6.91	4.31	TRAD	2	2	1
Sulfate	Surface Water	mg/l	1.84	30.00	7.22	8.41	2,085.00	1650	2520	615.18	WQ	1	2	2
	Sediment	mg/kg	1.08	168.00	39.22	24.74	1,310.00	1310	1310	0.00	WQ	1	1	1
Uranium 238	Surface Water	pCi/L	0.0485	5.48	1.24	1.01	39.63	12.8	85.1	39.59	TRAD	1	3	3
	Sediment	pCi/g	0.79	22.00	5.94	5.65	73.60	10.6	136.6	89.10	TRAD	2	2	2
Vanadium	Surface Water	ug/l	0.0141	3.30	0.74	0.40	0.38	<0.5	<1	0.18	DIN	1	2	0
Zinc	Surface Water	ug/l	0.026	13.60	2.27	0.87	2.43	<0.4	<9.3	3.15	DIN	1	2	0
Pollution Control Pond														
Antimony	Surface Water	ug/l	<0.1	1.40	0.03	0.09	2.50	<5	<5	0.00	DIN	1	1	0
Cadmium	Surface Water	ug/l	<0.2	9.20	1.52	0.32	47.51	29.1	69	11.10	DIN	1	13	13
	Sediment	mg/kg	0.02	0.68	0.15	0.18	5.67	<0.26	11.2	7.83	TIN	2	2	1
Chromium	Surface Water	ug/l	0.4	0.63	0.12	0.52	7.31	<1	7	13.82	DIN	1	13	9
	Sediment	mg/kg	1.4	22.30	5.21	10.81	19.00	7.6	30.4	16.12	TIN	2	2	2
Cobalt	Sediment	mg/kg	0.91	12.90	3.16	6.88	86.95	7.9	166	111.79	TIN	2	2	2
Lead	Sediment	mg/kg	4	21.00	3.93	10.87	15.95	6.5	25.4	13.36	TIN	2	2	2
Manganese	Sediment	mg/kg	88.6	871.00	187.06	391.16	2,386.00	442	4330	2,749.23	TIN	2	2	2
Nickel	Surface Water	ug/l	0.5	5.00	1.18	1.59	1,852.31	900	2690	448.85	DIN	1	13	13
	Sediment	mg/kg	0.89	23.80	5.85	9.45	387.25	17.5	757	522.91	TIN	2	2	2
Nitrate	Surface Water	mg/l	0.0002	2.98	0.48	0.11	1.40	1.17	1.64	0.14	WQ	1	12	12
Radium 226	Surface Water	pCi/L	0.0939	1.81	0.56	0.51	18.07	6.4	49.4	11.59	TRAD	3	15	15
	Sediment	pCi/g	1.36	8.21	2.11	3.49	3.67	<2.86	5.919	3.17	TRAD	2	2	1
Sulfate	Surface Water	mg/l	1.84	30.00	7.22	8.41	3,261.54	2780	4110	371.35	WQ	1	13	13
Uranium 238	Surface Water	pCi/L	0.0485	5.48	1.24	1.01	6,074.67	2500	10000	1,731.92	TRAD	3	15	15
	Sediment	pCi/g	0.79	22.00	5.94	5.65	1,178.63	21.26	2336	1,636.77	TRAD	2	2	2
Vanadium	Surface Water	ug/l	0.0141	3.30	0.74	0.40	15.00	<30	<30	0.00	DIN	1	1	0
Zinc	Surface Water	ug/l	0.026	13.60	2.27	0.87	4,027.69	1830	5930	1,105.94	DIN	1	13	13

- Please see explanation of abbreviations and terms at end of table -

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Midnite Mine Summary Statistics by Area Compared with Background Values

			Background Values				Site Sampling Results							
Indicator	Matrix	UOM	Minimum	Maximum	Std Dev	Average	Average	Minimum	Maximum	Std Dev	Method	Locn's	Samples	Detects
Mined Area														
Aluminum	Groundwater	ug/l	0.0965	3,780.00	832.94	367.62	158,785.15	<8.4	1460000	382,851.17	DIN	19	111	58
	Surface Soil	mg/kg	8230	24,100.00	4,622.50	15,172.00	14,787.66	4140	33700	5,174.56	TIN	47	47	47
	Subsurface Soil	mg/kg	7720	16,500.00	2,371.40	12,468.00	18,851.58	9480	28000	4,813.53	TIN	19	19	19
Antimony	Groundwater	ug/l	0.0018	5.20	1.07	0.46	48.66	<0.1	15	91.09	DIN	12	13	5
Arsenic	Surface Soil	mg/kg	0.1804	234.00	47.82	28.07	39.68	<4	239	51.84	TIN	47	47	41
	Subsurface Soil	mg/kg	0.78	86.10	29.42	20.86	20.26	<4	77	19.03	TIN	19	19	18
Cadmium	Surface Soil	mg/kg	0.09	0.45	0.08	0.26	0.30	<0.04	1.8	0.29	TIN	47	47	34
	Subsurface Soil	mg/kg	0.03	0.32	0.08	0.17	0.50	0.1	3.5	0.75	TIN	19	19	19
Chromium	Groundwater	ug/l	0.0621	11.70	2.62	1.95	38.41	<1.1	15.2	60.64	DIN	19	111	4
	Surface Soil	mg/kg	3.6	18.20	3.93	9.56	15.78	2.9	33.7	5.98	TIN	47	47	47
	Subsurface Soil	mg/kg	2.8	14.90	3.13	7.72	18.65	5.7	66	12.54	TIN	19	19	19
Cobalt	Groundwater	ug/l	0.0144	7.20	1.35	0.72	3,930.27	1.2	20700	7,599.98	DIN	12	13	9
Copper	Surface Soil	mg/kg	4.6	41.80	9.71	15.16	28.91	5.7	83	15.81	TIN	47	47	47
	Subsurface Soil	mg/kg	4.9	35.80	9.46	14.50	27.23	9.7	64.9	13.08	TIN	19	19	18
Iron	Groundwater	ug/l	0.4946	28,300.00	7,024.30	2,897.40	50,471.82	<10	526000	138,209.75	DIN	19	111	84
Lead	Surface Soil	mg/kg	7.4	20.90	2.78	13.07	20.52	8	73.5	13.55	TIN	47	47	47
	Subsurface Soil	mg/kg	8.2	12.30	1.03	9.95	17.95	6	84	16.71	TIN	19	19	19
Lead 210	Surface Soil	pCi/g	1.1	11.00	1.72	3.43	74.75	20	260	83.85	TRAD	16	16	16
Manganese	Groundwater	ug/l	1	1,930.00	396.91	245.73	201,163.23	<10	1430000	401,917.13	DIN	19	111	108
	Surface Soil	mg/kg	254	1,640.00	270.27	870.75	873.96	309	2750	472.74	TIN	47	47	47
	Subsurface Soil	mg/kg	379	1,300.00	196.33	774.44	1,101.74	511	5190	1,036.88	TIN	19	19	19
Nickel	Groundwater	ug/l	0.1558	13.90	3.32	2.73	3,894.89	<1.8	31000	8,501.00	DIN	19	111	63
Radium 226	Surface Soil	pCi/g	1.33	8.92	1.52	2.57	63.45	0.074	879.8	104.93	TRAD	103	103	98
Selenium	Surface Soil	mg/kg	0.0433	0.52	0.09	0.12	9.66	<0.24	64	16.53	TIN	47	47	16
	Subsurface Soil	mg/kg	0.2222	0.56	0.09	0.30	30.21	<4	90	28.41	TIN	19	19	16
Sulfate	Groundwater	mg/l	0.87	187.00	37.58	22.02	3,917.15	1.11	22600	5,634.25	WQ	19	111	109
Uranium 234	Groundwater	pCi/L	0.112	37.20	7.19	4.43	14,221.72	<5	120000	29,298.52	DRAD	13	102	100
	Groundwater	pCi/L	0.112	37.20	7.19	4.43	21,629.05	0.423	130000	36,710.06	TRAD	12	23	23

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Midnite Mine Summary Statistics by Area Compared with Background Values

Indicator	Matrix	UOM	Background Values Minimum	Background Values Maximum	Background Values Std Dev	Background Values Average	Site Sampling Results Average	Site Sampling Results Minimum	Site Sampling Results Maximum	Site Sampling Results Std Dev	Method	Locn's	Samples	Detects
Mined Area														
Uranium 238	Surface Soil	pCi/g	0.779	15.20	2.52	2.32	45.36	0.65	417	73.89	TRAD	65	65	65
	Subsurface Soil	pCi/g	0.834	14.40	3.39	2.56	14.88	0.58	48	15.95	TRAD	19	19	19
Zinc	Groundwater	ug/l	0.0889	181.00	41.64	15.91	8,197.73	3.8	75700	20,113.50	DIN	19	111	79
	Surface Soil	mg/kg	17.2	62.40	9.51	44.69	60.78	31.4	204	30.35	TIN	47	47	47
	Subsurface Soil	mg/kg	26.6	44.90	5.70	36.19	71.89	29	381	77.03	TIN	19	19	19
Blood Pool														
Cadmium	Surface Water	ug/l	<0.2	9.20	1.52	0.32	5.14	1.4	9	3.43	DIN	1	5	5
	Sediment	mg/kg	0.02	0.68	0.15	0.18	0.14	<0.28	<0.28	0.00	TIN	2	2	0
Chromium	Surface Water	ug/l	0.4	0.63	0.12	0.52	12.76	<1	26	12.18	DIN	1	5	4
	Sediment	mg/kg	1.4	22.30	5.21	10.81	43.05	35.4	50.7	10.82	TIN	2	2	2
Cobalt	Sediment	mg/kg	0.91	12.90	3.16	6.88	8.60	5.9	11.3	3.82	TIN	2	2	2
Lead	Sediment	mg/kg	4	21.00	3.93	10.87	19.80	18.5	21.1	1.84	TIN	2	2	2
Manganese	Sediment	mg/kg	88.6	871.00	187.06	391.16	331.00	310	352	29.70	TIN	2	2	2
Nickel	Surface Water	ug/l	0.5	5.00	1.18	1.59	596.00	90	1090	455.61	DIN	1	5	5
	Sediment	mg/kg	0.89	23.80	5.85	9.45	24.30	19.6	29	6.65	TIN	2	2	2
Nitrate	Surface Water	mg/l	0.0002	2.98	0.48	0.11	0.45	<0.05	1.73	0.73	WQ	1	5	3
Radium 226	Surface Water	pCi/L	0.0939	1.81	0.56	0.51	4.05	1.37	7.3	2.38	TRAD	3	7	7
	Sediment	pCi/g	1.36	8.21	2.11	3.49	17.93	<1.31	35.2	24.43	TRAD	2	2	1
Sulfate	Surface Water	mg/l	1.84	30.00	7.22	8.41	1,638.00	630	2260	657.62	WQ	1	5	5
Uranium 238	Surface Water	pCi/L	0.0485	5.48	1.24	1.01	1,643.29	660	2670	759.53	TRAD	3	7	7
	Sediment	pCi/g	0.79	22.00	5.94	5.65	22.74	13.37	32.1	13.24	TRAD	2	2	2
Zinc	Surface Water	ug/l	0.026	13.60	2.27	0.87	572.00	130	970	377.12	DIN	1	5	5
Downwind Northeast Area														
Aluminum	Surface Soil	mg/kg	8230	24,100.00	4,622.50	15,172.00	19,716.00	13400	29500	4,237.40	TIN	16	25	25
	Subsurface Soil	mg/kg	7720	16,500.00	2,371.40	12,468.00	16,366.67	12800	22100	3,617.00	TIN	6	6	6
Arsenic	Surface Soil	mg/kg	0.1804	234.00	47.82	28.07	8.79	2	50.5	12.75	TIN	16	25	25
	Subsurface Soil	mg/kg	0.78	86.10	29.42	20.86	7.63	1.7	31.2	11.61	TIN	6	6	6

- Please see explanation of abbreviations and terms at end of table -

Table 5 - 133

Midnite Mine Summary Statistics by Area Compared with Background Values

Indicator	Matrix	UOM	Background Values Minimum	Background Values Maximum	Background Values Std Dev	Background Values Average	Site Sampling Results Average	Site Sampling Results Minimum	Site Sampling Results Maximum	Site Sampling Results Std Dev	Method	Locn's	Samples	Detects
Downwind Northeast Area														
Cadmium	Surface Soil	mg/kg	0.09	0.45	0.08	0.26	0.37	<0.37	0.8	0.15	TIN	16	25	16
	Subsurface Soil	mg/kg	0.03	0.32	0.08	0.17	0.08	<0.06	<0.26	0.03	TIN	6	6	0
Chromium	Surface Soil	mg/kg	3.6	18.20	3.93	9.56	18.06	12.7	29.1	4.16	TIN	16	25	25
	Subsurface Soil	mg/kg	2.8	14.90	3.13	7.72	15.93	12.8	24	4.19	TIN	6	6	6
Copper	Surface Soil	mg/kg	4.6	41.80	9.71	15.16	18.64	10.3	32.2	5.61	TIN	16	25	25
	Subsurface Soil	mg/kg	4.9	35.80	9.46	14.50	17.23	10.6	23.1	4.99	TIN	6	6	6
Lead	Surface Soil	mg/kg	7.4	20.90	2.78	13.07	16.08	8.2	27.1	4.15	TIN	16	25	25
	Subsurface Soil	mg/kg	8.2	12.30	1.03	9.95	9.25	7.4	10.9	1.27	TIN	6	6	6
Lead 210	Surface Soil	pCi/g	1.1	11.00	1.72	3.43	4.88	2.7	8.3	1.52	TRAD	16	16	16
	Subsurface Soil	pCi/g	1.2	5.10	1.19	2.86	2.28	<1	5.3	2.02	TRAD	6	6	3
Manganese	Surface Soil	mg/kg	254	1,640.00	270.27	870.75	854.20	532	1990	308.58	TIN	16	25	25
	Subsurface Soil	mg/kg	379	1,300.00	196.33	774.44	778.67	525	1270	271.53	TIN	6	6	6
Radium 226	Subsurface Soil	pCi/g	1.4	3.87	0.70	2.34	1.34	1.337	1.337	0.00	TRAD	1	1	0
Selenium	Surface Soil	mg/kg	0.0433	0.52	0.09	0.12	0.13	<0.17	<0.37	0.03	TIN	16	25	0
	Subsurface Soil	mg/kg	0.2222	0.56	0.09	0.30	0.21	<0.41	<0.44	0.01	TIN	6	6	0
Uranium 238	Surface Soil	pCi/g	0.779	15.20	2.52	2.32	2.31	0.908	5.11	1.31	TRAD	16	16	16
	Subsurface Soil	pCi/g	0.834	14.40	3.39	2.56	1.34	0.673	3.34	1.01	TRAD	6	6	6
Zinc	Surface Soil	mg/kg	17.2	62.40	9.51	44.69	54.43	35.2	116	18.47	TIN	16	25	25
	Subsurface Soil	mg/kg	26.6	44.90	5.70	36.19	34.08	25.4	40.1	6.15	TIN	6	6	6
Downwind Sothwest Area														
Aluminum	Surface Soil	mg/kg	8230	24,100.00	4,622.50	15,172.00	15,231.25	11500	19900	2,225.82	TIN	16	16	16
	Subsurface Soil	mg/kg	7720	16,500.00	2,371.40	12,468.00	13,483.33	11500	15000	1,427.47	TIN	6	6	6
Arsenic	Surface Soil	mg/kg	0.1804	234.00	47.82	28.07	3.81	2	5.5	0.92	TIN	16	16	16
	Subsurface Soil	mg/kg	0.78	86.10	29.42	20.86	3.33	2.2	4.6	0.79	TIN	6	6	6
Cadmium	Surface Soil	mg/kg	0.09	0.45	0.08	0.26	0.19	0.07	0.36	0.08	TIN	16	16	16
	Subsurface Soil	mg/kg	0.03	0.32	0.08	0.17	0.04	<0.05	<0.11	0.01	TIN	6	6	0
Chromium	Surface Soil	mg/kg	3.6	18.20	3.93	9.56	9.90	6.3	13.9	2.16	TIN	16	16	16
	Subsurface Soil	mg/kg	2.8	14.90	3.13	7.72	7.78	5.4	10.2	1.92	TIN	6	6	6

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Midnite Mine Summary Statistics by Area Compared with Background Values

Indicator	Matrix	UOM	Background Values Minimum	Background Values Maximum	Background Values Std Dev	Background Values Average	Site Sampling Results Average	Site Sampling Results Minimum	Site Sampling Results Maximum	Site Sampling Results Std Dev	Method	Locn's	Samples	Detects
Downwind Sothwest Area														
Copper	Surface Soil	mg/kg	4.6	41.80	9.71	15.16	12.50	9.5	15.4	1.76	TIN	16	16	16
	Subsurface Soil	mg/kg	4.9	35.80	9.46	14.50	12.92	10.1	16.1	2.31	TIN	6	6	6
Lead	Surface Soil	mg/kg	7.4	20.90	2.78	13.07	13.43	10.7	16.1	1.61	TIN	16	16	16
	Subsurface Soil	mg/kg	8.2	12.30	1.03	9.95	10.93	10.1	12.5	0.84	TIN	6	6	6
Lead 210	Surface Soil	pCi/g	1.1	11.00	1.72	3.43	2.20	<1.4	4.6	1.28	TRAD	16	16	9
	Subsurface Soil	pCi/g	1.2	5.10	1.19	2.86	3.92	2.8	5.5	0.94	TRAD	6	6	6
Manganese	Surface Soil	mg/kg	254	1,640.00	270.27	870.75	543.63	458	623	51.03	TIN	16	16	16
	Subsurface Soil	mg/kg	379	1,300.00	196.33	774.44	547.33	441	652	73.61	TIN	6	6	6
Selenium	Surface Soil	mg/kg	0.0433	0.52	0.09	0.12	0.19	<0.22	0.76	0.18	TIN	16	16	2
	Subsurface Soil	mg/kg	0.2222	0.56	0.09	0.30	0.21	<0.4	<0.43	0.01	TIN	6	6	0
Uranium 238	Surface Soil	pCi/g	0.779	15.20	2.52	2.32	2.05	1.05	5.18	1.22	TRAD	16	16	16
	Subsurface Soil	pCi/g	0.834	14.40	3.39	2.56	1.39	0.763	2.23	0.54	TRAD	6	6	6
Zinc	Surface Soil	mg/kg	17.2	62.40	9.51	44.69	42.14	32.9	58.1	5.68	TIN	16	16	16
	Subsurface Soil	mg/kg	26.6	44.90	5.70	36.19	36.65	35.2	38.1	1.32	TIN	6	6	6
Adjacent to Haul Road														
Aluminum	Surface Soil	mg/kg	8230	24,100.00	4,622.50	15,172.00	15,450.00	11000	20500	2,289.98	TIN	13	16	16
	Subsurface Soil	mg/kg	7720	16,500.00	2,371.40	12,468.00	13,415.00	9990	17200	2,710.60	TIN	6	6	6
Arsenic	Surface Soil	mg/kg	0.1804	234.00	47.82	28.07	8.60	2.7	25	7.21	TIN	13	16	16
	Subsurface Soil	mg/kg	0.78	86.10	29.42	20.86	13.10	1.7	64.2	25.09	TIN	6	6	6
Cadmium	Surface Soil	mg/kg	0.09	0.45	0.08	0.26	0.30	0.09	0.85	0.20	TIN	13	16	13
	Subsurface Soil	mg/kg	0.03	0.32	0.08	0.17	0.06	<0.03	<0.26	0.05	TIN	6	6	0
Chromium	Surface Soil	mg/kg	3.6	18.20	3.93	9.56	12.43	5.2	21.2	4.90	TIN	13	16	16
	Subsurface Soil	mg/kg	2.8	14.90	3.13	7.72	9.77	4.1	18.8	6.23	TIN	6	6	6
Copper	Surface Soil	mg/kg	4.6	41.80	9.71	15.16	15.42	8.6	37.3	7.36	TIN	13	16	16
	Subsurface Soil	mg/kg	4.9	35.80	9.46	14.50	14.25	7.6	30.6	9.37	TIN	6	6	6
Lead	Surface Soil	mg/kg	7.4	20.90	2.78	13.07	13.96	9.8	28.9	4.26	TIN	13	16	16
	Subsurface Soil	mg/kg	8.2	12.30	1.03	9.95	11.35	9.5	14.2	1.85	TIN	6	6	6

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Midnite Mine Summary Statistics by Area Compared with Background Values

			Background Values				Site Sampling Results							
Indicator	Matrix	UOM	Minimum	Maximum	Std Dev	Average	Average	Minimum	Maximum	Std Dev	Method	Locn's	Samples	Detects
Adjacent to Haul Road														
Lead 210	Surface Soil	pCi/g	1.1	11.00	1.72	3.43	11.12	<1.2	41.9	11.22	TRAD	13	17	14
	Subsurface Soil	pCi/g	1.2	5.10	1.19	2.86	11.70	3.7	45	16.43	TRAD	6	6	6
Manganese	Surface Soil	mg/kg	254	1,640.00	270.27	870.75	689.56	494	1160	156.47	TIN	13	16	16
	Subsurface Soil	mg/kg	379	1,300.00	196.33	774.44	536.67	452	652	87.74	TIN	6	6	6
Radium 226	Surface Soil	pCi/g	1.33	8.92	1.52	2.57	28.17	11.5	59	20.57	TRAD	6	6	6
	Subsurface Soil	pCi/g	1.4	3.87	0.70	2.34	1.10	1.048	1.183	0.06	TRAD	7	7	7
Selenium	Surface Soil	mg/kg	0.0433	0.52	0.09	0.12	0.13	<0.19	<0.29	0.02	TIN	13	16	0
	Subsurface Soil	mg/kg	0.2222	0.56	0.09	0.30	0.26	<0.38	0.56	0.15	TIN	6	6	1
Uranium 238	Surface Soil	pCi/g	0.779	15.20	2.52	2.32	11.83	2.32	51	12.48	TRAD	13	17	17
	Subsurface Soil	pCi/g	0.834	14.40	3.39	2.56	5.41	1.13	15.9	5.18	TRAD	8	8	8
Zinc	Surface Soil	mg/kg	17.2	62.40	9.51	44.69	49.52	39.4	71.3	10.57	TIN	13	16	16
	Subsurface Soil	mg/kg	26.6	44.90	5.70	36.19	37.92	29.3	47.6	6.27	TIN	6	6	6
On Haul Road														
Aluminum	Surface Soil	mg/kg	8230	24,100.00	4,622.50	15,172.00	12,360.00	10900	16700	2,452.14	TIN	3	5	5
Arsenic	Surface Soil	mg/kg	0.1804	234.00	47.82	28.07	36.50	10.1	92.4	32.96	TIN	3	5	5
Cadmium	Surface Soil	mg/kg	0.09	0.45	0.08	0.26	0.56	<0.39	0.86	0.27	TIN	3	5	3
Chromium	Surface Soil	mg/kg	3.6	18.20	3.93	9.56	11.66	7.7	17.9	4.28	TIN	3	5	5
Copper	Surface Soil	mg/kg	4.6	41.80	9.71	15.16	36.04	17	58.4	19.25	TIN	3	5	5
Lead	Surface Soil	mg/kg	7.4	20.90	2.78	13.07	13.28	8.8	16.3	2.79	TIN	3	5	5
Lead 210	Surface Soil	pCi/g	1.1	11.00	1.72	3.43	26.18	10.6	70	22.17	TRAD	3	6	6
Manganese	Surface Soil	mg/kg	254	1,640.00	270.27	870.75	925.40	613	1100	214.93	TIN	3	5	5
Radium 226	Surface Soil	pCi/g	1.33	8.92	1.52	2.57	25.03	15.4	35.4	10.02	TRAD	3	3	3
Selenium	Surface Soil	mg/kg	0.0433	0.52	0.09	0.12	0.11	<0.17	<0.28	0.03	TIN	3	5	0
Uranium 238	Surface Soil	pCi/g	0.779	15.20	2.52	2.32	34.15	15.7	86.8	26.37	TRAD	3	6	6
Zinc	Surface Soil	mg/kg	17.2	62.40	9.51	44.69	64.52	42.1	90.3	21.00	TIN	3	5	5

Table 5 - 133

Midnite Mine Summary Statistics by Area Compared with Background Values

			Background Values				Site Sampling Results							
Indicator	Matrix	UOM	Minimum	Maximum	Std Dev	Average	Average	Minimum	Maximum	Std Dev	Method	Locn's	Samples	Detects

Explanation of Abbreviations and Terms

1. UOM	Unit of measure for sample results
2. Std Dev	Standard Deviation - a measure of dispersion of sample results
3. Average	Calculated as arithmetic mean of sample results (non-detects are included in average using 1/2 the laboratory detection limit). Site averages which exceed the background average are displayed in a box.
4. Method	Group (or "class") of laboratory processing techniques used to determine analytic results for samples. Methods used for this report include: DIN = Dissolved Inorganics TIN = Total Inorganics WQ = Water Quality
5. Locn's	Number of distinct sampling locations at which results were found
6. Samples	Number of samples for which results were processed
7. Detects	Number of samples from which a reliable indicator value could be determined (was above the lab instruments' detection limit)

Table 5-134
Midnite Mine Total Petroleum Hydrocarbons by Matrix Type and Location

		Diesel			Gasoline		
Matrix	Location	Value	Unit	UDQ	Value	Unit	UDQ
Groundwater							
	CD SEEP/SDCD-0	1,000	ug/l	UJ	100	ug/l	UJ
	EAST SEEP/SDED	1,000	ug/l	UJ	100	ug/l	UJ
	GW-19	1,000	ug/l	U	100	ug/l	U
	GW-35A	1,000	ug/l	U	100	ug/l	U
	GW-36A	1,000	ug/l	U	100	ug/l	U
	GW-50	1,000	ug/l	UJ	100	ug/l	UJ
	GW-51	1,000	ug/l	UJ	100	ug/l	U
	MW-1	1,000	ug/l	UJ	100	ug/l	U
	MW-2	1,000	ug/l	UJ	100	ug/l	UJ
	MW-4	1,000	ug/l	UJ	100	ug/l	U
	MW-5	1,000	ug/l	UJ	100	ug/l	U
	MW-6	1,000	ug/l	U	100	ug/l	UJ
	MWCD-01	1,000	ug/l	UJ	100	ug/l	UJ
	MWCD-02	1,000	ug/l	U	100	ug/l	U
	MWED-02	1,900	ug/l	J	100	ug/l	U
	MWED-03	1,000	ug/l	U	100	ug/l	UJ
	MWED-04	1,000	ug/l	UJ	100	ug/l	U
	MWED-06	1,000	ug/l	UJ	100	ug/l	U
	MWED-07	1,000	ug/l	UJ	100	ug/l	U
	MWED-08	1,000	ug/l	UJ	100	ug/l	U
	MWED-09	1,000	ug/l	UJ	100	ug/l	U
	MWED-10	1,000	ug/l	U	100	ug/l	UJ
	MWED-11	1,000	ug/l	UJ	100	ug/l	UJ
	MWFW-01	1,000	ug/l	UJ	100	ug/l	U
	MWFW-02	1,000	ug/l	U	100	ug/l	U
	MWFW-03	4,110	ug/l	J	100	ug/l	U
	MWFW-04	1,000	ug/l	UJ	100	ug/l	U
	MWFW-05	1,000	ug/l	UJ	100	ug/l	U
	MWNE-03	1,000	ug/l	U	100	ug/l	U
	MWNE-04	1,000	ug/l	U	100	ug/l	UJ
	MWNE-05	1,000	ug/l	U	100	ug/l	U
	MWNE-06	1,000	ug/l	UJ	100	ug/l	U
	MWWD-01	1,000	ug/l	UJ	100	ug/l	U
	WDSEEP/SDWD-0	1,000	ug/l	UJ	100	ug/l	UJ
Sediment							
	CD SEEP/SDCD-0	55	mg/kg	J			
	EAST SEEP/SDED	110	mg/kg	A			
	ED04-SD/ED-2A	20	mg/kg	J			
	ED-4A/SDED-02	24	mg/kg	J			
	SDCD-02/SW-12	100	mg/kg	A			
	SDCD-03	150	mg/kg	A			
	SDED-01	44	mg/kg	A			
	SDED-07	37	mg/kg	A			
	SDFW-01/SWFW-0	26	mg/kg	J			
	SDNE-02/SWNE-0	24	mg/kg	A			
	SW-02/SDED-6	15	mg/kg	A			
	SW-06/ED01-SD/E	49	mg/kg	J			
	SWED-01/SDED-0	36	mg/kg	J			
	SWED-02/SDED-0	17	mg/kg	J			

ug/l = micrograms per liter mg/kg = milligrams per kilogram UDQ = Usability Data Qualifier

Table 5-134
Midnite Mine Total Petroleum Hydrocarbons by Matrix Type and Location

		Diesel			Gasoline		
Matrix	Location	Value	Unit	UDQ	Value	Unit	UDQ
Sediment							
	SWWD-01/SDWD-	19	mg/kg	A			
	WDAC/SDWD-03	43	mg/kg	J			
	WDSEEP/SDWD-0	17	mg/kg	J			
Surface Water							
	ED04-SD/ED-2A	1,000	ug/l	UJ			
	ED-4A/SDED-02	1,000	ug/l	UJ			
	OF01SW/OF01SD	1,000	ug/l	UJ			
	SDCD-02/SW-12	1,000	ug/l	U			
	SW-02/SDED-6	1,000	ug/l	U			
	SW-06/ED01-SD/E	1,000	ug/l	U			
	SWED-01/SDED-0	1,000	ug/l	U			
	SWED-02/SDED-0	1,000	ug/l	UJ			
	WDAC/SDWD-03	1,000	ug/l	U			

ug/l = micrograms per liter mg/kg = milligrams per kilogram UDQ = Usability Data Qualifier

Table 5-135

Summary of Indicator Parameter Exceedances in Groundwater

Area of Well	Well Number	Sampling Zone	Al	Sb	Cr	Co	Fe	Mn	Ni	Zn	SO_4	U^{234}
North End of MA and East at Pit 4	MWNW-07	BWT										
	MWND-01	BWT										
	MWNE-01	BWT										
	MWNE-02	DBR			●				●			
South of Pit 4 and Southwest of Pit 4	GW-47	BWT						●	●		●	●
	MWP4-02	DBR				●		●				●
	MWNE-03	AWT										
	MWNE-04	DBR										
	MW NE 07	BWT									●	
South of Hillside dump West of Pit 3	GW-46	AWT						●	●	●	●	
	GW-45	AWT										
	GW-49	AWT										
	MWHD-01	BWT									●	
	GW-48	BWT							●		●	●
Vehicle Maintenance Area	MWFW-03	BWT										
	MWFW-04	BWT										
	MWFW-05	BWT										
Backfilled Pits	GW-53	AWT	●					●	●	●	●	●
	GW-54	BWT	●				●	●	●	●	●	●
South of Pit 3	MWP3-01	BWT				●					●	
	MWP3-02	DBR									●	
	GW-42	BWT									●	●
	GW-43	BWT										●
	MWDB-01	DBR	●		●	●		●	●	●	●	●
South Spoils Pile	BOM-17	AWT						●	●	●	●	●
	BOM-14S	AWT		●				●			●	●
East and Southeast of Pit 3	1S	AWT										
	GW-41A	BWT										
	MWED 09	BWT									●	
Far West Drainage	MWFW-01	AWT							●			
	MWFW-02	DBR			●				●			
Southwestern Drainage	MWSW-01	AWT										
	MWSW-02	DBR										
Western Drainage	WD Seep/SDWD-01/SW10	AWT				●		●	●	●	●	●
	MW-1	AWT				●		●	●	●	●	●
	MWWD-01	DBR										
	GW35A	AWT				●		●	●	●	●	●
	GW-50	BWT									●	
Central Drainage	CD Seep/SDCD-01	AWT				●		●	●	●	●	●
	MW-2	AWT						●			●	●
	MWCD-01	DBR										●
	GW3-6A	AWT				●		●	●	●	●	●
	GW-51	BWT									●	
	MWCD-19	AWT						●	●	●	●	
	MWCD-02	DBR										
Eastern Drainage	MW-6	AWT										
	MWED-02	DBR										
	MWNE-05	AWT										
	MWNE-06	DBR										
	MWW-5	AWT									●	
	MWED-03	DBR									●	
	MW-4	ATW									●	
	MWED-04	DBR										
	MWED-10	AWT							●		●	
	MWED-11	DBR										
East Seep Pumpback	East Seep SD ED-05	AWT	●			●		●	●	●	●	●
	MWED-07	BWT									●	
	MWED-08	DBR									●	
East Dump Fork	MWED-05	BWT	●			●		●	●	●	●	●
	MWED-06	DBR						●	●	●	●	●

Notes:
1) Source of data is Figure GW-9 in Appendix H
2) Grey bars denote wells completed in close proximity and sampled at different depths
3) Bullets indicate indicator parameter exceeds background

AWT: Alluvial Water Table
BWT: Bedrock Water Table
DBR Deep Bedrock

6.0 CONTAMINANT FATE AND TRANSPORT

In an RI/FS, the mobility and persistence of COCs in the environment transport pathways are referred to as contaminant fate and transport. Understanding contaminant fate and transport at a site provides an important basis for assessing human health and ecological risks from exposure to COCs and for developing FS remedial actions to mitigate those risks. In this section, contaminant fate and transport in MA and PIA is discussed using available site characterization data.

Relatively few environmental controls were used during operation of the Midnite Mine from 1955 to 1981. As discussed in Section 5, substantial areas of mining impacts in the MA and PIA were identified. Transport in surface water and groundwater along natural drainages is considered the primary transport pathway for COC migration from the MA to the PIA.

Beginning in 1982, the mining company implemented a number of reclamation activities at the site, including:

- Recontouring and covering the South Spoils
- Controlling sediment migration along the MA boundary
- Installing a seep collection and pumpback system and a water treatment system to reduce off-site migration of contaminants

Section 5 identified areas of the MA and PIA that were impacted by mining. Discussion of contaminant fate and transport will be limited to the impacted areas, which include the entire MA, but only a portion of the PIA. The portion of the PIA found to be impacted is referred to as the "Mining Affected Area" (MAA) and consists of areas impacted by the environmental transport of mining contaminants. The MAA includes surface water and sediment in the Northeastern, Eastern, Central, Western, and Far West Drainages and Blue Creek (including the delta) downstream of the mine drainage confluence; impacted groundwater along the drainages; and surface materials in the haul roads, including impacted areas adjacent to the haul roads.

6.1 POTENTIAL MIGRATION ROUTES

This section integrates the information on the site physical characteristics, contaminant sources, and nature and extent of contamination to describe the potential routes of migration of contaminants in affected environmental media. The following discussions focus on the potentially complete and significant migration pathways from mine-related sources to potential

receptors in the MA, and from the MA contaminant sources to the MAA. Detailed site conceptual models of the release mechanisms, which are presented in the Human Health Risk Assessment Work Plan (URS 2002c), illustrate the significant exposure pathways referred to below.

6.1.1 Surface Water and Sediment Transport Pathways

Within the MA, surface materials in areas disturbed by mining contain constituent levels above background. This reflects a combination of transport processes such as earth-moving by mining machinery, erosion, downhill transport by runoff, and deposition in surface depressions. After mining ceased in 1982, transport of materials containing elevated levels of COPCs in the MA has involved a combination of physical weathering processes and stormwater runoff processes. Erosion of the steep walls of the open pits and stormwater runoff into the pits is now the principal pathway for COPCs to be transported in surface water and deposited in sediment within the MA. An important secondary pathway is stormwater runoff from the protore stockpiles, which deposits COPC-containing sediments in localized topographic depressions downhill of the stockpiles in the MA.

The surface water hydrologic system is described in detail in Section 4.2.1. Historically, surface water runoff distributed mining-related contaminants in alluvial sediments downstream of the MA. Sections 5.4 and 5.5 provide a detailed description of the nature and extent of contaminants in surface water and sediments. As illustrated on Figure 5-4, mine-affected surface water is present in the Northeastern, Eastern, Central, Western, and Far West Drainages, and in Blue Creek. In addition, mine-affected sediments exist in each of those drainages, as shown on Figure 5-5.

The drainages immediately south and southeast of the MA contain the largest number and highest concentrations of contaminants. Although the concentrations and number of contaminants generally decrease with distance downstream from the MA, sediments containing site-related contaminants above background levels extend as far as Lower Blue Creek. High stream flows during spring snowmelt and storm periods cause further downstream migration of these site-related constituents; however, natural erosion and sedimentation processes cause mixing of the sediments with other non-site-related sediments, which reduces the constituent concentrations to levels that are only slightly elevated above background in Lower Blue Creek.

Within the MA, the large topographic depressions created by excavation of the open pits form hydrologic sinks for surface water runoff. Surface water runoff and sediment transport from the MA to other adjacent watersheds is constrained by the land surface topography and surface drainage diversions present along the MA perimeter, which approximately coincide with the limits of the Eastern Drainage. During the past 25 years, DMC has implemented numerous measures to reduce off-site surface water flow and sediment transport.

DMC constructed the PCP at the toe of the South Spoils waste rock pile in the Central Drainage to contain surface water runoff and water seeping from the largest of the waste rock dumps. DMC also performed partial reclamation of the South Spoils side slopes, which have been revegetated with a mixture of grasses, small shrubs, and a few small Ponderosa pine trees.

DMC constructed a seep collection and pumpback system and a water treatment system to reduce offsite migration of contaminants in surface water. The history of these systems is summarized in Section 2.

In 1992, DMC began dewatering the two pits and treating the water as required by the EPA discharge permit. Before that time, Pits 3 and 4 had filled to levels at which mine-affected water was close to overflowing the southern portion of the pits and flowing southward toward the MA boundary. Since then the pit lake levels have declined as a result of pumping and treating the water in the pits. Surface water runoff and groundwater inflow water collected in Pits 3 and 4 are treated in the WTP, and the treated water is discharged to the Eastern Drainage at the NPDES Outfall Pond just east of the MA.

Despite the water management measures implemented by the mining company, several pathways still remain for migration of mine-affected surface water and sediment beyond the MA boundary.

While reduced relative to migration potential during active mining, under current site conditions, the principal migration routes for surface water and sediment leaving the MA are:

- A portion of the snowmelt and storm flow runoff bypasses the sediment detention dam in the Northeastern Drainage.
- Sheet flows from storm events cause erosion and slope wash of sediments on the eastern side of the Pit 4 Dump to migrate eastward past the MA boundary into the Northeastern Drainage.
- A portion of the snowmelt and storm event runoff bypasses the seep collection pumpback systems in the Western Drainage, at the Blood Pool, at the Dam Toe Seep, and at the East Seep areas. This water would continue to flow downstream, affecting lower drainages.
- Storm runoff from the western portion of the area containing the former vehicle shop and mine offices transports sediment into the Far West Drainage.

Sediment and surface water (which can interact with sediment) that have entered Blue Creek continue to transport contaminants downstream.

6.1.2 Groundwater Transport Pathways

Groundwater flow interacts with surface water flow in many areas of the MA and MAA. The groundwater flow system and its interaction with surface water are described in detail in Section 4.3.2 and the Phase 1 Hydrologic Modeling Technical Memorandum (URS 2002a). In general, wherever surface water drainages or standing water elevations are higher than the groundwater table elevation, there is potential for downward percolation of surface water into the groundwater flow system. Conversely, in topographic depressions and surface drainages where the water table is equal to or higher than ground surface, shallow groundwater has the potential to flow out of the ground surface, where it is either consumed by evapotranspiration or enters the surface water flow system.

In the MA, large areas of bare rock, waste rock, and ore/protore contribute contaminants to groundwater because precipitation infiltrates, oxidizes sulfide minerals, and dissolves metals and radionuclides as the recharge water percolates downward and into the groundwater flow system. Migration of groundwater from the MA and historical runoff of mine-affected surface water from the MA have adversely impacted groundwater in the PIA. In addition, migration of mining-related contaminants in alluvial sediments downstream of the mining source areas has likely contributed to contamination of shallow groundwater.

Section 5.6 provides a detailed description of the nature and extent of contaminants in groundwater. As illustrated on Figure 5-6, mine-affected groundwater now exists in unconsolidated materials underlying the Eastern, Central, Western, and Far West Drainages. Even though the concentrations and number of contaminants generally decrease with distance downstream from the MA, groundwater containing site-related contaminants above background levels extends in the alluvial aquifer to the furthest downgradient monitoring well, which is located adjacent to Middle Blue Creek (MWBC-01). Site-related contaminants are also present in the bedrock groundwater beneath areas of contaminated shallow groundwater in the surface drainages south and southeast of the MA (Figure 5-7). However, the number of constituents, their concentrations, and the extent of the contamination in bedrock groundwater are substantially less than in the shallow groundwater.

Other than operating the seep collection and pumpback systems, little was done by the mining company to control sources of groundwater contamination within the MA until DMC began pumping and treating the mine-affected water from the open pit lakes. Before Pits 3 and 4 were pumped down, the lake levels were substantially higher than the bedrock groundwater levels beneath portions of the pits, which likely caused some seepage from the pit lakes into the bedrock groundwater beneath the MA. High groundwater levels in the backfilled pits contributed contaminants to the groundwater flow system. However, with the pit lakes pumped down to low levels, the open pits capture mine-affected groundwater within a substantial portion of the MA.

Continued extraction of the water from the open pits, and treatment of the water before discharging it to the NPDES Outfall Pond, reduces the degree of groundwater contamination in the MA. Moreover, the groundwater drawdowns and westerly hydraulic gradients caused by pumping down Pit 3 and Pit 4 create capture zones that extend eastward from the pits beyond the eastern boundary of the MA. These capture zones cause the groundwater affected by the Pit 4 Dump waste rock to flow toward Pit 4 or southward toward Pit 3 along the MA boundary. Pit 3 also captures mine-affected groundwater from other areas in the MA upgradient of the pit perimeter.

The surface water controls implemented by DMC in the MA have reduced the adverse affects of contaminated surface water and seep discharges on the shallow groundwater outside the MA. However, despite the water management measures, several pathways still remain for migration of mine-affected groundwater beyond the MA boundary. Under current site conditions, the principal pathways for affected groundwater to migrate beyond the MA are:

- Southeast toward the East Dump Fork and East Seep areas
- South toward the Central Drainage area
- Southwest toward the Western Drainage area

Groundwater flows generally southward from sources in the southeastern MA, which include protore and waste rock piles, toward the East Dump Fork and East Seep areas. Mine-affected groundwater exists in the shallow unconsolidated and deeper bedrock materials underlying both those drainages. The Blood Pool Pumpback and the East Seep Pumpback capture and collect some of the seep flows that discharge at the ground surface near the base of the South Spoils in those drainages. Nonetheless, a portion of the mine-affected groundwater bypasses the pumpback systems.

The seep collection and pumpback systems collect only some of the groundwater that emerges at the ground surface near the base of the South Spoils. However, some of the mine-affected groundwater migrates along deeper pathways because of the downward hydraulic gradients. Moreover, there is no groundwater collection and pumpback system in the East Dump Fork Drainage. Groundwater flowing past the southeastern MA boundary, which tends to converge toward the axes of the drainages, continues to migrate in a southeastward direction toward the Eastern Drainage. At the Eastern Drainage, groundwater flow continues southward in parallel with the drainage. Further south, upward hydraulic gradients along the East Drainage cause shallow groundwater to discharge into the surface water flow system.

In the south-central portion of the MA, the pattern of hydraulic gradients indicates that groundwater flows southward toward the MA boundary, converging toward the Central Drainage. Mining-related sources in the MA, which include protore and waste rock materials, release contaminants to the groundwater system. Flow paths move generally downward and

converge toward, then along, the former surface drainage, which is now buried beneath waste rock. Flow paths in the unconsolidated materials convey a relatively large portion of the affected groundwater because the bedrock has much lower hydraulic conductivity. Although the PCP pumpback system intercepts shallow seepage emerging at the ground surface along the MA boundary, another substantial portion of the groundwater flow bypasses the MA boundary and continues southward beneath the Central Drainage. South of the MA, groundwater pathways converge toward the axis of the Central Drainage. Further south of the MA (i.e., southward from the GW-36 area), upward hydraulic gradients cause upward groundwater flows and discharges to the surface water system.

In the southwest portion of the MA, groundwater flow pathways are similar. Flow paths are generally down and south, converging toward the former Western Drainage, which is now buried beneath waste rock. Although the Western Drainage seep collection and pumpback system intercepts shallow seepage along the MA boundary and returns the water to Pit 3 for treatment, another substantial portion of the groundwater flow bypasses the pumpback system and continues southward beneath the Western Drainage. Along the southern MA boundary, the unconsolidated materials convey a relatively large portion of the affected groundwater because the bedrock has much lower hydraulic conductivity. South of the MA, groundwater flows primarily within weathered bedrock and alluvium. Flow paths generally converge toward the axis of the Western Drainage. Further south of the MA, upward hydraulic gradients cause upward groundwater flow and discharge to surface water along the drainage.

On the western side of the MA, several areas of land disturbance extend outside the watershed divide. Potential contaminants in those areas may be associated with mine operations activities at the former vehicle shop and mine offices. In those areas, groundwater flows toward the southwest, which may create pathways to transport mine-affected groundwater beyond the MA boundary and toward the Far West Drainage. However, affected groundwater has not been detected above background levels outside the MA in those areas.

6.1.3 Air Transport Pathways

Under current site conditions, the principal releases of contaminants to air involve dust generation and generation of radon^{222} through radioactive decay of radium^{226}. The highest rates of dust generation are on steep, rocky, sparsely vegetated slopes that are exposed to weathering processes and wind. In the MA, exposed protore piles likely provide most of the contaminants in windblown dust because materials in these piles contain the highest concentrations of COPCs. Even though nonvegetated waste rock piles probably generate dust at rates similar to those of the protore stockpiles, COPC concentrations from the waste rock are expected to be lower because the waste rock stockpiles contain a higher percentage of rock having lower amounts of ore and metallic minerals.

During historical mine operations, the rate of dust generation in the MA and transport by wind was likely much higher than today because those operations involved intensive drilling, blasting, earth-moving, and ore-hauling activities. However, as described in Sections 5.7 and 5.8, the extent of mine-affected surface and subsurface materials is limited to areas within the MA boundary, except for areas adjacent to haul roads in the MAA. Within the MA, surface materials in areas disturbed by mining contain constituent levels above background, which reflects a combination of transport processes involving earth-moving by mining machinery, erosion, and physical transport by wind.

Deposition of these surface materials is primarily downhill of contaminant sources, but the materials also may be dispersed to some extent in all directions locally around the sources, especially the protore stockpiles. On the other hand, forested areas surrounding the MA in the principal downwind areas do not show the effects of air transport of mine-related contaminants, as described in Section 5.9. Therefore, from the standpoint of contaminant migration, transport pathways from MA sources to the MAA are judged to be of no practical significance.

Adjacent to the East and West Haul Roads, however, a number of parameters are present in surface material at levels exceeding background (Figure 5-8). Surface material contamination adjacent to the haul roads has resulted primarily from erosion of material used to resurface the roads and deposition of the material downhill from the roads. Erosion and deposition involve a combination of physical weathering processes and stormwater runoff processes. Wind transport of dust and localized spills of material from haul trucks using the roads are less important than physical erosion and deposition; the roadside samples downhill of the roads contain mine-related constituents at levels above background whereas uphill samples in general do not contain constituent levels above background.

Emanation of radon^{222} resulting from decay of radium^{226} in protore and waste rock materials causes elevated radon concentrations in air, which may be transported from the MA by wind. It is also important to evaluate potential air transport of radon^{222} daughter products because radon decays to other radioactive isotopes, including polonium^{210} and lead^{210}. Activity concentrations of radium^{226} and radon flux rates were measured in the MA and background areas.

Many areas within the MA were found to have higher radon emanation rates than background. As expected, the highest levels of radium^{226} and radon flux were found in protore stockpile materials. Radon flux rates from waste rock materials are elevated above background, especially for the waste rock overlying the backfilled pits. High levels of radon flux from these MA materials causes elevated levels of radon in air in the MA. All but two of the 14 locations where long-term airborne radon measurements were taken in the MA showed that radon is substantially elevated above background. However, as discussed in Section 5.9, airborne radon is present at levels only slightly above background at MAA sampling locations in the principal downwind areas next to the MA and along the West Haul Road.

None of the radionuclides are elevated in the Southwest Downwind Area. Moreover, activity concentrations of the long-lived radon daughter products, lead^{210} and polonium^{210}, in surface and subsurface materials in both the principal downwind areas from the MA do not show a pattern indicating atmospheric transport of these constituents from the MA into the MAA. Thus the elevated airborne radon is likely related to "blowover" from the MA. However, from the standpoint of contaminant migration, air transport of radon and its daughter products into the MAA is not of practical significance.

6.2 CONTAMINANT PERSISTENCE AND MOBILITY

For this site, COPCs were identified through a process of technical literature review, site characterization, sampling, analysis, and risk screening. Details of the COPC selection process are described in a technical memorandum (URS 2002c). This section briefly identifies the principal contaminants for Midnite Mine site and describes their persistence in the environment.

For the primary exposure media, COPCs include radionuclides and other metals and metalloids listed on the EPA list of priority pollutants. Radionuclide COPCs in surface water include lead^{210}, uranium^{234}, and uranium^{238}. In addition to these, radium^{226} is a COPC for sediment and surface material. Of these radionuclides, only the two uranium isotopes are COPCs in groundwater. For air, radon^{222} is the only COPC.

Radionuclides are subject to radioactive decay, which affects their environmental persistence. As described in the Quality Assurance Project Plans (URS 1999, 2000a), radiological parameters analyzed for this RI/FS were selected to focus on the long-lived and high-dose-factor isotopes within each decay series. For this site, the selected radionuclide COPCs are in the uranium^{238} decay series, except for thorium^{228}, which is in the thorium^{232} decay series. Table 5-1 illustrates the series of decay products resulting from decay of uranium^{238} and indicates which radionuclides were determined by laboratory analysis for this RI/FS.

The uranium^{238} decay series includes a number of decay products that would rapidly diminish in the environment because of their short half-lives if their long-lived parent isotopes were not present. However, continued presence of the long-lived isotopes uranium^{238}, uranium^{234}, radium^{226}, and lead^{210} at relatively constant activity concentrations will cause their short-lived decay products to persist in solid media. For instance, lead^{210} has the shortest half-life of any of these COPCs (21 years). The half-life of radium^{226} is about 1,600 years, and the uranium isotopes have half-lives ranging from about 250,000 years to 4.5 billion years. Thus radioactive decay is not of practical significance as a mechanism for reducing the COPC concentrations, particularly in sediments and surface materials.

However, for surface water and groundwater, radioactive decay may significantly reduce activity concentrations of short-lived dissolved radionuclides as the water moves along transport pathways away from the source material if the parent isotopes of the short-lived decay products are not dissolved or suspended in the water. For example, although radon^{222} is a COPC in the surface water drainages near the MA, it does not appear in areas further downstream even though it is very soluble in water. Radon is present only at very low levels in the water of Blue Creek and in the groundwater beneath the drainages because its half-life (3.8 days) is very short relative to the migration rates along these pathways from the primary MA sources of its parent, radium^{226}.

Metal COPCs found elevated in surface water and sediment at the site include cadmium, chromium, cobalt, manganese, nickel, and uranium. Aluminum, cobalt, chromium, manganese, nickel, uranium, and zinc are metal COPCs found in groundwater. Excluding radioactive elements, none of the metals (or metalloids) that is elevated at the site are subject to radioactive decay or biodegradation. Thus unlike radioactive elements, metal COPCs in surface material and sediment will persist through time.

Moreover, within the time scale of human generations, oxidation of sulfide minerals in the rock exposed to weathering under current site conditions will continue to generate ARD. Because of the large mass of metal sulfide minerals in the rocks exposed at the site, ARD generation will continue to leach metals and radionuclides from the rock and thereby release COPCs into surface water and groundwater. Therefore, COPCs now existing at the site are likely to persist in the environment under the present site conditions. However, although interactions between the minerals in rock (or sediment) and water generate acid through sulfide oxidation, which releases COPCs, other chemical reactions can reduce the aqueous concentrations as the COPCs migrate through the environment.

A variety of natural processes cause attenuation of COPC concentrations as they are transported along pathways away from the disturbed areas of the MA. The major natural processes that reduce the mobility of the COPCs in surface water and groundwater are: neutralization, precipitation, adsorption, dilution, and dispersion.

Although an aqueous acidic environment is conducive to the increased mobility of the groundwater and surface water COPCs, most of these contaminants become much less mobile in water with a near-neutral pH. Mobility of dissolved metals away from the source of acidity is primarily a function of the total acidity of the aqueous solution and the acid-neutralizing capacity of the material along the flow path. As the ARD is being neutralized, which is indicated by increasing pH values, the solubility of metals will typically decrease.

Moreover, solution pH is the primary variable governing metal adsorption by hydrous solids (e.g., metal oxides and clays). For heavy metals that exist as uncomplexed cations in aqueous

solutions, the rate the metals are adsorbed onto the solid phase generally increases as pH values increase. However, when the heavy metals exist as an aqueous anion, removal by adsorption generally increases with decreasing pH (SenGupta 2002).

For the Midnite Mine site, sampling has not been conducted for the purpose of determining the details of each natural attenuation process. Rather, the sample data described in Section 5 show spatial patterns reflecting the contaminant release processes in the source areas and the combined effects of natural attenuation processes along transport pathways. Spatial patterns in concentrations of the COPCs (aluminum, cadmium, chromium, cobalt, manganese, nickel, lead^{210}, zinc, and uranium) show that as distance increases along pathways downgradient from the MA sources, surface water and groundwater COPC concentrations decrease substantially as the pH values increase toward circum-neutral values.

Because of the neutralization reactions, aqueous metals concentrations decline as a result of precipitation and adsorption of the dissolved minerals onto the solid material in contact with the water. This is particularly true for oxidizing waters, which have a positive redox potential (Eh). For instance, although concentrations of aluminum, cadmium, chromium, manganese, nickel, uranium, and zinc are elevated in surface water and groundwater within and along the margins of the MA, these constituents decline substantially with distance downstream in the MAA drainages as pH values return to near-neutral values. A similar pattern of downstream attenuation exists for radium^{226} in surface water. Although radium^{226} is elevated in water in the open pits, the PCP, and Blood Pool, this COPC declines rapidly in concentration with distance from the MA and is below background in the MAA drainages. As shown in Section 5, sediments downstream and adjacent to the MA have high metal concentrations, which generally decline in the downstream direction. The higher metal concentrations in sediment may be, in part, due to surface water transport-adsorption process described above where metals are sensitive to pH changes.

Similar natural attenuation processes reduce concentrations of the COPCs in groundwater migrating along pathways from the MA sources. As it is in surface water, radium^{226} is elevated in groundwater in some parts of the MA where pH is very low, such as in the backfilled pits. However, concentrations of this COPC decline rapidly with distance from sources of acidity as neutralization of the aqueous solution proceeds. As a result, radium^{226} is not above background levels in groundwater except in the immediate vicinity of the MA. In contrast, the other radionuclide COPCs for groundwater, uranium^{234} and uranium^{238}, persist at elevated concentrations far downstream of the MA in the MAA drainages. The larger extent of elevated levels of these uranium isotopes in groundwater reflects the relatively high mobility of dissolved uranium in oxidizing aqueous environments, even at near-neutral pH. However, none of the COPCs were found in the groundwater sampled from the Blue Creek alluvium at well MWBC-01, which indicates that substantial natural attenuation is occurring in the area between the MA and Blue Creek.

Dilution of the water flowing from the Eastern Drainage into Blue Creek further contributes to attenuation of the COPCs. For example, samples of Blue Creek have much lower concentrations of all the metals and radionuclides than the surface water in the drainages below the MA. Even COPCs that tend to be very mobile in circum-neutral oxidizing water (which include cadmium, chromium, nickel, and uranium) decrease to levels below or very close to background in Middle and Lower Blue Creek. On the other hand, sulfate persists at high concentrations in groundwater and surface water, even within Lower Blue Creek. Although sulfate is a product of the generation and neutralization reactions, this relatively conservative ion is not being removed in significant amounts from the water by precipitation or adsorption reactions. Sulfate concentrations are particularly high in Blue Creek surface water during the low-flow season, when relatively little dilution from Upper Blue Creek water occurs, as a result of loads of sulfate released in the WTP effluent.

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