

### **2.2.3.5 Building 97**

Eight soil samples were collected beneath Building 97 in support of the Third Grant Amendment (TRC June 1999). PCBs were not detected in the samples. Two pesticides (DDT and endrin aldehyde) were detected in two of the eight samples. The MTL ROD Cleanup Goals for PAHs were exceeded at both of these samples. Since PAHs were detected above ROD Cleanup Goals, the Grant restrictions were not removed. Nine metals (arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, and zinc) and nitrate were detected. Concentrations of detected metals were at levels that reflect site background concentrations.

### **2.2.3.6 Building 146**

One soil sample was collected beneath Building 146 in support of the Second Grant Amendment (TRC, April 1999). PAHs and pesticides/PCBs were not detected in the samples. Seven metals (arsenic, beryllium, chromium, copper, lead, nickel, and zinc) were detected. Concentrations of detected metals in the sample were at levels that reflect site background concentrations.

Risk analysis was conducted by TRC for Building 146 for construction worker and commercial worker exposure scenarios. The calculations showed risk to be below the cancer risk and non-cancer HQ/HI limit for the construction worker and commercial worker.

### **2.2.3.7 Building 229**

One soil sample was collected beneath Building 229 for the First Grant Amendment (TRC, June 1999). PAHs and PCBs were not detected in the samples. Seven metals (arsenic, beryllium, chromium, copper, lead, nickel, and zinc) were detected. Concentrations of detected metals in the sample were at levels that reflect site background concentrations.

Risk analysis was conducted by TRC for Building 229 for construction worker and commercial worker exposure scenarios. The calculations showed risk to be below the cancer risk and non-cancer HQ/HI limit for the construction worker and commercial worker.

### **2.2.3.8 Building 292**

Eight soil samples were collected beneath Building 292 for the Third Grant Amendment (TRC, June 1999): PCBs were not detected in any of the samples collected beneath Building 292, and only one pesticide (DDT) was detected in one sample at a concentration near the detection limit. Ten metals (arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc) and nitrate and cyanide were detected. Concentrations of detected metals throughout the samples were generally at levels that reflect site background concentrations except for the chromium levels. Five PAH compounds were detected in one of the samples. No exceedances of ROD Cleanup Goals for PAHs were detected.

Risk analysis was conducted by TRC for Building 292 for construction worker, commercial workers and the trespasser exposure scenarios. The calculations showed risk to be below the cancer risk and non-cancer HQ/HI limit for the construction worker. The calculations for the commercial worker showed risk to be below the cancer risk for the construction worker and within the acceptable cancer risk range of the commercial worker. Both were below the non-cancer HQ/HI limit. For the trespasser scenario, since the concentrations were significantly less than the ROD Cleanup Goals for PAHs (based on the report Addendum to Human Health Evaluation, Army Materials Technology Laboratory, as prepared by WESTON for the U.S. Army Environmental Center in July 1996), risk to trespassers in the Building 292 Area will be much lower than those estimated in the July 1996 report and pose no significant risk to trespassers.

This building was demolished in the Summer of 1999 by CRBCA and the area is a paved parking lot.

### **2.2.3.9 Building 311**

Eighteen soil samples were collected beneath Building 311 for the Second Grant Amendment (TRC April 1999). PAHs and pesticides/PCBs were not detected in the samples. Seven metals (arsenic, beryllium, chromium, copper, lead, nickel, and zinc) and nitrate were detected. Concentrations of detected metals in the samples were at levels that reflect site background concentrations.

Risk analysis was conducted by TRC for Building 311 for the construction worker and commercial worker exposure scenarios. The calculations showed risk to be below the cancer risk and non-cancer HQ/HI limit for the construction worker. The calculations showed risk to be within the acceptable cancer risk range and below the non-cancer HQ/HI limit for the commercial worker.

### **2.2.3.10 Building 312**

Eight soil samples were collected beneath Building 312 for the Third Grant Amendment (TRC, June 1999). Pesticides and PCBs were not detected in any of the samples. Nine metals (arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, and zinc) and nitrate were detected. Concentrations of detected metals were consistent with site and local background concentrations. PAHs were detected at concentrations above the ROD Cleanup Goals.

Because PAHs were detected above ROD Cleanup Goals, the Grant restrictions were not removed for this building.

### **2.2.3.11 Building 654**

Building 654, which is also part of T1, was constructed of masonry block walls, a concrete slab with concrete footings, and a poured concrete roof (WESTON March 1998). The building was 10 ft x 10 ft x 10 ft and was designed to be used as a well pump house for supplying non-potable water to the former nuclear reactor on the facility (former Building 100). Prior to the start of demolition in 1997 by WESTON, an engineering survey of the structure was conducted by WESTON personnel to evaluate potential hazards to demolition workers. In addition, an asbestos survey of the building was conducted in February 1990 by TRC (East Hartford, Connecticut) and no suspect asbestos containing materials were identified. Permission to demolish the building was received from MDEP in June 1997.

Preparation for demolition occurred on 26 June 1997. During this preparatory work, fixtures such as pipes, pumps, and electrical boxes inside the building were removed. All windows, including the glass panes, were removed so that additional hazards would not be created during demolition. Demolition of Building 654 commenced on 27 June 1997 using a hydraulic

excavator-mounted hammer. The concrete roof was broken first, followed by the walls. Material was transported from the demolition site to on-site 30 cubic yards (yd<sup>3</sup>) metal roll-off containers (roll-offs) by dump truck. The debris was disposed of at an appropriate off-site location as construction and demolition debris.

#### **2.2.3.12 Building 656**

Two soil samples were collected beneath Building 656 for the First Grant Amendment (TRC June 1999). Pesticides/PCBs were not detected in the samples. Six metals (beryllium, chromium, copper, lead, nickel, and zinc) were detected. Concentrations of detected metals in the sample were at levels that reflect site background concentrations. Eight PAHs were detected in one sample, with one PAH detected above MTL ROD Cleanup Goals.

Risk analysis was conducted for Building 656 for the construction worker and commercial worker exposure scenarios. The calculations showed risk to be below the cancer risk and non-cancer HQ/HI limit for the construction worker and commercial worker.

#### **2.2.4 Current Status**

OUI, which includes Zone 2, was deleted from the NPL on 22 November 1999. Since the remedial action of Excavation Area E was completed in 1997, Excavation Area E has been disturbed. A limited amount of soil exceeding the applicable cleanup goal is slated to be removed by CRBCA. MDEP has reviewed a soil removal work plan submitted by CRBCA and has granted verbal approval to remove the soil under the terms of the Grant. This will ensure that Area E remains protective of human health and the environment. The remedy for the remainder of Zone 2 is still protective of human health and the environment (see Subsection 6.9 for protectiveness statement).

### **2.3 ZONE 3**

The reuse alternative selected for Zone 3 was residential use. Areas F, G, and H were included in Zone 3 (WESTON 1998). COCs for Zone 3 were developed based on the human health risk for the reuse scenario. In addition, analytical analyses were also performed for pesticides and PCBs

to comply with the Zone 3 residential reuse standards. Remediation at Area I (also in Zone 3) was completed during the Summer and Fall of 1996 and work performed was documented in the Final Remedial Action Completion Report dated 19 December 1996 (WESTON, 1996). Remedial action for the remainder of the zone was performed between the Fall of 1996 and October 1997, and is documented in the Final Remedial Action Report: Zones 1-4 for Outdoor Soil Removal Army Materials Technology Laboratory May 1998.

Buildings that are located within Zone 3 are Building 117, Building 118, Building 313, Building 37, and Building 131.

### **2.3.1 Remedy Selection**

The selected remedy was soil excavation and off-site disposal/reuse (Alternative S6) (WESTON September 1996). This remedy included the following:

- Excavation of areas with contaminated soils that were above cleanup goals.
- Confirmatory soil sampling within excavations after contaminated soil removal.
- Off-site landfill disposal or reuse of the excavated soil.
- Backfilling of clean fill soils into the excavations.
- Institutional controls with 5-year site reviews.

Institutional controls for this zone include restrictions related to potentially contaminated soil located underneath buildings. The restrictions control the demolition of buildings under which soil contamination may be above cleanup goals by dictating proper sampling and handling of any soils from under buildings existing at the time of transfer from the Army. To the extent required by law, USEPA and the U.S. Army will review the site at least once every 5 years after the initiation of remedial action at the site for the areas where any hazardous contaminants remain to ensure that the restrictions continue to protect human health and the environment. Specifically, the reviews will be performed to determine if restrictions are effective and that the remedy remains protective of human health and the environment.

## **2.3.2 Remedial Actions**

WESTON was contracted by CENAE to conduct remedial action in Zone 3.

### **2.3.2.1 Area F**

During the initial definition of the reuse zones at MTL, Areas F1 and F2 were physically located in Zone 2 (WESTON 1998). Because of the potential intended reuse as a residential area, Zone 3 cleanup goals were implemented during the remedial effort. During the post-remedial survey in late Winter 1998, the zone boundary between Zones 2 and 3 was adjusted to include Area F in the residentially designated Zone 3.

### **2.3.2.2 Area F1**

Area F1 was initially excavated around soil sample 13SS-1 to dimensions of 25 ft x 25 ft x 1 ft (L x W x D) to remove PAH- and pesticide-contaminated soils. Excavation at Area F1 occurred between 29 May and 23 October 1997. During the excavations at Area F1, several bushes of unknown species, lilac bushes, rose bushes, and approximately 150 linear ft of concrete sidewalk were removed from the east and north sides of Building 118. One tree was excavated to 1 ft bgs and immediately backfilled to preserve the tree.

Although metals were not identified prior to the Area F1 excavation as contaminants that exceeded risk reduction goals, confirmation soil samples were collected for metals analysis in addition to the PAH and pesticide COCs. This sampling was initiated because Area F1 was treated as if it was in Zone 4, which had metals COCs. However, on 14 October 1997, after discussions with the USEPA, a decision was made to discontinue sampling at Area F1 for metals because location 13SS-1 was not previously identified as an ecological risk reduction area. The removal of the identified risk reduction soil boring locations (See Subsection 2.2.3.9) resulted in an acceptable site-wide risk to ecological receptors, therefore additional excavation for ecological risk reduction was not deemed necessary. As a result, no further excavation for metals was performed at Area F1 following this date.

A total of six expansions were performed at Area F1 and approximately 700 tons of soil were removed. All confirmation soil sample results met the applicable risk-based cleanup goals. Final dimensions of the Area F1 excavation were approximately 100 ft x 80 ft at its longest and widest points and the excavation depth ranged from 1 to 5 ft bgs.

Area F1 restoration was performed from 23 October to 5 November 1997. Common borrow material was used to replace formerly grassed areas. Restoration of the sidewalk, rose bushes, and lilac bushes east of Building 118 was not performed per MTL staff request. Compacted gravel borrow material was placed under the sidewalk along the northern parking area and concrete was replaced in March 1998. Grass was planted in late October 1997 and additional grass seed was planted in April 1998. No further restoration work is required at Area F1.

### **2.3.2.3 Area F2**

Area F2 was initially excavated around soil sample 13SS-2 to dimensions of 25 ft x 25 ft x 1 ft (L x W x D) to remove PAH- and pesticide-contaminated soils. Excavation at Area F2 occurred between 29 May and 4 August 1997. During the excavations at Area F2, a row of scrub brush adjacent to Building 117, and several small trees and bushes were removed. Analytical results from one sample along the south side of Building 117 (F2-08) exceeded the pesticide and PAH cleanup goals. However, because additional excavation adjacent to the building could have weakened its structural stability, excavation in Area F2 on the south side of Building 117 was terminated. Contaminated soils that remain in the vicinity of this sample and potentially beneath the building were managed through the use of institutional controls.

Three expansions were performed at Area F2 and approximately 250 tons of soil were removed. All confirmation soil sample results met the applicable risk-based cleanup goals. The excavation area at F2 ranged from 1 to 3 ft in depth and was approximately 40 ft x 70 ft at its widest and longest points. Area F2 restoration was performed on 8 September 1997 using common borrow material as a base under 0.5 ft of loam. Grass was planted in September 1997. One tree was planted in June 1998 to complete the restoration effort at Area F2.

#### **2.3.2.4 Area G**

Area G was initially excavated around soil boring GRSB-9 to dimensions of 6.5 ft x 9 ft x 3 ft (L x W x D) to remove PAH-contaminated soils. Excavation at Area G commenced on 13 December 1996. A 2-inch diameter polyvinyl chloride (PVC) gas line was located at a depth of 2.5 ft bgs along the west side of the excavation. Confirmation soil samples collected from three sidewalls of the initial excavation indicated PAH concentrations exceeding cleanup goals, however, because of concerns raised by MTL staff regarding a potential disruption of gas service to an active furnace, further excavation was not performed in the Fall of 1996. The excavation was lined with poly and backfilled on 31 December 1996.

Excavation at Area G resumed on 8 April 1997. In the initial Spring expansion to the north, south, and west, the cleanup goals based on human health risk were used to determine the need for expansion. For the second expansion, construction worker risk-based cleanup goals were applied to the portion of the excavation which crossed in to Zone 2. The line marking the transition between Zone 3 and Zone 2 was located at a point approximately 20 ft west of Building 313. As a result, most of the excavation in Zone 2 was performed to 1 ft bgs. PAH results from confirmation soil samples collected in the Zone 2 and 3 portions of the excavation did not exceed the construction worker or human health risk based cleanup goals, respectively. Therefore, no additional excavation was conducted in Area G.

Two expansions were performed at Area G and approximately 165 tons of soil, 151 yd<sup>2</sup> of bituminous concrete roadway, and 64 linear ft of concrete sidewalk were removed. The final excavation was trapezoidal-shaped with an approximate maximum length and width of 60 ft and 35 ft, respectively. Excavation depths ranged from 3 ft bgs in Zone 3 to 1 ft bgs in Zone 2.

Restoration at Area G was performed on 6 and 7 June 1997. Compacted gravel borrow material was used in the roadway and below the sidewalk and common borrow material was used in the grassy area adjacent to Building 312. Restoration of the sidewalk, bituminous concrete, and grass occurred in June 1997. No further restoration work is required at Area G.

In Paragraph 3 A of the Grant, it prohibits the reduction of the grade below surface grade for Excavation Area B, Excavation Area E, Excavation Area G, and Excavation Area L-4 and a

reduction of the grade below the surface grade shall be deemed to temporary provided that the grade is reduced below the surface grade for a period of less than eighteen calendar days.

Three Grant violations were also noted for Excavation Area G, and were due to an excavation by CRBCA in July 1999. During the excavation to install utilities, a steam tunnel was discovered, cut open and was partially removed. The area was backfilled with the soil that was originally excavated, and additional clean backfill was placed on top to bring the surface back to grade. During a survey it was determined that there was a six inch to eight inch surface grade reduction on the southeast side of Excavation Area G resulting from this work, which was a violation of the Grant relating to the required amount of clean cover material (one foot) over the area. CRBCA later demonstrated that the current grade actually represents more than one foot of cover because of filling in the steam tunnel. However, CRBCA did not submit a written determination of the restored grade of all affected benchmarks (second Grant violation) certified in writing by a registered surveyor. In addition, benchmarks are currently missing at Excavation Area G, which is another Grant violation. A picture was taken of the current Excavation Area G during the site inspection on 30 May 2001, see Figure 2-6.

**Figure 2-6 Excavation Area G During Site Inspection On 30 May 2001**



Discussions regarding necessary repair work in Area G are ongoing. However, it has been concluded by the Army, USEPA, and MDEP that the Grant violations noted and related to the Excavation Area G have not resulted in any potential risk to human health and the environment.

### **2.3.2.5 Area H**

Area H was initially excavated around soil boring 11SB-4 to dimensions of 23 ft x 18 ft x 3 ft (L x W x D) to remove PAH-contaminated soils. Prior to commencement of the Area H excavation, monitoring well MW-20 was decommissioned in place on 26 November 1996 using a bentonite/cement slurry. Excavation at Area H commenced on 17 December 1996. The confirmation sample collected from the west sidewall adjacent to the Building 313 parking area contained concentrations of PAHs that exceeded cleanup goals, but no further excavation was performed in the Fall 1996 because of adverse weather conditions. As a result, the excavation was lined with poly and backfilled on 3 January 1997.

Excavation at Area H resumed on 10 April and 11 April 1997. During the expansion, an 8-inch diameter clay drain line was damaged. As a result, the entire 25 linear ft of drain line in the excavation was removed in several places. Only one expansion was required at Area H and an approximate total of 120 tons of soil, 60 yd<sup>2</sup> of bituminous concrete roadway, and 24 linear ft of concrete curbing were removed. The final excavation had dimensions of 35 ft x 25 ft x 3 ft (L x W x D).

Restoration at Area H was performed on 25 April 1997. Prior to backfill, approximately 25 linear ft of drain line was replaced with new sections of 8-inch diameter PVC pipe. Compacted gravel borrow material was used as a subgrade for the roadway. Restoration of the curbing, bituminous concrete, and grass occurred in June 1997. Soil sample results met remediation limits and no further restoration work is required at Area H.

### **2.3.3 Land Use Controls and Restrictions in Zone 3**

The 7 August 1998 Grant of Environmental Restriction and Easement for Army Materials Technology Laboratory redesignated areas into lots for property transfer from the U.S. Army (Interview with Bruce Hoskins on 8 May 2001). Areas in Zones 1, 2, and 3 were redesignated

Lot 1. Lot 1 was sold to the WADC and then to CRBCA in 1998. CRBCA sold the property to President and Fellows of Harvard College in May 2001.

A Second Grant Amendment was requested on 15 April 1999 to eliminate the subsurface restrictions in order to renovate and reuse Building 131 for commercial use within Zone 3. Soil samples were collected and a risk analysis was conducted for this Amendment in accordance with the Building 131 residential re-use designation. The Second Grant Amendment was approved by MDEP on 16 April 1999 and was recorded on 20 April 1999. See Subsections 6.4 and 6.5 for more details on the Grant Amendments.

A Third Grant Amendment was requested on 1 June 1999 to eliminate the subsurface restrictions in order to renovate and reuse Building 37, 117, 118 and 313 for commercial and/or residential use that is consistent with the use restrictions imposed by the Grant and were located within Zone 3. Soil samples were collected and a risk analysis was conducted for the Amendment in accordance with the residential re-use designations for these buildings. The Third Grant Amendment was approved on 8 June 1999. See Subsections 6.4 and 6.5 for more details on the Grant Amendments.

### **2.3.3.1 Building 37**

Eight soil samples were collected beneath Building 37 in support of the Third Grant Amendment (TRC, June 1999). PAHs and pesticides/PCBs were not detected in any of the samples. Eight metals (arsenic, beryllium, cadmium, chromium, copper, lead, nickel, and zinc) and nitrate were detected. Concentrations of detected metals were consistent with site and local background concentrations.

Risk analysis was conducted by TRC for Building 37 for the construction worker, commercial worker and residential exposure scenarios, for the soils beneath Building 37. These calculations showed risk to be within the acceptable cancer risk range for the construction worker, commercial worker, and residential exposures. The construction worker, commercial worker, and residential risks were at or below the non-cancer HQ/HI limit. Therefore, the Grant restrictions were removed for the soils beneath Building 37 because the risk analysis work satisfied the residential re-use scenario.

### **2.3.3.2 Building 117**

Four soil samples were collected beneath Building 117 in support of the Third Grant Amendment (TRC, June 1999). PAHs and PCBs were not detected in the samples. Nine metals (arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, and zinc) and nitrate were detected. Levels of detected metals in the samples were consistent with site background concentrations. In addition, low levels of dichlorodiphenyltrichloroethane (DDT) were detected in two samples and low levels of 1,2-dichloro-2,2-bis(4-chlorophenyl)ethane (DDE) were detected in all four samples. Risk analysis was conducted by TRC for Building 117 for construction worker, commercial worker and residential exposure scenarios. The calculations showed risk to be below the cancer risk and non-cancer HQ/HI limits for a construction worker. Both the commercial worker and residential calculations showed risk to be within the acceptable cancer risk range. Both are below the non-cancer HQ/HI limit. Therefore, the soil restrictions were removed as part of the Third Grant Amendment.

### **2.3.3.3 Building 118**

Three soil samples were collected beneath Building 118 in support of the Third Grant Amendment (TRC, June 1999). PCBs were not detected in any of samples. Nine metals (arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, and zinc) were detected. Levels of detected metals were consistent with site background concentrations, except for lead that was detected at elevated levels. PAHs were detected but were not above ROD cleanup goals for PAHs. Elevated levels of four pesticides [lindane, 1,1-Bis(4-Chlorophenyl)-2,2 Dichloroethane (DDD), DDE and DDT] were detected.

Risk analysis was conducted by TRC for Building 118 for construction worker, commercial worker and residential exposure scenarios. For the construction worker, the risk was calculated to be at or below the acceptable cancer risk range and below the non-cancer HQ/HI limit. Risk for the commercial worker and residential exposure scenario were found to be within the acceptable cancer risk range and below the non-cancer HQ/HI limit. Therefore, the soil restrictions were removed as part of the Third Grant Amendment.

#### **2.3.3.4 Building 131**

Nine soil samples were collected beneath Building 131 in support of the Second Grant Amendment (TRC, April 1999). PAHs and pesticides/PCBs were not detected in the samples. Ten metals (arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, and zinc) were detected. Concentrations of detected metals in the sample were at levels that reflect site background concentrations.

Risk analysis was conducted for Building 131 for the construction worker, commercial worker and residential exposure scenarios. These calculations showed risk below cancer risk for construction worker and below the non-cancer HQ/HI limit. These calculations showed risk within the acceptable cancer risk range for the commercial worker and residential exposure scenarios. The construction worker and commercial worker risks were below the non-cancer HQ/HI limit. The residential risk is below the non-cancer HQ/HI limit. Therefore, the soil restrictions were removed as part of the Third Grant Amendment.

#### **2.3.3.5 Building 313**

Ten soil samples were collected beneath Building 313 in support of the Third Grant Amendment (TRC, June 1999). Pesticides and PCBs were not detected in any of the samples. Eight metals (beryllium, cadmium, chromium, copper, lead, mercury, nickel, and zinc) and nitrate and nitrite were detected. Concentrations of detected metals were consistent with site and local background concentrations. PAHs were detected at low levels, but did not exceed the MTL ROD Cleanup Goal.

In the Grant of Environmental Restriction and Easement for the MTL site, Paragraph 2 (A) (iv) states that the Building 313 Area would not undergo “excavating, drilling or otherwise disturbing the soil underlying building foundations and slabs; and disturbance of the building foundations and slabs which would compromise their integrity in a manner that would or would be likely to results in human contact with the underlying soils.” Residual PCB contamination is present within the floor slabs in the remainder of the Building 313C section and southerly wing including Rooms 153, 153A, 153B and 198 in Building 313. Where residual PCB contamination exists, the floor slabs have been encapsulated by concrete. The Grant restrictions were not

removed for these areas, but the Grant restrictions were removed for the remainder of the building which allowed for the demolition of the majority of the center building wing (313C). Based on the June 1999 soil sampling results, the soils beneath the demolished section meet residential cleanup goals. A picture was taken of the current Building 313S during the site inspection on 30 May 2001, see Figure 2-7.

**Figure 2-7 Building 313 Area With Restrictions Photograph Taken During Site Inspection on 30 May 2001**



#### **2.3.4 Current Status**

OU1, which includes Zone 3, was deleted from the NPL on 22 November 1999. The remedy is still protective of human health and environment (see Subsection 6.9 for protectiveness statement).

#### **2.4 ZONE 4**

The reuse alternative selected for Zone 4 was public/open space access. Areas J, K, and L were located in Zone 4 (WESTON 1998). Soil cleanup goals were established for pesticides, PCBs, and PAHs. The COCs for Zone 4 were developed based on the human health risk for the reuse scenario. The cleanup goals for Zone 4 were based on USEPA guidance level for human health

for PCBs. Remedial action for this zone was performed between the Fall of 1996 and the Fall of 1997, and is documented in the Final Remedial Action Report: Zones 1-4 for Outdoor Soil Removal Army Materials Technology Laboratory, May 1998.

Buildings that are located within Zone 4 are Building 111, Building 244, Building 245 and Building 142.

### **2.4.1 Remedy Selection**

The selected remedy was soil excavation and off-site disposal/reuse (Alternative S6) (WESTON September 1996). This remedy included the following:

- Excavation of areas with contaminated soils that were above cleanup goals.
- Confirmatory soil sampling within excavations after contaminated soil removal.
- Off-site landfill disposal or reuse of the excavated soil.
- Backfilling of clean fill soils into the excavations.
- Institutional controls with 5-year site reviews.

Institutional controls for this site include restrictions, which will be necessary only in the areas where the level of cleanup is not as stringent as for areas remediated to residential use as well as for contaminated soil beneath buildings that will not be remediated. Zone 4 has been remediated to allow for public access/recreational use. To the extent required by law, USEPA and the U.S. Army will review the site at least once every 5 years after the initiation of remedial action at the site for the areas where any hazardous contaminants remain to ensure that the restrictions continue to protect human health and the environment. Specifically, the reviews will be performed to determine if restrictions are effective and that the remedy remains protective of human health and the environment.

### **2.4.2 Remedial Actions**

WESTON was contracted by CENAE to conduct remedial actions in Zone 4.

#### **2.4.2.1 Area J1**

Area J1 was initially excavated around soil sample 13SB-1 to dimensions of 25 ft x 25 ft x 3 ft (L x W x D) to remove PCB- and pesticide-contaminated soil. Excavation at Area J1 occurred

between 24 April and 19 August 1997. No PCB-contaminated soils were identified at this location.

The Area J1 excavation eventually merged with the Area J2 excavation to the west during the latter extensions and an underground concrete utility tunnel eventually formed the northern boundary of Area J1. During the excavation at Area J1, approximately 193 yd<sup>2</sup> of bituminous concrete in Talcott Avenue, a portion (95 yd<sup>2</sup>) of the driveway to Building 111, and 40 linear ft of historic brick sidewalk were removed.

During removal of soils on the west side of Talcott Avenue at Area J1, a bank of conduit containing electrical cables that was not shown on site plans was encountered at a depth of about 3 ft bgs; the cables were believed to be abandoned. During excavation activities, one of the electric lines contained within the conduit and several sections of brittle Orangeberg conduit were damaged. After the excavation was complete, it was discovered that the conduit bank supplied power to Building 111. Although the supply power lines were not damaged, the conduit in the excavation was replaced and new power lines were run between Building 111 and a manhole north of the Area J1 excavation. The conduit for these lines was encased in concrete to prevent future damage.

Although metals were not identified prior to the J1 excavation work as contaminants that exceeded risk reduction goals, confirmation samples were collected for metals analysis because metals were identified as COCs in Zone 4. However, on 14 October 1997, after discussions with USEPA, a decision was made to discontinue sampling at Area J1 for metals because location 13SB-1 was not previously identified as an ecological risk reduction area. The removal of the identified risk reduction soil boring locations (see Subsection 2.2.3.9) resulted in an acceptable site-wide risk to ecological receptors, therefore additional excavation for ecological risk reduction was not deemed necessary. As a result, no further excavation for metals was performed at Area J1.

A total of five expansions were performed at Area J1 and a total of approximately 825 tons of soil were removed. Final dimensions of the Area J1 excavation were approximately 75 ft x 60 ft at its longest and widest points. All confirmation samples for pesticides were below ROD cleanup goals. Area J1 restoration was performed between 19 September and

26 September 1997. Common borrow material was used to fill formerly grassed areas and 0.5 ft of loam was placed on top of the borrow material. Grass was planted in September 1997. Compacted gravel borrow material was used below sections of Talcott Avenue and the driveway for Building 111 that required replacement. Bituminous concrete was replaced in November 1997 and the historic brick walkway was replaced in March of 1998.

#### **2.4.2.2 Area J2**

Area J2 was initially excavated around soil sample 13SS-5 to dimensions of 10 ft x 5 ft x 1 ft (L x W x D) between the Arsenal Park fence and Talcott Avenue to remove pesticide and PCB contaminated soils. Excavation at Area J2 occurred between 28 April and 21 October 1997. No PCB contaminated soils were identified at this location.

The initial Area J2 excavation was expanded northward to meet the underground concrete tunnel and Area J1 to the west. During the excavation at Area J2, approximately 85 yd<sup>2</sup> of bituminous concrete from Talcott Avenue were removed.

Area J2 was excavated eastward up to the Arsenal Park fence. During the course of the excavation, confirmation samples J2-24, J2-31, J2-45, and J2-50 along this fence line indicated pesticide concentrations exceeding cleanup goals. However, the property located to the east of Area J2 was being investigated by CENAE under the Defense Environmental Restoration Program, Formerly Used Defense Sites (DERP-FUDS) Program, and is regulated under the MCP. As a result, no further excavation to the east into Arsenal Park was required in 1997.

Although metals were not identified prior to the J2 excavation work as contaminants that exceeded risk reduction goals, confirmation samples were collected for metals analysis because metals were identified as COCs in Zone 4. However, on 14 October 1997, after discussions with USEPA, a decision was made to discontinue sampling at Area J2 for metals because location 13SS-5 was not previously identified as an ecological risk reduction area. The removal of the identified risk reduction soil boring locations (see Subsection 2.2.3.9) resulted in an acceptable site-wide risk to ecological receptors, therefore additional excavation for ecological risk reduction was not deemed necessary. As a result, no further excavation for metals was performed at Area J2 following this date.

A total of seven expansions were performed at Area J2 and approximately 300 tons of soil were removed. Area J2 restoration was performed from 11 November to 13 November 1997. Common borrow material was used to fill formerly grassed areas and 0.5 ft of loam was placed over the borrow material. Compacted gravel borrow material was used below sections of Talcott Avenue which were repaved. Bituminous concrete restoration occurred in November 1997. Some grass was planted in November 1997, however, additional grass seed was planted in April 1998 to fill in areas where vegetation was sparse. No further restoration work is required at Area J2.

#### **2.4.2.3 Area K1**

Area K1 was initially excavated around soil sample GRSB-21/13SS-8 to dimensions of 25 ft x 19 ft x 3 ft (L x W x D) to remove pesticide-contaminated soil. Excavation at Area K1 occurred on 16 May 1997. Approximately 100 tons of soil were removed from Area K1.

Because of the historic and prehistoric nature of the Area K site, excavation activities were overseen by and partially guided by an archaeologist from The Public Archaeology Laboratory, Inc., in Pawtucket, Rhode Island. Confirmation soil samples collected from the initial excavation yielded pesticide concentrations below cleanup goals. The excavation was backfilled on 9 June 1997 with common borrow material. The borrow material was covered with approximately 0.5 ft of loam and grass was subsequently planted. Some restoration was performed on the south side of Building 111 where the existing grass was disturbed during transportation of the excavated soils. No further restoration work is required at Area K1.

No items of historic or prehistoric significance were unearthed during excavation at Area K1. Archaeologist findings are detailed in the report from the Public Archaeology Laboratory dated 14 July 1997.

#### **2.4.2.4 Area K2**

Area K2 was initially excavated around soil boring 15SB-2 to dimensions of 25 ft x 13 ft x 3 ft (L x W x D) to remove pesticide- and metals-contaminated soil. Excavation at Area K2 occurred between 23 April and 27 October 1997. The Area K2 excavation was situated directly over a 12-inch diameter clay sewer main owned by the Town of Watertown. Visual observation of

portions of the exposed line at 2.5 ft bgs showed that the line appeared brittle in most places. Because the line was subject to cracking while excavation was being performed, an agreement was made between CENAE, WESTON, MTL, MDEP, and USEPA that excavation related to remedial efforts not be performed within a 5 ft lateral distance of the sewer line. The Area K2 excavation remained 5 ft south of the sewer line and test pit soil samples were collected from two locations 5 ft north of the sewer line on the steep northern embankment.

Lead was detected at concentrations above 1,000 mg/kg in soil samples collected from the north sidewall of the excavation, facing the sewer line. To mitigate risk to potential sewer line workers, the soils above the sewer line were carefully removed on 27 October 1997 to the northern test pit boundaries where lead concentrations were below 1,000 mg/kg.

Because the Area K2 location (15SB-2) was identified in the FS for metals risk reduction, COC metals (arsenic, nickel, and lead) concentrations in confirmation soil samples (0 to 2 ft bgs) were compared to the COC metals concentrations in 15SB-2 for determination of percent reduction. COC metals concentrations from sidewall samples (0 to 2 ft bgs) were reduced by at least 25% at Area K2, meeting the ecological risk reduction for metals at this location.

Three expansions were performed at Area K2 and approximately 600 tons of soil were removed. All confirmation soil sample results met the applicable risk-based pesticide cleanup goals and ecological goals at 15SB-2. In several areas, cracks in the bells of the sewer pipe sections were visible. These cracks were patched and covered with concrete prior to backfill. Area K2 restoration was performed from 12 November to 17 November 1997. Common borrow material was used as fill below 0.5 ft of loam. Grass was planted in April 1998 and trees were planted by June 1998, completing the restoration at Area K2.

#### **2.4.2.5 Area K3**

Area K3 was initially excavated around soil sample 15SOL01 to dimensions of 25 ft x 17 ft x 1 ft (L x W x D) to remove pesticide-contaminated soil. Excavation at Area K3 occurred between 23 April and 5 November 1997. The Area K3 excavation was located just north of a 12-inch diameter clay sewer main owned by the Town of Watertown. Initially, the

proximity to the sewer line was not a concern because excavation was being performed to 1 ft bgs; however, deepening of the excavation bottom was required at Area K3 upon receipt of the initial confirmation sampling results. As a result, the sewer line was exposed in the excavation. Because the line was subject to cracking while excavation was being performed, an agreement was made between CENAE, WESTON, MTL, MDEP, and USEPA that excavation related to remedial efforts not be performed within a 5 ft lateral distance of the sewer line.

The Area K3 excavation remained 5 ft north of the sewer line, running parallel to the toe of the embankment. One sidewall sample, K3-17, collected from 1 ft bgs adjacent to the sewer line exceeded the PAH cleanup goals based on human health, but were below the construction worker risk-based cleanup goals. The future reuse of Area K is intended as open space, and construction worker clean up goals were applied because future subsurface/intrusive work is only expected to be performed by a construction or utility worker.

Several large trees were located in the Area K3 excavation at the toe of the embankment. These trees were treated as significant and historic. A cluster of several trees was located at the west end of the Area K3 excavation. Samples K3-25 and K3-26, collected from the west sidewall of the excavation, exhibited concentrations exceeding pesticide cleanup goals. However, analytical data from areas on the embankment west of the trees is available from test pit samples K2-09 and K2-10. These test pit samples did not exceed the Area K3 cleanup goals. No further excavation was performed westward.

Although metals were not identified prior to the Area K3 excavation work as contaminants that exceeded ecological risk reduction goals, confirmation soil samples were collected for metals analysis because metals were identified as COCs in Zone 4. However, on 14 October 1997, after discussions with USEPA, a decision was made to discontinue sampling work at Area K3 for metals because location 15SOL01 was not previously identified as an ecological risk reduction area. The removal of the identified risk reduction soil boring locations (see Subsections 2.2.3.9) resulted in an acceptable site-wide risk to ecological receptors, therefore additional excavation for ecological risk reduction was not deemed necessary. As a result, no further excavation for metals was performed at Area K3 following this date.

One soil sample from Area K3 collected adjacent to the sewer main owned by the Town of Watertown did exceed the PAH cleanup goals for human health. An additional soil sample was collected from a test pit 5 ft south of the sewer main and it showed PAH levels below site cleanup goals. As a result, no further excavation was performed in Area K3.

A total of four expansions were performed at Area K3 and a total of 175 tons of soil were removed. All confirmation soil sample results met the applicable risk-based pesticide and PAHs cleanup goals. Area K3 restoration was performed between 24 November and 5 December 1997. Common borrow material was used as fill below 0.5 ft of loam. Grass was planted in April 1998. No further restoration work is required at Area K3.

#### **2.4.2.6 Area K Area-wide Samples**

The Area K excavation area shown in the ROD was rectangular in shape, extending from the North Beacon Street fence to the south side of Building 111. Three excavations were performed in Area K. A steep embankment is located approximately one third of the way between the south facility fence and Building 111. The Area K2 and K3 excavations spanned a significant portion of the ROD area at the bottom of the slope. At the top of the embankment, the Area K1 excavation was located in the center portion of the area defined in the ROD and an approximate distance of 100 ft remained between Area K1 and both the east and west ROD area boundaries.

Area wide confirmation soil samples were collected in the grassy areas midway between Area K1 and the east/west ROD area boundaries to determine if contamination exceeding cleanup goals remained in Area K. Two soil samples were collected from each area wide location at depths of 1.5 and 3 ft bgs. These samples were analyzed for Area K COCs. A post hole digger was used to excavate a hole approximately 1.5 ft in diameter by 3 ft deep from which the area wide soil samples were collected. No items of historic or prehistoric significance were found during sampling at these locations. All sample results indicated that concentrations were below the pesticide and PAH cleanup goals for Area K. As a result, no further excavation was performed in Area K.

#### **2.4.2.7 Area L1**

Area L1 was initially excavated around one of the discrete points for composite soil sample 16SS-1 to dimensions of 4.5 ft x 6 ft x 1 ft (L x W x D) to remove pesticide- and metals contaminated soils. Metals results are discussed with the Ecological Risk Reduction Areas in Subsection 2.2.3.9.

The excavation was performed on 4 December 1996 during which approximately 2 tons of soil were removed. Bituminous concrete walkway (2 yd<sup>2</sup>) was removed from the entrance of Building 244 and a portion of the Propellant Storage Area fence was removed from the front of the bunkers to provide access for excavation. All confirmation soil sample results yielded pesticide concentrations below cleanup goals for the L1 excavation. The excavation was backfilled on 3 December 1996 with common borrow material. The bituminous concrete walkway and the perimeter fence were not restored by request of MTL staff. No further restoration work is required at Area L1.

#### **2.4.2.8 Area L2**

Area L2 was initially excavated around one of the discrete points for composite soil sample 16SS-1 to dimensions of 5 ft x 4.5 ft x 1 ft (L x W x D) to remove pesticide- and metals contaminated soils. Metals results are discussed with the Ecological Risk Reduction Areas in Subsection 2.2.3.9.

The excavation was performed on 4 December 1996 during which approximately 2 tons of soil were removed. Bituminous concrete walkway (2 yd<sup>2</sup>) was removed from the entrance of Building 245 and a portion of the Propellant Storage Area fence was removed from the front of the bunkers to provide access for excavation. All confirmation soil sample results yielded pesticide concentrations below cleanup goals for the L2 excavation. The excavation was backfilled on 23 December 1996 with common borrow material. The bituminous concrete walkway and the perimeter fence were not restored by request of MTL staff. No further restoration is required at Area L2.

#### **2.4.2.9 Area L3**

Area L3 was initially excavated around one of the discrete points for composite soil sample 16SS-1 to dimensions of 5 ft x 5 ft x 1 ft (L x W x D) to remove pesticide- and metals-contaminated soils. Metals results are discussed with the Ecological Risk Reduction Areas in Subsection 2.2.3.9.

The initial excavation was performed on 3 December 1996 during which approximately 2 tons of soil were removed. Analytical results for soil samples collected from the initial excavation showed that pesticide cleanup goals were met, however, the north sidewall metals concentrations did not meet the minimum 25% risk reduction. The excavation was lined with poly and backfilled with common borrow material on 31 December 1996.

One expansion was performed for Area L3 on 23 June 1997 to the north to achieve additional metals risk reduction. Analytical results for the confirmation samples collected in the expansion indicated that a minimum of 25% risk reduction was achieved (see Subsection 2.2.3.9). During the expansion at Area L3, an additional 3 tons of soil were removed. The excavation was backfilled between 12 November and 17 November 1997 using common borrow material as a base under 0.5 ft of loam. This backfilling was performed at the same time as the Area L4 backfilling. Grass was planted in April 1998. No further restoration work is required at Area L3.

#### **2.4.2.10 Area L4**

Area L4 was initially excavated around soil sample 16SS-2 to dimensions of 10 ft x 27 ft x 1 ft (L x W x D) to remove pesticide- and PAH-contaminated soil. No PCB-contaminated soils were identified at this location.

The initial excavation was performed on 3 December 1996 during which approximately 40 tons of soil were removed. An expansion was required at Area L4 to address pesticide contamination. Due to the proximity of several large trees in the expansion area, test pit samples were collected on 17 December 1996 to determine the extent of contamination. Results from these samples indicated the need for further expansion, however, weather conditions did not permit further expansion at the time. As a result, the Area L4 excavation was lined with poly and backfilled

with common borrow material on 31 December 1996 and expansion continued in the Spring of 1997.

Excavation at Area L4 resumed on 23 June 1997 and excavation was eventually performed up to the facility fence (property boundary) in the south and southeast. The area immediately adjacent to the facility fence is a paved sidewalk along North Beacon Street. Soil samples from the excavation sidewall contained concentrations of 4,4'-DDE and 4,4'-DDT exceeding the ecological cleanup goals of 140 and 170 µg/kg, respectively. Although pesticides were detected adjacent to the property fence where spraying may have occurred, it is unlikely pesticides would be present beneath the sidewalk on North Beacon Street. In addition, the pavement provides adequate cover to minimize potential risk of exposure to human health or the environment and the paved area is not a habitat for ecological receptors. Therefore, no expansion was performed in the southerly direction outside the parcel boundary. All other southern and southeastern final confirmation sample results at Area L4 met the pesticide cleanup goals.

Confirmation soil samples collected from the eastern and southeastern sidewall expansions were compared to the construction worker risk-based PAH cleanup goals. The future reuse of Area L is intended as open space, and construction worker clean up goals were applied because future subsurface/intrusive work is only expected to be performed by a construction or utility worker. This decision was documented in the ESD signed in 1997. Confirmation soil samples were collected immediately beneath Talcott Avenue, which currently provides 1 ft of cover (composed of concrete and bituminous concrete) over these soils. None of the analytical results for the samples from the eastern sidewall exceeded the construction worker risk-based pesticide cleanup goals. In addition, pesticide cleanup goals were met at each sample location along the eastern sidewall. As a result, no further expansion eastward was performed.

Results from sample L4-30, located adjacent to Building 245, exceeded pesticide soil cleanup goals; however, no additional soil removal was performed at this location due to the presence of the building. Contaminated soils that remain under Building 245 have been managed through the use of institutional controls.

During the Area L4 expansions, several pine trees from the area between the facility fence and Building 245 were removed. Driplines of large hardwood trees were excavated. One half of

Talcott Avenue (161 yd<sup>2</sup> of bituminous concrete) was also removed during the final eastward expansion.

A total of four expansions were performed at Area L4. The final excavation spanned from the east side of Building 245 to a point 12 ft into Talcott Avenue, and south to the facility fence. The excavation area at L4 ranged from 1 to 4 ft bgs in depth and was about 130 ft x 130 ft at its widest and longest points. A total of 1,050 tons of soil was removed. During the expansions at Area L4, the electric service to the Building 142 Sentry Station and light posts on top of the historical South Gate were interrupted. Repairs of the electrical service to these structures were made by MTL staff prior to the backfill of Area L4.

Area L4 restoration was performed between 6 November and 17 November 1997. Common borrow material was used to replace formerly grassed areas. Compacted gravel borrow material was placed under the section of removed roadway. The bituminous concrete roadway was replaced in November 1997. Grass was planted in April 1998 and trees were planted by June 1998, completing the restoration work for Area L4.

One of the four benchmarks is currently missing at Excavation Area "L4". The town is currently working on replacing the missing benchmark. A picture was taken of the current Excavation Area "L4" during the site inspection on 30 May 2001, see Figure 2-8.

**Figure 2-8 Excavation Area L4 On The Property Of Watertown Taken During The Site Inspection On 30 May 2001**



### **2.4.3 Land Use Controls and Restrictions in Zone 4**

The 11 August 1998 Grant of Environmental Restriction and Easement for Army Materials Technology Laboratory redesignated areas into lots for property transfer from the U.S. Army to the Town of Watertown (Interview with Bruce Hoskins on 8 May 2001). Areas in Zone 4 were redesignated Lot 2. Lot 2 still remains Town of Watertown property.

### **2.4.4 Current Status**

The Town of Watertown has renovated the Commanders Quarters, located in Lot 2, and it is currently a museum and is also used for social activities. No other remediation activities have been conducted on Lot 2.

OUI, which includes Zone 4, was deleted from the NPL on 22 November 1999. The remedy is still protective of human health and environment (see Subsection 6.9 for protectiveness statement).