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Superfund Record of Decision:

Waste Disposal, MN

50272-101

REPORT DOCUMENTATION PAGE

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First Remedial Action - Final

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Washington, D.C. 20460

13. Type of Report & Period Covered
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14.

15. Supplementary Notes

16. Abstract (Limit: 200 words)

The Waste Disposal Engineering (WDE) site, consisting of 73 acres of a 114-acre dump, is located in the City of Andover (formerly Grown Township), Anoka County, Minnesota. The site area is characterized by low relief with shallow water tables and numerous wetlands. During the past year, most extensive residential development has been or will be constructed and planned for around the site. The original dump was established in 1963 and operated until 1908. Disposal of wastes was by burial or burning in pits or trenches. In 1968, WDE purchased the dump and was licensed by Grow Township to operate as a sanitary landfill. In 1970, WDE submitted a solid waste permit application which included a proposal to build a specially constructed pit for hazardous waste disposal. A permit was issued in March 1971, to operate the site as a sanitary landfill. The pit received approximately 6,600 containers (ranging from one gallon pail to fifty-five gallon drums) from 1972 to 1974, in the form of acids, caustics, waste paints, spent solvents, plating sludges, and cyanides. An undetermined quantity of hazardous waste, much of it as bulk loads, was disposed throughout the landfill. Of the 3,200,000 gallons of hazardous waste thought to be disposed at the site, only ten percent is thought to have been disposed of in the pit. The area of refuse/non-hazardous waste disposal covers an area of 73 acres and contains approximately 2,500,000 yd^3 of
(See Attached Sheet)

17. Document Analysis a. Descriptors
Record of Decision
Waste Disposal, MN
First Remedial Action - Final
Contaminated Media: gw
Key Contaminants: organics, VOCs

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement

19. Security Class (This Report) None

20. Security Class (This Page) None

21. No. of Pages 81

22. Price

(See ANSI-Z39.18)

See Instructions on Reverse

OPTIONAL FORM 272 (4-77)
(Formerly NTIS-35)
Department of Commerce

16. ABSTRACT (continued)

waste. Much of the landfill is covered by lime sludge. The landfill and pit have remained abandoned and inactive since February 1984. The site property has gone through tax forfeiture so that it is currently property of the State of Minnesota with administration by the county. Currently, the pit area shows the most serious ground water degradation and is the dominant source of contaminants entering Coon Creek. The primary contaminants of concern include VOCs and organics.

The selected remedial action for this site includes: ground water pump and treatment using carbon adsorption with offsite discharge to Coon Creek; installation of a RCRA cap to completely cover the 73-acre landfill; installation of a clay slurry wall; implementation of institutional controls including well use restrictions; filling in of a wetland, construction of an alternate wetland area, and extensive monitoring; the estimated capital cost for this remedial action is $9,504,796 with present worth O&M of $862,915.

RECORD OF DECISION
REMEDIAL ALTERNATIVE SELECTION

Site: Waste Disposal Engineering, Andover, Minnesota

Documents Reviewed

The following documents, which describe the physical characteristics of the Waste Disposal Engineering Site and which analyze the cost-effectiveness of various remedial alternatives, have been reviewed by the United States Environmental Protection Agency (U.S. EPA) and form the basis for this Record of Decision (ROD):

- Modified Appendix B, Remedial Investigation, Conestoga - Rovers & Associates Limited (CRA), January 30, 1986.
- QA/QC Data Assessment, CRA, February 1, 1986.
- QA/QC Data Assessment, Volume 11 Appendices, CRA, February 1, 1986.
- Addendum to Modified Appendix B, CRA, February 28, 1986.
- Remedial Investigation, CRA, March 31, 1986.
- Supplementary Monitoring Report, CRA, July 25, 1986.
- Pit Investigation, Summary Report, CRA, August 7, 1986.
- Supplemental Remedial Investigation Report, CRA, September 22, 1986.
- Alternatives Report, CRA, April 18, 1986.
- Detailed Analysis Report, CRA, October 9, 1986.
- Detailed Analysis Report Appendices, CRA, October 9, 1986.
- Response of SW28 Group to U.S. EPA Letter Dated May 28, 1987, CRA, July 9, 1987.
- Public comments received during the 21-day comment period, and the Responsiveness Summary.
- Summary of Remedial Alternatives Selection.

I have also considered other documents which are included in the attached index to the administrative record.

Description of Remedy

The selected remedial alternative for the Waste Disposal Engineering Site is to cover the landfill with a vented cap, to contain contaminated ground water discharges from the landfill through downgradient ground water extraction wells, to contain an area within the landfill which received hazardous waste (hereinafter referred to as the "Pit") with a slurry wall and extraction well system, to avoid usage of contaminated groundwater and reversal of the upward gradient between the lower and uppers sand aquifers through institutional controls to limit wells on and near the site, to fill-in and replace a wetland area affected by the site, to treat and dispose of extracted ground water, which is expected to be accomplished by carbon adsorption and discharge to Coon Creek, and to monitor the site. The selected alternative includes the following major components.

- Lime sludge cap meeting Resource Conservation and Recovery Act (RCRA) technical performance standards.

- Ground water extraction wells in the upper sand aquifer between Coon Creek and the landfill.

- Clay slurry wall around the Pit with pumping inside the wall.

- Institutional controls to prohibit uppers sand aquifer wells at the site and just north of Coon Creek and to prohibit lower sand aquifer wells near the landfill.

- Carbon adsorption treatment of extracted ground water (air stripping or a combination is possible based on design.

- Discharge of treated extracted ground water to Coon Creek.

- Monitoring, including geophysical work around the site to locate heavier-than-water non-aqueous phase liquid monitoring, to assure the effectiveness of the remedy.

Consistent with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.F.R Part 300, I have determined that, at the Waste Disposal Engineering Site, the selected remedial alternative is cost-effective, provides adequate protection of public health, welfare, and the environment, and utilizes treatment to the maximum extent practicable.

The action will require operation and maintenance activities to ensure continued effectiveness of the remedial alternative as well as to ensure that the performance objectives meet applicable State and Federal surface and groundwater criteria.

I have determined that the action being taken is consistent with Section 121 of SARA. The State of Minnesota has been consulted and is expected to concur with the selected remedy.

In accordance with Section 121 (c) of SARA, the remedial action at the Waste Disposal Engineering Site shall be reviewed no less often than every five years after initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented.

for Frank M. Covington
Valdas V. Adamkus
Regional Administrator

12-31-87
Date

Attachments: (1) Summary of Remedial Alternative Selection
(2) Responsiveness Summary
(3) WDE Administrative Record Index

Site Summary of Remedial Alternative Selection
Waste Disposal Engineering Site
Andover, Minnesota

I. Site Location and Description:

The WDE Site is located within the City of Andover (formerly Grow Township), Anoka County, Minnesota (see Attachments 1, 2), approximately 15 miles north of the City of Minneapolis. It is situated on the south side of Coon Creek, which discharges into the Mississippi River 11 river miles downstream from the Site. The discharge into the Mississippi River is approximately 3 miles upstream of the intake for the St. Paul water supply and 7 miles upstream of the intake for the Minneapolis water supply.

The WDE Site is situated within the Anoka Sand Plain. The topography is gently rolling to flat, with shallow water tables (less than 20 feet) and numerous wetlands. The area surrounding the WDE Landfill historically was comprised of small farms and small residential developments. Immediately south of the Site are a series of scrapyards. During the past year, more extensive residential development has been or will be constructed and planned for around the Site. The Site is bounded on the north by Coon Creek, with flows in a west-northwesterly direction at this location. To the west, the Site is bounded by Anoka County Road 18 (Crosstown Boulevard), farm land, and a residential development (Red Oaks Manor). The southern boundary of the Site consists of woodlands and commercial developments (mostly scrapyards) along Anoka County Road 16 (Bunker Lake Boulevard). Hanson Boulevard borders the eastern edge of the WDE Site. Along the eastern edge of the Site are two overlapping easements, United Power Association (45 feet wide) and Northern States Power Company (150 feet wide).

The original dump was established in 1963 by a Mr. Leonard Johnson. Disposal of wastes was by burial or burning in pits or trenches. WDE purchased the facility in 1968 and was licensed by Grow Township to operate as a sanitary landfill. In 1970, WDE submitted a solid waste permit application to the MPCA, including a proposal to build a specially constructed pit for disposal of hazardous waste. The permit (SW-28) was issued on March 30, 1971 to operate the WDE Site as a sanitary landfill. The Site operating permit was revoked by the MPCA in February, 1984.

The hazardous waste pit received hazardous wastes from November, 1972 to January, 1974. The base of the pit was specified to be an 18-inch layer of clay overlain by a six-inch bituminous layer and six inches of crushed limestone. Approximately 6,600 containers (ranging from 1 gallon pails to 55 gallon drums) holding a wide variety of wastes (acids, caustics, waste paints, spent solvents, plating sludges, cyanides) are thought to have been disposed in the pit. An undetermined quantity of hazardous waste, much of it as bulk loads, was

disposed throughout the landfill. Based on interviews and government files, approximately 3.2 million gallons of hazardous waste are thought to have been disposed at the WDE Site. Using these estimates, only 10 percent of the waste expected to be at the Site would have been disposed in the pit.

The area of actual refuse disposal in the landfill covers an area of 73 acres (see Attachment 3). The maximum thickness of waste is 40 feet. The landfill contains nearly 2.5 million cubic yards of waste. Much of the landfill is covered by lime sludge obtained from the Minneapolis Drinking Water Treatment Plant. The lime sludge consists of very fine particles of lime that yields a clay-like substance. The sludge thickness ranges from three to six feet (average of four feet). Additional lime sludge is stockpiled on ten acres immediately southeast of the area of refuse disposal.

The WDE facility ceased operations in February, 1984 and has remained abandoned and inactive. The property of the Site has gone through tax forfeiture so that it is currently property of the State of Minnesota with administration by Anoka County.

II. Site History:

Prior to development of the WDE Site in the early 1960's, land use consisted of cropland and pastureland, and open deciduous woodland with scattered wetland pockets. The area consisted of a glacial outwash plain characterized by low relief, poor external drainage, and fine, sandy soil. Also located at the Site were two related drainage channels. One of these channels was eventually buried by the landfill while the other was abandoned when Coon Creek was straightened. In addition, by 1964, three field ditches had been constructed on the northeast portion of the present landfill. These ditches, which are partially buried, drain to the north and empty into Coon Creek.

As indicated earlier, the landfill (dump) was established in the early 1960's by Leonard E. Johnson. By 1964, the dump covered only three acres. In 1970, the landfill had expanded to cover 41 acres, and by 1982 to its present-day size of 114 acres. The dump was purchased by WDE in 1968. In 1971, construction of the WDE Pit began. The Pit was completed in 1972 and was operated until January, 1974. The landfill operated until 1984.

III. Results of the Remedial Investigation:

A. Investigations

Investigations at the Waste Disposal Engineering (WDE) Site included the following:

1. Review and evaluation of historical disposal practices and other records relating to the Site.

2. Extensive aquifer sampling and water level measurements to determine ground water quality, flow directions, etc.

3. Soil sampling in the northeast portion of the Site to define soil contamination in the area of historic drainage ditches.

4. Coon Creek sampling to define the Site's impacts on the creek.

5. Soil borings to define the geology at the Site.

6. Lime sludge testing to define whether or not it could be considered as a component of the landfill cap.

7. Landfill gas measurements to define gas levels within the landfill.

B. Geology

The WDE Site is situated within the Anoka Sand Plain. The surficial deposits were glacial meltwater deposits (forming outwash plains associated with Grantsburg Sublobe later reworked by the Mississippi River). These deposits are fine to medium sand, have relatively high permeabilities, and are 40 to 73 feet thick at the landfill. The outwash plain is relatively flat, and lacks good drainage. Numerous small lakes and wetlands reflect high water table conditions. Many streams in the area, including Coon Creek, have been channelized to lower inverts and improve drainage. Several drainage ditches were present in the Northeast quarter of the Site prior to the landfilling.

There is a thin, gray silt till unit (0 to 15 feet thick) within the Upper Sand Unit. This silt till is present in most deeper borings at the Site at depths around 30 to 40 feet. However, its continuity is uncertain, because its presence is not indicated in some drilling logs, and it is not relied upon as an effective confining unit.

Below the Upper Sand is a red-brown clay-silt till. It is a relatively dense till, has low permeabilities [10^{-5} to 10^{-6} centimeters per second (cm/sec)], and serves as an aquitard for the underlying lower sand. The till thickness ranges from 10 to 40 feet thick and becoming progressively thinner from north to south across the Site. The surface of the till unit is highest immediately below the Pit area of the landfill, and slopes downward concentrically from the peak (see Attachment 4). The steepest slope is to the northwest and west.

Underlying the red-brown till is the Lower Sand. This outwash was deposited by the Superior advance and retreat and consists of relatively coarse sand and gravel. It becomes finer and more silty with depth. The thickness of this unit is on the order of 80 feet thick.

C. Ground Water

The Upper Sand aquifer is under water table conditions (unconfined). Ground water flow in the Upper Sand at the Site is pronounced to the north discharging into Coon Creek (see Attachment 5). Coon Creek serves as the regional discharge for the Upper Sand aquifer. At the Site, the water table contours parallel Coon Creek. Ground water elevations are generally in the range of 867 feet near the Creek to 880 feet south of the landfill. Ground water flow rates in the Upper Sand are on the order of 25 to 30 feet per year.

The Lower Sand aquifer is under confined conditions and is artesian under the WDE Site. In fact, in the vicinity of Coon Creek, flowing artesian conditions exist (i.e., monitoring well 26D). Ground water flow in the Lower Sand aquifer in the region is to the southwest, ultimately discharging into the Mississippi River, approximately 4 miles downgradient of the WDE Site. At the WDE Site, ground water flow appears to be more towards the west-northwest because of the readings from one particular monitoring well. Without this one well, ground water flow patterns would be entirely consistent with the regional pattern. Piezometric levels in the Lower Sand aquifer are generally in the range of 876 to 878 feet at the Site.

The Lower Sand aquifer is used extensively for domestic water supply, particularly southwest (and downgradient) of the Site. The Upper Sand aquifer is used by some residents having sand points, particularly north of Coon Creek. One issue of primary concern has been the relative vertical piezometric gradients within the Upper Sand aquifer and between the Upper Sand aquifer and Lower Sand aquifer across the red-brown till confining unit. This is particularly critical since the gradients and flow directions are roughly opposite between the Upper Sand aquifer and Lower Sand aquifer.

In general, there is a downward component of flow within the Upper Sand at the WDE Site, except as one approaches Coon Creek where the gradient switches to produce an upward flow.

The vertical gradient across the red-brown till unit between the Lower Sand and Upper Sand aquifers is upward under the limits of refuse disposal and the area between the refuse and Coon Creek. The vertical gradient across the red-brown till unit between the Lower Sand and Upper Sand aquifers is downward immediately south of the limits of refuse disposal. The gradient is consistently downward at monitoring well nest 1 and is variable (downwards and upwards) at monitoring well nest 23 (see Attachment 6).

The lateral ground water gradient in the Upper Sand aquifer is approximately 0.005. With a hydraulic conductivity of 1.6×10^{-3} cm/sec and an assumed porosity of 0.3, the average lateral ground water movement in the Upper Sand is approximately 27 feet per year. The vertical ground water gradient across the red-brown till at well nest 1 is 0.038 using a hydraulic conductivity range of 2×10^{-6} cm/sec to 1×10^{-3}

cm/sec and an assumed porosity of 0.3, the average vertical ground water velocity downward across the red-brown till is approximately 0.4 to 2.0 feet/year. This is 1.5 to 7.4 percent of the lateral flowrates. Therefore, ground water flow in the Upper Sand aquifer is primarily lateral towards Coon Creek, but there is a downward component across the red-brown till south of the limits of refuse disposal (see Attachment 7).

D. Extent and Magnitude of Contamination

Ground water contamination exists within the Upper Sand aquifer beneath and downgradient of the landfill and ultimately enters Coon Creek. The degradation is most severe in the upper portion of the Upper Sand aquifer. Contaminants include typical landfill type contaminants (reduced pH, chlorides, and COD) and a wide variety of organic constituents, including aromatic and halogenated volatiles, and low levels of metals (see Attachments 8 to 12). Some of the volatile organics found in highest concentrations include methylene chloride, dichloroethylene, trichloroethane, tetrahydrofuran, methyl ethyl ketone, benzene, and xylenes.

The areal distribution of contaminants show the most severe contamination at and downgradient of the pit (wells W6, W8, W11, and W22A). High concentrations or "hot spots" were detected at other scattered locations (i.e., W28A, and W31A) within the landfill, reflecting the scattered pattern of disposal practices throughout the history of the landfill operations. At this point in time, the Pit area shows the most serious ground water degradation and is the dominant source of contaminants, notably volatile organics, entering Coon Creek. Contamination in the Upper Sand is most severe near the water table and decreases with depth, producing a stratified plume (see Attachment 13).

Coon Creek is the primary receptor of contaminated ground water in the Upper Sand aquifer leaving the WDE Site. No contaminants, particularly volatile organics, are detectable upstream of the WDE Site. Very low levels of some volatile organics are detectable along most of Coon Creek along the north side of the WDE Site until the contaminant plume from the Pit enters the Creek. At that point, the levels of a variety of volatile organics, particularly chlorinated volatiles, are present, and persist several miles down stream of the Site. Non-halogenated volatiles are observed in high concentrations in ground water near the Creek and are thought to volatilize quickly upon entering the Creek. However, the non-halogenated volatiles do persist when ice cover conditions exist. The levels of volatiles in Coon Creek where the Pit plume enters the Creek are in the range of 1 to 30 ug/l for several different halogenated volatiles. There is some contamination present in one monitoring well nest immediately north of Coon Creek, but this appears to be due to some localized underflow and reversal back to Coon Creek because of some fine-grained lenses under Coon Creek. None of the private wells further north of the creek show any contamination.

The Lower Sand aquifer has not shown any indications of contamination to date. A number of factors are responsible for the lack of impact, including the presence of 10 to 40 feet of a dense till confining the aquifer, an upward gradient across the till unit, and a pronounced flow in the Upper Sand aquifer northwards towards Coon Creek. However, the long-term integrity of the Lower Sand aquifer cannot be completely guaranteed. The gradient across the till is downward immediately south of the landfill and, if ground water conditions were to shift in the future, the downward gradient may expand northward under the landfill. Also, heavier-than-water, non-aqueous phase liquids (NAPL) may migrate along the surface of the till southward (down the slope of the till surface) to the zone of downward gradients and, in the long-term, potentially impact ground water quality. Thirdly, most of the residential wells southwest (and downgradient, in terms of the regional flow, in the Lower Sand) of the WDE Site are completed in the Lower Sand and may be impacted if serious contamination were to reach the Lower Sand aquifer. The presence of such a large number of wells southwest of the Site does have the potential to aggravate the downward gradient condition southwest of the Site.

E. Landfill Gas

The WDE Site has 11 gas probes, located primarily along the western and southern sides of the landfill (see Attachment 5). Probes were installed at these locations because Coon Creek (along the north and northeast sides of the Landfill) provides a hydraulic barrier to gas migration and because the closest residential developments are in these directions. Also, some evergreen trees immediately along the west side of the landfill are showing signs of stress. Combustible gas measurements show the highest levels (15 to 30 percent) in gas probe nest 6, with a few percent levels in probes 1 and 4. Volatile organics analyses also indicate the presence of a variety of organics, principally halogenated organics, in the gas probes. As with combustible gas, probes GP-1, GP-4, and GP-6 show the highest concentrations and the largest variety of volatile organics (see Attachment 16). These gas probes are immediately adjacent to the landfill and represent the worst case (Attachment 16). Probes further from the landfill (GP-2, GP-9, GP-10 show much lower vapor gas concentrations and fewer compounds) and those along the south are completely clean. The fact that gas migration seems to be very limited beyond the landfill is due to the relatively high water table conditions and the high porosity and permeability of the surficial deposits in the area. Some of the levels of individual contaminants (1,1,2,2-tetrachloroethane, 1,3-dichloropropene) do exceed Threshold Limit Values in GP-4 and GP-6 immediately adjacent to the landfill. In addition, the levels of some contaminants (methylene chloride, benzene, trichloroethene) exceed the potency factors for carcinogens identified in the Public Health Risk Evaluation Data Base. With the fact that methane and specific volatile gases are being generated and that the landfill is a relatively young facility (most waste disposed in the last 10 years), concerns do remain regarding long-term migration of gases.

F. Wetlands

The wetlands north of the site are listed in the National Wetland Inventory as a Type 2 wetland (Class Palustrine, emergent, subject to intermittent flooding, drained). The U.S. Fish and Wildlife Service has identified the presence of sedges, reed canary grass, cattails, and willows.

IV. Potential Receptors and Pathways:

A. Potential Receptors

Land resources in the area are used for agriculture, residential, and light industrial purposes. Some land is undeveloped. No unique agricultural land or wildlife habitat exist around the Site. (See Attachment 14).

Potentially impacted water resources consist of the groundwater in the Upper and Lower Sand aquifers and surface waters in Coon Creek and the Mississippi River. Although used as a source of potable water in the area, including just north of the Site, the Upper Sand aquifer is less significant as a potable water source than the Lower Sand aquifer. Mississippi River irrigation and livestock watering are other possible uses of the ground and surface waters.

Coon Creek and the Mississippi River are important to wildlife in the area and contain fish and other aquatic organisms.

Wetlands between the limit of refuse disposal and Coon Creek, particularly in the area of monitoring well nests 2 and 13, have been impacted by seeps and shallow leachate of the Site. Migrating waterfowl may utilize these wetlands.

B. Releases

The WDE Site has a variety of exposure pathways, existing or potential, for the release of hazardous substances. The existing pathways include ingestion/dermal exposure from contamination of Coon Creek by Upper Sand ground water, and direct contact for people on site with exposed wastes and leachate. There is also the risk of physical injury due to the existing hazards at the Site (i.e., exposed cables, rusty drums, etc.). Potential pathways include contaminated drinking water from contaminated ground water from leakage into the Lower Sand (i.e., NAPL) or migration beneath Coon Creek within the Upper Sand. Controls are necessary to protect public health, welfare, or the environment from the continuing releases of hazardous substances. The releases are described as follows:

1. Heavily-contaminated ground water within the Upper Sand aquifer, particularly from the Pit, is currently discharging into Coon Creek resulting in low but persistent levels of various chlorinated volatile organics.

2. Leachate seeps are sporadically active near the base of the north face of the landfill near Coon Creek. When the leachate seeps are active, they do pose a direct contact risk to people and wildlife on WDE Site. The leachate seeps ultimately drain into Coon Creek via interflow or overland flow.

3. Landfill wastes, and potentially hazardous wastes, are gradually being exposed as the existing, unprotected lime sludge cap erodes. The lime sludge alone does not support any vegetative cover and, because of the very fine-grain size, is subject to wind erosion under dry conditions and runoff erosion during periods of even moderate rainfall. Extensive and deep (up to 10 feet deep) gullies have developed particulately in the northwest quarter of the landfill. As the lime sludge cap erodes, the potential for direct contact exposure to wastes increases over time. Although the potential for direct contact is low, there is some undefined chance for acute exposures.

4. Ground water contamination in the Upper Sand aquifer greatly exceeds U.S. EPA Maximum Contaminant Levels established under the Safe Drinking Water Act and Water Quality Criteria established under the Clean Water Act and Minnesota Recommended Allowable Limits (RAL's). The highest levels of contamination are at and downgradient of the Pit and in isolated/random locations in the landfill (so called "hot spots"). Although the ground water contamination is largely limited to the site, being discharged to Coon Creek, there is one small pocket of contamination exceeding RAL's and nearing Water Quality Criteria, but exceeding only methyline chloride, in the vicinity of well nest 21, raising concerns regarding the adequacy of Coon Creek as a complete hydraulic barrier. There are also long-term concerns regarding NAPL migration in the Upper Sand, and contamination entering the Lower Sand aquifer due to NAPL migration or dissolved contaminants migrating downward south of the Site. To date, no contamination has been detected in private wells.

5. Gas, both methane gas from the landfill and individual volatile organics from wastes, is being released from the Site and to the west. Gas migration does appear to be limited due to these high porosity and permeability of the surficial soils.

C. <u>Exposure Pathways</u>

The WDE FS defined thirteen exposure routes from which response objectives were derived (See Attachment 15). The routes are as follows:

1. Inhalation of Dust and/or Volatilized Chemicals (dust includes contaminants absorbed to dust particles). Three groups of people are expected to be affected by such a release: on-site investigators/workers, trespassers, and nearby downwind residents. The response objective is to control the potential dust and/or volatilized chemical emissions.

2. Inhalation of Chemicals as a Result of Incompatible Waste Reactions. Potential incompatible waste reactions range from minor reactions that may increase or decrease the rate of chemical releases from the site to major reactions that release large volumes of volatilized chemicals. The large volume release from an undisturbed landfill has a low probability due to the slow rate of release of individual containers, the sorbent properties of the solid waste, the buffering affect of surrounding soils, and the cool temperatures and anaerobic conditions in the landfill. No major release has been recorded. The response objective is to reduce the probability of incompatible waste reactions and to control the effects of reactions that may occur.

3. Inhalation of Lime Sludge Tracked Off-Site by Local Residents As local residents use the site for recreational activites and as most of the site is covered by lime sludge, lime sludge is expected to be tracked off-site and inhaled as dust. The response objective is to remove the opportunity for contact with the lime sludge.

4. Inhalation of Soil Gas Contaminated by the Pit and Landfill. Landfill gas is generated at every sanitary landfill by the anaerobic decomposition of solid waste. This gas can be pushed out into surrounding soils. The gas can also carry volatilized organic compounds from industrial wastes. Gas was present in the soil, although no volatile organic compounds were above detection limits in the ambient air. The response objective is to control soil gas migration.

5. Ingestion of Lime Sludge Tracked Off-Site by Local Residents. As local residents use the site for recreational activities and as the site is covered with lime sludge, lime sludge is expected to be ingested. The response objective is to remove the opportunity for contact with the lime sludge.

6. Ingestion of Lime Sludge On-Site. On-site investigators/workers and trespassers are expected to be exposed. The response objective is to prevent the opportunity for contact with the lime sludge.

7. Ingestion of Upper Sand Aquifer Water Contaminated by the Pit. The ground water contamination from the pit area appears to be confined to the Upper Sand aquifer and to discharge into Coon Creek. As the till layer mounds under the Pit, NAPL could

migrate off-site in virtually any direction because it will tend to follow the slope of the till layer rather than the ground water flow. The response objectives are to control future exposure to Upper Sand aquifer ground water both from areas that may become contaminated and from areas where pumping may affect contaminant distributions, and to eliminate, or minimize, future contaminant releases to Coon Creek and subsequently the Mississippi River.

8. Ingestion of Upper Sand Aquifer Water Contaminated by the Landfill. The ground water contamination from the landfill also appears to be confined to the Upper Sand aquifer and to discharge into Coon Creek. As the till layer mounds under the landfill, NAPL could migrate off-site in virtually any direction. Although specific contamination sources may be less significant than the Pit, the area impacted, and therefore the total release, may ultimately be substantial. No receptors exist between the landfill and creek at this time. The response objectives are to control future exposure and minimize future releases to the Upper Sand aquifer, and to eliminate or minimize future contaminant releases to Coon Creek and subsequently the Mississippi River.

9. Ingestion of Lower Sand Aquifer Water Contaminated by a Release from the Upper Sand Aquifer. Although the Lower Sand aquifer does not show any impact from the site at this time, it is an important drinking water source that must be protected. The possibilities for future contamination are primarily if contaminated groundwater flows through the till layer because the existing upgradient is reversed, or heavier than water non-aqeous phase liquids (NAPL) accumulate on the till surface and reach sufficient depth to push through the till against the upgradient. The response objective is to protect the Lower Sand aquifer by controlling vertical gradients and the impact of NAPL accumulation.

10. Ingestion of Water and Fish from Coon Creek. Low level contamination from the site has been found in the creek. The response objective is to eliminate or minimize contaminant loadings to Coon Creek.

11. Ingestion of Exposed Waste/Leachate. Trespassers and on-site investigators/workers could be affected by such an exposure. The response objectives is to prevent exposure to waste/leachates.

12. Dermal Contact with Coon Creek. Although the creek is not an attractive water sport stream, children may play in the creek. The response objective is to eliminate or minimize contaminant loadings to Coon Creek.

13. Dermal contact with Exposed Waste and/or Leachate. Trespassers and on-site investigators/workers could be affected by such an

exposure. The response objective is to prevent direct contact to exposed waste/leachate.

V. Alternatives Evaluation:

A. Response Objectives

The response objectives are listed from the "Exposure Pathways" discussion, above (see IV.C.), as follows:

1. Control potential dust and/or volatilized chemical emissions.

2. Control contact with lime sludge.

3. Control contact with exposed waste/leachate.

4. Minimize contaminant releases to the Upper Sand aquifer.

5. Eliminate or minimize contaminant releases to Coon Creek.

6. Reduce the probability of incompatible waste reactions.

7. Control the effects of possible reactions that may occur.

8. Control future exposure to the contaminated Upper Sand aquifer.

9. Protect the Lower Sand aquifer by controlling the vertical gradient and the impact of heavier-than-water non-aqueous phase liquid (NAPL) accumulation.

10. Control soil gas migration.

B. Alternatives Screened

The Feasibility Study analyzed a wide variety and large number of alternatives to deal with the various releases identified previously. The alternatives are:

1. No Action

2. Capping
   a. Normal Portland Concrete Pavement
   b. Asphaltic Concrete Pavement
   c. In-situ Soil Admixtures
   d. Sprayed-on Covers
   e. Low Permeability Soil Cover Meeting MPCA Solid Waste Rules
   f. Low Permeability Soil Cover Exceeding MPCA Solid Waste Rules

g. Low Permeability Soil Cover to RCRA Performance Standards
h. Synthetic Membranes to RCRA Performance Standards
i. Composite Construction to RCRA Performance Standards

3. Ground Water Cut-Off Wall

   a. Slurry Wall
   b. Sheet Piles
   c. Injected Screens
   d. Grout Curtain

4. Ground Water Pumping

   a. Treatment Options
   b. Disposal Options

5. Leachate Collection Drain

6. Site Grading

7. Waste Removal (Excavation)

8. Deep Well Injection

9. Incineration

10. Landspreading/Biotreatment

11. Temporary Warehousing

12. Off-Site Hazardous Waste Landfill

13. On-Site Hazardous Waste Landfill

14. Landfill Closure

   a. Rodent Control
   b. Maintenance
   c. Final Cover/Vegetation
   d. Gas
   e. Drainage

All of the alternatives were screened in the Alternatives Report (dated April 18, 1986), with some alternatives being eliminated from further consideration. The remaining alternatives, which are discussed below under "Alternatives Considered" (see VII.,B., below), were more fully evaluated in a Detailed Analysis Report (dated October 9, 1986).

C. Alternatives Considered

1. No Action - This alternative discusses actual and potential impacts caused by contamination from the Waste Disposal

Engineering (WDE) Site if no cleanup actions are taken. It is used as a baseline against which other alternatives are compared and includes site monitoring. The alternative includes long-term monitoring and covers the following:

a. Contaminant monitoring in the Upper Sand aquifer through wells along the landfill perimeter, primarily downgradient of the wastes, and within the landfill to act as an earlier warning of releases of contaminants (includes residential wells).

b. Contaminant monitoring in Coon Creek.

c. Monitoring through wells of the Lower Sand aquifer to assure contamination is not occurring and to monitor gradient between the Upper and Lower Sand aquifer.

d. NAPL monitoring wells with sumps to collect NAPL. Wells are proposed for known areas of higher level contamination. In addition, a geophysical investigation is proposed to locate low areas around the landfill where additional monitoring can be placed.

e. Monitoring of gas migrating beyond the landfill.

f. Background wells in the Upper and Lower Sand aquifers, and in Coon Creek to define ambient conditions in areas not contaminated by the landfill.

2. Capping - This alternative involves placing a low permeability cover over the area of concern. The cover would be vented to avoid gas build-up. The cap would eliminate the opportunity for direct contact with the waste, stabilize the waste pile, discourage rodents and other vermin, control odors and vapors, control surface run-off, control dust, promote vapors, transpiration, and control the percolation of water into and through the waste (infiltration). The more water going through the waste, the more leachate (contaminated liquid) produced. There were five capping alternatives considered:

a. Low Permeability Cover Exceeding Minnesota Pollution Control Agency (MPCA) Standards. This cap consists of grass vegetated cover, over 6 inches (") of topsoil, over 6" of sand lateral drainage [hydraulic conductivity (K) around 1 X 10^{-3} centimeters per second (cm/s)], over 24" of compacted clay (K less than or equal to 2 X 10^{-6} cm/s).

b. Low Permeability Cover Meeting Resource Conservation and Recovery Act (RCRA) Performance Standards. This cap consists of grass vegetated cover, over 6" of topsoil, over 30" of clean fill, over geotextile filter fabric, over 12" of sand lateral

drainage (K greater than or equal to 1 X 10^{-3} cm/s), over 24" of compacted clay (K less than or equal to 1 X 10^{-7} cm/s).

c. Synthetic Liner Meeting RCRA Performance Standards. Cap consists of grass vegetated cover, over 6" of topsoil, over 12" of clean fill, over geotextile filter fabric, over 6" of sand lateral drainage (K greater than or equal to 1 X 10^{-3} cm/s), over high density polyethylene synthetic liner, on 6" of sand cushion.

d. Composite System Meeting RCRA Performance Standards. This cap consists of grass vegetated cover, over 6" of topsoil, over 24" of clean fill, over geotextile fabric, over 12" of sand lateral drainage (K greater than or equal to 1 X 10^{-3} cm/s), over high density polyethylene synthetic liner, over 6" of sand cushion, over 24" of compacted clay (K less than or equal to 1 X 10^{-7} cm/s).

e. Lime Sludge Meeting RCRA Technical Performance Standards. This cap consists of grass vegetated cover, over 6" of topsoil, over 30" of clean fill, over geotextile filter fabric, over 12" sand lateral drainage (K greater than or equal to 1 X 10^{-3} cm/s) over 36" of lime sludge (K less than 2 X 10^{-6} cm/s).

3. Groundwater Cut-off Wall with Cap. This alternative involves a cap (see item 2., above) and a low permeability perimeter barrier which would be keyed into the red/brown silt till (the till layer between the Upper and Lower Sand aquifers). The perimeter barrier wall would consist of a soil-bentonite slurry wall which will contain contaminants within the wall. To insure an inward gradient across the wall the groundwater level within the wall would be kept lower than outside the wall. If a leak occurs the inward gradient will cause water to flow into the walled area thereby avoiding discharges outside the wall. Two methods of maintaining the inward gradient are:

   a. Groundwater Extraction Wells. The water level within the wall is lowered by a pump-out well.

   b. Groundwater Collection Drain. The water level within the wall is lowered using perforated pipe connected to a sump. The water in the sump would then be pumped-out.

4. Groundwater Interception and Extraction. This alternative involves a cap (see item 2., above) and interception and removal of contaminated groundwater from the Upper Sand aquifer through creation of a hydraulic barrier.

   a. Groundwater Pumping With Cap. This involves wells to intercept and extract contaminated groundwater from the Upper Sand aquifer downgradient of the waste site.

b. Groundwater Collection Drain. This involves perforated pipe to intercept the flow of groundwater downgradient of the waste site. The pipe leads to a sump. The sump is pumped-out to extract the water.

5. Excavation of the Pit. This alternative involves removal of about 5500 cubic yards of material, including drummed wastes and contaminated soil. Removal is expected to occur at least to the asphalt lining of the Pit. Disposal is expected via one or a combination of the following:

   a. On-site RCRA facility. This would involve redisposal of wastes consistent with RCRA at the site.

   b. Off-site RCRA facility. This would involve transportation and disposal of wastes at an existing compliant facility away from the site.

   c. Incineration of wastes in a rotary kiln incinerator operated at the site. Liquid wastes from quenching and scrubbing would be collected and disposed at a RCRA facility or treated and discharged. Residual materials remaining after incineration would be disposed at a RCRA compliant facility or delisted and buried on-site.

6. Excavation and Disposal and Groundwater Pumping of the Pit Area. This alternative is a combination of items 4.a. and 5, above.

7. Treatment of Extracted Groundwater.

   a. Air Stripping. By exposing contaminated water to the air volatile compounds are removed from the water. This alternative is often used for low level volatile compound contamination or to reduce or eliminate some contaminants prior to treatment with other processes such as activated carbon. As contaminants are discharged into the atmosphere, activated carbon treatment is often required of the contaminated air before it is discharged into the atmosphere.

   b. Carbon Adsorption. Contaminated water is exposed to the activated carbon. The carbon removes contaminants and must be replaced periodically.

   c. A combination of a) and b), above. These technologies can be used together to reduce air pollution caused by air stripping via activated carbon, to increase the life of the activated carbon by air stripping, or to increase contaminant removal efficiencies.

8. Disposal of Extracted Groundwater.

a. Coon Creek. This involves direct discharge to Coon Creek.

b. Publicly Owned Sewage Treatment Works. This involves discharge to a nearby sanitary sewer, which would discharge to the sewage treatment plant.

c. Infiltration. This involves discharge into an in filtration pond, which allows treated water to reenter the Upper Sand aquifer.

d. Irrigation/Evapotranspiration. This involves land application of the discharge.

D. Compliance with Legally Applicable, or Relevant and Appropriate Requirements (ARARs).

Alternatives 2, 3 and 4 involve capping the Site. Resource Conservation and Recovery Act (RCRA) requirements for closure of a RCRA landfill is an ARAR for capping the Site.

Alternatives 3 and 4 involve groundwater extraction and discharge. If discharge is to Coon Creek (alternative 8.a.) or land application (alternative 8.d.), National Pollutant Discharge Elimination System (NPDES) permit requirements are an ARAR. If discharge is to the sanitary sewer (alternative 8.b.) an agreement with the Metropolitan Waste Control Commission (MWCC) in accordance with its pretreatment program under the Clean Water Act is an ARAR.

Alternatives 2, 3 and 4 must attain Army Corps of Engineer 404 permit requirements for construction of the cap in the floodplain. Filling of wetlands in the floodplain must also meet these requirements.

Alternatives 1, 2, 5 and 6 would allow continued discharge of contaminated water to Coon Creek where Water Quality Criteria and drinking water standards (for the Mississippi River) would apply.

Alternatives 2 through 8, would involve air emissions either through excavation or through ground water extraction and treatment which must be considered under the Clean Air Act and State requirements.

E. Reduction of Toxicity, Mobility, or Volume

Alternative 1 does not reduce toxicity, mobility, or volume.

Alternative 2 will reduce the mobility of contaminants in the waste and the volume of contaminants entering the groundwater by restricting infiltration through the waste. Because the volume and mobility of contaminants is reduced, the toxicity of the contaminated groundwater is reduced.

Alternative 3 has the advantages of alternative 2 plus it further reduces the mobility, toxicity and volume of contaminated groundwater and NAPL discharges off-site by containing them within the barrier. A concern is that if not extensively monitored, NAPL discharges may pool along the barrier wall and that the weight of the NAPL will cause it to penetrate and contaminate the Lower Sand aquifer. Consequently, the barrier is considered more desirable for a smaller area which can be more easily monitored (i.e., the Pit).

Alternative 4 has the advantages of alternative 2, plus it further reduces the mobility, toxicity, and volume of contaminated groundwater by creating a hydraulic barrier to contain such contamination on-site, as well as reduce it through groundwater extraction. This alternative does not contain NAPL discharges.

Alternative 5, by exposing deteriorating drums of incompatible wastes, has a potential for causing a significant increase in the toxicity, mobility, and volume of contaminant discharges to the air and groundwater during the excavation and handling of wastes. The long-term reduction of toxicity, mobility and volume of contaminants from the material excavated would be significant, after the risks of excavation are experienced. This would not affect contamination of the groundwater from the rest of the landfill.

Alternative 6 has the benefits of alternatives 4 and 5 for the contaminated groundwater around the Pit area.

F. Short-term Effectiveness

Alternative 1 would not be effective in addressing contamination from the site. It would monitor conditions at the site.

Alternative 2 would cause short-term impacts due to construction of the cap. These would include noise from heavy equipment, dust, and increased chances for direct contact with wastes by construction personnel. If the lime sludge is not used, exposure of wastes, and removal and disposal of the lime sludge would cause additional risks. The chances for contact with wastes, contaminated gas releases, and infiltration through the wastes would be reduced by the cap.

Alternative 3 would pose risks associated with alternative 2 plus risks to workers placing the barrier wall. Groundwater contamination and NAPL discharges within the barrier would be contained. NAPL levels for the Pit barrier alternative would be reduced, as needed, within the barrier by extraction wells.

Alternative 4 would pose risks associated with alternative 2 plus some minimal short-term risk during construction to workers. Groundwater contamination would be contained and reduced through groundwater extraction. NAPL would not be contained.

Alternative 5 would pose significant short-term risk due to the excavation and handling of incompatible wastes. Workers, local populations, the air, groundwater and surface water could be impacted by short-term discharges.

Alternative 6 has short-term impacts of alternatives 4 and 5 except that to the extent the sources of NAPL are removed without incident, there would no longer be sources of NAPL from the Pit.

G. Long-term Effectiveness and Permanence

Alternative 1 would not be effective in addressing contamination from the site. Continuous professional management would be required to assure that responses could be initiated based on the monitoring. The determination and timeliness of required actions would also be of concern. The reliability of this alternative alone is suspect due to the complexity of the management required.

Alternative 2 would require long-term care of the cap. The chances for contact with the wastes, contaminated gas releases, and infiltration through the wastes would be reduced. The lime sludge cap has greater long-term risks due to uncertainties in the use of lime sludge. Its advantages are it is already on-site, and if not used, would be a significant disposal problem as it would need to be removed.

Alternative 3 would require care and monitoring of the barrier wall. Groundwater contamination and NAPL within the barrier wall would be contained. For the landfill, where NAPL could accumulate undetected against the barrier wall due to the lenth of such a wall, there would be additional concern due to the potential that such an event could cause contamination in the Lower Sand aquifer over the long term. NAPL accumulation is expected to be detected by monitoring wells and controlled by pumping out those wells within the smaller Pit barrier, if necessary. Any breach in the wall could be discovered by the increased pumping rates necessary to maintain an inward gradient across the wall. Replacement would be expensive.

Alternative 4 would require minimal additional construction. Groundwater interception and extraction is commonly used, reliable, and replacing wells is relatively inexpensive. Long-term operation and maintenance is required. Groundwater contamination is contained and reduced. NAPL is not contained.

Alternative 5 would require long-term care of any excavated contaminated materials remaining on-site. If disposed off-site, risks due to transportation, accidents, and redisposal would occur. If contained on-site, some leakage of the containment facility and spreading of contamination is possible, although less than from the existing Pit. Long-term care would be required of an on-site facility.

Long-term NAPL discharge from excavated materials would not be expected.

Alternative 6 is a combination of alternatives 4 and 5 for the Pit and would have the same impacts.

H. Implementability

Alternative 1 is easily implemented, but less reliable than other alternatives.

Alternative 2 is common and easily constructed. Caps utilizing liners would be more difficult due to the need to reduce slopes such that the liner would not tear.

Alternatives 3 and 4 would be required to meet National Pollutant Discharge Elimination System (NPDES) permit requirements for discharges to Coon Creek, or an agreement with the publicly owned sewage treatment works for discharge to the sanitary sewer. Alternative 3 could be more difficult to construct such that adequate containment is achieved. Alternative 4 is common and easily constructed. Capture zones can be measured to assure adequate coverage. NAPL would not be addressed.

Alternative 5 would be difficult due to the need to excavate the wastes, and, in the case of incineration, site an incinerator. Also, some wastes may be prohibited from being landfilled.

Alternative 6 would be the same as 4a and 5 except NAPL would be addressed if not caused during excavation.

Alternative 8a would be reliable and would require the equivalent of an NPDES permit. Implementability is expected to be easy, however this cannot be assured until the permit conditions are known during design.

Alternative 8b would be reliable and would require compliance with the pretreatment requirements of the POTW. Implementability is technically easy, however problems with acceptance by the POTW due to the dilute nature of the waste stream and depletion of the area's growth capacity allocation at the POTW are concerns.

Alternative 8c would be easily implemented, outside problems with land aquisition, but causes concern due to the addition of water to an area of the Upper Sand aquifer, just south of the Site, where a downgradient exists between the Upper and Lower Sand aquifers. This would also increase concerns about creation of a downgradient under the landfill itself.

Alternative 8d would require the equivalent of an NPDES permit, but is not considered reliable for the cold climate at the Site.

I. Cost

1. Alternative 1 has a capital cost for monitoring of $70,000 plus a present worth (PW) of operations and maintenance (O & M) of $647,529 for a total PW of $717,529.

2. Alternative 2 costs are as follows:

Type of Cap	Capital Cost of Cap	PW of O & M of Cap	Total PW of cap	Total PW including monitoring (alternative 1)
a. Cap meeting MPCA Standards	$ 4,697,280	235,673	4,932,953	5,650,482
b. Cap Exceeding MPCA Standards	9,101,736	235,673	9,337,409	10,054,938
c. Soil RCRA Cap	12,709,760	235,673	12,945,433	13,662,962
d. Synthetic Liner RCRA Cap	12,652,220	820,107	13,472,327	14,189,856
e. Composite RCRA Cap	19,119,365	235,673	19,355,038	20,072,567
f. Lime - sludge RCRA Cap	8,196,500	235,673	8,432,173	9,149,702

(The Pit was also considered alone. However, since the Pit was found to have several feet of clay capping already, no additional cap was needed. Had the clay not been there, a less permeable cap might have been needed for the asphalt-lined Pit to keep water from accumulating in the Pit.)

3. Estimated costs for alternative 3 are as follows:

a. For the Landfill (must also add alternative cap cost):

Type of System	Capital Cost of System	PW of O & M of System	Total PW of System
i) Groundwater Cut-off Wall with collection drain	$ 5,238,996	123,753	5,362,749
ii) Groundwater Cut-off Wall with	4,770,976	123,753	4,894,729

extraction well

b. For the Pit:

i) Wall with drain	389,536	86,308	475,844
ii) Wall with well	302,723	86,308	389,031

4. Estimate costs for alternative 4 are as follows:

a. For the Landfill (must also add cap cost):

i) Groundwater Pumping with Extraction well	812,000	41,478	853,478
ii) Leachate collection	1,452,500	41,478	1,493,978

b. For the Pit:

i) Well	127,120	90,498	217,618
ii) Drain	201,495	51,376	252,871

5. Estimated costs for alternative 5 are as follows:

a. Excavation and Off-site Landfill			
i) Emelle, Alabama	2,810,851	37,708	2,848,559
ii) Chicago, Illinois	1,963,851	37,708	2,001,559
b. Excavation and On-site Landfill	645,051	37,708	682,759
c. Excavation and On-site Incineration	6,275,851	37,708	6,313,559

6. Estimated costs for alternative 6 are as follows:

a. Excavation and Off-site Disposal with Groundwater Pumping			
i) Emelle, Alabama	2,935,171	41,478	2,976,649
ii) Chicago, Illinois	2,088,171	41,478	2,129,649
b. Excavation and On-site Disposal with Groundwater Pumping	744,171	41,478	785,649

7. Estimate costs for alternative 7 (ground water treatment) are as follows:

a. For the Landfill

i) Carbon Adsorption

*) Ground water pumping	91,000	470,138	561,138
**) Ground water pumping within cut-off wall	91,000	355,295	446,295
ii) Air Stripping	84,000	263,953	347,953

b. For the Pit

i) Carbon Adsorption

*) Ground water pumping	91,000	162,319	253,319
**) Ground water pumping within cut-off wall	91,000	44,670	135,670
ii) Air Stripping	84,000	44,306	128,306

8. Alternative 8 (ground water disposal) estimated costs are as follows:

a. For the Landfill

i) Coon Creek	28,700	381,789	410,489
ii) Sewage Treatment Plant	413,280	488,125	901,405
iii) Infiltration Pond	256,500	245,099	501,599
iv) Irrigation	322,000	324,285	646,285

b. For the Pit

i) Coon Creek	28,000	362,936	390,936
ii) Sewage Treatment Plant	371,280	265,160	636,440
iii) Infiltration Pond	97,500	245,099	342,599
iv) Irrigation	189,000	324,285	513,712

J. Community Acceptance

The community has been involved in the planning process as described later in Section XI. Information in the RI assisted in the lifting of a well advisory by the Minnesota Department of Health. Initially removal of the Pit was considered desirable. However, as discovered during the RI/FS investigation of the site, there are hazards involved in excavation and the benefits are not as great as originally thought, considering industrial wastes have

been disposed throughout the landfill, not just in the Pit. Presently, there is concern that sewer capacity, and therefore growth, is adversely affected if extracted ground water is discharged to the sanitary sewer. The timeliness of the process has also been questioned.

K. State Acceptance

The MPCA has approved the Detailed Analysis Report, as modified under the Consent Order. That report, as modified, includes the selected alternatives described herein as its recommended alternative.

L. Overall Protection of Human Health and the Environment

1. Ability to Meet the Response Objectives Listed in V.A., Above:

a. No Action (alternative 1). This alternative provides, through monitoring, information on which the need for response could be made, although the long-term management required to determine when and what response is called for, and the timeliness of such response are concerns. It does not provide protection of any receptor or potential receptor of contaminated releases.

This alternative does not meet any of the listed response objectives.

b. Capping only (alternative 2). A cap would meet objectives 1, 2, and 3 by covering the landfill. Objective 10 would be achieved by vents in the cap. Objective 7 would be met somewhat by the bulk and weight of the cap. Over the long-term a cap would reduce contaminant releases to the Upper Sand aquifer (partially addressing objective 4) by reducing infiltration through the landfill. Reduced contaminant releases to the Upper Sand aquifer would reduce Coon Creek releases (partially meeting objective 5). Objectives 6, 8 and 9 are not met by this alternative.

Capping alternatives vary mainly in the amount of infiltration they allow into the landfill.

c. Groundwater Cut-Off Wall with Cap and Groundwater Extraction Well(alternative 3a). This alternative would consist of a cap, a clay cut-off wall around the entire waste area which would be keyed into the till layer, and a ground water extraction well to maintain an inward gradient within the cut-off wall such that in the event of leakage through the wall water would flow into, not out of, the walled area. This alternative would meet all of the objectives of capping (see item b., above). In addition, objective 4 would be met to a greater degree. A major known source area which contributes to the primary

contaminant plume in the Upper Sand aquifer would be contained. Objective 5 would be met as the source of contamanents to Coon Creek through the groundwater would be eliminated through containment. For the Pit, a small area, the NAPL would not be allowed to accumulate significantly due to the monitoring/pump-out wells (objective 9 is met for the Pit area only). For the landfill, due to the larger area encircled by the wall, it is possible that NAPL could accumulate along the wall without detection, increasing the probability of contamination of the Lower Sand aquifer (objective 9 is not met). NAPL would not be allowed to migrate along the till away from the walled area which reduces the chances of exposure to the NAPL (objective 8). Objective 6 is not met by this alternative, nor is the maintenance of an upward vertical gradient.

d. Groundwater Cut-off Wall, with Cap and Groundwater Collection Drain (alternative 3b). This is similar to item c., above.

e. Groundwater Pumping with Cap (alternative 4a). This is similar to item c., above, except that objectives 8 and 9 are not met because NAPL would not be contained.

f. Leachate Collection Drain with Cap (alternative 4b). This is similar to item e., above.

g. Excavation and Off-site Disposal of the Pit (alternative 5b). Excavation of the Pit poses the greater risk of significant short-term releases associated with objectives 1, 2, 3, 6, and 7 due to excavation activities and handling of wastes while exposing them to the air. This alternative meets objectives 4, 5 and the NAPL portion of objective 9. Objective 8 is met to the extent that NAPL discharges are eliminated. Objectives 1, 2, 3, 6 and 7 would be met in the long-term after the short-term risks are endured.

h. Excavation and On-site Disposal of the Pit (alternative 5a). This is similar to item g., above, except over the long-term there is a continuing potential for remaining wastes to leak, which would mean objectives 4 and 5 would be met to a lesser degree.

i. Excavation and On-site Incineration (alternative 5c). This is similar to item g., above.

VI. Selecting the Recommended Alternative

The Detailed Analysis Report, prepared by potentially responsible parties in accordance with a Consent Order issued by U.S. EPA and MPCA, recommended implementation of the following alternative response action which, in concert, are expected to reliably and cost-effectively protect public health, welfare and the environment by physically isolating the buried waste to eliminate direct contact exposures and minimize liquid migration; to capture, remove, and treat all

contaminated ground water currently leaving the WDE Site and eliminate releases of hazardous substances to receptors; to prevent the migration of NAPL from the Pit area; and to monitor and control gas migration from the Site. The selected remedy consists of:

A. Extensive monitoring program to monitor for gas, dissolved contaminants, and NAPL at the perimeter of the WDE facility.

B. Installation of a soil cap, incorporating the existing lime sludge at the WDE Site as the low permeability layer, which will meet RCRA Performance Standards.

C. Installation of a ground water extraction system along the northern boundary of the facility to intercept contaminated ground water leaving the WDE Site and currently entering Coon Creek.

D. Treatment of contaminated ground water using air stripping and/or activated carbon (possibly with pretreatment for other contaminants). Treated water will be discharged to Coon Creek.

E. Institutional controls to: 1) avoid wells near and under the Site in the Upper Sand aquifer, and; 2) as a precautionary measure to be considered to limit additional wells in the Lower Sand aquifer near the Site to help assure continued maintenance of the upward vertical gradient between the Upper and Lower Sand aquifers.

The Detailed Analysis Report was approved with modifications by the MPCA and U.S. EPA. The most significant modification was to add another component to the set of response action alternatives recommended in the DAR. The additional response action involves the installation of a slurry wall around the Pit (keyed into the red-brown silt till) and a separate ground water pump-out and NAPL control system exclusively for the Pit. In addition, the cap is upgraded to be more in conformance with RCRA technical guidance standards. Thirdly, a geophysical survey will be conducted to better design the NAPL monitoring network. Fourthly, the overall gas and ground water monitoring network is upgraded to cover the perimeter of the WDE Site. Finally, a wetland between the WDE facility and Coon Creek will be filled because it does receive periodic leachate discharges and will be replaced with a newly constructed wetland.

The recommended alternatives, in concert, deal with the WDE Site as a whole because of the size of the former facility (up to 40 feet of wastes over 73 acres), the disperse nature of concentrated sources of hazardous waste (known and unknown "hot spots"), and the deteriorating condition of the present site cover. Much attention was focused upon excavating the Pit because its location is well defined and it is clearly having a significant current impact on ground water and Coon Creek. However, the Pit represents 10% of the hazardous wastes disposed at the Landfill so excavation of the remaining wastes from the Pit would not make a significant difference in the

long-term when looking at the site as a whole. The concentration of wastes in the Pit, including acids, caustics, cyanides, flammables, and solvents, does pose a severe safety risk to workers and the surrounding residential areas due to reactions of incompatibles. A test excavation of the Pit conducted in June, 1986, indicated that many of the wastes are in deteriorated containers or have already been released from ruptured containers. Many of the reactives are in plastic containers and are extremely difficult to locate by detecting equipment or excavation equipment. Even if wastes were excavated successfully from the Pit, some wastes will be extremely difficult, if not impossible, to dispose in the near future and this situation is aggravated even more by the implementation of RCRA amendments, including the "land ban," which prohibits land-filling certain types of wastes. The costs for excavation of the Pit and disposal are estimated to range from $ 0.7 to 6.3 million dollars, depending upon the disposal method (on-site land disposal, off-site land disposal, incinerators). Since landfilling the excavated wastes (on-site or off-site) may not be implementable due to land ban considerations, the $6.3 million for on-site incineration is probably the more realistic cost estimate for disposing the excavated wastes. Also, off-site land disposal is the least preferred option for dealing with these wastes per Section 121 of CERCLA. Even with the excavation of the Pit, response actions for the entire WDE Site (adequate cap, ground water extraction and treatment system, gas monitoring, ground water monitoring, NAPL monitoring) are necessary, in large part due to the disperse and unknown pattern of past waste disposal. Containment of Pit wastes, in combination with the other response actions, will accomplish the same overall objectives as excavation of the Pit. Excavation of the pit would only eliminate the need for a slurry wall about the Pit. Because of the obvious safety concerns, disposal difficulties with excavated wastes, high cost ($6.3 million), and remaining need for other response actions, the effectiveness of excavation is minimal. However, some control of the release from the Pit would be effective in reducing the existing impact on Coon Creek and mitigate any NAPL releases that may occur. A slurry wall around the Pit, with its own ground water extraction system and NAPL monitoring/extraction system, will minimize the continued release beyond the Pit and will avoid the severe safety risks and disposal problems faced with excavation.

A wide variety of capping alternatives were evaluated. The fact that the site is a former, but recently active landfill, necessitates the use of flexible, self-healing caps to cope with differential settlement. This condition rules out the use of non-flexible covers (cement, asphaltic - concrete, soil admixtures). The fact that hazardous wastes were disposed at the Site throughout the landfill justified the need for a cap meeting RCRA requirements, thus ruling out conventional

landfill caps. However, the presence of up to 8 feet of lime sludge over the Site poses difficulties in placing a new RCRA cap. Removal of the lime sludge would result in a disposal problem of the lime sludge and potentially expose waste. On the other hand, the lime sludge has very low hydraulic conductivity (10^{-5} to 10^{-6} cm/sec) and excellent self-healing properties. There is a tremendous advantage to incorporating the lime sludge into a RCRA design cap. The cap will consist of a minimum of 36 inches of stabilized lime sludge, overlain by a 12-inch sand lateral drainage layer, overlain by a 30-inch layer of general fill, and completed with a 6-inch layer of topsoil that would be vegetated (see Attachment 17). The Remedial Design will incorporate some adjustments in surface slope, slope of drainage layer, grain size of fill, and thickness of lime sludge in order to meet RCRA performance standards.

The cap will completely cover the presently defined limits of waste disposal (73 acres) and will incorporate the existing lime sludge that would otherwise have to be disposed. It will minimize the migration of liquids, provide excellent rodent/vector control, eliminate exposed wastes and leachate seeps. The fact that there are wastes below the water table and liquid wastes (bulk and containerized) were disposed throughout the landfill necessitate the need for extensive ground water extraction and treatment which, in turn, may provide some flexibility in cap design and performance.

As noted earlier, ground water in the Upper Sand aquifer is seriously contaminated and is entering Coon Creek, adversely affecting the quality of Coon Creek. Wastes are disposed below the water table and liquid wastes (bulk and containerized) and sludges were dumped throughout the landfill. Although the most serious contamination detected to date is associated with the Pit, monitoring wells located within the landfill have identified other, scattered "hot spots". There are certainly expected to be many more, unidentified and unlocated hot spots buried in up to 40 feet of wastes. Because it is impractical to locate and control all potential hot spots, an overall site, ground water remedy is required.

The ground water extraction system is the only effective means of preventing contaminated ground water from entering Coon Creek. The use of a drain system is not as effective as extraction wells (particularly for potential NAPL), more difficult and costly to install, and more prone to deterioration and failure than extraction wells. Wells can be installed quickly and easily, have a proven reliability, are easily repaired or replaced if they do fail, can be easily adjusted in terms of performance, and do not pose the risk of encountering wastes that exists with trenching a drain system.

Not only will the ground water extraction system prevent contaminated ground water from entering Coon Creek, it will also increase the difference of hydraulic potential between the Lower Sand aquifer and Upper Sand aquifer and enhance the upward gradient, further minimizing the potential for contaminants to migrate downward.

Excavation of the Pit has already been discussed. Excavation of the entire landfill (over 2.5 million cubic yards of wastes) was viewed as impracticable for lack of disposal options, extremely costly ($48 million for excavation alone), and extremely hazardous due to scattered presence of the equivalence of 60,000 to 100,000 barrels of hazardous wastes plus unknown quantities of other special wastes or infectious wastes.

VII. Recommended Alternative

A. Description

In order to control and prevent all existing releases from the Site (Coon Creek discharge, leachate seeps, exposed wastes) and potential future releases (ground water contaminant migration, NAPL generation/migration, gas migration), a number of different remedial alternatives are necessary. The alternatives include ground water extraction from the Upper Sand for the entire Site, air stripping/carbon treatment of the contaminated ground water and likely discharge under an NPDES permit, slurry wall around the Pit with its own ground water extraction system and NAPL monitoring system, and a cap over the entire Site incorporating the existing lime sludge covering the Site and meeting RCRA requirements, and long-term monitoring of the Upper Sand and Lower Sand aquifers.

The ground water extraction system will consist of six eight-inch wells, screened throughout the entire saturated thickness of the Upper Sand, pumping approximately 10 gallons per minute continuously, and located between the landfill and Coon Creek (see Attachment 18). The extraction system will effectively intercept all contaminated ground water migrating from the Site in the Upper Sand aquifer and currently entering Coon Creek. The ground water removed by the system would be treated, using air stripping or activated carbon or both depending upon the actual hydraulic and chemical loadings and NPDES limitations (other pretreatment may be necessary). The preferred discharge would be to Coon Creek meeting NPDES permit requirements. Final decisions on the treatment and disposal options must await detailed design, pilot testing, and permit requirements. The extraction system will be active indefinitely, and will greatly reduce, if not eliminate, any loadings to Coon Creek and prevent contamination of those

private wells north of Coon Creek. Normally, ground water remedial systems are active until all ground water that is moving beyond a Site boundary, at the very least, meets drinking water standards. The ground water in the Upper Sand is so severely contaminated and the releases will be ongoing from scattered sources in the Site for an indefinite period, precluding any chance of shutting down the system within a projected time frame.

The Pit is the current major source of contaminant loading to the Upper Sand aquifer and to Coon Creek. The Pit also has the highest potential for NAPL generation, although no NAPL has been clearly detected to date. In order to provide confinement of any potential NAPL that might be released and maximize removal of heavily-contaminated ground water, a slurry wall will be installed completely around the Pit (Attachment 19) and keyed into the existing red-brown till. The slurry wall will be a soil-bentenite mixture, at least 2 feet thick, having a conductivity less than $1x10^{-7}$ cm/sec. The slurry wall is designed to trap releases from the Pit for recovery via the extraction well, manhole pumpout, and NAPL recovery wells. An 8-inch extraction well will be installed on the upgradient end of the area enclosed by the slurry wall, will pump an estimated 90 gallons/day to maintain a lower piezometric level within the slurry wall and an inward gradient across the slurry wall. Maintaining the inward gradient will minimize the migration of dissolved contaminants across the slurry wall. Extracted groundwater will be treated with the rest of the boundary groundwater extraction system.

The extraction well will be screened about 10-15 feet below the water table. The existing manhole is completed to the bottom of the Pit. Any liquids detected in the manhole will be pumped out to minimize liquid releases from the Pit. NAPL monitoring wells (4 well nests of paired wells) will be located outside the Pit but within the slurry wall. The wells will be equiped with sumps for NAPL detection and recovery. One well of each pair will be completed at the top of the gray till and the other well at the top of the red till. Any NAPL will be recovered using these wells (see Attachment 20).

The cap over the entire site will consist of lime sludge that largely covers the 73-acre site already. The lime sludge has a hydraulic conductivity on the order of 10^{-5} to 10^{-6} cm/sec. The intent is to meet RCRA performance standards. The lime sludge will be graded, stabilized, and compacted to achieve a thickness of at least 3 feet, overlain by a 12 inch sand drainage layer (hydraulic conductivity of greater than 10^{-3} cm/sec.), a geotextile filter fabric, 30 inches of fill, and 6 inches of topsoil with a grass vegetation cover. The surface slope will be at least 3.5 percent. Altogether, 48 inches of fill will cover the lime sludge zone. The lime sludge is

self-healing when it does not become dessicated; which is the condition currently existing in portions of the Site. The 48 inches of cover over the lime sludge will maintain adequate moisture to maintain the lime sludge (just like a clay layer), will prevent erosion of the fine grain lime sludge, and will provide protection from frost heaving. The Remedial Design. will require further permeability testing, and adjustments to surface slope, slope of drainage layer, grain size of fill, and thickness of lime sludge in order to meet the RCRA performance standards. Institutional controls (deed restrictions) will be required to prevent installation of drinking water wells or other action which could jeopardize the integrity of the cap.

Gas generation and migration (both for methane and for specific volatile organics) has been documented, particularly west of the landfill. Gas vents will be installed below the lime sludge layer through to the surface. The gas vents will be fitted with granular activated carbon filters to remove organic contaminants (see Attachment 21).

In order to monitor the effectiveness of the response actions and to ensure contaminants do not migrate into Coon Creek, beyond Coon Creek in the Upper Sand aquifer, into the Lower Sand and gas does not migrate in the unsaturated zone, an extensive array of gas probes, ground water monitoring wells in the Lower Sand aquifer and Upper Sand aquifer, NAPL monitoring wells in the Upper Sand aquifer, the manhole in the Pit, and sampling points in Coon Creek will be monitored. Any Coon Creek discharges would be monitored as part of NPDES permit requirements. Monitoring stations will be located on all sides of and within the landfill and will include approximately 28 ground water monitoring wells, 10 NAPL monitoring wells, 3 surface water stations, 10 gas probes, the manhole in the Pit, and selected, but as yet, undetermined number of private wells (see Attachment 21). The monitoring system will assess the effectiveness of the response actions already discussed and will monitor all routes of current releases (Pit release towards Coon Creek and potential releases of NAPL).

In order to enhance the monitoring network for NAPL migration beyond the Site) to deal with the concern of multiple, unlocated sources - "hot spots"), geophysical surveys will be conducted along the perimeter of the landfill (500-foot radius about the landfill) in order to identify low areas in the till for placement of NAPL monitoring wells.

A related response action involves filling wetland areas between the landfill and Coon Creek because they do receive seepage intermittently from the Site. In order to discourage migrating water fowl and other wildlife from inhabiting this area, the wetlands will be filled in accordance with applicable U.S. Army Corps of Engineering (COE) and U.S. Fish and Wildlife

Service (FWL) requirements, including mitigation. The actual location(s) of any new wetlands must be negotiated between the City of Andover, Anoka County, the Minnesota Department of Natural Resources, MPCA, FWL, COE and U.S. EPA.

B. Costs

The costs of the recommended alternatives for response actions are broken down into capital costs (generally construction or requisition costs), operation and maintenance costs, and a total present worth cost (10 percent discount rate and 30 year life).

The costs are delineated for each component of the response action as follows:

	Capital Costs	Present Worth O & M	Total Present Worth
Capping of Site	$8,196,500	$235,673	$8,432,173
Ground Water Extraction			
Construction	812,000	41,478	853,478
Treatment			
Carbon Treatment	91,000	470,138	561,138
Air Stripping	84,000	44,306	128,306
Disposal			
Coon Creek NPDES	28,700	381,789	410,489
Slurry Wall With Extraction Well	302,723	86,308	389,031
Site Monitoring	70,000	647,529	717,529
Filling of Wetland	3,837	-0-	3,837
Total	9,504,796	1,862,915	11,367,675

(for carbon treatment and Coon Creek disposal)

VII. Applicable or Relevant and Appropriate Requirements

A. General Discussion

Section 121(d) of SARA requires that remedial actions comply with legally applicable or relevant and appropriate requirements (ARARs) of Federal environmental laws and more stringent, promulaged State laws.

"Applicable" requirements are cleanup standards, standards of control and other substantive environmental protection requirements, criteria or limitations promulgated under Federal or State law that specifically address a hazardous substance, pollutant contaminant, remedial action, location or other circumstance at a site. A requirement is "applicable" if the remedial action or circumstances at the site satisfy all the jurisdictional prerequisites of the requirement. "Revelant and appropriate" requirements are cleanup standards, standards of control and other environmental protection requirements, criteria or limitations promulgated under Federal or State law that, while not "applicable" to the remedial action or circumstances at the site, address problems or situations sufficiently similar to those encountered at the site that their use is well suited to the remedial action at the site.

Non-promulgated advisories or guidance documents issued by Federal or State governments do not have the status of potential ARARs; however, where ARARs do not exist, or for some reason may not be sufficiently protective, non-promulgated advisories or guidance documents may be considered in determining the necessary level of cleanup for protection of human health and the environment. See Interim Guidance on Compliance with Applicable or Relevant and Appropriate Requirements dated July 9, 1987. State of Minnesota Recommended Allowable Limits (RALs) fall into this category.

This section identifies the requirements of environmental laws, regulations and polices that are applicable or relevant and appropriate standards for the recommended alternative for remediating the site.

Ground water protection standards have been established under RCRA, at 40 CFR Section 264.94. RCRA regulations apply to facilities treating, storing and disposing of hazardous waste as of November 19, 1980. Such facilities were required to apply for an operating permit by that date. Such facilities are further required under Section 3004(u) of RCRA and 40 CFR 264.101 to institute "corrective action" as set forth in the permit, to remedy releases of hazardous waste and constituents from any "solid waste management unit" at the facility. The ground water protection standards at 40 CFR 264.94 are to be established in permits and apply to any solid waste management

units which received waste after July 26, 1982. The ground water standards serve both as a trigger for requiring corrective action to remedy a release from such a solid waste management unit, and as clean-up standards for the corrective action. However, because no hazardous waste was placed in this area after July 26, 1982, the ground water protection standards of 40 CFR 264.94 are not "applicable" under RCRA to this solid waste management unit. They may, nevertheless, be "relevant and appropriate" as clean-up standards for this ground water remedial action.

There are three types of standards established under 40 CFR 264.94: Background levels, Listed Maximum Concentration Limits and Alternate Concentration Limits (ACLs). The regulations specify that the standard for concentrations of hazardous constituents in ground water in a facility permit must not exceed the background level or a listed maximum concentration limit or an ACL established by the Regional Administrator.

1. Listed Maximum Contaminant Levels. To date, Maximum Concentration Limits under RCRA have been established for fourteen chemicals. These limits are based on and are identical to the Safe Drinking Water Act MCLs for these chemicals. None of these listed chemicals are contaminants in the ground water at the WDE site.

2. Background Levels. The background level is that level of a chemical in the ground water in an area not impacted by contaminants in the ground water at the WDE site.

3. ACLs. U.S. EPA may establish ACLs in lieu of background levels or listed maximum concentration limits of the ACL "will not pose a substantial present or potential hazard to human health or the environment as long as the [ACL] is not exceeded." 40 CFR 264.94(b).

Standards for specific contaminants have been promulgated under the Safe Drinking Water Act (SDWA) to protect public drinking water systems. Standards set under the SDWA are usually relevant and appropriate when groundwater is being cleaned up at Superfund sites. Since this remedy creates an hydraulic barrier to prevent movement of contaminated groundwater to off-site areas, the remedy would comply with the SDWA and RCRA corrective action requirements. Under RCRA, the point of compliance would be set at the landfill boundary (at groundwater extraction system). The SDWA standards are not ARARs for on-site areas in this case, since institutional controls will prevent any potential use of the contaminated groundwater.

The Federal Clean Water Act (CWA), 33 U.S.C. 1251, et. seq., as amended, requires U.S. EPA to establish water quality criteria for bodies of water, based on effects of pollutants on

human health and aquatic life. 33 U.S.C. 1314. Section 121 of CERCLA states that remedial actions shall attain these water quality criteria where they are relevant and appropriate under the circumstances of the release, based on the usage or potential usage of the water receiving the release. By eliminating contaminated groundwater discharges the selected remedy will assure continued maintenance of these criteria in Coon Creek and should result in attainment of these criteria in the groundwater north of Coon Creek (methylene chloride presently exceeds criteria. The existing concentration of contaminants in Coon Creek should be brought well below the 10^{-6} risk levels and other freshwater criteria established under the CWA.

The Federal Clean Water Act limits construction activities in floodplains and wetland through Section 404. The Army Corps of of Engineers administers these requirements through permits. Since the proposed response action will involve construction of a cap in the floodplain and the filling of wetlands, compliance with applicable permit requirements established by the COE, FWL and U.S. EPA, including mitigation, is appropriate.

The Federal Clean Water Act limits discharges to waterways. Individual discharges are regulated through National Pollutant Discharge Elimination System (NPDES) permits. (40 CFR Part 122) the State administered water quality program is substantially equivalent to the Federal NPDES requirements. The discharge limits established in the NPDES permit process are designed to preserve the present use designation of the receiving waters and potential downstream uses. Coon Creek is currently designated as a partial body contact, warm water fishery. The NPDES regulations are an ARAR for effluent from Superfund site treatment plants which discharge offsite. Water quality-based NPDES permit limits will be based in part on stream criteria and may include more stringent limits or whole effluent toxicity limits to protect against interactive effect of toxicants. NPDES permit limitations will be required for discharges of treated groundwater to Coon Creek.

During the design phase of the project the potential for discharge to the POTW will be examined further. In order to discharge from a Superfund site to a POTW, certain factors must be considered which are identified in a policy memorandum dated April 15, 1986, "Discharge of Wastewater from CERCLA Sites into POTWs" from Henry L. Longest, Director, Office of Emergency and Remedial Response, Rebecca Hanner, Director, Office of Water Enforcement and Permits, and Gene Lucero, Director, Office of Waste Programs Enforcement, to Waste Management Division Directors, Regions I-X. These factors are listed below.

(1) Potential of pollutants to cause pass through or interference, including a health hazard to employees at the POTW.

(2) The ability of the POTW to ensure compliance with applicable treatment standards and requirements.

(3) The POTW's record of compliance with the NPDES permit and pretreatment program requirements.

(4) The potential for volatilization of the wastewater and its impact upon air quality.

(5) The potential for ground water contamination from transport of CERCLA wastewater to the POTW, and the need for ground water monitoring.

(6) The potential effect of the CERCLA wastewaters upon the POTW's discharge into receiving waters.

B. Site Discussion

The overall objective of any response actions are to permanently or significantly reduce the volume, toxicity, or mobility of the hazardous substances, pollutants, or contaminants. However, dealing with sites on the scale of the WDE Site (equivalent of 60,000 - 100,000 barrels of hazardous wastes within 2.5 million cubic yards of solid waste) is extremely difficult, particularly in regard to reducing the volume and toxicity. Although excavation of the Pit may potentially reduce the volume and toxicity of hazardous substances, the Pit does represent only an estimated 10 percent of the hazardous substances disposed at the Site. The remaining wastes are scattered throughout the landfill. The nature of the Site is such that response actions must deal with the Site in its entirety and, therefore, focus on controlling the mobility of the hazardous substances. The lime sludge cap is designed to isolate the wastes from direct contact, to limit the mobilization of liquids and generation of leachates, and control gas migration. It should meet RCRA performance requirements and will incorporate the existing lime sludge cover at the Site. The cap does satisfy MPCA requirements for general landfill caps and Anoka County requirements for cap closures. This cap will also need to satisfy the State closure requirements for the SW-28 permit issued in 1971.

If the lime sludge cap were not utlized as a cap, the excavation and disposal of the lime sludge will be a significant problem in and of itself, in addition to concerns about exposed wastes and physical hazards.

The ground water extraction system will require carbon treatment and/or air stripping, with a discharge of the treated effluent to Coon Creek. The ground water extraction component is the primary mechanism for eliminating the mobility of

hazardous substances from the Site. These hazardous substances are currently impacting Coon Creek and some ground water beyond the creek. The ground water extraction system will prevent contaminants from migrating beyond the northern fringe of the Site, eliminated the contamination in the Creek and beyond the Site. The existing concentrations of contaminants should be brought well below the 10^{-6} risk Water Quality Criteria for contaminants in Coon Creek and below the Maximum Contaminant Levels, Water Quality Criteria, and Minnesota Recommended Allowable Limits for ground water north of the creek.

The air stripper will have to have carbon treatment for the exhaust because some of the volatile organics are considered carcinogenic. Additional treatment trains may need to be evaluated and implemented to meet the objectives of the NPDES permit requirements.

Spent carbon from the air stripper as well as from the carbon treatment of ground water will be handled as a hazardous waste under RCRA regulations.

The discharge from the ground water extraction system will likely go to Coon Creek under an NPDES permit requirements established by the MPCA and with the approval of the Coon Creek Watershed District. Appropriations approval from the Minnesota Department of Natural Resources for the extraction of contaminants will be required. The wells must comply with the Minnesota Water Well Construction Code.

In the event that an NPDES permit requirements cannot be achieved, the option of disposal to the sanitary sewer must be seriously considered. However, the City of Andover has strongly objected to this option and the MWCC has expressed reservations about allowing long-term discharges to the sanitary sewer system because of the relatively dilute wastewater (relatively low solids) and the presence of a wide variety of organics. This Record of Decision will be modified in the event that discharge to the sanitary sewer is recommended as a result of future remedial design activities.

The slurry wall with ground water extraction and NAPL monitoring and extraction for the Pit do not necessarily have any particular rules or regulations that directly apply to the alternative other than those already applicable to the overall ground water extraction system.

The filling of the wetlands (about 2 acres in total) south of Coon Creek will be conducted considering applicable U.S. Army Corps of Engineers requirements and input from the Department of Natural Resources. Mitigation, such as replacement, can be required by FWS, according to CWA, section 404, provisions.

The construction of the new monitoring wells and extraction wells must be in accordance to the Minnesota Water Well Construction Code.

IX. Enforcement Status

The WDE Site is located within the city limits of Andover (formerly Grow Township), Anoka County. Prior to 1971, the WDE Site was operated as a solid waste dump for at least nine years. The dump was established by Leonard E. Johnson and was licensed by Grow Township.

The dump was purchased by WDE, Inc. in 1968. A permit to operate as a sanitary landfill was granted by the Grow Township Board effective mid-year, 1968. In 1970, WDE, Inc. submitted a permit application for the MPCA to operate a solid waste disposal system. Included in this application was a proposal to dispose of hazardous substances in a specially constructed trench in the landfill (generally referred to as the "WDE Pit"). On March 30, 1971, the MPCA issued a permit (SW-28) to WDE, Inc. to operate the WDE Site as a solid waste disposal system including construction and operation of the WDE Pit. Approval was also given by Anoka County and the Metropolitan Council.

Construction of the WDE Pit was completed in 1972. The MPCA ordered the WDE Pit closed effective February 1, 1974 due to changes in regulations and because the MPCA determined that a high potential for ground water pollution existed at the WDE Site. That determination was based on the fact that: WDE Inc. submitted inadequate hazardous waste disposal reports, WDE, Inc. did not submit required monitoring results, and investigation indicated that WDE, Inc. did not follow the plans approved by the MPCA for the WDE Pit disposal operations.

WDE, Inc. sent a notification of a Hazardous Waste Site regarding the WDE Site to U.S. EPA in June, 1981 in fulfillment of CERCLA 103(c). Pursuant to section 105(b) of CERCLA, the WDE Site was listed on the National Priorities List by publication in the Federal Register on September 8, 1983, 48 Fed. Reg. 40658-40682 (1983).

The Minnesota Department of Health in January, 1983 issued a drinking water well advisory in portions of the city of Andover due, in part, to hazardous substances disposal at the WDE Site. The well advisory was dropped following the completion of the Remedial Investigation for the Site in October, 1985.

In March, 1984 the MPCA and U.S. EPA entered into a Consent Order with 9 companies. Three more companies joined the group and executed the Consent Order in April, 1984. The twelve companies (known as the "Respondents" in the Consent Order) are Economics Laboratory, Inc., Ford Motor Company, Honeywell, Midland Cooperatives, Inc., Minco products, Onan Corporation, Sperry Corporation (Unisys), Thermo King Corporation, Warden Oil, Control Data Corporation, Cornelius Company, and FMC Corporation.

The Respondents agreed in the Consent Order to accomplish the following tasks:

1. Design, initiate and complete the landfill and pit Remedial Investigation/Feasibility Study (RI/FS);
2. Establish a trust fund to pay for the RI/FS work;
3. Establish a $1 million trust fund in the event the Respondents do not implement the remedial actions as selected by the MPCA and U.S. EPA;
4. Design the selected response action for the WDE site designated in the U.S. EPA Record of Decision; and
5. Enter into good faith negotiations leading to an agreement to address remedial and removal actions at the WDE Site.

Under the Consent Order the MPCA and U.S.EPA agreed to:

1. Identify additional potential responsible persons who are not currently parties to the Consent Order;
2. Issue Requests for Response Actions (RFRA's) to additional responsible persons; and
3. Issue Determinations of Inadequate Response (DIR's) to each of the responsible persons who have failed to respond or who respond inadequately.

In partial fulfillment of obligations under the Consent Order, the MPCA issued a RFRA to seven responsible persons in July, 1984. These seven included Melron, Inc. (property owner), Ronald Roth (part owner of Melron, Inc. and operator of the WDE Site), Waste Control, Inc. (WCI-transporter), Art Willman & Sons, Inc. (transporter), Industrial Steel Container (owned or possessed hazardous substances and arranged for their disposal), and Whittaker Corporation (owned or possessed hazardous substances and arranged for their disposal). Each of the parties named as responsible persons in the July, 1984 RFRA failed to take the requested actions and were subsequently issued a DIR in October, 1984.

In April, 1987, the MPCA again issued a RFRA to seven additional responsible persons. These seven included American Can Company, G & K Services, Inc., Gillette Company, H.B. Fuller Company, Minneapolis Electric Steel Castings Division-Evans Product Company, Soo Line Railroad Company and Union Brass and Metal Manufacturing Company. These parties were issued a RFRA because they owned or possessed hazardous substances and arranged for the disposal or transport for disposal of those substances at the WDE Site. Each of these companies have agreed, in writing, to take the requested actions by notifying the MPCA that they intend to negotiate in good faith regarding participation in implementation of remedial action at the WDE Site.

In September, 1987 the MPCA issued a RFRA to twelve additional responsible persons. These twelve included American Hoist and Derrick, Brandtjen and Kluge, Dworsky Barrel, Federal Cartridge Corporation (Federal-Hoffman, Inc.), Foley Manufacturing Company (Foley-Belsaw

Company), Frost Paint and Oil Corporation, Glidden Paint, Mogul Corporation, Northwest Airlines, Pako Corporation, Saxon Industries, Inc. (Paper Corporation of America) and Whirlpool Corporation.

The MPCA and U.S. EPA shall intend to begin negotiations to enter into a Consent Decree with the responsible parties. The major task to be accomplished in the Consent Decree is the implementation of the remedial actions.

X. Operation and Maintenance:

There are many operations in the proposed remedy which must be maintained. These include the following:

A. Operation, maintenance, and monitoring of ground pump-out wells:

1. in a line along the northern perimeter of the site to contain and remove contaminated groundwater, and which will also be beneficial in maintaining the upward gradient between the Upper and Lower Sand aquifers at the Site, and

2. within the slurry wall around the Pit to maintain an inward gradient and to remove contamination if necessary.

B. Operation, maintenance, and monitoring of the extracted ground water treatment system, which is expected to be carbon absorption.

C. Monitoring of the discharge of the collected groundwater, expected to be to Coon Creek in accordance with an NPDES permit.

D. Operation, maintenance, and monitoring of the landfill gas vents to avoid gas accumulation under the landfill cap.

E. Maintenance of the landfill cap to maintain a cover over waste materials, to eliminate seeps, to reduce infiltration through waste materials and to prevent use of the underlying groundwater.

F. Monitoring of ground water, surface water, potential NAPL routes, and gas within the landfill to assure the effectiveness of the response actions.

G. Maintaining institutional controls prohibiting wells in the Upper and Lower Sand aquifers near the Site to avoid use of contaminated water and to maintain a vetical gradient across the red/brown till is being recommended as a precautionary measure. These actions can be implemented by the State through the Minnesota Department of Health, through their approval rights over installation of new drinking water wells.

XI. Community Relations History:

Since 1983, the MPCA and U.S. EPA have been involved in numerous community relations activities associated with the WOE, Inc. Site. The major community relation relations activities include the following:

April 1983	The MPCA conducted community interviews with local officials and interested residents.
May 1983	The MPCA prepared a Community Relations Plan for the anticipated fund-financed Remedial Investigation/Feasibility Study.
Oct. 27,1983	The MPCA issued a news release announcing a public meeting and the beginning of a Superfund project.
November 1983	The MPCA prepared a fact sheet providing background on the Site.
Nov. 10, 1983	The U.S. EPA and MPCA participated in a public meeting at the Andover City Hall and discussed the Superfund project.
Mar. 23, 1984	The U.S. EPA issued a news release announcing that agreement had been reached on the terms of a Consent Order.
June 18, 1984	The MPCA issued a news release announcing a public meeting and the beginning of a responsible party investigation.
June 1984	The MPCA prepared a revised fact sheet providing background and history of the Site.
June 25, 1984	The MPCA sponsored a public meeting at the Andover City Hall to discuss the Consent Order and investigation plans.
Sept. 27, 1985	The MPCA issued a news release announcing a public meeting and completion of a draft Remedial Investigation report.
Oct. 9, 1985	The MPCA sponsored a public meeting on the Remedial Investigation report.
Oct. 25, 1985	The MPCA issued a news release regarding the revised Remedial Investigation report.
Feb. 7, 1986	The MPCA issued a news release regarding the completion of a draft Alternative Reports.
March 10, 1986	Meeting on Alternatives Report held with Anoka County Commissioners and Andover City Council.

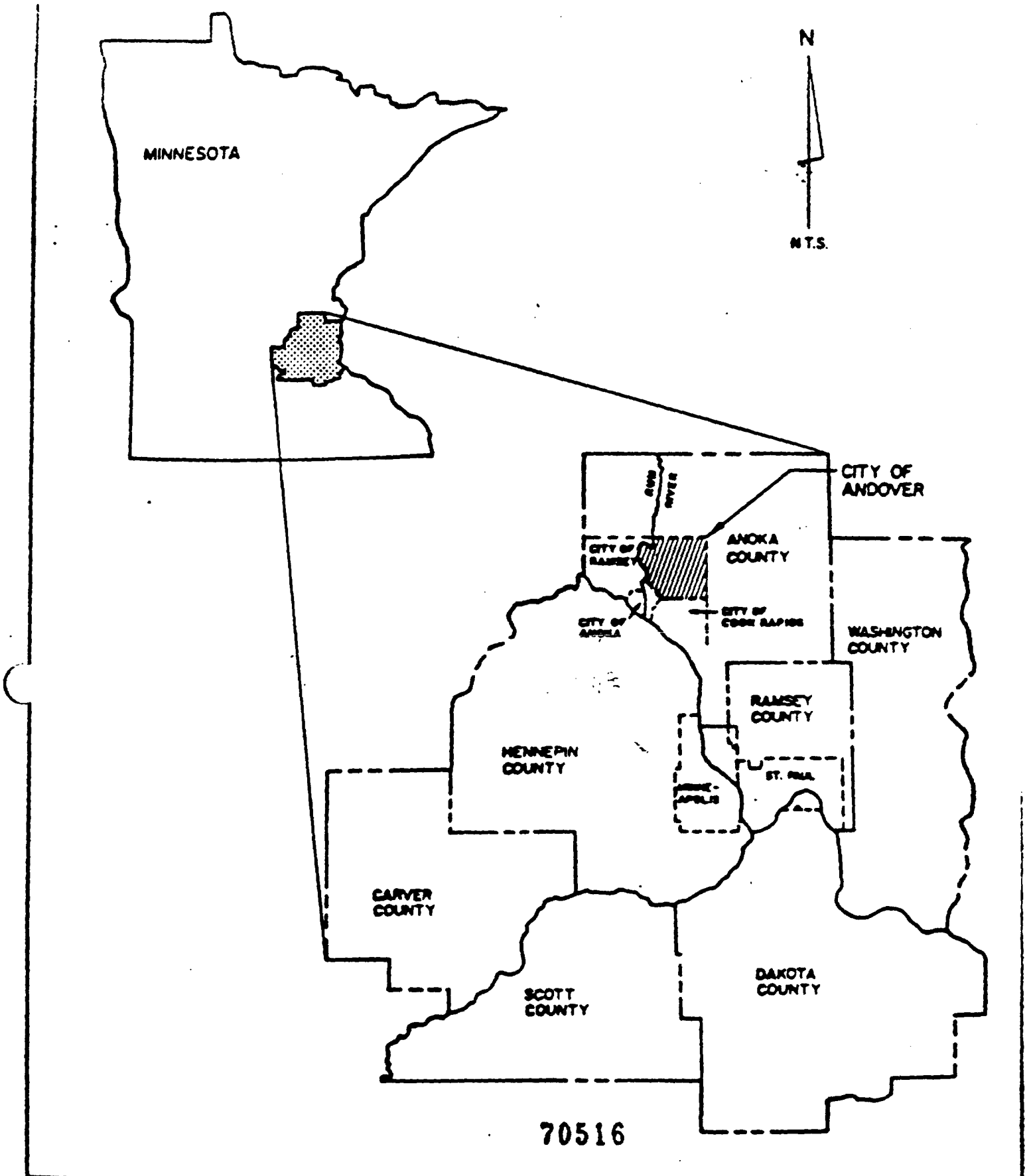
May 1, 1986	The MPCA issued a news release announcing a public meeting to provide a project update.
May 1986	The MPCA prepared an updated fact sheet which included investigation results and a list of alternatives being considered. The fact sheet (and a public meeting announcement) was delivered door-to-door by members of the community.
May 14, 1986	The MPCA sponsored a public meeting at the Andover City Hall as a project update.
June 16, 1986	The MPCA provided an update to the staff and members of the Coon Creek Watershed District.
October 15, 1986	Meeting held with officials of the City of Andover, Anoka County, MPCA, and representatives of the SW-28 Group to discuss the Detailed Analysis Report.
Sept. 3, 1987	The MPCA issued a news release announcing the recommended alternatives and a public meeting.
Sept. 8, 1987	The U.S. EPA sponsored an ad in the Minneapolis daily paper which included the meeting date and the recommended alternatives.
Sept. 14, 1987	The U.S. EPA and MPCA sponsored a public meeting at the Andover City Hall to discuss the recommended alternatives.

Throughout the project, reports and fact sheets were made available at the Andover City Hall. During the latter half of 1985, when investigation results were coming in, a number of meetings were held with city and county officials to respond to their questions on the findings.

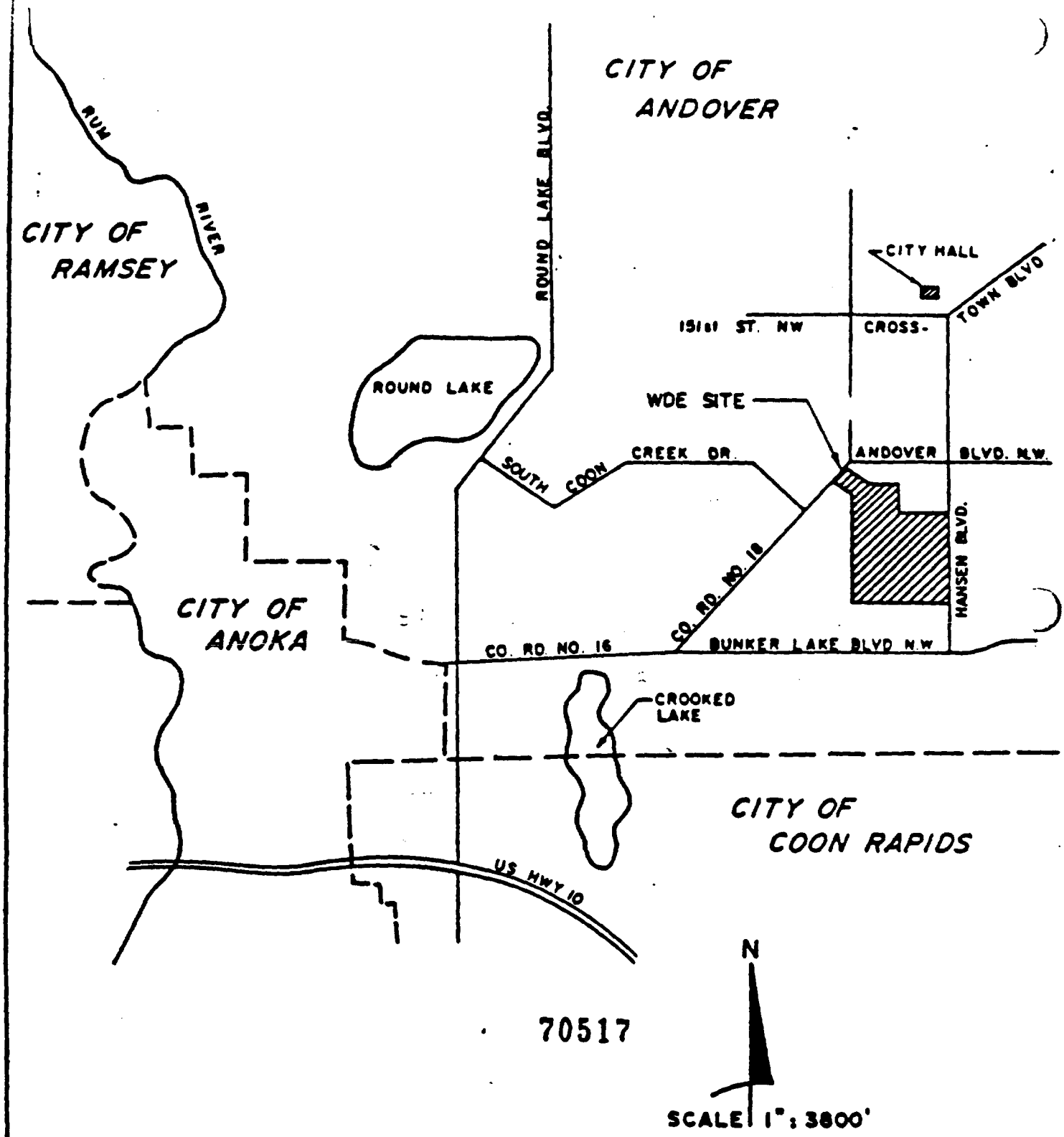
Throughout the course of the RI/FS, the MPCA, Anoka County, and City of Andover officials have discussed on an individual basis with many private citizens. Approximately 75 private citizens were on a regular mailing list to receive all fact sheets and news releases and all aspects of the RI/FS and related activities.

In addition, a number of news publications have reported major findings, developments, or decisions throughout the RI/FS process. City of Andover and Anoka County officials have been invited to and actively participate in discussions and meetings with the SW-28 Group throughout the RI/FS process. They have also commented extensively on the submittals related to the RI/FS process.

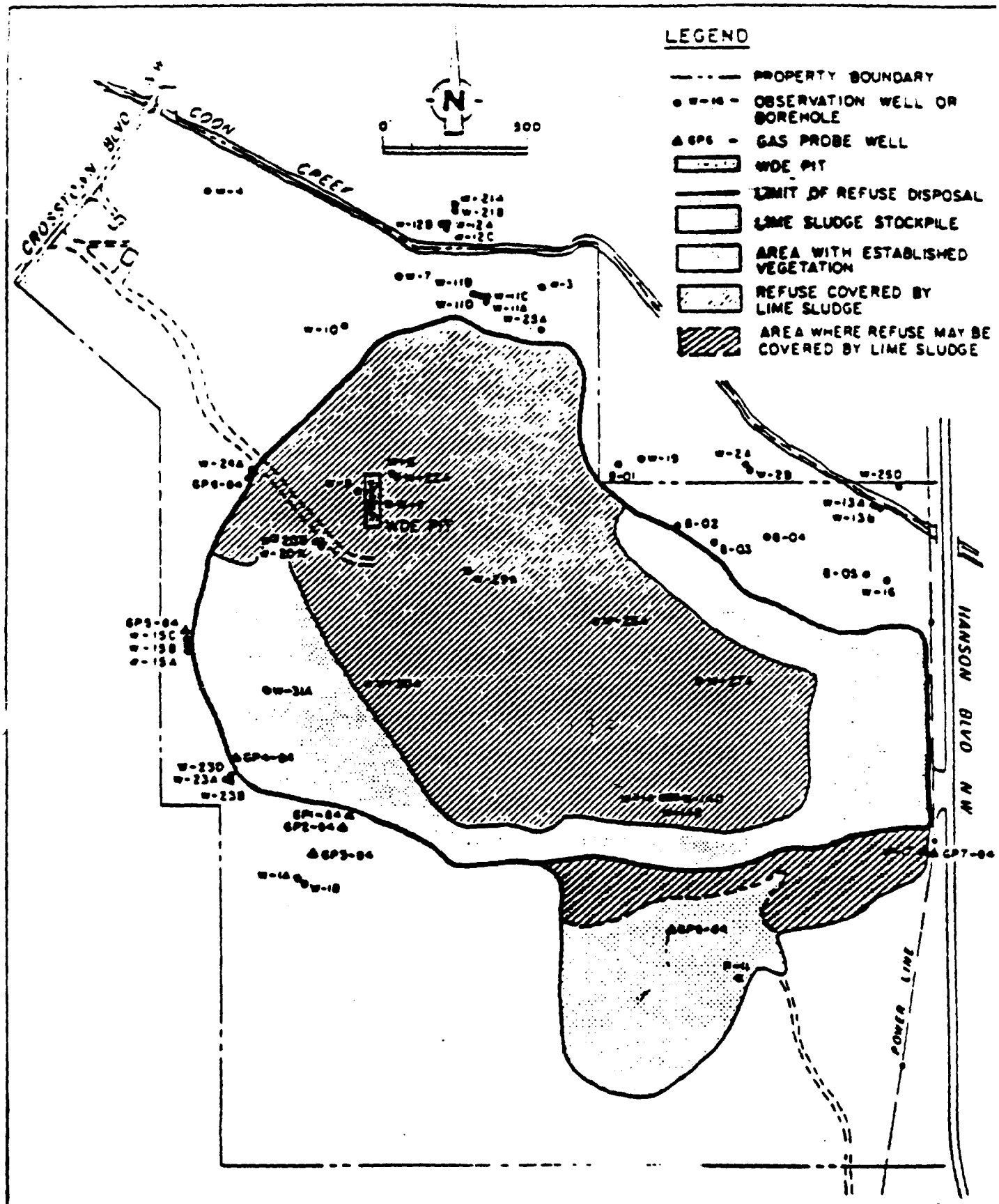
These actions will be implemented in accordance with applicable laws and regulations.



WDE RI/FS EVALUATION	E.A. HICKOK & ASSOCIATES HYDROLOGISTS · ENGINEERS MINNEAPOLIS · MINNESOTA	APRIL, 1984
LOCATION MAP - GENERAL AREA		1



WDE RI/FS EVALUATION	E.A. HICKOK & ASSOCIATES HYDROLOGISTS-ENGINEERS MINNEAPOLIS-MINNESOTA	APRIL, 1984
LOCATION MAP-REGIONAL AREA		2



ATTACHMENT 3
WASTE DISPOSAL ENGINEERING

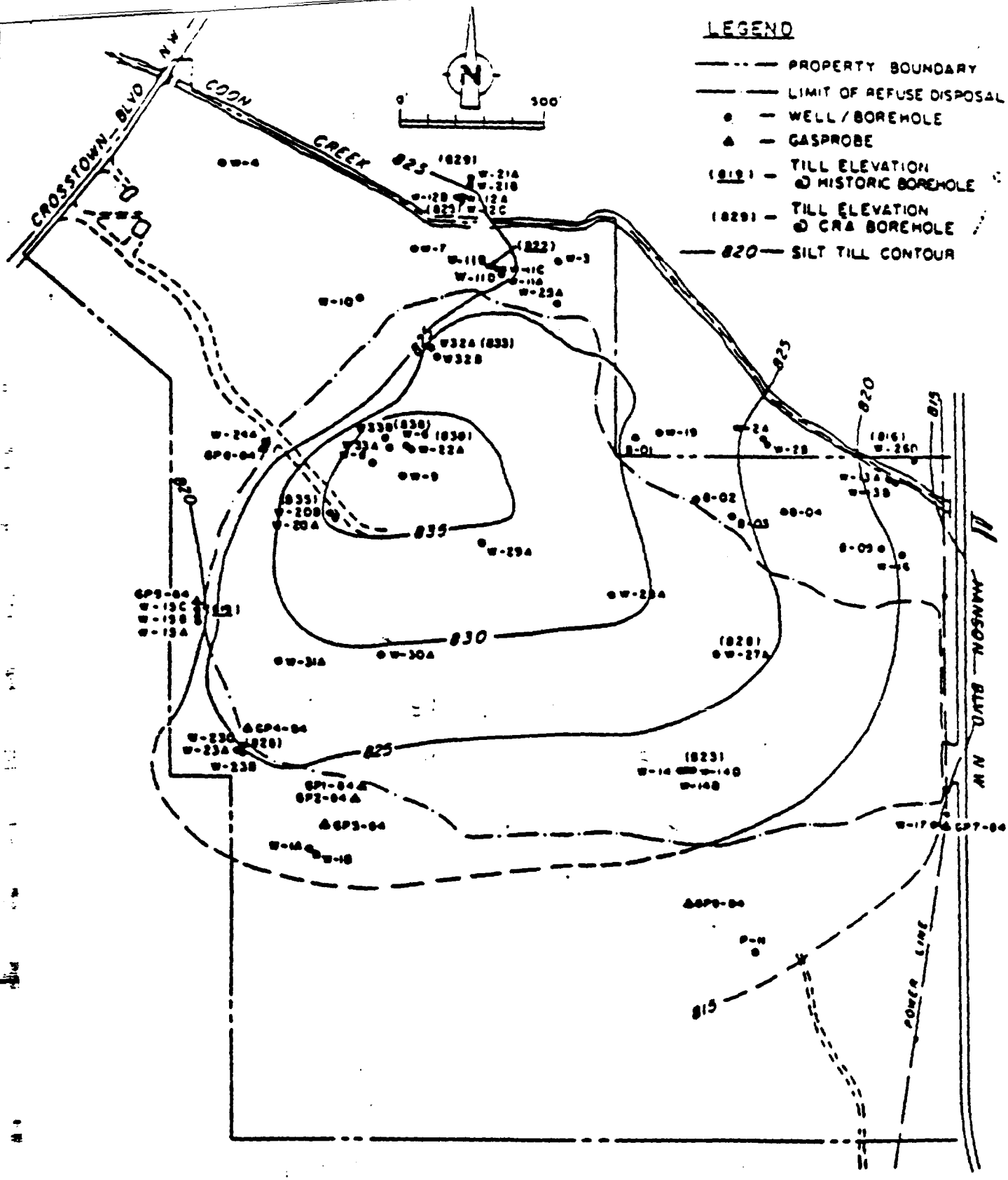
195[illegible]

figure 12

PLAN OF REFUSE DISPOSAL
WDE, Andover, Minnesota

CRA

1472-28-23/08/85



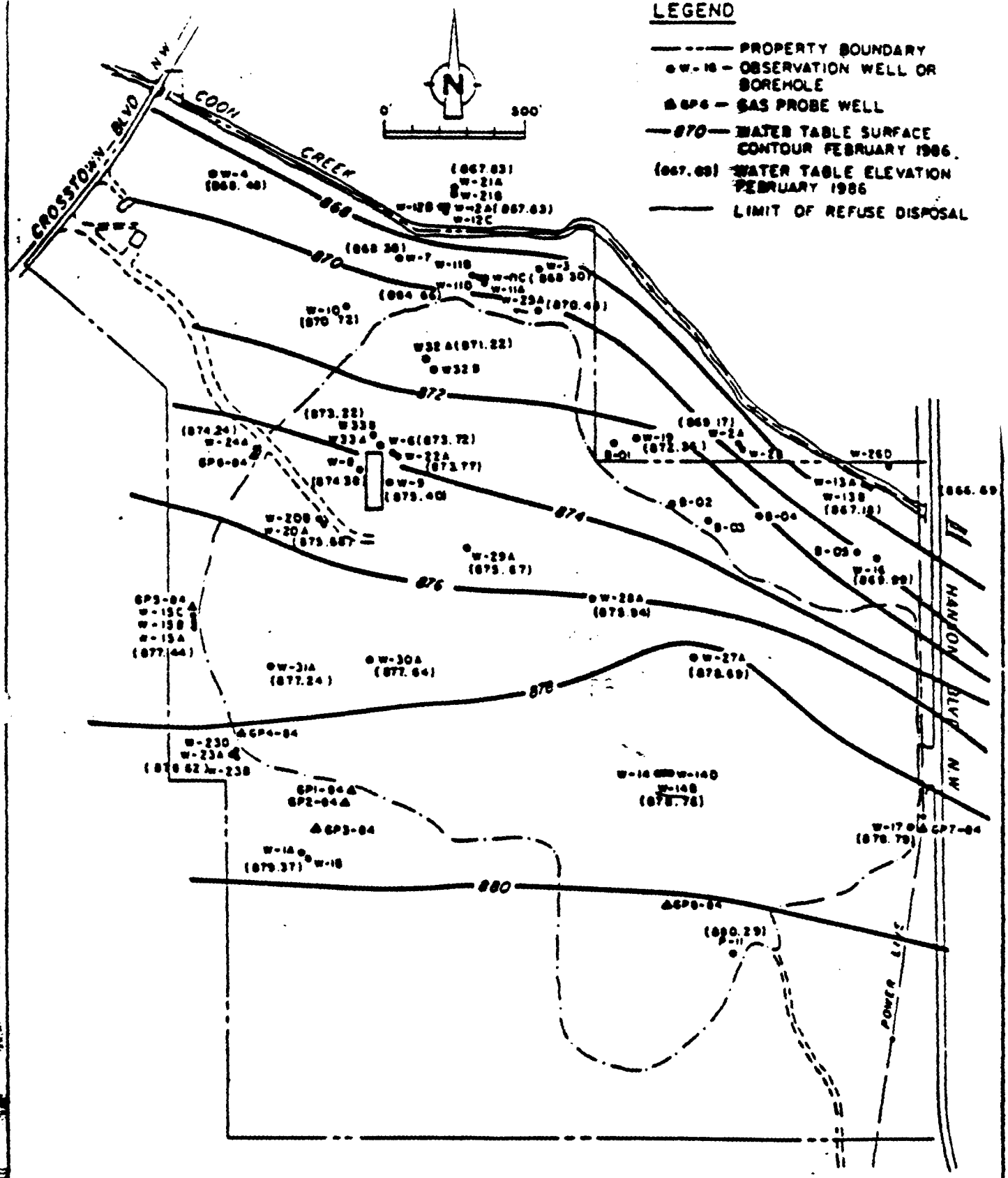
ATTACHMENT 4
WASTE DISPOSAL ENGINEERING

figure 4.13

TOP OF SILT TILL UNIT
W D E, Andover, Minnesota

CRA

M72-71 4 08/03/88



ATTACHMENT 5
WASTE DISPOSAL ENGINEERING

figure 4·21
WATERTABLE CONTOURS
UPPER SAND AQUIFER
WDE, Andover, Minnesota

CRA

1472-71-06/03/86

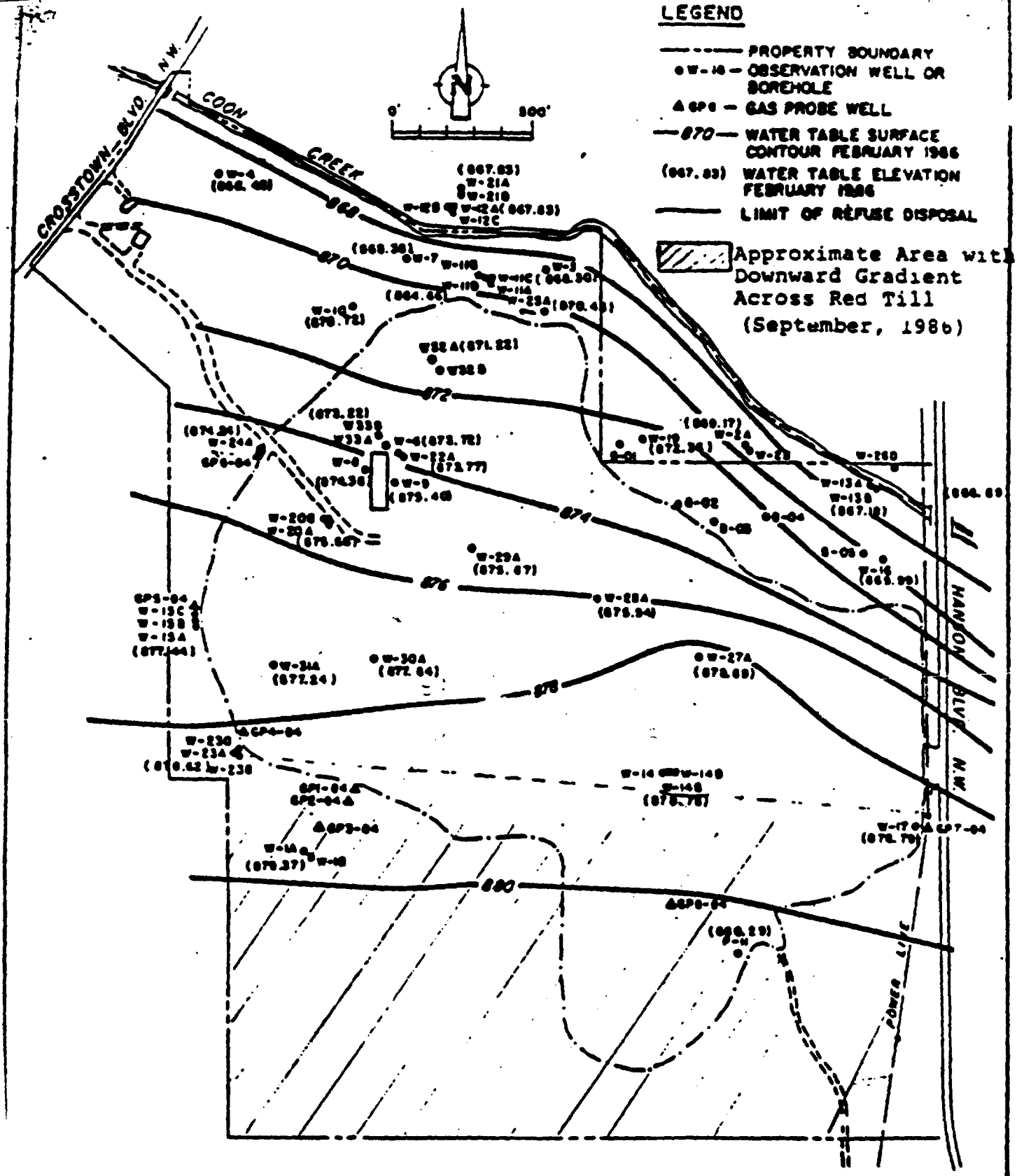


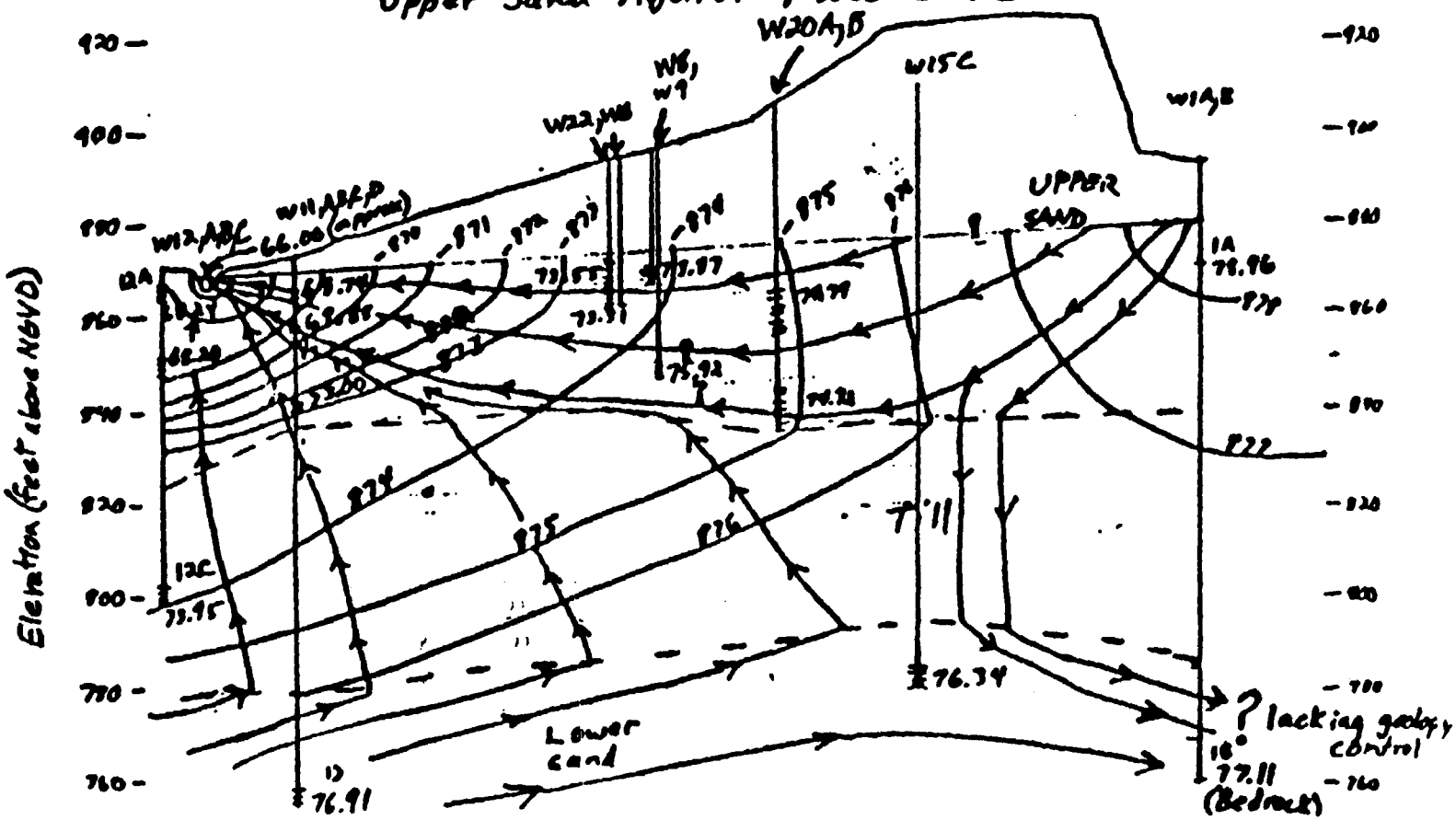
figure 4·21
WATERTABLE CONTOURS
UPPER SAND AQUIFER
WDE, Andover, Minnesota

ATTACHMENT 6
WASTE DISPOSAL ENGINEERING

CRA

Figure 4: May 27, 1985

Generalized Groundwater Flow Lines and Equipotentials for Cross-Section Along Upper Sand Aquifer Flow Line



Explanation: —— 1274 —— line of equal hydraulic potential labeled in Feet above NGVD

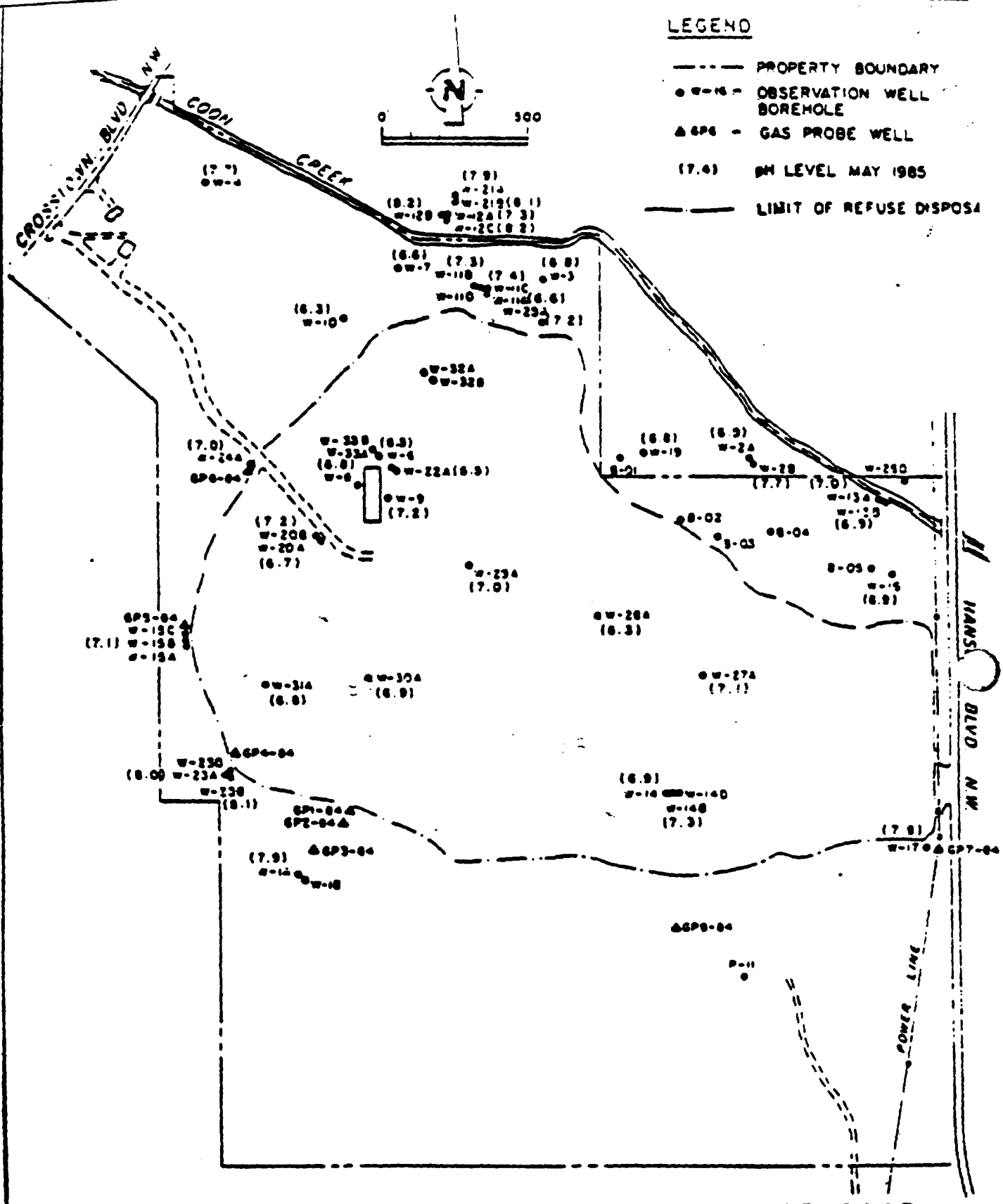
→ generalized line of ground water flow

Notes: Streamline - equipotential line orthogonality not preserved due to large vertical scale exaggeration. Till contacts are not accurate, but do not affect general flow pattern as shown.

ATTACHMENT 7
WASTE DISPOSAL ENGINEERING

73872

48



1552343

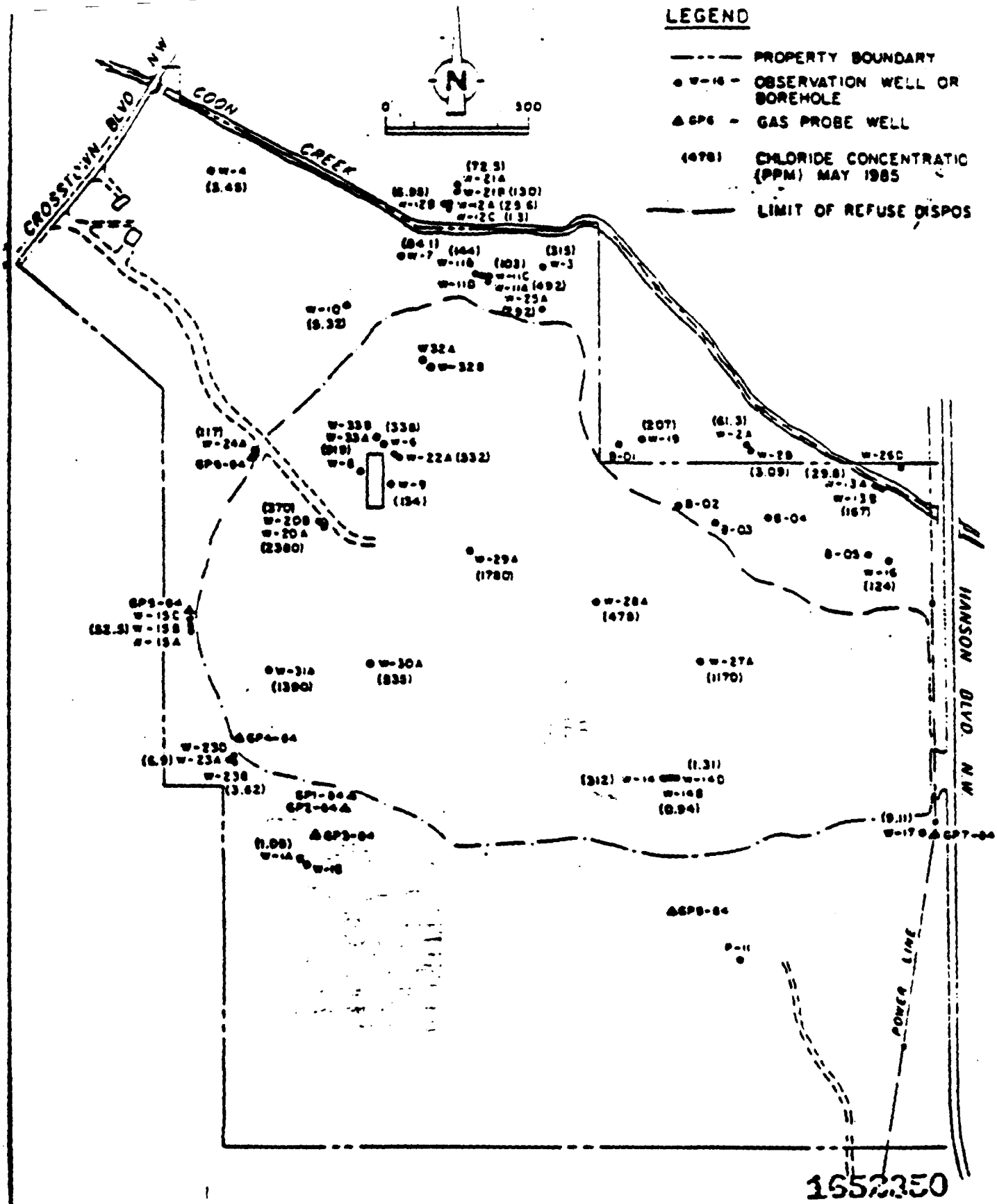
figure 4.

ATTACHMENT 8
WASTE DISPOSAL ENGINEERING

pH LEVELS
UPPER SAND AQUIFER
WDE, Andover, Minnesota

CRA

1472-71-08/03/86



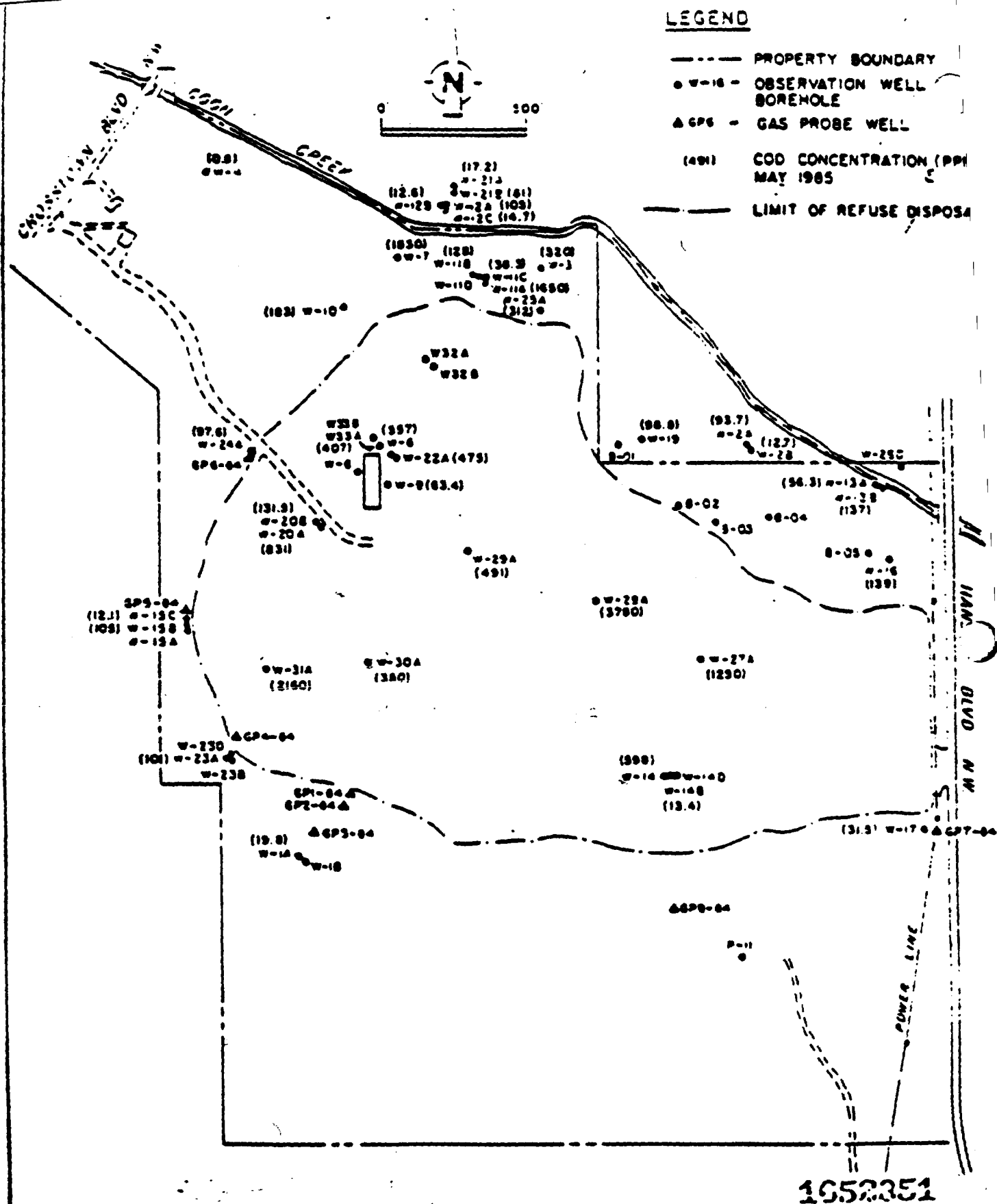
1652350

ATTACHMENT 9
WASTE DISPOSAL ENGINEERING

figure 4.32

CHLORIDE CONCENTRATIONS
UPPER SAND AQUIFER
WDE, Andover, Minnesota

CRA



1052351

ATTACHMENT 10
WASTE DISPOSAL ENGINEERING

figure 4.33

COD CONCENTRATIONS
UPPER SAND AQUIFER
WDE, Andover, Minnesota

CRA

1472-71-08/03/88

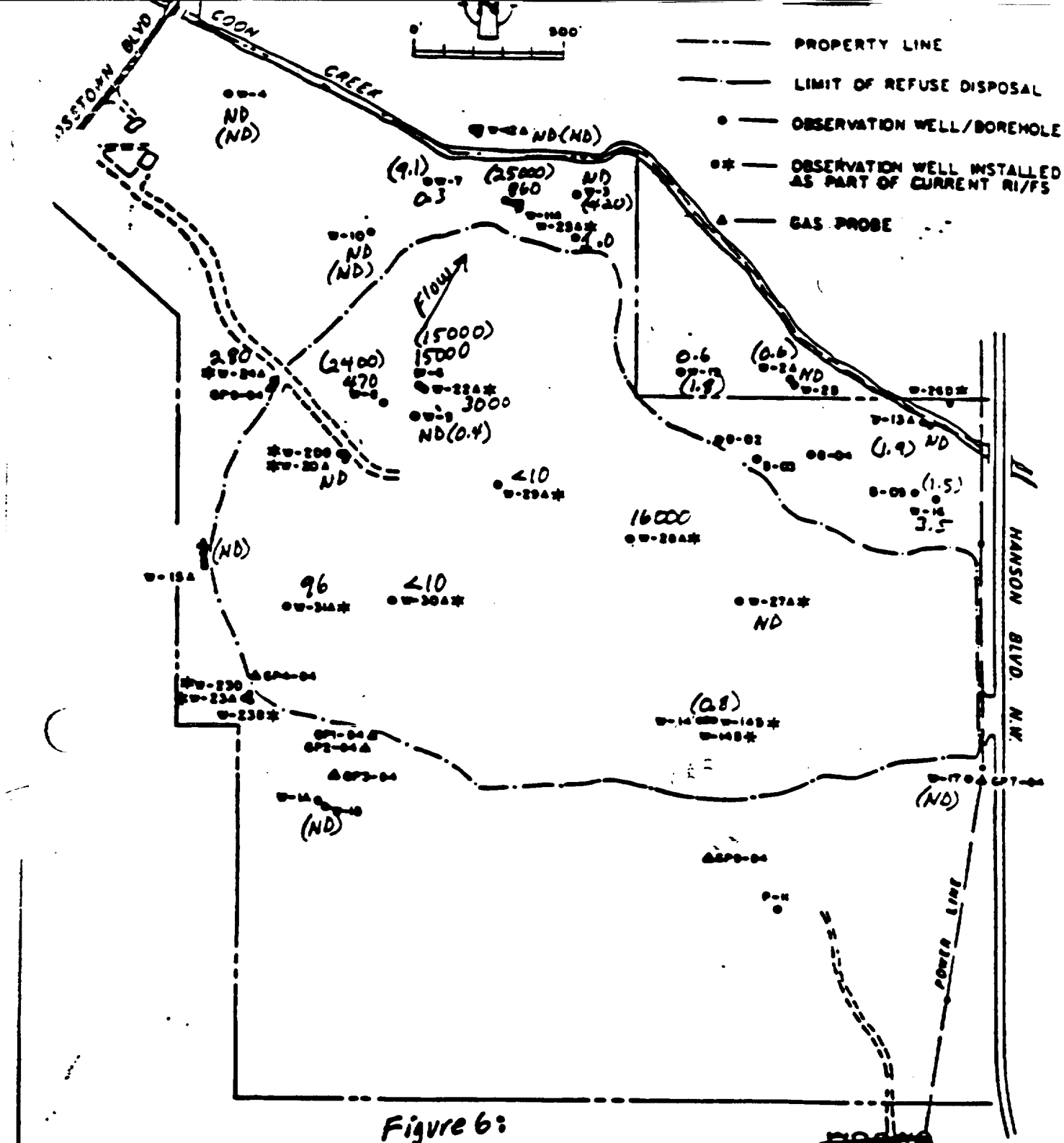


Figure 6:
Water Table Well Cis-1,2-Dichloroethylene Concentrations (ppb) for 3/85 - 5/85 Sampling and June 1983 Sampling (Parenthesized)

ND = compound not detected at low- or sub-ppb level.

73874

ATTACHMENT 11
WASTE DISPOSAL ENGINEERING

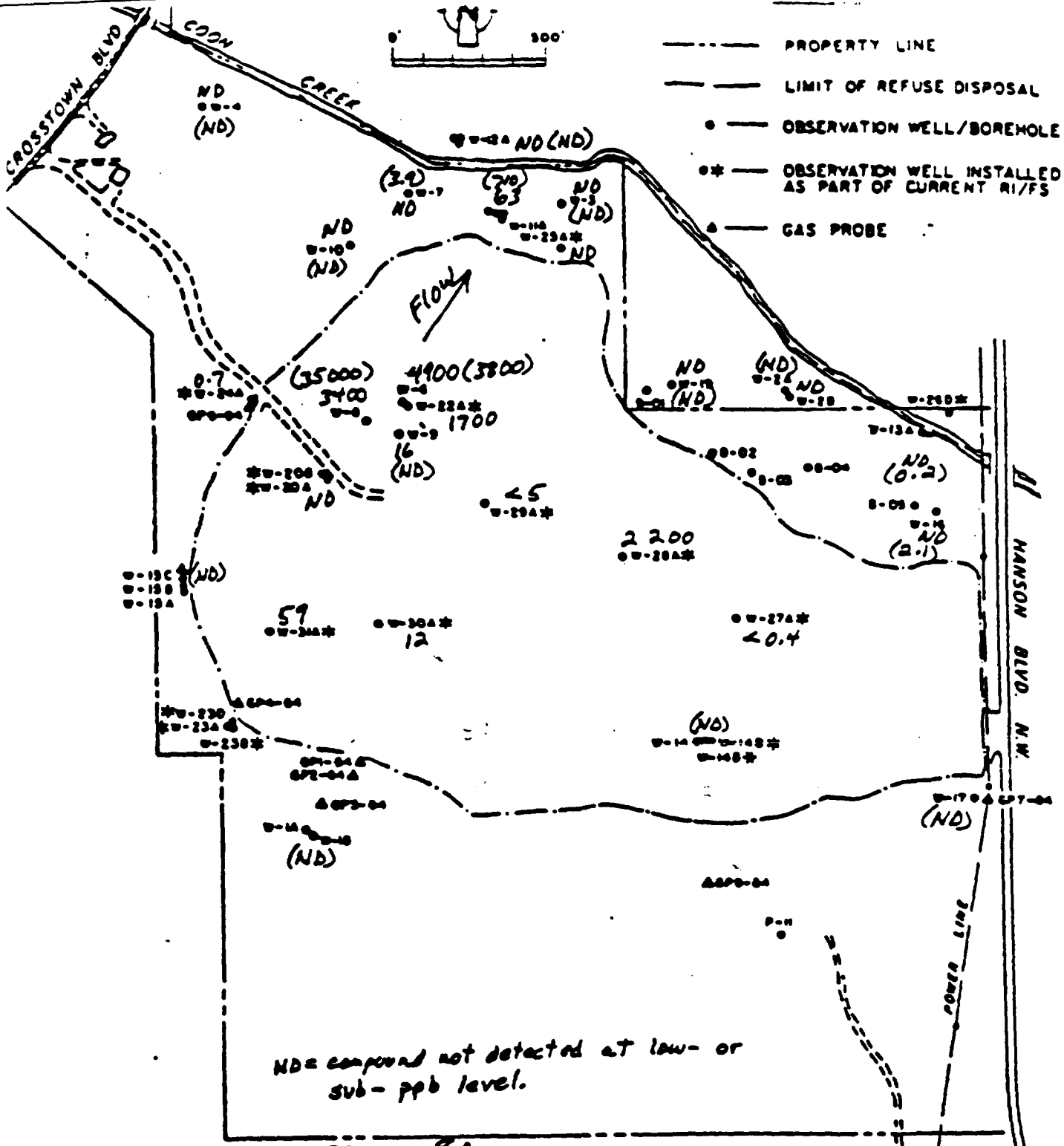


Figure 8:
Water Table Well 1,1,1-Trichloroethane Concentrations (ppb) for 3/85 to 5/85 Sampling and for June 1983 Sampling (Parenthesized values in ppb)

ATTACHMENT 12
WASTE DISPOSAL ENGINEERING

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1472-30-23/09/88

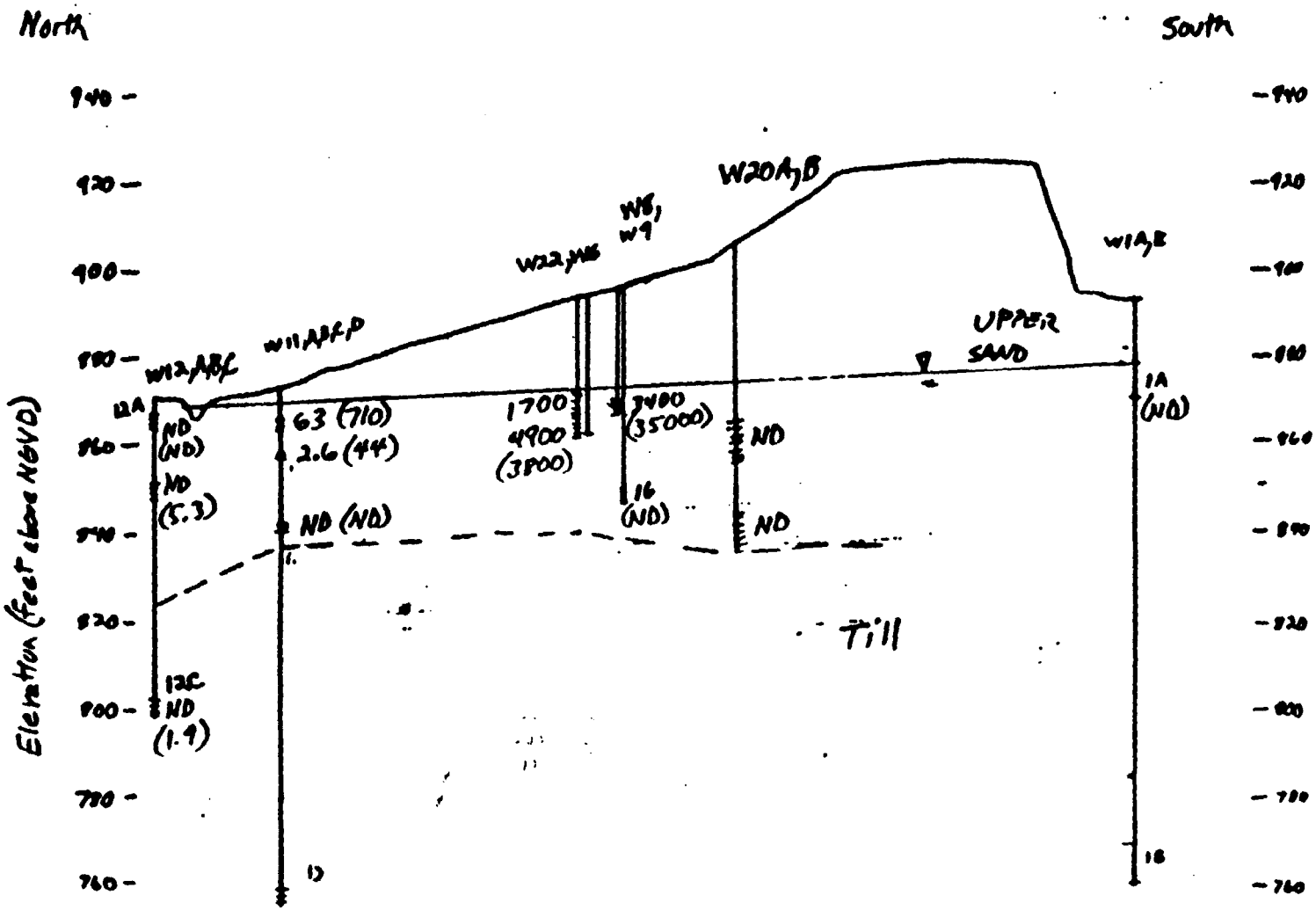


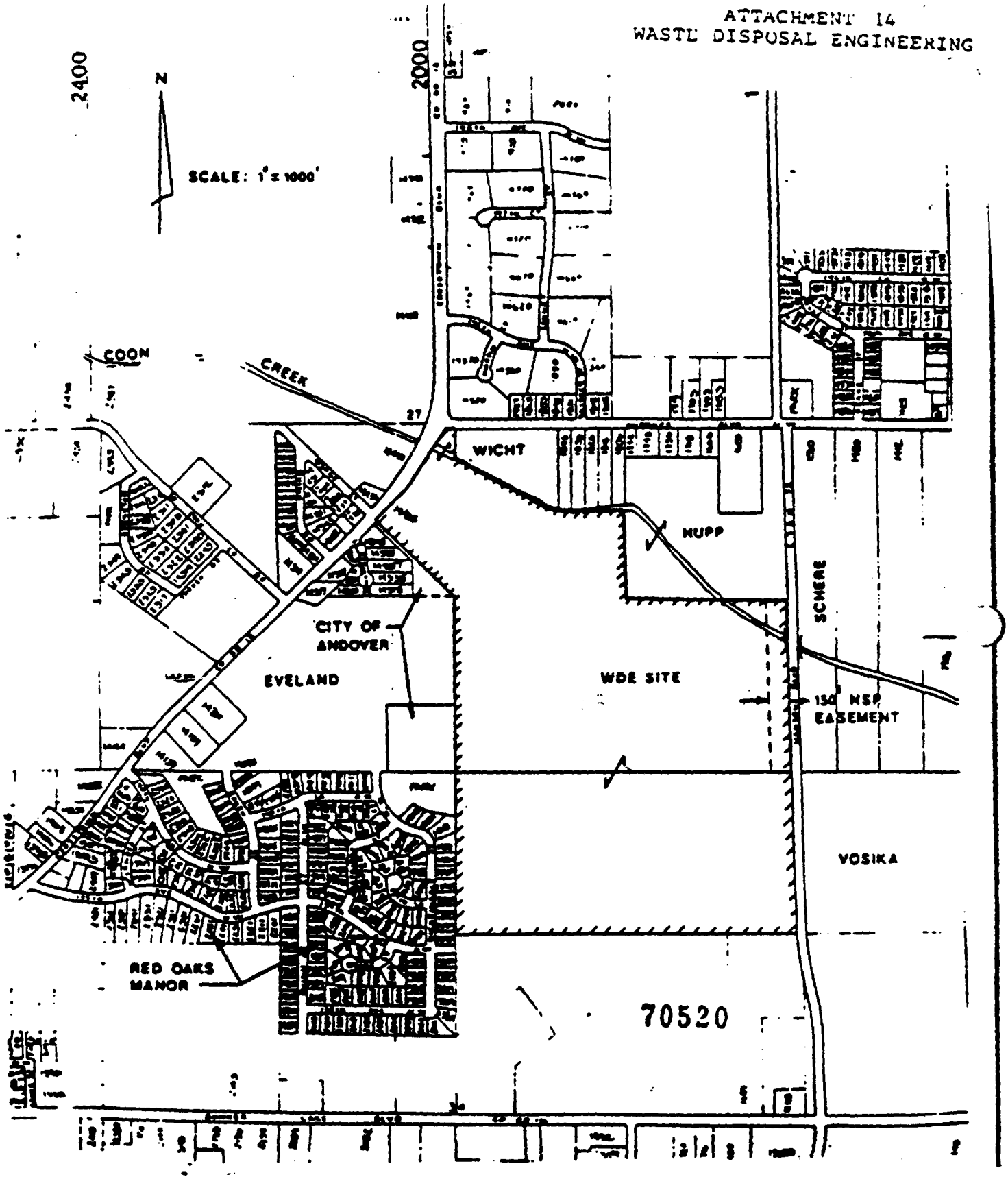
Figure 12:
1,1,1-Trichloroethane Concentrations for Samples Obtained 3/85 - 5/85 (ppb) and for Samples Obtained June 1983 (parenthesized values in ppb)

ND = compound not detected at low- or sub-ppb range.

ATTACHMENT 13
WASTE DISPOSAL ENGINEERING

73880

ATTACHMENT 14
WASTE DISPOSAL ENGINEERING



SOURCE: ANOKA COUNTY

WDE RI/FS EVALUATION	E.A. HICKOK & ASSOCIATES HYDROLOGISTS-ENGINEERS MINNEAPOLIS-MINNESOTA	APRIL, 1984
PROPERTY OWNERSHIP MAP		5

TABLE 3.4

DEVELOPMENT OF POTENTIAL EXPOSURE PATHWAYS - WDE SANITARY LANDFILL
(See Worksheet 4.2 of the Superfund Public Health Evaluation Manual)

Release/Source Mechanism	Release/ Transport Medium	Potential Exposure Route	Potential Exposure Point	Number of People Potentially Affected	Pathway Complete
Dust/volatilization	Air	- inhalation - dermal	- on-site	<50	yes
Soil gas	Air	- inhalation - dermal	- within 500 feet of limit of refuse	<50	yes
Reaction between incompatible wastes	Air	- inhalation	- residential within 1 mile of the site	1,000	no
Pit leakage	Upper Sand Aquifer	- ingestion of drinking water	- on-site	0	no
Landfill leakage	Upper Sand Aquifer	- ingestion of drinking water	- on-site	0	no
Possible future leakage from upper sand aquifer	Lower Sand Aquifer	- ingestion of drinking water	- residential within 0.5 miles west and south-west of site	1,800	no
Discharge from upper sand aquifer	Surface Water	- ingestion of water and fish - dermal contact - indirect exposure through ingestion of exposed crops or animals	- Coon Creek - Mississippi River	<100 <10,000	yes yes

continued....

TABLE 3.4

DEVELOPMENT OF POTENTIAL EXPOSURE PATHWAYS - WDE SANITARY LANDFILL
(See Worksheet 4.2 of the Superfund Public Health Evaluation Manual)

Release/Source Mechanism	Release/ Transport Medium	Potential Exposure Route	Potential Exposure Point	Number of People Potentially Affected	Pathway Complete
Tracking of lime sludge	Soil	- inhalation and/or ingestion of lime sludge	- local residents who participate in recreational activities on-site	<50	yes
NAPL	Upper Sand Aquifer a) on top of water surface (floaters) b) on top of till surface (sinkers)	- migration on top of water surface - gravity flow on top of till surface	- Coon Creek - Coon Creek Lower Sand Aquifer	0	no
Exposed waste/ leachate and lime sludge	none	- direct dermal contact - inhalation - ingestion	- individuals on site for recreation	<50	yes

TABLE 3.5

COMPARISON OF SOIL PROBE GAS ANALYSIS AND TLV[1] VALUES**

Indicator Chemicals and Other Chemicals Reported in Gas Probe Samples[2]	TLV(ppm)	Highest Conestration in Soil Gas (ppm)
1,1 Dichloroethane*	200	ND[4]
1,2 Dichloroethene*	200	ND
1,1,2-Trichlorotrifluoroethane*	1,000[3]	1.30
1,1,1-trichloroethane*	350	ND
Methyl ethyl ketone	200	0.16
Methyl Isobutylketone*	50	0.37
Dichloroethane	10	0.12
Toluene*	100	9.52
Xylene*	100	2.18
Methylene chloride	350	0.07
Acetone	1,780	0.02
Tetrahydrofuran	200	0.17
1,1 Dichloropropene	1	0.74
Benzene	10	2.47
Dibromochloromethane	200	0.93
1,1,2 trichloroethane	10	0.92
1,1,2,2-Tetrachloroethane	1	54.5
Trichloroethene	50	0.31
1,3 Dichloropropene	1	1.74
Ethylbenzene	100	0.27
Cumene	50	1.41
Ethyl ether	400	0.16

* Indicator Chemicals
** This follows methodologies of Section 4.3 of the Manual

(1) TLV - Threshold Limit Values from "Threshold Limit Values and Biological Exposure Indices for 1985-86" American Conferance of Governmental Industrial Hygienists

(2) Highest concentrations in sample analyzed.

(3) TLV available for 1,1,2-trichlorofluoroethane.

(4) ND = Not detected in soil probe gases

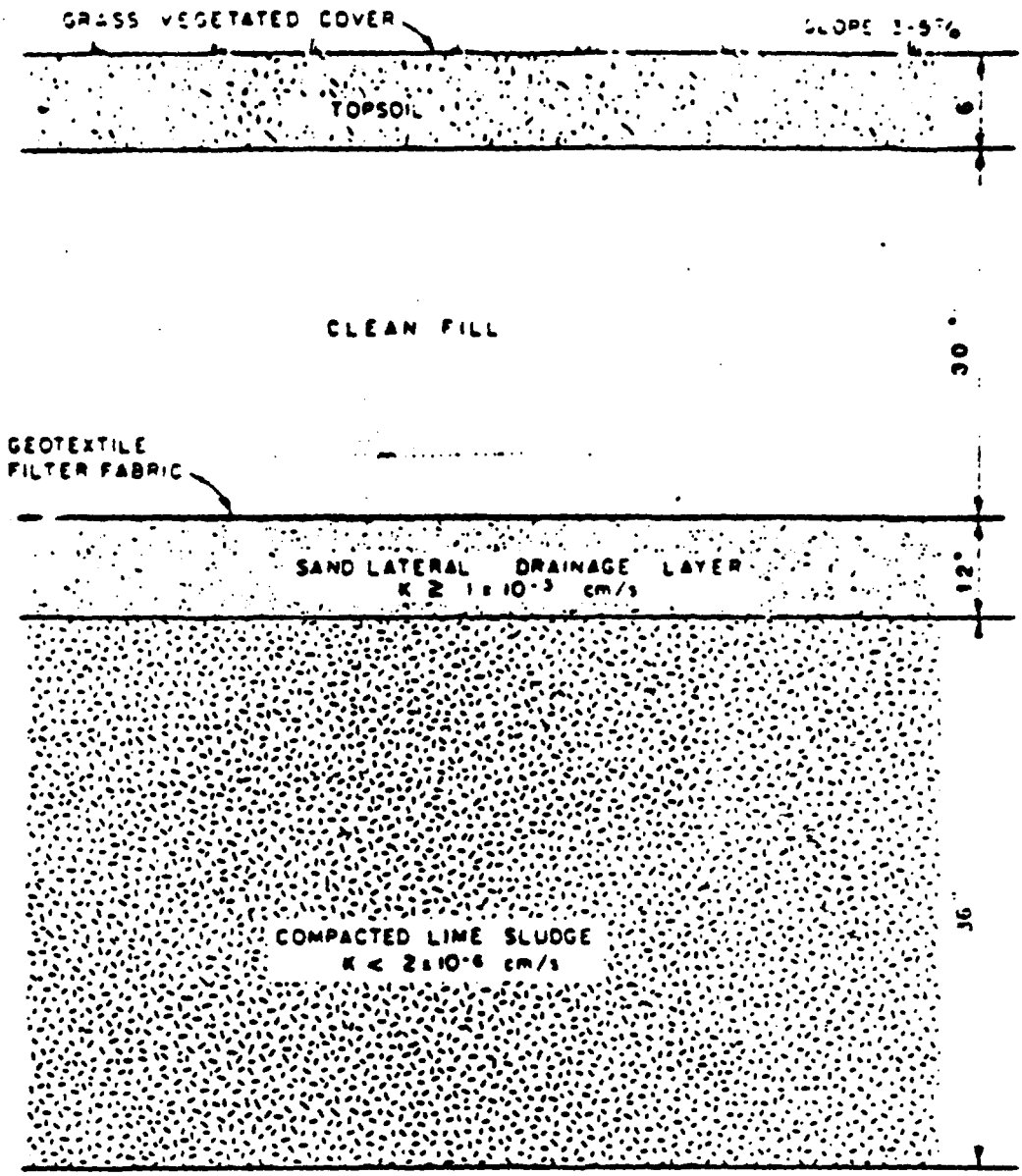


figure 2.7

SCHEMATIC CROSS SECTION OF COMPACTED LIME SLUDGE CAP MEETING RCRA PERFORMANCE STANDARDS

WDE, Andover, Minnesota

ATTACHMENT 18
WASTE DISPOSAL ENGINEERING

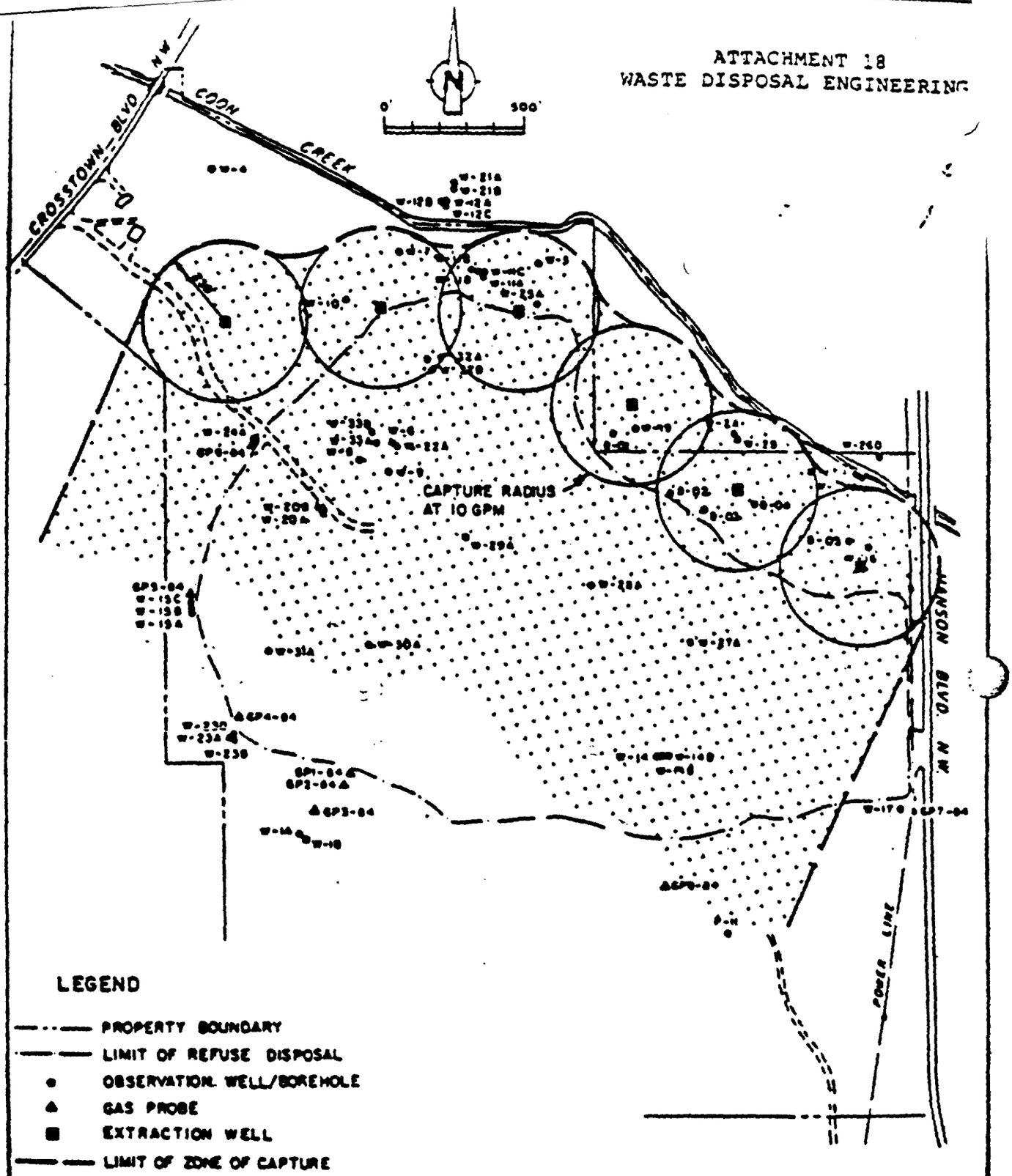
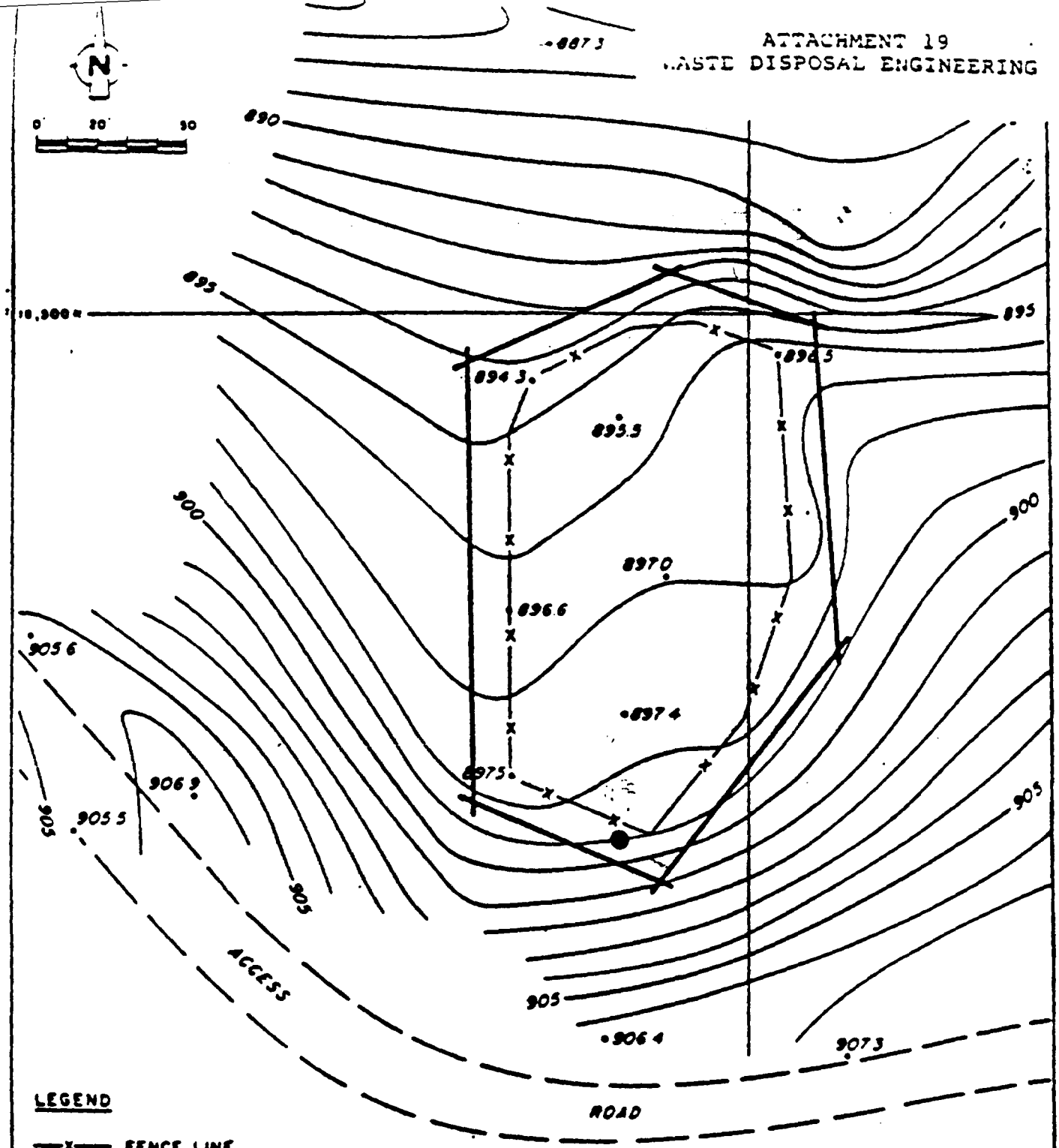


figure 2.26

GROUNDWATER EXTRACTION
WELL LOCATION - LANDFILL
WDE, Andover, Minnesota

CRA

1472-74-9/18/86



LEGEND

—x— FENCE LINE

896.6 • SPOT ELEVATION

—895— CONTOUR

APPROXIMATE LIMITS OF PIT AREA

GROUNDWATER CUTOFF WALL

● 8" DIAMETER EXTRACTION WELL

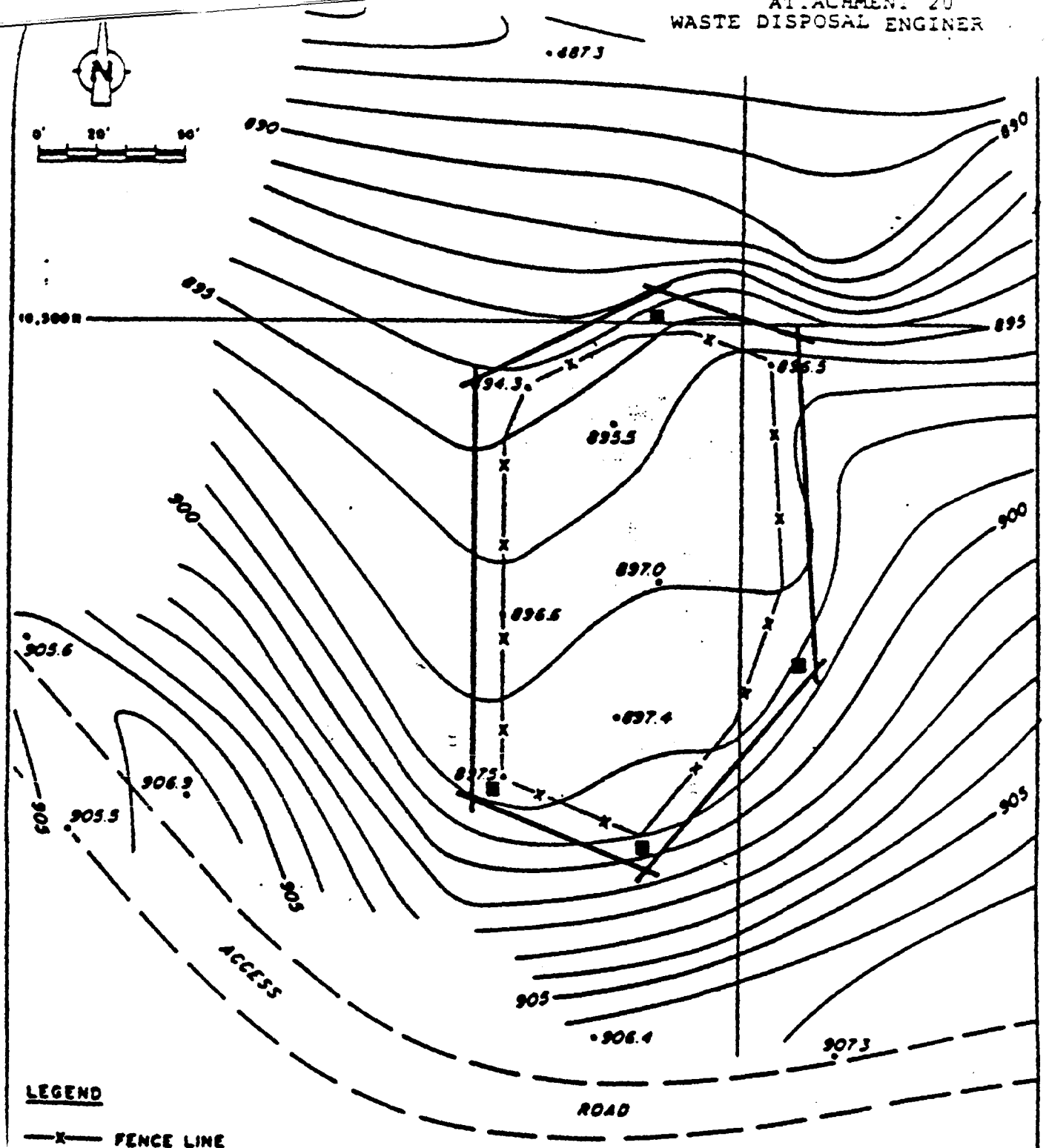
CRA

1472-74-9/10/86

figure 2.12

EXTRACTION WELL LOCATION FOR GROUNDWATER CUTOFF WALL - PIT

WDE, Andover, Minnesota



LEGEND

—x— FENCE LINE

896.6 • SPOT ELEVATION

■ NAPL Monitoring Well Pair

—895— CONTOUR

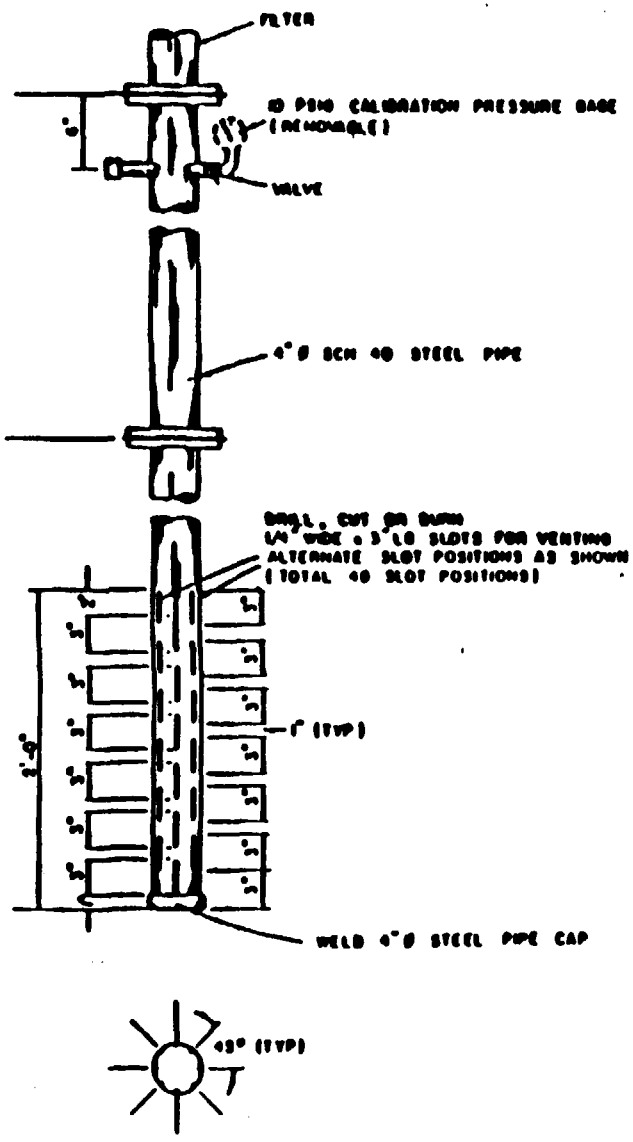
APPROXIMATE LIMITS OF PIT AREA

GROUNDWATER CUTOFF WALL

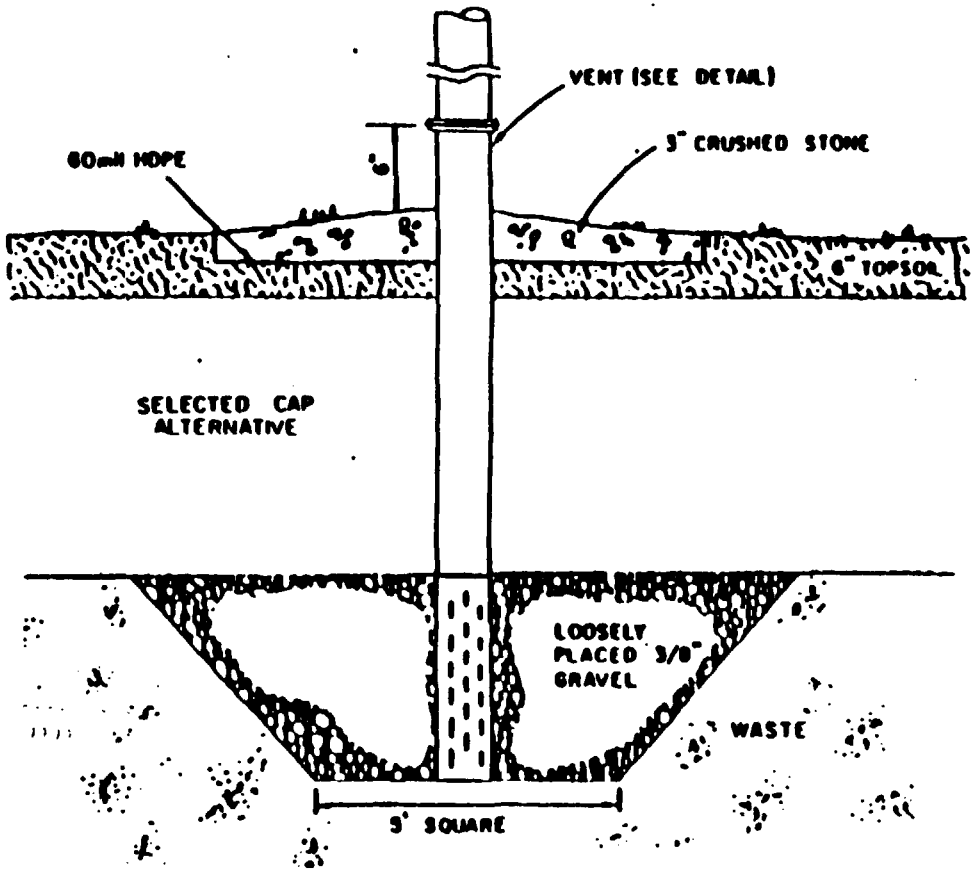
CRA

Figure 2.8
LOCATION OF GROUNDWATER CUTOFF WALL - PIT
WDE, Andover, Minnesota

1672-70-8/10/86



VENT DETAIL



ATTACHMENT 21
WASTE DISPOSAL ENGINEERING

figure 2.1

TYPICAL GAS VENT CONSTRUCTION
WDE, Andover, Minnesota

63

CRA

Responsiveness Summary for the Waste Disposal
Engineering Site in Andover, Minnesota.

1. Introduction

The United States Environmental Protection Agency (U.S. EPA) obtained information on the types and extent of contamination, evaluated remedial measures, and recommended remedial actions for ground and surface water contamination, gas emissions, and direct contact concerns resulting from the Waste Disposal Engineering Site in Andover, Minnesota. As part of this process, U.S. EPA submitted its recommended alternative for public comment for a twenty-one day period. Public participation in Superfund projects is required under the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and the National Oil and Hazardous Substances Contingency Plan (NCP). A public meeting to discuss alternatives, explain the proposed remedy and solicit public comment was held at the Andover City Hall on September 14, 1987. Comments received by the public are considered in the selection of the remedial action for the Site. This document summarizes the comments received and states U.S. EPA's responses to those comments.

The responsiveness summary has four section:

a. Introduction. This section briefly explains this document.

b. Overview. This document briefly presents a history of community relations at the Site.

c. Background on Community Involvement. This section briefly presents a history of community relations.

d. Summary of Public Comments Received During the Public Comment Period and U.S. EPA's Responses.

2. Overview

During the public comment period, the U.S. EPA and the Minnesota Pollution Control Agency (MPCA) held a public meeting to discuss the Site. The U.S. EPA and MPCA recommended a solution, similar to the potentially responsible parties recommendation, through some additions to the feasibility study document entitled the "Detailed Analysis Report". The recommended solution includes long-term (indefinite) ground water extraction through pump-out wells in the Upper Sand aquifer between the landfill and Coon Creek to keep contaminants from migrating off-site; a Resource Conservation and Recovery Act (RCRA)-compliant lime sludge cap to cover the landfill, safely vent and treat landfill gases, and reduce infiltration through the waste; a slurry wall around the Pit to contain the concentration of wastes within the Pit; a ground water extraction well within the slurry wall to maintain an inward hydraulic gradient such that if the wall leaks the water will flow into the walled area and be extracted by the pump-out well thereby containing contaminants; filling

in a wetland area in the northeast corner of the Site and replacing it nearby; treatment of extracted ground water by carbon adsorption; discharge of extracted ground water to Coon Creek; and long-term monitoring of the remedial activities (the cap, the extraction system, etc.), the contamination (ground water, gas, etc.), and the receptors (Coon Creek, residents' wells, the Lower Sand aquifer, etc.). In addition, the recommendation included consideration of institutional controls to keep people from placing new wells in the Upper Sand aquifer just north of Coon Creek where contamination has been found and in the Lower Sand aquifer around the Site in order to maintain the existing upward water pressure between the Upper and Lower Sand aquifers. The addition of municipal water to the area by the City of Andover is expected to reduce the likelihood of new wells. The Upper Sand aquifer just north of the creek is near a sanitary sewer line, is in the floodplain, will be isolated from the contamination by the extraction well system, and will, in the long-term, cleanse itself. These conditions act to reduce the probablity of new wells being placed in the area. The Lower Sand aquifer around the Site is expected to continue to be stressed by the construction of new private drinking water wells which would increase the likelihood of a downward water pressure between the Upper and Lower Sand aquifers. However, the municipal water will reduce the stress on the aquifers that would have been expected due to the construction of new wells and the monitoring will give warning if action is needed to maintain an upward gradient. Consequently, although they are considered prudent, the need for institutional controls beyond the Site area (includes all land just south of Coon Creek) is not critical at this time.

Comments were received at the public meeting on the Waste Disposal Engineering Site held in the Andover City Hall in September of 1987, and by the potentially responsible parties (PRPs) during the public comment period.

3. Background on Community Involvement

Since 1983 the MPCA and the U.S. EPA have been involved in numerous community relations activities associated with the Waste Disposal Engineering Site. Numerous fact sheets and news releases were issued throughout the remedial investigation/feasibility study (RI/FS) to, among others, approximately 75 private citizens on the regular mailing list. Public meetings were held at the beginning of the project, on the remedial investigation report, after the alternatives report, and on the proposed remedy, and City of Andover and Anoka County officials were invited to and participated in discussions with, and commented extensively on submittals of the SW-28 Group (PRPs who came forward to conduct the RI/FS) throughout the RI/FS process.

On September 3, 1987, the MPCA issued a news release on the proposed remedy and the public meeting. On September 8, 1987, U.S. EPA sponsored an ad in the Minneapolis daily paper announcing the beginning of the public comment period, the availability of the RI/FS, as modified, for public inspection, the meeting date, and the proposed remedy. On September 14, 1987, a public meeting was held in the Andover City Hall and public comments were received. On September 29, 1987, the public comment period was closed.

During the comment period, comment was received from the SW-28 Group. No other public comments were received.

4. Summary of Public Comments Received During the Public Comment Period

The following are comments from the September 14, 1987 public meeting in the Andover City Hall.

a. Comment: Why does it take so long for anything to happen? The Site has been known since 1968 and twenty years later we are still talking about it.

Response: Although the Site was purchased by Waste Disposal Engineering, Inc., in 1968, it was a permitted and operating landfill in the 1970's and early 1980's. The framework for the U.S. EPA to address this Site began with the passage of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) on December 11, 1980. Once the authority was established by CERCLA, a process had to be established to find potential sites and decide which ones should be addressed first with limited Federal resources. Using this process the Waste Disposal Engineering Site was announced as a potential Superfund site on July 23, 1982. Initially, background information on the Site and potentially responsible parties (PRPs), those persons that may be liable for problems at the Site, was compiled. Using the background information, statements of work that generally describe the kind of studies that are necessary to characterize the Site were prepared, and the PRPs were notified that they were PRPs, that the U.S. EPA intended to do work at the Site, and that they might be liable for the U.S. EPA costs of that work. In March of 1984, a written agreement, called a Consent Order, was signed in which the PRPs committed to conduct a remedial investigation/feasibility study (RI/FS) based on statements of work contained in the Consent Order. The RI/FS is to characterize the Site and analyze various solutions such that the cost-effective solution that protects the public health, welfare and the environment can be chosen. The information obtained during and presented in the RI/FS must be obtained in a manner that will stand up in a court of law. Once the U.S. EPA, in consultation with the MPCA, designates its chosen solution in a Record of Decision (ROD), the PRPs will design the solution as part of the Consent Order. Negotiations will then occur to determine if the PRPs will conduct the construction. If not, the U.S. EPA can either conduct the action itself and sue for its costs later, or it can seek to have the court require that the PRPs do the cleanup. If so, the MPCA, U.S.EPA, and PRPs can sign a Consent Decree, an agreement lodged with a court, to have the PRPs do the cleanup. In summary, much of the time the Site was in operation it was not known as a problem to be addressed by Superfund (i.e., 1960's and 1970's). When the Site was recognized, it was put into the Superfund remedial action process. The process is deliberate, but it does move forward along established lines toward Site cleanup. Two problems which have taken more time than originally expected were establishing analytical procedures and finding a laboratory capable of conducting the work as specified, and determining and incorporating the additional requirements of the Superfund Amendments and Reauthorization Act of 1986 (SARA).

b. Comment: The levels of toxicity in the discharge water have not been specified.

Response: The National Pollutant Discharge Elimination System (NPDES) permit requirements under the Federal Clean Water Act are an applicable or relevant and appropriate requirement (ARAR) which will be addressed at this Site. The permit requirements define the actual levels of contaminants that can be discharged to the Creek, as well as the conditions under which discharges can occur. Factors considered in making these requirements include the flow in the creek, the dilution given to the discharge by the creek, and Water Quality Criteria. In other words, the creek conditions at the Site are considered in conjunction with the concentrations of the contaminants to determine the appropriate discharge levels that will not adversely impact the creek and its uses. Specific effluent limitations will be defined for the discharge during the remedial design and as part of the NPDES process.

It should also be understood that the ground water in the Upper Sand aquifer ultimately discharges to the creek. Therefore, by removing and treating the ground water before it enters the creek, the total contaminant mass that enters the creek is reduced.

c. Comment: The standards change as more information becomes available and there is no real assurance from the scientific community that the levels are safe.

Response: It is a fact that standards can change as new information becomes available. However, the standards are generally conservatively applied such that factors of safety are built in to the process. Further, under the Superfund Amendments and Reauthorization Act of 1986 (SARA), Section 121(c), the U.S. EPA is required to reevalute a Site where contaminants are left on-site no less often than every five years after initiation of the remedial action to assure that human health and the environment are being protected by the remedial action being implemented. The reevaluation will consider any new potential health impacts which may have been identified due to scientific advances.

d. Comment: Looking at a thirty-year plan for monitoring wells, there are concerns about well breakdowns, improper reading of the wells, contamination of samples, and poor laboratory results.

Response: The monitoring wells are expected to be in operation indefinitely. The thirty-year period is used for cost comparisons because after that period of time the present worth value of the costs tend to be negligible. As part of the operations and maintenance of the proposed remedial action, provisions are made to assure that proper care is taken in the implementation of the monitioring program. If the wells break down, they will be repaired or replaced. There will be a specific plan for the methods to be used in sampling and analysis of samples. There will also be checks built into the procedures to assure adequate sampling and analysis is performed (blanks, split samples, calibration checks, etc.). The Site will also undergo periodic review by the U.S. EPA under SARA.

e. Comment: A special assessment on a house was to support a holding pond to keep water out of Coon Creek. Putting more water into Coon Creek should be avoided.

Response: Since the Upper Sand aquifer discharges into Coon Creek anyway, the discharge of extracted ground water is not the same as discharging an independent source of water into the creek. Furthermore, the analysis of alternatives indicated that the creek discharge would be favorable compared to the discharge which would involve removing the water from the creek area, discharge to the sanitary sewer and ultimately to the sewage treatment plant. As discussed in the public meeting, discharge to the sanitary sewer would reduce available sewer capacity, which would limit growth, which would reduce the available tax base for the community. The proposed discharge is expected to be limited such that adverse impacts to the creek resulting from such discharges will be mitigated (It is one of the considerations of the NPDES process).

f. Comment: The local community is paying for municipal water to protect them and that investment is not being addressed by the people who created the problem.

Response: The private drinking water wells in the area are not now being adversely affected by the Site. With the implementation of the proposed remedy, those wells are not expected to be impacted by the Site.

g. Comment: The economic losses to the community are staggering already and not a drop of water has been purified.

Response: The proposed remedy is designed to contain contamination from the Site and to treat contaminant discharges before they are discharged into the environment. Upon implementation of the proposed remedy, water is expected to be treated.

h. Comment: Can kids go in Coon Creek wading and swimming, and not be harmed?

Response: The Minnesota Department of Health and the public health evaluation of current conditions in the Detailed Analysis Report indicate that the existing health risks in Coon Creek are not such that those activities need to be prohibited. The proposed remedy is primarily to assure that the potential for a significant problem resulting from the volumes of wastes that went into the landfill is never realized in the creek.

i. Comment: How far down from the Site was Coon Creek sampled?

Response: As part of the remedial investigation, Coon Creek sediments were sampled up to three and a half miles downstream of the Site.

j. Comment: When discharging to Coon Creek will the quality of Coon Creek water be better than with leachate discharging into it?

Response: Overall, since it is expected that the Upper Sand aquifer discharges entirely into Coon Creek from the Site, the contaminant loadings to Coon Creek will be reduced, the water quality improved, and the potential for significant contaminant discharges into the creek from the Site through the ground water eliminated by the proposed remedy.

k. Comment: Is Coon Creek going to be dealt with in terms of the volume of the discharge into it?

Response: Yes. Based on discussions with the MPCA, it is not expected that the proposed discharge of around 60 gallons per minute will adversely impact the creek. This will be considered further in terms of NPDES requirements.

The following are comments from the SW-28 Group (the PRPs who volunteered to come forward and conduct the RI/FS and remedial design under a Consent Order with the U.S. EPA and MPCA) as expressed in their September 10, 1987 letter.

l. Comment: For U.S. EPA to issue its Record of Decision (ROD) before the end of its fiscal year, September 30, 1987, would be inappropriate.

Response: Since the public comment period did not end until September 29, 1987, U.S. EPA agreed with the comment and did not publish the ROD before the end of the fiscal year.

m. Comment: The SW-28 Group reserves the right to supplement the record beyond the 21-day public comment period.

Response: Under 40 CFR Part 300.67(d) of the NCP, the feasibility study must be provided to the public for review and comment for a period of not less than 21 calendar days. This was done for the Waste Disposal Engineering Site in that the public comment period was 21 days. Further, since the SW-28 Group prepared the feasibility study and has discussed issues at the Site with the U.S. EPA and the MPCA extensively throughout the previous months, it was not considered appropriate to extend the public comment period for undefined reasons for an indefinite length of time. The public comment period closed on September 29, 1987.

The following is a comment from the SW-28 Group as expressed in their September 24, 1987 comment letter.

n. Comment: The additional six inches of drainage layer and six inches of fill required by U.S. EPA and MPCA modifications to the Detailed Analysis Report are not required to meet the technical performance standards of a Resource Conservation and Recovery Act (RCRA) landfill closure cap.

Response: RCRA landfill closure (see 40 CFR Part 264), which is an ARAR, requires five elements be addressed. They are: 1) provide long-term minimization of migration of liquids through the closed landfill; 2) function with minimum maintenance; 3) promote drainage and minimize erosion or abrasion of the cover; 4) accommodate settling and subsidence so that the

cover's integrity is maintained; and 5) have a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present. Items 1), 2), and 3) were of concern due to the original design of the lime sludge cap. By allowing the open field frost penetration in the area of four feet to penetrate a foot into the lime sludge, the impermeable layer, the ability of the cap structurally to continue to support the rest of the cap (function with a minimum of maintenance) and to maintain long-term minimization of liquids through the landfill is put in doubt because heaving could both weaken and allow more infiltration through the lime sludge. This is especially significant because the lime sludge is not being placed in six-inch lifts as is normally expected to assure the integrity of the impermeable layer and because the history of lime sludge as an adequate impermeable layer is lacking. The surface layers of the lime sludge are structurally significant and must be protected from frost penetration. The need to promote adequate drainage requires that a one foot drainage layer be constructed. The proposed six-inch layer is not considered adequate, considering construction techniques, to drain and not be clogged. With these modifications and the testing to be required during design of the cap, it is expected that the lime sludge cap will be constructed to be generally consistent with RCRA performance standards.

TITLE/SUBJECT	AUTHOR	DATE	NO. OF PAGE
I. PASI			
1. Preliminary Assessment and Site Investigation (There are two site inspection reports)	USEPA	7/1981	28
2. National Priorities Checklist (NPL)	USEPA	none	1
3. Quality Control Notes	Michael Gifford	8/10/82	25
4. Enforcement Summary and Status Report	USEPA	none	5
5. Conditions and Status Report	Kerry Street	1983	1
6. Worksheets to grade the site	Doug Day John E. Aho	9/10/81	5
II. PASI APPENDIX			
1. Bibliography for Document which ranks the site. (Includes references)	USEPA	6/28/82	16
III. WORKPLAN			
1. Landfill RI/FS	USEPA	4/1984	32
2. Landfill and Pit Safety Plan	USEPA	4/1984	70
3. Evaluation Report Landfill and Pit RI/FS	USEPA	4/1984	80
4. Security Plan Landfill RI/FS	USEPA	4/1984	6
5. Security Plan Pit RI/FS	USEPA	4/1984	6
6. RI: Pit RI/FS	USEPA	4/1984	35
IV. WORKPLAN CORRESPONDENCE			
1. Letter to E.A. Hickok from Minnesoat Pollution Control Agency (MPCA) requesting modifications to the Evaluation Report, Landfill and Pit RI/FS.	MPCA	6/13/84	3
2. Letter to E.A. Hickok from MPCA requesting modifications to the QA/QC Plan and Safety Plan.	MPCA	6/19/84	1

TITLE/SUBJECT	AUTHOR	DATE	NO. OF PAGE
IV. WORKPLAN CORRESPONDENCE			
3. Letter to Kerry Street from Onan stating that the new consultant is Conestoga-Rovers & Ass.	Bruce Borgerding ONAN Corp.	7/27/84	2
4. Letter to WDE from MPCA	Thomas Kalitowski MPCA	8/1/84	3
5. Letter to Patricia Lindquist, City Admin. of Andover, Minn. from MPCA regarding the testing of residential water wells.			
6. Letter from MPCA to Elldfard Briesemeister Mngr of Manuf., Foley Belsaw	Clifford Anderson MPCA	7/30/84	1
7. Letter from CRA to MPCA regarding sampling changes.	Alan W. VanNorman CRA	8/30/84	3
8. Letter from CRA to MPCA regarding changes in sampling.	Richard G. Shepherd CRA attorney	9/17/84	6
V. QAPP (3)			
1. Letter which approves the three QAPP plans.	USEPA Norman R. Niedergang	2/22/87	3
2. QA/QC Landfill and Pit RI/FS	Hickok & Ass.	4/1984	95
3. Letter from MPCA to USEPA regarding report modifications.	MPCA	6/1/84	100
4. QAPP	CRA	2/22/85	465
5. QAPP	CRA	8/7/86	80
VI. QA/QC DATA AVAILABLE AT 536 S. Clark Chicago, Ill.			
VII. RI/FS: REMEDIAL INVESTIGATION AND BIBLIOGRAPHY	CRA	3/1986	142 257
VIII. SUPPLEMENTAL REMEDIAL INVESTIGATION	CRA	9/1986	37
IX. DETAILED ANALYSIS REPORT	CRA	10/1986	275
1. This is a final draft of the feasibility study. (also pps. 104-166 have been pulled out and placed in the Public Endangerment file.)			
2. Appendices	CRA	10/1986	275

TITLE/SUBJECT	AUTHOR	DATE	PAGES
X. PUBLIC HEALTH EVALUATION	CRA	10/1986	103
XI. DECISION DOCUMENTS			
1. Alternative Selection (pulled from FS)	CRA	10/1986	13
XII. ROD NOT AVAILABLE YET.			
XIII. COMMUNITY RELATIONS			
WE ARE WAITING FOR ADDITIONAL DOCUMENTS FROM THE STATE OF MINNESOTA.			
1. Community Relations Plan	MPCA	7/18/83	5
2. Press Release	?	3/23/84	2
3. Letter from Bowman and Bowman to MPCA	David Graves	3/29/85	5
4. Cnty of Anoka to USEPA	Albert Kordiak	1/22/85	2
5. Letter from MPCA to Honorable Albert A. Kordiak, Anoka Cnty. Brd. of Commiss.	T. Kalitowski	2/26/85	3
6. Canonie Engrs to USEPA	Canonie Engrs.	5/24/84	1
7. MPCA to Mayor of Andover	Douglas N. Day	5/22/84	2
8. News Release	EPA	3/23/84	2
9. MPCA Letter to USEPA	Susan M. Brustman	12/2/83	2
10. Valdas V. Adamkus to Senator Rudy Boschwitz	Valdas Adamkus	11/28/83	3
11. Request for Information from Minneapolis Star Tribune	Kerry Street	11/29/83	4
12. Valdas V. Adamkus to Senator Rudy Boschwitz	Valdas Adamkus	11/15/83	6
13. Valdas V. Adamkus to Senator Rudy Boschwitz	Valdas Adamkus	5/17/83	11
14. Valdas V. Adamkus to Senator Rudy Boschwitz	" " "	5/12/83	3
15. Copy of NPL sent to Irene Lund.	Kerry Street	5/17/83	2
XIV. ENFORCEMENT			
1. Consent Order (signatures are missing).	USEPA	?	50

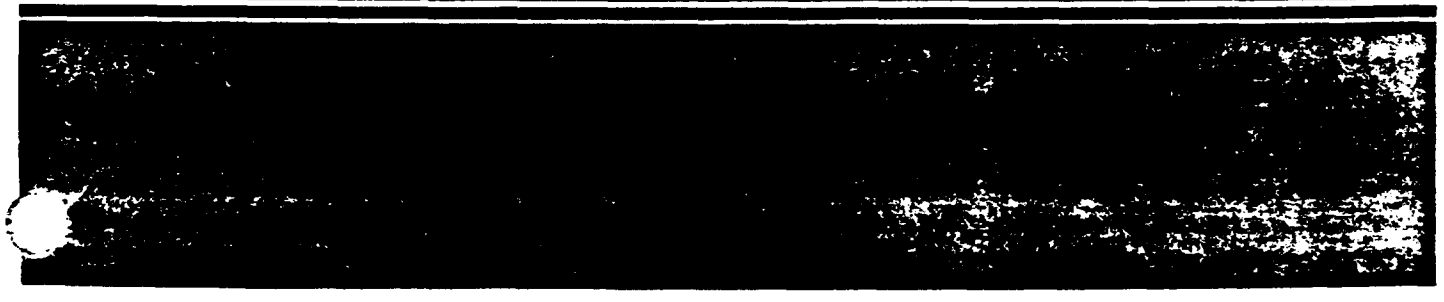
TITLE/SUBJECT	AUTHOR	DATE	PAGES
XV. Additional Items			
1. Comment Letter on DAR from Kerry Street (U.S. EPA) to Alan Van Norman	Kerry Street	8/29/87	7
2. Response Letter on DAR from SW-28 Group to U.S. EPA and MPCA	SW-28 Group	9/14/87	32
3. Transcript of Proceedings for Public Meeting on FS	Mary Ann Hintz (Court Reporter)	9/14/87	68
4. FS Comment Letter from SW-28 Group to U.S. EPA and MPCA	SW-28 Group	9/10/87	3
5. FS Comment Letter on DAR from CRA to U.S. EPA and MPCA	CRA	9/24/87	4
6. MPCA Memo on 1/28/87 Sampling of Coon Creek	Michael Convery	2/23/87	15
7. Agenda, Fact Sheet and Press Release for Public Meeting on FS	MPCA and U.S. EPA	9/3/87	5
8. Letter to SW-28 Group from MPCA on Public Comments	Thomas Kalitowski	10/12/87	3
9. MPCA and U.S. EPA Response to SW-28 Group 9/14/87	Thomas Kalitowski	11/4/87	10

United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R05-88/063
December 1987

EPA

Superfund Record of Decision:

Waste Disposal, MN