DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Yeoman Creek Landfill
Waukegan, Illinois

STATEMENT OF BASIS AND PURPOSE

This decision document represents the selected Final Remedial Action for the Yeoman Creek Landfill Site in Waukegan, Illinois. This action was chosen in accordance 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 to the extent practicable, with the National Oil and Hazardous Substances Contingency Plan (NCP). The decisions contained herein are based on information contained in the administrative record for this site.

The State of Illinois concurs with the selected remedy. The concurrence letter is attached to this Declaration.

ASSESSMENT OF THE REMEDY

Actual or threatened releases of hazardous substances from the site, if not addressed by implementing the response action selected in this Record of Decision (ROD), may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE REMEDY

This remedy is intended to be the final action for this site. This final action includes containment of landfilled wastes, excavation and on-site containment of contaminated soils and sediments, collection and treatment of leachate entering Yeoman Creek, and recovery and treatment of landfill gases. This final action addresses the following migration pathways from the Site: releases of leachate to ground water, surface water, surface sediments, and wetlands; and release of landfill gases to air

within adjacent buildings and to the ambient air.

The major components of the selected remedy include:

- construction of a new cover over the landfill to minimize infiltration of precipitation through the landfill, consisting of the following components: a 3 foot frost protection layer including a top vegetated layer;

- Implementation of access restrictions, including enclosing the entire Site in a fence and posting warning signs.

- Long term maintenance and post closure care.

STATUTORY DETERMINATIONS

This Final Remedial Action is protective of human health and the environment, complies with Federal and State applicable or relevant and appropriate requirements and is cost-effective. The selected remedial action utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable. However, due to the large volume and heterogeneous distribution of waste at the Site, treatment as a principle element is not considered practicable at the Site. Thus, this remedy does not satisfy the statutory preference for treatment that reduces toxicity, mobility, or volume as a principal element. However, treatment is a secondary element in that landfill gases will be treated resulting in destruction of hazardous substances.

A review will be conducted to ensure that the remedy continues to provide adequate protection of human health and the environment within five years after commencement of the remedial action.

September 30, 1996
Date

David A. Ullett
for Valdas V. Adamkus
Regional Administrator

RECORD OF DECISION SUMMARY

YEOMAN CREEK LANDFILL SITE, WAUKEGAN, ILLINOIS

I. SITE NAME, LOCATION, AND DESCRIPTION

The Yeoman Creek Landfill (Landfill) Site (Site) is located between Sunset Ave./Golf Road on the north, Glen Flora Avenue on the south, Lewis Avenue on the west, and Western Avenue on the east, in the City of Waukegan, Illinois (see Figure 1). The landfilled area covers approximately 60 acres. The Site is adjacent to a large wetland, and residential and commercial developments, including single family residences, apartment buildings, a nursing home, a doctor's office, a shopping center, and restaurants. Yeoman Creek flows through the Site and into the Waukegan River 1.75 miles downstream from the Site. The Waukegan River flows into Lake Michigan approximately 2.25 miles downstream from the Site.

The landfill was largely constructed within wetlands and also within the flood plain of Yeoman Creek. The landfill is still partially within the floodway and flood plain of Yeoman Creek. The landfill is fairly shallow with an estimated maximum depth of 19 feet. The total volume of landfilled waste has been estimated to be over one million cubic yards.

The Site can be divided into two discontinuous portions. The portion north of the power lines and Greenwood Avenue (see Figures 1 and 2) will be referred to as the Yeoman Creek Landfill portion of the Site, and the portion south of the power lines and Greenwood Avenue will be referred to as the Edwards Field Landfill portion of the Site. The Yeoman Creek landfill portion includes an estimated 49.2 acres of landfilled area, and the Edwards Field Landfill portion includes an estimated 11.9 acres of landfilled area. These portions of the Site had the same owner, operator, and operational procedures, as well as being in close proximity to each other.

II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

The Site was operated as a municipal landfill from 1958 through 1969. The Edwards Field Landfill portion operated as a landfill from 1958 through 1963, and the Yeoman Creek Landfill portion from 1962 through 1969. Some landfilling also occurred south of Edwards Field after 1962 and is considered part of the Site.

The Illinois Environmental Protection Agency (IEPA) inspected both portions of the landfill periodically during the 1970s. IEPA repeatedly reported violations of IEPA regulations due to discharge of leachate to Yeoman Creek and inadequate cover thickness at the Yeoman Creek Landfill portion.

As a result, IEPA eventually initiated an enforcement action against the City of Waukegan. In 1981, additional cover was placed over the Yeoman Creek Landfill portion, which generally provided a two foot cover over the entire landfill. According to a draft IEPA report, this action reduced the amount of leachate discharge. Leachate discharges were also reported by IEPA for the Edwards Field portion of the Site prior to 1975.

From 1978 through 1981, IEPA conducted a more thorough investigation of the Yeoman Creek Landfill portion of the Site (but not the Edwards Field portion), including conducting leachate, ground water, surface water, and stream sediment sampling. The result of most concern was that PCBs were detected in the leachate, stream sediment, and ground water. Later sampling by U.S. EPA during the 1980s confirmed the detection of PCBs in the stream sediments, and leachate at the Yeoman Creek Landfill portion. Based on this information, U.S. EPA added the Yeoman Creek Landfill Site to the National Priorities List, which made the Site eligible for a federally funded investigation and cleanup. Later it was realized that the Edwards Field Landfill portion should be part of the Site since it is in the vicinity of the Yeoman Creek Landfill portion, and had the same owner, operator, and operational procedures.

U.S. EPA identified potentially responsible parties (PRPs) for the Site. In December 1989, U.S. EPA and IEPA entered an Administrative Order by Consent (Order) with a number of PRPs requiring the PRPs to conduct a Remedial Investigation/ Feasibility Study under U.S. EPA and IEPA oversight, and to conduct certain interim remedial measures including implementing erosion control measures and fencing the Site. U.S. EPA had the lead in providing oversight. The first action completed under this order was fencing the known landfill boundaries to restrict access, which was completed in 1990. Erosion control actions were also completed in 1990.

The agreement between U.S. EPA and IEPA, and the PRPs was amended

in 1991 to add the Edwards Field area to the Site. Subsequently, use of this area for baseball playing was discontinued and the area was enclosed in a fence.

Sampling for the Remedial Investigation was conducted from 1991-1993. This included conducting soil borings to define the extent of the landfill, a hydrogeological investigation, ground water sampling, surface water sampling, sediment sampling, soil sampling and landfill gas sampling.

In October 1992, landfill gas sampling appeared to indicate that landfill gases were migrating off-site and entering the basement of an adjacent building.

During 1993 and 1994, under an amendment to the Order, PRPs implemented interim measures to attempt to address this situation, including blocking gas entry through footing drains and cracks in the floor, construction and operation of a basement ventilation system, and regular monitoring.

III. HIGHLIGHTS OF COMMUNITY PARTICIPATION

A kickoff meeting for the Remedial Investigation/Feasibility Study was held in October 1991. News releases were provided to the public in August 1992 and October 1992 regarding the detection of landfill gases off-site and possibly entering an adjacent building. In addition, an availability session was held by U.S. EPA regarding the landfill gas concerns and the general progress of the investigation in July 1993. In July 1994, U.S. EPA met with officials from the City of Waukegan, the Waukegan Park District, and Waukegan School District #60, who are potentially responsible parties, to listen to their concerns.

The public participation requirements of CERCLA section 113(k)(2)(B)(i-v) and 117 were addressed when a Proposed Plan was published by U.S. EPA in May 1995. U.S. EPA provided a public comment period on the Proposed Plan from May 15, 1995 through July 15, 1995, and conducted a public meeting on the Proposed Plan on June 1, 1995. U.S. EPA also met again with officials from the City of Waukegan, the Waukegan Park District and Waukegan School District #60 in August 1995. U.S. EPA's response to the public comments received are summarized in the attached Responsiveness Summary, which is part of this Record of Decision.

IV. SCOPE OF THE SELECTED REMEDY

Under the existing Order, interim measures have already been taken to mitigate threats due to potential entry of landfill gases into an adjacent building, to restrict access to the Site by construction of a fence around the Site, and to stabilize the Site by implementation of erosion control measures. The PRPs have also imposed deed restrictions over most of the Site property.

The purpose of this Record of Decision (ROD) is to select the final remedial actions for the Site. This final remedy is a source control remedy, which contains or controls the landfill, contaminated soils and sediments from the landfill, and releases of leachate and landfill gas from the landfill. The remedy addresses all media and migration pathways that are considered to present an unacceptable risk, including landfilled wastes; contaminated soil and sediment; and releases to surface water, to ambient air, to air within adjacent buildings, to ground water, to surface sediments, and to wetlands.

This remedy does not include treatment that reduces toxicity, mobility, or volume as a principal element. Because of the size of the landfill (over one million cubic yards), the costs for excavation and treatment of the entire landfill would be prohibitive. In addition, excavation and treatment of the entire landfill would entail significant public health and environmental risks. Therefore, alternatives for excavation and treatment of the entire landfill were not evaluated. Available information on the landfill operations indicates that it would not be worthwhile to attempt to locate concentrated areas of hazardous substance disposal (hot spots). Therefore, alternatives were not evaluated for location and treatment or removal of hot spots in the landfill. In addition, because the amount of ground water contamination is limited, the remedy does not includes direct ground water treatment.

V. SUMMARY OF SITE CHARACTERISTICS

Based on information available to U.S. EPA, it appears that wastes deposited at the Site were predominantly typical, putrescible municipal solid wastes, but wastes from industrial and commercial facilities in the area were also disposed of at

the Site. Information available to U.S. EPA indicates that wastes from industrial and commercial sources included waste oil that was likely contaminated with high concentrations of polychlorinated biphenyls (PCBs), spent solvent, paint wastes, resin wastes, foundry sand, waste inks, uncured rubber, and auto and truck repair wastes.[1] U.S. EPA has no firm evidence that hazardous wastes as defined by RCRA were disposed of at the Site. Samples of the landfilled wastes were not collected, but leachate concentrations were well below the regulatory levels for hazardous substances by characteristic under RCRA. Evidence from depositions of persons using and operating the landfill, indicate that hazardous or drummed wastes were not segregated on the Site, but were deposited and compacted along with other wastes that were being buried at the time of disposal.

The soil borings were conducted along the perimeter of the landfill to determine the areal extent of the landfilling. This investigation indicated that the landfilled area extends north of the expected property boundaries along the north boundary of the Yeoman Creek Landfill portion, and south of the expected property boundary of the Edwards Field Landfill portion (see Figure 2).

Borings were conducted to investigate the existing site cover characteristics. The existing cover is very flat over almost all of the Site. The cover is from 2-4 feet thick, and generally consists of low plasticity clays. Samples of the cap produced laboratory hydraulic conductivity values of from 1.7×10^{-5} to 6.3×10^{-9} cm/sec, although the site cover also had desiccation cracks.

The hydrogeological and ground water investigation included 32 borings and monitoring wells into the outwash, and two borings and monitoring wells into bedrock. The results indicate that the geology is complex and locally variable (see Figure 3 for a cross section). The shallow upper outwash unit is discontinuous at the Site and may be only locally interconnected to the shallow ground

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[1] There is firm evidence that waste oil likely containing high concentrations of PCBs was disposed of at the Yeoman Creek Landfill portion of the Site, but firm evidence for disposal of waste oil likely containing PCBs is not available for the Edwards Field portion of the Site.

water unit at the Site, which the Remedial Investigation consultant designated as the fluviolacustrine unit. A lower outwash unit is continuous within the study area. The bedrock units are isolated from the shallower flow systems by more than 30 feet of till. The shallow outwash, fluviolacustrine sands and lower outwash meet the requirements for Class I aquifers pursuant to 35 IAC 620.

The hydrogeological investigation showed that the landfill is connected to permeable portions of the shallow ground water, that shallow permeable formations are connected to the deeper outwash aquifer at the Site, and that most of the landfill leachate either seeps into lower outwash aquifer or into Yeoman Creek. The shallow aquifer is discontinuous at the Site; so there may be little communication between the shallow aquifer and the contaminated shallow ground water at the Site. The flow direction in the shallow and deep outwash is primarily to the east toward Lake Michigan. A horizontal flow direction in the fluviolocustrine sands could not be determined. The distribution of chloride concentrations at the Site appears to confirm that the Site is impacting the fluviolacustrine sands and the deep outwash aquifer.

It is estimated that 88 percent of the Yeoman Creek Landfill and 69 percent of the Edwards Field Landfill is presently under the water table. Capping the Site may reduce the percentage of waste below the water table to 37 percent at the Yeoman Creek Landfill and 46 percent of the Edwards Field Landfill.

Ground water is not used in the vicinity of the Site, and a City of Waukegan ordinance requires use of the municipal system for residential water within the City. The ground water is used for residential purposes in Beach Park approximately two miles from the Site. Based on available information, it does not appear that ground water from the Site has the potential to affect these residential wells.

According to Golder Associates, Yeoman Creek is a gaining stream along the Yeoman Creek Landfill portion, but appears to be a losing stream south of the Yeoman Creek Landfill portion (see p. 48 of the Remedial Investigation Report, Yeoman Creek/Edwards Field landfills, Waukegan, Illinois, February 1995 by Golder Associates). Landfilled wastes are present within a few feet of

Yeoman Creek along the Yeoman Creek Landfill portion, including within approximately 10 feet of Yeoman Creek along an estimated 600 feet of the total of 3200 feet of the Yeoman Creek Landfill portion bordering Yeoman Creek. At the Edwards Field portion, there is at least a 30 foot buffer between the landfilled wastes and Yeoman Creek.

PCBs were detected in wetland soils, stream sediments, stream water, and leachate, but were not detected in the ground water. The highest concentration of PCBs detected in surface soils outside the fenced area was 2 mg/kg, the highest concentration in stream sediments was 82 mg/kg, and PCBs were only detected in one surface water sample at a concentration of 0.5 ug/l. The PCB concentrations in stream sediments were highest adjacent to the Yeoman Creek Landfill portion, and dropped off to non-detect concentrations past the Edwards Field Landfill portion (see Figure 4). PCBs were detected in all three of the leachate seep samples at the Yeoman Creek Landfill portion with a maximum concentration of 71 ug/l. PCBs were detected in all four leachate seep soil samples at the Yeoman Creek Landfill portion at a maximum concentration of 90 mg/kg. PCBs were detected in all four leachate well samples at the Yeoman Creek Landfill portion at a maximum concentration of 190 ug/l. However, no PCBs were detected in the four leachate seep soil samples collected at the Edwards Field Landfill portion (no liquid seep samples could be collected at the Edwards Field Landfill portion). PCBs were only detected in one out of the three leachate well samples collected in the Edwards Field Landfill portion at a concentration of only 0.5 ug/l. In addition, no PCBs were detected in the wetland soil samples south of the Edwards Field Landfill portion.

Other contaminants and characteristics of concern and their maximum detected levels include:

In landfill gas:

explosivity (100% LEL);
benzene (1.2 mg/m^3);
trichloroethylene (0.087 mg/m^3);
tetrachloroethylene (0.051 mg/m^3);
vinyl chloride (not detected in landfill gas but detected in gas entering an adjacent building at 52 ppbv).

In ground water;

arsenic (284 ug/l);
beryllium (3.8 ug/l);
lead (103 ug/l);
manganese (2860 ug/l);
vinyl chloride (3 ug/l);
benzene (20 ug/l);
pentachlorophenol (2 ug/l);
bis(2-ethylhexyl)phthalate (10 ug/l).

In surface water:

acetone (19,000 ug/l);
cyanide (20.7 ug/l).

In wetland soils located east of Yeoman Creek and south of the Yeoman Creek Landfill portion:

benzo(a)pyrene (0.82 mg/kg);
lead (209 mg/kg);
zinc (307 mg/kg);
polyaromatic hydrocarbons (PAHs) (4.9 mg/kg).

In wetland soils south of the Edwards Field portion:

benzo(a)pyrene (8.2 mg/kg);
lead (1100 mg/kg);
zinc (874 mg/kg);
PAHs (88 mg/kg).

In Yeoman Creek sediments:

benzo(a)pyrene (1.6 mg/kg);
lead (257 mg/kg);
zinc (1770 mg/kg);
PAHs (24 mg/kg);

In leachate seeps in Yeoman Creek Landfill portion:

acetone (11 ug/l);
cyanide (234 ug/l);
lead (135 ug/l);

zinc (351 ug/l).

In seep soils in the Yeoman Creek Landfill portion:

acetone (0.1 mg/kg);
cyanide (1.3 mg/kg);
lead (127 mg/kg);
zinc (176 mg/kg);
PAHs (72 mg/kg).

In seep soils in the Edwards Field Landfill portion:

acetone (not detected);
cyanide (not detected);
benzo(a)pyrene (1.8 mg/kg);
lead (427 mg/kg);
zinc (451 mg/kg);
PAHs (42 mg/kg).

In leachate wells in the Yeoman Creek Landfill portion:

arsenic (27.6 ug/l);
beryllium (1.6 ug/l);
lead (953 ug/l);
manganese (1120 ug/l);
benzene (21 ug/l);
bis(2-ethylhexyl)phthalate (67 ug/l);
acetone (320 ug/l);
zinc (1460 ug/l).

Leachate wells in the Edwards Field Landfill portion:

arsenic (9.6 ug/l);
lead (132 ug/l);
manganese (327 ug/l);
trichloroethylene (3 ug/l);
tetrachloroethylene (3 ug/l);
1,2-dichloroethylene (3 ug/l);
1,2-dichloroethane (3 ug/l);
benzene (21 ug/l);
bis(2-ethylhexyl)phthalate (22 ug/l);
acetone (34 ug/l);
zinc (466 ug/l).

VI. SUMMARY OF SITE RISKS

A. ESTIMATED HUMAN HEALTH AND ECOLOGICAL RISKS IF CURRENT SITE CONDITIONS CONTINUE IN THE FUTURE:

At this time the ground water in the vicinity of the Site is unused, and it appears that it is unlikely to be developed in the future since a City of Waukegan ordinance requires use of municipal water for residential purposes.

The municipal water supply is from Lake Michigan. There are residential ground water users approximately two-miles downgradient from the Site in Beach Park, although it is unclear whether ground water from the Site can affect these wells. The Site is fenced, and deed restrictions have been placed over most of the Site.

The deed restrictions placed reportedly permanently prohibit future development. As a result, risks to human health if current Site conditions continue in the future are limited.

For adjacent residents the incremental lifetime cancer risk (ICR) was estimated to be 3.1×10^{-6} using average exposure assumptions (average), and 2.5×10^{-5} using reasonable maximum exposure assumptions (RME). A large portion of this risk is due to potential for landfill gas migration into adjacent buildings. Presently, this risk is being addressed by monitoring in adjacent buildings north of the Yeoman Creek portion of the Site, and operation of a ventilation system in one building. The remainder of the estimated risk is primarily due to potential for direct contact with PCBs and benzo(a)pyrene in surface soils, and surface water in the vicinity of the Site.

The risks to ecologic receptors was evaluated using potential effects on nesting red-winged black birds, and to mink. The risk to ecological receptors if current conditions continue in the future appears to be substantial. The evaluation indicated that risks due to potential contact with soil and sediments associated with the site that are contaminated with PCBs, lead, polyaromatic hydrocarbons, lead, and zinc, and surface water contaminated with cyanide and acetone may have a detrimental impact on some ecological receptors.

B. ESTIMATED RISKS IF GROUND WATER IS DEVELOPED FOR RESIDENTIAL PURPOSES IN THE FUTURE:

As stated previously the ground water in the vicinity of the Site is currently unused. However, if the ground water in the vicinity of the Site is developed in the future, the human health risks would be unacceptable. Existing information indicates that the shallow ground water is unlikely to be useable for residential purposes, but that the deeper outwash aquifer most likely could be developed for usage by a limited number of residences. The distribution of chloride concentrations appears to indicate that the landfill has impacted both the shallow and deep outwash formations. Hazardous substances of concern detected in ground water near the Site include arsenic, beryllium, manganese, lead, benzene, bis(2-ethylhexyl)phthalate, pentachlorophenol, and vinyl chloride. For lifetime residential usage of the shallow aquifer ground water, the ICR is estimated to be 8.7×10^{-5} and non-carcinogenic hazard index (HI) 6.3 (average), and 4.6×10^{-4} and 16 (RME).

For lifetime residential usage of the deeper aquifer, the ICR is estimated to be 5.1×10^{-5} and the HI 2.0 (average), and ICR 2.9×10^{-4} and HI 5.2 (RME). In addition, lead exceeded the Illinois Ground Water Quality Standards (IGWQS) in some aquifer samples. It should be noted that no PCBs were detected in ground water.

The extent to which these estimated risks, in the case of future residential ground water usage is attributable to the Site can not be fully defined using the available data.

Although it is possible that arsenic, beryllium, and pentachlorophenol are being released from the Site, these constituents do not appear to have been detected at significant concentrations in leachate samples. Arsenic was not detected above the IGWQS, either in leachate or aquifer samples, and may be associated with background and solids in the aquifer. Beryllium was detected in leachate samples, but only slightly above detection limits, and was only detected above the Maximum Contaminant Level (40 CFR 141) in one of the 72 (1/72) site-related aquifer samples. Some data indicates that at least some of the arsenic and beryllium are associated with solids in the aquifer. The range of arsenic concentrations near the Site is also similar to the range in ground water samples collected from the Lake County region.

Pentachlorophenol was detected at a very low concentration in only one leachate sample, and was detected in 2/72 site-related ground water samples at concentrations below the Contract Required Quantification Levels (CRQLs) above the IGWQS.

If arsenic, beryllium, and pentachlorophenol are not considered, the ICR for the shallow ground water is reduced to 1.3×10^{-5} (average) and 7.0×10^{-5} (RME). These estimated risks are apparently due to releases of benzene, bis(2-ethylhexyl)phthalate and vinyl chloride (or vinyl chloride precursors) from the Site, which has resulted in sporadic detection of these compounds in the aquifer. Benzene was detected in leachate, and in 8 samples from three shallow monitoring wells along the perimeter of the landfill, and exceeded the IGWQS in three samples from one of the monitoring wells. Bis(2-ethylhexyl)phthalate was detected in leachate, and in 5/72 site-related aquifer samples at concentra-0tions below the CRQL. Vinyl Chloride was not detected in the leachate although trichloroethylene and tetrachloroethylene, which can degrade to vinyl chloride, were detected in leachate. Vinyl chloride was detected in two shallow ground water samples from the perimeter of the Site at concentrations below the CRQL but at or above the IGWQS.

Lead was present in elevated concentrations in leachate samples and exceeded the IGWQS of 7.5 ug/l in 16/37 shallow ground water samples, and in 4/27 deep outwash samples. The highest concentration was 124 ug/l. However, lead also exceeded the IGWQS in 1/6 background ground water samples (25 ug/l) and appears to be strongly associated with solids in the aquifer. Some of the lead detected may be from the Site, but may be difficult to mobilize for residential exposures due to lead's affinity for solids.

The estimated non-carcinogenic risk is predominantly due to manganese. The manganese was as high as 1120 ug/l in leachate.

The IGWQS of 150 ug/l was exceeded in 35/42 shallow ground water samples with a maximum concentration of 2600 ug/l, and in 12/30 lower outwash samples with a maximum concentration of 2900 ug/l. However, manganese was also exceeded the IGWQS in 5/6 background ground water samples with a maximum of 830 ug/l. In addition, data appears to indicate that much of the manganese is associated with solids in the aquifer, and that the range of manganese

detected at the Site is similar to the range of ground water concentrations detected in Lake County, if the samples with the highest total suspended solids are excluded.

C. ESTIMATED RISKS IN CASE OF DEVELOPMENT OF THE PERIMETER OF THE SITE IN THE FUTURE:

If the perimeter of the Site is developed in the future for residential purposes and ground water is not used, the estimated ICR is estimated to be 3.2×10^{-6} (average) and 7.4×10^{-5} (RME). These risks are primarily due to potential exposure to PCBs in soil. Some of the estimated risk is also due to benzo(a)pyrene and benzo(b)flouranthene in soil, PCBs in surface water, and benzene and vinyl chloride in landfill gas. If residential ground water usage is also assumed, these risks should be added to the ground water risks.

D. RISKS IN CASE SITE IS DEVELOPED IN THE FUTURE:

At this time it appears very unlikely that the Site will be developed in the future. However, for a number of reasons it is very likely that, absent the waste disposal on the Site, the Site would have been developed for residential, recreational, commercial, and/or governmental purposes (or in the case of Edwards Fields Landfill use as a baseball field would have continued). These reasons include:

- the Site is flat and surrounded by residential and commercial development, including other properties that filled in low areas to allow such construction;

- the City transferred the property to the School Board because of plans to build a school on the Site;

- until recently the Edwards Field Landfill and surrounding area was a little league ball park;

- until recently portions of the landfill adjacent to the School Board property were being advertised for sale;

- a portion of the landfill is presently being used as a parking lot;

- property transfers have occurred without knowledge of the presence of landfilled waste on the property.

There are a number of reasons why normal residential, commercial or governmental development on the Site would result in an unacceptable risk. One concern is that landfill gas entry would cause an explosion risk. In addition, landfill gas entry into a building could result in an unacceptable risk from long term exposure via inhalation. For example, use of the equation for exposure to soil gas using a distance of one foot from the source would result in an estimated ICR of 2.6×10^{-4} (average) and 7.8×10^{-4} (RME). Data on actual concentrations of contaminants in the landfill are unavailable. However, it is certainly expected that contaminant concentrations would be many times higher in some locations in the landfill than the concentrations detected in the leachate or leachate seep samples. This would result in a very high risk due to potential dermal and ingestion exposures to these contaminants in case the Site was developed. The potential risks from future ground water usage at the Site has already been discussed.

Based on the results of the risk assessment, the objectives of the remedial actions include addressing the following risks:

- human health risks in case of future development of the Site;

- human health risks due to off-site landfill gas migration;

- human health and ecological risks due to the continuing releases of hazardous substances to wetlands, Yeoman Creek, and the ground water (this includes meeting drinking water standards in the aquifers at the Site);

- human health risks from off-site soil contamination;

- ecological risks due to contamination of sediments and limited wetland areas.

VII. DESCRIPTION OF ALTERNATIVES:

A. OVERVIEW:

Because of the size of the landfill (over one million cubic yards), the costs for excavation and treatment of the entire landfill would be prohibitive. In addition, excavation and treatment of the entire landfill would entail significant public health and environmental risks. Therefore, alternatives for excavation and treatment of the entire landfill were not evaluated.

In addition, available information on the landfill operations indicates that industrial wastes were disposed of along with the residential and commercial wastes. Because of this and the difficulty in locating hot spots within a landfill, alternatives were not evaluated for location and treatment of hot spots in the landfill.

As a result, the Feasibility Study concentrated on alternatives for containment of the landfill -- that is measures to prevent or minimize migration of contaminants from the landfill to the ground water, wetlands, surface water, and air. Containment technologies evaluated in detail for the Yeoman Creek Landfill Site include use of the following technologies:

- site covers having single barrier clay and membrane liners, and having composite clay and membrane liners to minimize formation of leachate generated by infiltration of precipitation through the landfill;

- leachate collection systems to intercept, remove and treat any leachate before entering Yeoman Creek whether the leachate is formed by precipitation, ground water movement, or changes in stream water level elevations;

- artificial channels to provide a barrier to entry of landfill leachate into Yeoman Creek;

- slurry walls to prevent off-site migration of contaminated ground water; and

- passive and active landfill gas ventilation systems to prevent off-site migration of landfill gas in the subsurface.

The alternatives evaluated in detail, except for the no-action

alternative, include combinations of the above listed technologies.

B. ACTIONS COMMON TO ALL CAPPING ALTERNATIVES:

All of the alternatives, including the no-action alternative, include imposition of deed restrictions and access restrictions over all of the Site property and enclosing the site with a fence. In addition, all of the capping alternatives include additional investigation, long term monitoring, remediation of contaminated sediments in Yeoman Creek and limited wetland areas, compliance with floodway/floodplain regulations, remediation of contaminated surface soils outside of the new cover area, compensation for loss or damage to wetlands, rerouting and sealing of existing storm drains that go through the landfill, and continuation of interim actions to control and monitor landfill gases until the final remedial action is implemented and demonstrated to be effective.

While source control (i.e. the landfill cover) will provide a mechanism for preventing future ground water contamination, natural attenuation will address existing ground water contamination.

1. Additional Investigation:

Additional ground water investigation shall be conducted, as necessary to determine the extent of ground water contamination. If necessary, sampling of Yeoman Creek sediments, limited wetland soils, and soils that will be outside of the site cover that may be contaminated by leachate seeps, will be conducted to determine the extent of contamination exceeding the cleanup action level. In addition, verification sampling will be conducted, as necessary, to test whether cleanup action levels are attained following the remedial action. The baseline quality of the wetlands south and east of the Site will be assessed to enable evaluation of the long term impacts of the landfill.

2. Long Term Monitoring:

Long term monitoring of the ground water, Yeoman Creek, landfill gas emissions, and wetlands will be conducted.

3. Remediation of contaminated sediments in Yeoman Creek and limited wetland areas, and of surface soils outside of the wetland and site cover area:

U.S. EPA and IEPA have determined that major disturbance of the large area of wetlands located south and east of the Site to remove contaminants is not warranted to address the concentrations of hazardous substances detected in the wetlands due to the potential adverse impact on the wetlands.[2]

For the sediments in Yeoman Creek and the limited wetland areas shown in Figure 5, and for surface soils outside of the wetland areas and the site cover area, U.S. EPA has established cleanup action levels (CALs) to address contamination that is significantly adding to risks to ecological receptors. An explanation of these CALs is included in Attachment 1. Landfill cover Alternatives #2-#5, include excavation of sediments that exceed these CALs, consolidation and temporary containment of the excavated sediments on the Site, and final containment under the final site cover.

By this Record of Decision, the Regional Administrator has waived the TSCA disposal requirements of 40 CFR 761.75(b)(1),(2),(3) and (7).

It is anticipated that for temporary containment of excavated sediments, a berm will be constructed around designated areas on the Site. The excavated sediments will be placed within these bermed areas to a depth not to exceed 1 foot. After the excavated sediments have dewatered to a consistency that can support low ground pressure earthwork equipment, the sediments will be covered with at least 6 inches of clean soil.

Additional sampling will be conducted of the Yeoman Creek sediments and in limited wetland areas, and surface soils that

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[2] Maximum concentration of various hazardous substances detected in wetland soils were: PCBs = 2 mg/kg in surface soil, and 5.5 mg/kg at 6-12 inches below the surface; benzo(a)pyrene = 0.82 mg/kg; benzo(b/k)flouranthene = 1.9 mg/kg; cumulative polyaromatic hydrocarbons = 8.9 mg/kg; lead = 209 mg/kg; mercury = 0.31 mg/kg; and zinc = 307 mg/kg.

may have been affected by leachate seeps and are located outside wetland areas and the site cover area to determine the extent of excavation. Based on sampling data available, it appears that between 900 and 3000 feet of stream sediments will have to be excavated and 40,000 square feet of sediments south of Edwards Field Landfill. Assuming that contaminated sediments are excavated to a 12 inch depth and 1200 feet of stream sediments 10 feet wide are excavated, approximately 2000 cubic yards of sediments would be excavated at an estimated cost of approximately $ 200,000. This cost will be partially offset by a reduction in the quantity of soil needed to bring the landfill cover to an acceptable grade.

As an Alternative to the limited excavation described above, excavation and on-site consolidation and containment of all sediments and the limited wetland areas shown in Figure 5 may be conducted if necessary to comply with floodplain/floodway regulations as described in the following section. In this case sampling to determine the extent of excavation will not be required.

An evaluation of the effects of the excavation on the wetland hydrology will have to be conducted. No adverse effects on the wetland hydrology will be allowed.

4. Compliance with floodplain/floodway regulations:

Work shall be conducted to comply with the Illinois Department of Transportation (IDOT) regulations (92 IAC 708) and Lake County Storm Water Management Commission (SMC) Watershed Development Ordinance. The remedial design phase shall include the additional investigation, modeling, alternative evaluation, and work with the regulatory Agencies to select procedures for compliance with the floodway/floodplain regulations. The required additional investigation, modeling and alternative evaluation shall be determined by U.S. EPA, largely based on input from IDOT and the SMC.

Compliance with the requirements of the SMC will entail remapping the floodplain because the current FEMA floodplain map is out of date (it does not include the filling that took place during operation of the landfill).

Following completion of the additional evaluation and work with IDOT and SMC, U.S. EPA will select the actions to be implemented for compliance with the floodplain/floodway regulations. The selected actions will largely be based on input from IDOT and the SMC.

All of the site cover alternatives (#2-#5) have the potential to include filling within the regulated floodway/floodplain in order to construct the site cover. Alternatives #3, 3A-3D, 4, 4A, and 4B have the potential for more floodway/floodplain filling than Alternative #2 because additional filling would be conducted to provide a 2% slope after settling and a 3 foot instead of a two foot cover would be added over the grading layer. Alternative #5 has the potential for even more floodway/flood plain filling since this Alternative includes additional filling to provide a 3 % slope after settlement and a 5 foot cover over the grading layer. New construction within a floodway and floodplain is regulated by IDOT and the SMC. The SMC regulations are more stringent than the IDOT regulations, and among other provisions require the following:

- providing compensatory storage for all lost floodplain storage at a 1.2 to 1 replacement ratio;

- prohibiting increase in flood height or velocity;

- maintenance of the flood carrying capacity (conveyance) of the floodway.

The IDOT regulations are similar but require compensatory storage for only lost floodway storage at a 1 to 1 replacement ratio.

Compliance with the IDOT and SMC floodway/floodplain regulations may be achieved for Alternatives #2 - #5 by one or by a combination of the following:

a. Creation of compensatory storage for lost floodplain storage;

b. Use of artificial channels combined with detention facilities to maintain capacity without increasing the average velocity through the Site;

c. Limited excavation of soil and/or landfill wastes out of the floodway/floodplain, consolidation on-site, and containment under the new site cover;

d. Approval of a variance by the regulatory Agencies.

In the Feasibility Study dated December 1994, Golder Associates estimated that compliance with the IDOT regulations will require creation of 6,880 cubic yards of compensatory floodway storage. Golder proposes that a reasonable way to comply with this requirement would be creation of compensatory floodway storage by excavation of sediments in Yeoman Creek and the limited wetland areas defined in the previous section. Golder estimates that excavation of these areas to a 2.5 foot dept would create 7,220 cubic yards of compensatory storage at an estimated cost of $374,883 for excavation, consolidation and temporary containment on-site. This is $170,000 more than the estimated cost for excavation, consolidation and temporary storage solely for compliance with the sediment cleanup action levels.

To comply with the SMC regulations by creation of compensatory storage, it is estimated that 30,000 cubic yards of compensatory storage will have to be created. Golder has estimated that this volume of compensatory storage could be created in the golf course north of the Site at an estimated cost of $652,200.

The sediment and limited wetland excavation as described for compliance with the IDOT regulations could also be used toward compliance with the SMC regulations.

Another action that could be used towards compliance with both the IDOT and SMC regulations, is limited excavation of wastes at the limits of Yeoman Creek, or at the fringes of landfilled wastes. These wastes would be consolidated and temporarily contained on-site until the new site cover is installed over the wastes.

The excavation of wastes may cause short term odors in the vicinity of the Site, and create some potential for releases to the surface water. These problems should be controllable if the extent of waste excavation is limited. The costs for sediment and waste excavation and containment on-site would be partially offset by a reduction in the quantity of soil needed to provide

an adequate grade for the new site cover.

Article V of the SWC Watershed Development Ordinance provides criteria for obtaining a variance from the SMC requirements. However, no waivers or variances are available for the IDOT regulations.

5. Compensation For Loss or Damage To Wetlands:

The landfill cover alternatives (#2-#5), include filling an estimated relatively small area of on-site wetlands. This impact on existing wetlands will require compensation or replacement or some other compensatory action pursuant to Section 404 of the Clean Water Act.

Any other detrimental impact on wetlands from the remedial actions, such as the soil excavation in the limited wetland areas, that can not be mitigated, will also require compensation.

The run-off from the site cover will be adjusted to prevent degradation to and, if possible, enhance ecological conditions in the large wetlands south and east of the Site. It is anticipated that the cost of this portion of the remedy will be minor.

6. Rerouting and Sealing Of Storm Drains That Go Through the Landfill:

Storm drains that go through the Landfill shall be rerouted around that landfill and sealed. It is expected that two existing storm drains that go through the Yeoman Creek Landfill portion will have to be rerouted and sealed (see Figure 6). It is estimated that this will cost $85,000 for Alternative 2, $110,000 for Alternatives 3, 3A, 3B, 3C, 4, 4A, and 4B, and $165,000 for Alternative 5. Drains that originate on-site will be covered by the new site cover, and so will not need to be rerouted or sealed.

7. Continuation of Interim Actions to Address Landfill Gas Migration:

Periodic monitoring of a number of buildings north of the Site for landfill gas entry, and construction and operation of ventilation systems in buildings north of the Site, where

potential landfill gas entry is detected, have been implemented during completion of the Remedial Investigation/Feasibility Study. Implementation of these measures will continue until the active landfill gas system is constructed and demonstrated to be effective in eliminating off-site landfill gas migration.

C. Alternative Evaluation

1. ALTERNATIVE 1, ACCESS RESTRICTIONS AND INSTITUTIONAL CONTROLS:

a. DESCRIPTION: Under this alternative, deed restrictions would be imposed to prohibit use of, access to, and future development of the Site property, and the Site would be fenced. This alternative would not involve any filling of wetlands nor filling within the floodplain. Human health risks would be reduced by limiting access to the Site. However, risks to ecological receptors would not be addressed; leachate seepage into the ground water, Yeoman Creek and the wetland would continue unabated; landfill gas migration into the basement of an adjacent building would continue; and the landfill may be subject to erosion damage in the future.

b. ESTIMATED COSTS:

CONSTRUCTION COSTS	: $ 46,000
ANNUAL O&M COSTS	: $ 5,600
PRESENT WORTH	: $ 120,000
IMPLEMENTATION	: a few months

2. ALTERNATIVE 2, SITE COVER INCLUDING A BARRIER LAYER OF TWO FEET OF LOW PERMEABILITY SOIL, and PASSIVE GAS VENTILATION SYSTEM:

a. DESCRIPTION: The objective of any Site cover is to reduce generation of contaminated leachate that may migrate to ground water or the surface water, by reducing infiltration through the cover, and to eliminate the risks of direct contact with the wastes. The barrier layer to infiltration of precipitation for Alternative 2 would consist of two feet of low permeability soil (see Option 1 in Figure 7). Alternative 2 will have a minimum slope to promote run-off

of precipitation.

Pipe vents would be installed into the landfill to provide a direct route of release for landfill gases, which would reduce the likelihood of off-site migration of landfill gases.

The soil cover would reduce infiltration, and would at least temporarily eliminate direct contact with leachate seepage and soils near existing seeps. However, the reduction in infiltration would be modest even under ideal conditions, and this type of cap is susceptible to cracking due to desiccation, freezing and other causes. It is possible that leachate seeps would eventually reemerge through the sides of the landfill. The passive vents may not completely eliminate off-site migration of landfill gases. In addition, some of the landfill gases would be emitted near commercial and residential developments. This may cause an odor concern, and a hazard to off-site residents.

b. ESTIMATED COSTS:

CONSTRUCTION COSTS	: $ 6,700,000
ANNUAL O&M COSTS	: $ 240,000
PRESENT WORTH	: $ 9,900,000
IMPLEMENTATION	: 3-years

3. ALTERNATIVE 3, SITE COVER INCLUDING A BARRIER LAYER CONSISTING OF A FLEXIBLE MEMBRANE LINER, AND PASSIVE PERIMETER GAS VENTILATION SYSTEM:

a. DESCRIPTION: The site cover's barrier layer would consist of a flexible membrane liner (FML) placed over a permeable gas ventilation layer. It is anticipated that a 40 mil very low density polyethylene (VLDPE) FML would be used for the barrier layer. The barrier layer will underlie a geosynthetic drainage layer having a hydraulic conductivity of 28 cm/sec. In addition, a grading layer would be added to provide the cover with a 2% slope after settlement, and a three foot frost protection layer would be placed over the FML (see option 4 Figure 7). A passive perimeter trench system would be used to control off-site migration of landfill gases.

Modeling indicates that this cover could be very effective in reducing infiltration through the landfill due to precipitation as long as the FML overall quality is good. For example, if the leakage fraction is 10^{-5}, the HELP modeling included in the Feasibility Study predicts a 99.4% reduction in infiltration compared to current conditions.

This corresponds to a reduction in total infiltration from 1,800,000 cubic feet to 11,500 cubic feet per year over the portion of the landfill east of Yeoman Creek. Some factors argue for assuming a low leakage fraction, such as the shallow depth of the landfill and the age of the landfill, which will probably limit the amount of settlement due to further decomposition of the wastes. In addition, strict quality control measures can be required during installation of the FML to reduce the occurrence of leaks, and which should result in construction of a good quality FML cap.

However, leaks through FML liners always occur, and the results of this can result in substantial leakage through the FML, if the FML is underlain by a permeable layer, as is proposed for this site cover alternative. This is demonstrated in Figure 2-4 of Design and Construction of RCRA/CERCLA Final Covers, U.S. EPA, May 1991. As can be seen the flow rate through holes in FMLs can increase from 330 gal/acre/day for excellent FMLs to 10,000 gal/acre/day for poor quality FMLs. This is also demonstrated using site specific HELP model assumptions in Table 1, which predicts that infiltration would increase from 12,000 cubic feet for a good/excellent quality FML to 276,000 cubic feet for a poor quality FML.

TABLE 1
COMPARISON OF INFILTRATION RATES
FOR FML AND COMPOSITE FML/CLAY BARRIER LAYERS
FOR GOOD AND POOR QUALITY FMLS USING HELP MODEL[3]

TYPE OF BARRIER	INFILTRATION ASSUMING 10^{-5} LEAKAGE FRACTION[4] % REDUCTION[5]	CUBIC FT	INFILTRATION ASSUMING 10^{-3} LEAKAGE FRACTION[6] % REDUCTION	CUBIC FT
FML	99.4%	12,000	84.9%	276,000
FML/GCL	100.0%	0	100.0%	15
FML/2-feet compacted clay @ HC=10^{-7}cm/sec	100.0%	2	100.0%	141

[3] Help Model Assumptions are shown in Appendix B, of the December 1994 Feasibility Study for the 10^{-5} leakage fraction runs. The 10^{-3} leakage fraction used the same assumptions as the corresponding run in Appendix B, except for changing the leakage fraction.

[4] According to Table 2-4 of Design and Construction of RCRA/CERCLA Final Covers, U.S. EPA, May 1991, good to excellent quality FML (or geomembranes) can be characterized by having one 1 cm^2 to 0.1 cm^2 hole per acre. According to Figure 9-8 of the same reference, this corresponds to a leakage fraction in the vicinity of 10^{-5}.

[5] Cubic feet of infiltration using new cap divided by the cubic feet of infiltration under existing conditions times 100. Cubic feet of infiltration was estimated using the HELP model

[6] According to Table 2-4 of Design and Construction of RCRA/CERCLA Final Covers, U.S. EPA, May 1991, poor quality FMLs (or geomembranes) can be characterized by having 30 0.1 cm^2 holes per acre. According to Figure 9-8 of the same reference, this corresponds to a leakage fraction in the vicinity of 10^{-3}, assuming a 0.33 foot head.

FML/2-feet compacted clay @ HC=10^{-7}cm/sec	100.0%	14	99.9%	1,374

Since 30-40% of the landfill wastes will remain below the water table even after the leachate mound in the landfill dissipates, some leachate will be generated from movement of ground water through the wastes. In the Feasibility Study, Golder Associates, Inc. estimated that the maximum ground water flow through the east side of the landfill would be 5 gpm, which corresponds to approximately 350,000 cubic feet per year and 16% of the estimated flow through the landfill due to infiltration of precipitation under existing conditions. Leachate generated by ground water flow would continue to recharge the ground water and possibly Yeoman Creek. However, Golder believes that "potential for ground water flow through the waste would be minimal" (see p. 38 of the Feasibility Study Report, Yeoman Creek/Edwards Field Landfills, Waukegan, Illinois), December 1994 by Golder Associates (Golder). Golder believes that the eastern portion of the Landfill is largely isolated from the shallow ground water flow system, and the flow through the western portion of the landfill may be much less than 5 gpm.

The substantial reduction in infiltration using a cap with an FML barrier layer would reduce impacts on the ground water. However, some ground water impact will continue as a result of the apparently limited ground water flow through the landfill and the amount of infiltration that gets through leaks in the FML. The aquifers near the Site would likely meet the ground water remediation goals over time (except for parameters that naturally exceed the goals) as a result of reduction of the source, natural biodegradation, and other natural attenuation mechanisms.

Surficial leachate seeps would be eliminated as a result of the reduction in leachate generation and placement of additional cover materials over the top, and would be unlikely to emerge because of the substantial reduction in leachate formation. However, leachate would continue to recharge Yeoman Creek through subsurface routes during the

period of time when the leachate mound is dissipating. Some leachate would also be generated from the ground water movement through the landfill, infiltration through the site cover, and variations in the water level in Yeoman Creek. Some of this leachate may seep into Yeoman Creek especially along the Yeoman Creek Landfill portion, where Yeoman Creek is a gaining stream.

The passive landfill gas ventilation system would provide confidence that landfill gas would not migrate off-site. However, the landfill gas vents would be located along the perimeter of the Site near residential and commercial developments. This may cause an odor concern, and a hazard to off-site residents.

It is possible that some of the soils excavated for the landfill gas ventilation system would contain PCBs at concentrations equal to or exceeding 50 ppm. However, by this Record of Decision, the Regional Administrator has waived the requirements of 761.75(b)(1), (2), (3) and (7). Therefore, contaminated soils generated from this excavation can be consolidated on-site.

b. ESTIMATED COSTS:

CONSTRUCTION COSTS	: $ 16,500,000
ANNUAL O&M COSTS	: $ 230,000
PRESENT WORTH	: $ 19,600,000
IMPLEMENTATION	: 3-years

3A. Alternative 3A, SITE COVER INCLUDING A BARRIER LAYER CONSISTING OF A COMPOSITE FLEXIBLE MEMBRANE LINER OVER A GEOSYNTHETIC CLAY LINER, AND PASSIVE PERIMETER GAS VENTILATION SYSTEM:

a. DESCRIPTION: This alternative is identical to Alternative 3 except that the barrier layer of the soil would consist of a composite FML over a geosynthetic clay liner (GCL), instead of being directly over the gas ventilation layer (see option 4A Figure 7). The GCL consists of a thin layer of natural bentonite clay incorporated into a geosynthetic mesh, which serves to keep the bentonite in place so that a continuous low permeability bentonite layer is created below the FML.

The GCL is forgiving under load and is self healing.

The FML by itself is very effective in minimizing infiltration through the landfill as long as the FML is of good quality. However, leaks in the FML always occur and can substantially increase the quantity of infiltration as discussed in Section C.3. The GCL complements the FML's capability by essentially plugging leaks in the FML with a thin, but low permeability layer of clay. The potential effectiveness of the composite FML/GCL is demonstrated in Figure 2-4 from Design and Construction of RCRA/CERCLA Final Covers, U.S. EPA, May 1991. For site specific application, it is also demonstrated using the HELP model in Table 1.

The composite FML/GCL barrier provides significantly more insurance that the site cover will be very effective, compared to the FML barrier.

b. ESTIMATED COSTS:

CONSTRUCTION COSTS	: $ 18,900,000
ANNUAL O&M COSTS	: $ 230,000
PRESENT WORTH	: $ 22,000,000
IMPLEMENTATION	: 3-years

3B. Alternative 3B, SITE COVER INCLUDING A BARRIER LAYER CONSISTING OF A COMPOSITE FLEXIBLE MEMBRANE LINER OVER 2-FEET OF COMPACTED CLAY, AND PASSIVE PERIMETER GAS VENTILATION SYSTEM:

a. DESCRIPTION: This alternative is identical to Alternative 3 except that the barrier layer of the soil would consist of a composite FML over 2-feet of compacted clay, instead of being directly over the gas ventilation layer. The ventilation layer would be below the compacted clay (see option 4B Figure 7). In order to reduce the quantity of soil that would have to be imported onto the Site, the two foot clay layer would replace some of the grading soil. Along the edges where grading soil would not be required, the existing cover may be usable as part of the 2-foot compacted clay layer. The compacted clay would have a maximum hydraulic conductivity of 10^{-6} cm/sec.

Like the GCL, a 2-foot compacted clay layer complements the

FML by providing a low hydraulic conductivity barrier wherever leaks develop in the FML. The clay layer would also be self healing to some degree. The FML would protect the clay layer from desiccation cracking. The potential effectiveness of the composite FML/compacted clay barrier layer is demonstrated in Figure 2-4 from Design and Construction of RCRA/CERCLA Final Covers, U.S. EPA, May 1991, which is attached. For site specific application, it is also demonstrated using the HELP model in Table 1. The composite FML/compacted clay barrier provides significantly more insurance that the site cover will be very effective, compared to the FML barrier.

Figure 2-3 from Design and Construction of RCRA/CERCLA Final Covers, U.S. EPA, May 1991, which is attached, shows that the effect of reducing the hydraulic conductivity requirement for the compacted clay from 10^{-7} to 10-6 cm/sec does not result in a significant increase in infiltration.

This is also confirmed for site specific application in Table 1. For this reason, and because there may be a cost savings, the hydraulic conductivity criteria for the compacted clay is set at 10^{-6} cm/sec.

b. ESTIMATED COSTS:

CONSTRUCTION COSTS	: $ 18,100,000
ANNUAL O&M COSTS	: $ 230,000
PRESENT WORTH	: $ 21,200,000
IMPLEMENTATION	: 3-years

3C. ALTERNATIVE 3C: SITE COVER INCLUDING A BARRIER LAYER CONSISTING OF A FLEXIBLE MEMBRANE LINER, AND AN ACTIVE PERIMETER GAS CONTROL SYSTEM:

a. DESCRIPTION: This Alternative is identical to Alternative 3 except that an active perimeter gas control system will be used instead of a passive gas control system. The active gas control system will utilize a blower to remove gases from the perimeter gas collection trench. It is anticipated that one fan/blower will be located on the northern portion of the landfill and one in the southern portion. The gases collected will be directed to the center of both on-site

landfills for treatment by flaring or some other method (see attached Figure 8).

The active perimeter trench control system is the most reliable system available for preventing off-site migration of landfill gases in the subsurface. It is considerably more reliable than the passive perimeter trench system and, therefore, should eliminate concerns about entry of landfill gases into adjacent buildings. An additional benefit of the active system is that the active withdrawal of landfill gases has more potential to reduce ground water contamination by volatile organic compounds such as benzene and vinyl chloride by actively withdrawing them in the vapor phase, and thus preventing them from recondensing at the perimeter of the landfill and contaminating ground water. Another advantage of the active system is that VOCs will be permanently treated prior to release to the ambient air. The combination of directing the landfill gases to the centers of the landfill and treating the gases prior to release, should eliminate the concern regarding the odor and health risks to off-site residents from the release of landfill gases.

b. ESTIMATED COSTS:

CONSTRUCTION COSTS	: $ 17,300,000
ANNUAL O&M COSTS	: $ 340,000
PRESENT WORTH	: $ 22,000,000
IMPLEMENTATION	: 3-years

4. ALTERNATIVE 4, SITE COVER INCLUDING A BARRIER LAYER CONSISTING OF A FLEXIBLE MEMBRANE LINER, AN ACTIVE PERIMETER GAS CONTROL SYSTEM, A LEACHATE COLLECTION SYSTEM ALONG THE YEOMAN CREEK LANDFILL PORTION OF THE SITE, AND REROUTING YEOMAN CREEK ALONG EDWARDS FIELD PORTION OF THE SITE:

a. DESCRIPTION: This Alternative includes the site cover and active perimeter gas control system described for Alternative 3C, plus measures to insure isolation of Yeoman Creek from the landfill leachate. The isolation measures along the Yeoman Creek Landfill portion of the Site would be a leachate collection system. The leachate collection system would be installed along both sides of Yeoman Creek

where the landfill is present. It is anticipated that the leachate collection trench would extend to 12 to 18 inches below the level of Yeoman Creek. Wastes observed to be between the leachate collection system and Yeoman Creek would be excavated and consolidated on-site. Leachate would drain to a sump, from which it would be pumped to a treatment and/or storage system. The leachate would either be treated and discharged to the North Shore Sanitary District treatment system, or be transported off-site for treatment.

The leachate collection trenches would provide an effective barrier to prevent leachate from seeping into Yeoman Creek during dissipation of the leachate mounds in the landfill, and would prevent leachate generated from ground water movement from seeping into Yeoman Creek. Since 30-40% of the landfill wastes will remain below the water table even after the leachate mound in the landfill dissipates, it is possible that some leachate will be generated from movement of ground water through the wastes. This leachate could continue to recharge Yeoman Creek especially along the Yeoman Creek Landfill portion where Yeoman Creek is a gaining stream.

Along the Edwards Field portion of the Site, the stream would be relocated through the middle of the wetlands and away from the landfill. According to aerial photograph interpretation, this was the route of Yeoman Creek before the stream bed was relocated during operation of the landfill. If properly implemented, this relocation may enhance the quality of the wetlands east of the Edwards Field area. This action would move Yeoman Creek to 150 feet or more from the Edwards Field portion of the landfill (see attached Figure 9).

Although this option would not necessarily prevent leachate from eventually reaching Yeoman Creek, any leachate generated from dissipation of the leachate mound, infiltration through the site cover, and ground water flow through the lower portion of the landfill, would be buffered by a longer ground water flow route and the wetlands before reaching Yeoman Creek. There is presently a 30 foot buffer between the landfilled waste and the Creek, and the Creek

appears to be a losing stream in that area.

It is possible that some of the soils excavated for the landfill gas control system and leachate collection system would contain PCBs at concentrations equal to or exceeding 50 ppm. However, by this Record of Decision, the Regional Administrator has waived the requirements of 761.75(b)(1), (2), (3) and (7) (see Section IX.A). Therefore, contaminated soils generated from this excavation can be consolidated on-site.

b. ESTIMATED COSTS:

CONSTRUCTION COSTS	: $ 18,000,000
ANNUAL O&M COSTS	: $ 450,000
PRESENT WORTH	: $ 24,200,000
IMPLEMENTATION	: 3-years

4A. ALTERNATIVE 4A, SITE COVER INCLUDING A BARRIER LAYER CONSISTING OF A FLEXIBLE MEMBRANE LINER, AN ACTIVE PERIMETER GAS CONTROL SYSTEM, A CLOSED CULVERT IN YEOMAN CREEK ALONG THE YEOMAN CREEK LANDFILL PORTION OF THE SITE, AND REROUTING YEOMAN CREEK ALONG THE EDWARDS FIELD PORTION OF THE SITE:

a. DESCRIPTION: This Alternative is identical to Alternative 4 except that Yeoman Creek would be isolated from the Yeoman Creek Landfill portion of the Site by construction of a closed culvert in the creek along the landfill instead of construction of a leachate collection system. The culvert would be designed to provide a physical barrier to the landfill leachate.

An underdrain system would be incorporated into the bottom of the culvert to drain fluid into sumps. The fluid would be pumped to a treatment/storage facility, and, if necessary, either treated and discharged to the Northshore Sanitary District treatment system, or transported off-site for treatment. This system would be equally effective as the leachate collection system in preventing leachate from the Yeoman Creek Landfill portion from entering Yeoman Creek due to dissipation of the leachate mound, infiltration through the site cover, or movement of ground water through the landfill.

b. ESTIMATED COSTS:

CONSTRUCTION COSTS	: $ 19,800,000
ANNUAL O&M COSTS	: $ 440,000
PRESENT WORTH	: $ 25,900,000
IMPLEMENTATION	: 3-years

4B. ALTERNATIVE 4B, SITE COVER INCLUDING A BARRIER LAYER CONSISTING OF A FLEXIBLE MEMBRANE LINER OVER EITHER A GCL OR A 2-FOOT COMPACTED CLAY LINER, AN ACTIVE PERIMETER GAS CONTROL SYSTEM, AND A LEACHATE COLLECTION SYSTEM ALONG THE YEOMAN CREEK LANDFILL PORTION OF SITE

a. DESCRIPTION: Alternative 4B is the same as Alternative 4, except for use of one of the composite clay/FML liner systems as described for Alternatives 3A or 3B instead of use of the FML liner by itself for the barrier layer. In addition, rerouting of Yeoman Creek away from the Edwards Field portion of the Site is not included.

b. COSTS

CONSTRUCTION COSTS	: $ 20,100,000[7]
ANNUAL O&M COSTS	: $ 450,000
PRESENT WORTH	: $ 26,300,000
IMPLEMENTATION	: 3-years

4C. ALTERNATIVE 4C, SITE COVER INCLUDING A BARRIER LAYER CONSISTING OF A FLEXIBLE MEMBRANE LINER, AN ACTIVE PERIMETER GAS CONTROL SYSTEM, A LEACHATE COLLECTION SYSTEM ALONG THE YEOMAN CREEK LANDFILL PORTION OF THE SITE:

a. DESCRIPTION: Alternative 4C is the same as Alternative 4, except that rerouting of Yeoman Creek away from the Edwards Field portion of the Site is not included.

b. COSTS

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[7] This cost is based on the cost of the FML/compacted clay barrier in Alternative 3B, since this is estimated to be the cheaper of the two alternatives.

CONSTRUCTION COSTS	: $ 17,700,000
ANNUAL O&M COSTS	: $ 450,000
PRESENT WORTH	: $ 23,800,000

5. ALTERNATIVE 5, SITE COVER FULLY MEETING RCRA SUBTITLE C TECHNICAL GUIDANCE, AN ACTIVE PERIMETER GAS CONTROL SYSTEM, DEEP SLURRY WALLS AROUND THE ENTIRE LANDFILL, AND GROUND WATER/LEACHATE PUMPING TO PREVENT OFF-SITE MIGRATION:

a. DESCRIPTION: This Alternative includes a site cover fully consistent with RCRA Subtitle C technical guidance. It includes a 3% slope after settlement, a gas ventilation layer, a composite barrier layer consisting of an FML and a 2 foot compacted clay layer with 10^{-7} hydraulic conductivity above the grading layer (not incorporated into the grading layer as in Alternative 3B), and a three foot frost protection layer. This cover would require importing considerably more soil to provide the 3% slope and the full 2 foot compacted clay layer above the grading layer, which would result in a 5 foot thick site cover above the grading layer rather than a three foot thick cover above the grading layer as Alternatives 3, 3A, 3B, and 3C, 4, and 4A. This site cover would be very effective in preventing infiltration through the cover with a high level of reliability.

Alternative 5 would utilize deep soil-bentonite slurry-walls keyed into the lower till to prevent flow from the landfills into Yeoman Creek, as well as preventing migration into the aquifers near the Site. Ground water would be pumped within the containment area formed by the slurry walls in order to minimize vertical flow between the shallow and deep aquifers by equalizing their potentiometric head. The removed leachate/ground water would be pumped to a treatment/storage system and either discharged to the Northshore Sanitary District or transported off-site for treatment.

It is possible that some of the soils excavated for the landfill gas control system and the slurry walls would contain PCBs at concentrations equal to or exceeding 50 ppm. However, by this Record of Decision, the Regional Administrator has waived the requirements of 761.75(b)(1), (2), (3) and (7) (see Section IX.A). Therefore,

contaminated soils generated from this excavation can be consolidated on-site.

b. ESTIMATED COSTS:

CONSTRUCTION COSTS	: $ 39,800,000
ANNUAL O&M COSTS	: $ 880,000
PRESENT WORTH	: $ 51,900,000
IMPLEMENTATION	: 3-years

IX. SUMMARY OF COMPARATIVE EVALUATION OF ALTERNATIVES

The National Contingency Plan (NCP) requires that the alternatives be evaluated on the basis of the following nine evaluation criteria: (1) Overall protection of human health and the environment; (2) Compliance with applicable or relevant and appropriate requirements (ARARs); (3) Long-term effectiveness and permanence; (4) Reduction of toxicity, mobility, or volume through treatment; (5) Short-term effectiveness; (6) Implementability; (7) Cost; (8) State acceptance; and (9) Community acceptance. These criteria are summarized below. This section compares the alternatives with regard to these nine evaluation criteria.

A. Threshold Criteria

1. **Overall Protection of Human Health and the Environment** addresses whether a remedy provides adequate protection of human health and the environment and describes how risks posed through each exposure pathway are eliminated, reduced or controlled through treatment, engineering, or institutional controls. The selected remedy must meet these criteria.

2. **Compliance with Applicable or Relevant and Appropriate** Requirements (ARARs) addresses whether a remedy will meet applicable or relevant and appropriate federal and state environmental laws and/or justifies a waiver from such requirements. The selected remedy must meet this criteria or waiver of the ARAR must be attained.

B. Primary Balancing Criteria

3. **Long-Term Effectiveness and Permanence** refers to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup levels have been met.

4. **Reduction of Toxicity, Mobility, or Volume Through Treatment** addresses the statutory preference for selecting remedial actions that employ treatment technologies that permanently and significantly reduce toxicity, mobility, or volume of the hazardous substances as their principal element.

   This preference is satisfied when treatment is used to reduce the principal threats at the site through destruction of toxic contaminants, reduction of the total mass of toxic contaminants, irreversible reduction in contaminant mobility, or reduction of total volume of contaminated media.

5. **Short-Term Effectiveness** addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed, until cleanup levels are achieved.

6. **Implementability** is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.

7. **Cost** includes estimated capital and operation and maintenance (O&M) costs, also expressed as net present worth.

C. Modifying Criteria

8. **State Acceptance**
   Addresses whether or not the State Agency agrees with or objects to any of the remedial alternatives and also considers State ARARS.

9. **Community Acceptance**
   Addresses the public's general response to the remedial alternatives and to the Proposed Plan. The specific responses to public comments are addressed in the

Responsiveness Summary section of this ROD.

A. THRESHOLD CRITERIA: OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT AND COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS):

The ARARs of most concern for this remedial action include the following:

- surface water quality standards in 35 IAC Part 302;

- Maximum Contaminant Levels (MCLs) pursuant to 40 CFR 141 and Illinois Ground Water Quality Standards (IGWQS) pursuant to 35 IAC 620.410 in the aquifers below the Site;

- final cover system requirements of 35 IAC 811.314, which requires placement of a final cover consisting of a low permeability layer (either 3 feet of compacted soil with a permeability of 10^{-7} cm/sec, or an FML in combination with a shallower depth of compacted soil, of equal or superior performance) overlain by a protective layer;

- actions to minimize the destruction, loss, or degradation of wetlands in Executive Order 11988 and 40 CFR 6, Appendix A Section 6(a)(5);

- restrictions on construction within floodways and flood plains pursuant to 92 IAC Part 708, which generally requires compensation for lost floodway storage and conveyance, and prohibits increases in average channel velocity and flood height (U.S. EPA has determined that the Lake County Storm Water Management Commission Regulations, which are somewhat more stringent, are not ARARs, but will be seriously considered during implementation of the remedial actions);

- Northshore Sanitary District pretreatment requirements, and restrictions on discharge of pollutants to POTWs in 40 CFR 403.5, 35 IAC 307 1101-1103, 35 IAC 310.201(a)(c), 35 IAC 310.202, 35 IAC 309(d)(e);

- landfill gas management and disposal requirements of 35 IAC 811.311 and 811.312, which requires use of an active perimeter gas control system and treatment of the gas prior

to discharge to the atmosphere.

- TSCA disposal regulations at 40 C.F.R. § 761.60 et seq., are applicable to PCBs in concentrations of 50 ppm or greater (PCBs*) when such PCBs* are "taken out of service". Under the remedial actions being considered, TSCA disposal regulations could be triggered by excavation of PCBs* which may occur during the excavation of sediments, and during excavation of soils and wastes for construction of the leachate collection system and the landfill gas control system. The TSCA disposal regulations may also be triggered by constructing a new cover over leachate seep soils that contain PCBs*. Pursuant to 40 C.F.R. § 761.60(a)(4), PCBs* must be disposed of: "(i) in an incinerator which complies with 761.70; or (ii) in a chemical waste landfill which complies with 761.75." The TSCA compliant chemical waste landfill disposal method is generally much less expensive than incineration.

The on-site consolidation and containment of PCBs*, whether from the sediments, seep soils, or soils excavated for construction, would not meet the following chemical waste landfill requirements of Section 761.75(b):

- bottom liner requirements because the landfill does not have a bottom liner (761.75(b)(1) and (2));

- fifty foot distance between bottom liner and historical high water table (761.75(b)(3);

- leachate collection requirements (761.75(b)(7));

Pursuant to 761.75(c)(4), the Regional Administrator may determine that one or more of the requirements in 761.75(b) is not necessary to protect against unreasonable risk of injury to health or the environment from the PCBs, and may waive such requirements. In this Record of Decision, the Regional Administrator waives the requirements in 761.75(b)(1), (2), (3) and (7) for the following reasons:

1. the final remedial action will provide protection to human health and the environment against unreasonable risks of injury;

2. no significant reduction in the long term risks would be gained from the off-site disposal of the small quantity of PCBs* in the sediments, seep soils, and excavated soils since the bulk of the PCBs* will be contained in place under the final cover; and

3. the costs for the analyses to detect the extent of PCBs* and for off-site disposal of the PCBs* located is potentially large.

Alternative 1, the No Action Alternative, would result in unacceptable risks under current conditions due to the fire and explosion threat from off-site migration of landfill gases, and detrimental impacts on ecological receptors may be occurring under current conditions. Although Alternative 2 includes sediment and limited wetland remediation, over the long term re-emergence of leachate seeps may also cause a detrimental impact on ecological receptors. Alternative 1 would result in unacceptable risks in case of future development of the Site. Alternatives 1 and 2, would result in unacceptable risks in case of future ground water usage, and Illinois Ground Water Quality Standards would not be met in the aquifers near the Site. It is possible that this contamination would eventually affect downgradient residential well users.

In addition, Alternatives 1 and 2 do not comply with State of Illinois' final site cover requirements in 35 IAC 811.314. Therefore, Alternatives 1 and 2 are eliminated from further consideration.

Alternatives 3, 3A, and 3B include use of a passive perimeter gas ventilation system rather than an active perimeter gas control system as required in 35 IAC 811.311. In addition, Alternatives 3, 3A, and 3B may cause malodors beyond the property boundary in violation of 35 IAC 811.311; do not include treatment as required pursuant to 35 IAC 811.312; and may cause an off-site exposure risk due to the uncontrolled release of landfill gases along the perimeter of the landfill. Therefore, Alternatives 3, 3A, and 3B are eliminated from further consideration.

Of the remaining alternatives, Alternatives 3C, 4, 4A and 4C consider a cover consisting of only an FML liner. An FML liner does not meet the requirements of 35 IAC Part 811 for a site

cover of at least 3 feet of compacted soil with a hydraulic conductivity of 10^{-7} cm/sec or less, or an alternative which has an equivalent or greater performance.

This leaves Alternatives 4B, and 5 under consideration, both of which include use of an active perimeter gas control system and a cap meeting or exceeding the critera of 35 IAC 811.

Besides use of the active perimeter gas control system and cap requirements, all of the remaining alternatives include a number of common actions that are necessary to address site risks or to achieve ARARs, including the following:

1. Site access restrictions;

2. Institutional controls;

3. Additional investigation;

4. Long term monitoring;

5. Remediation of contaminated sediments in Yeoman Creek and limited wetland areas;

6. Compliance with floodway/floodplain regulations;

7. Remediation of surface soils outside of the new cover area;

8. Compensation for loss or damage to wetlands;

9. Rerouting and sealing of storm drains that go through the landfill;

10. Continuation of interim actions.

No alternative evaluation was conducted for these components of the remedy because either the costs are small compared to the overall costs of the remedy, or (with one exception) there was only one logical alternative to address the need. The exception is compliance with the floodplain/floodway regulations, for which alternatives for compliance will be evaluated during the remedial design phase.

Site access restrictions are necessary to protect the public from exposure to potentially hazardous landfill gases and leachate, and from the mechanical components of the remedial action. In addition, Site access restrictions are necessary to maintain the integrity of the site cover, and other components of the remedial action. The estimated cost of site access restrictions ($35,000) are very minor compared to the total cost of the remedial action.

Institutional controls will include deed restrictions to prohibit future development of the Site that would be incompatible with the remedial action.

Institutional controls will also include restrictions on usage of the contaminated ground water near the site. The cost of institutional controls is very minor compared to the total cost of the remedial action.

The additional investigation includes additional ground water investigation to define the extent of ground water contamination. It also includes sampling to determine the required extent of sediment and soil remediation and to verify attainment of the cleanup action levels following remediation. Long term monitoring is necessary to evaluate the long term effectiveness of the remedy, and to detect any hazardous conditions caused by the Site before it adversely affects public health or the environment. The FS estimates that the initial cost of the long term monitoring and ground water investigation will be $420,000, and yearly costs will be $128,800.

Remediation of the contaminated sediments is necessary to reduce impacts on ecological receptors from relatively high concentrations of contaminants from the Site. Since the bulk of the contamination is being contained on-Site, the only reasonable alternative to address the contaminated sediments is to excavate, consolidate and temporarily store the contaminated sediments on-site until finally contained under the new Site cover.

Off-Site disposal is clearly more expensive and would provide no significant reduction in risk.

Thus a waiver of the TSCA disposal requirements is justified. The estimated cost of $200,000 is small compared to the total cost of the remedy.

Compliance with the floodplain/floodway regulations is required pursuant to 92 IAC 708 and the Lake County Watershed Development Ordinance. Alternatives for compliance with these regulations will be evaluated during the remedial design phase. The actual costs will depend on the results of further study to determine the extent and impacts of filling in the floodplain and floodway. Golder estimates that a reasonable maximum cost will be $652,200, which is not a large amount compared to the total cost of the remedy.

Remediation of surface soils that will be outside of the new Site cover, is necessary to reduce human health risks from exposure to PCBs on the surface soil. The cost of this action will be very minor.

Compensation for loss or damage to wetlands is required pursuant to Executive Order 11988 and 40 CFR 6, Appendix A Section 6(a)(5). It is expected that this cost will be minor compared to the total cost of the remedy.

Rerouting and sealing of storm drains is necessary to prevent leachate formation due to potentially large volumes of storm water flow through the waste. This leachate could recharge ground water or Yeoman Creek. The estimated cost of $110,000 for Alternative 4B, is small compared to the total cost of the remedy.

Continuation of the interim actions for monitoring buildings north of the Site for landfill gas entry, and operation, maintenance and monitoring of the ventilation system installed to mitigate the affects of landfill gas entry, are necessary to protect public health from fire and explosion, and toxic hazards from the landfill gas until the final remedial action is implemented.

B. PRIMARY BALANCING CRITERIA: LONG-TERM EFFECTIVENESS AND PERMANENCE; REDUCTION OF TOXICITY, MOBILITY AND VOLUME THROUGH TREATMENT; SHORT-TERM EFFECTIVENESS; IMPLEMENTABILITY; AND COST.

Alternative 4B, is much less costly than Alternative 5. As stated before, these remaining alternatives include an active perimeter landfill gas control system. Alternative 4B includes a Site cover using a composite FML and clay liner as a barrier layer, a

leachate collection system along Yeoman Creek for the Yeoman Creek Landfill portion of the Site, but does not include relocation of Yeoman Creek away from the Edwards Field area. Alternative 4B is estimated to cost $25,600,000 less than Alternative 5, which includes a site cover fully consistent with RCRA Subtitle C technical guidance, slurry walls, and a ground water/leachate pumpout system.

1. Active landfill gas control system:

The active perimeter landfill gas control system is estimated to cost $1,200,000 to construct and $115,000 per year to operate and maintain. This is substantially more than the $540,000 to construct and $13,000 per year to operate and maintain the passive perimeter control system. However, this additional cost is necessary to assure protection of the public health and to meet ARARs.

As stated previously none of the alternatives evaluated in detail include treatment to reduce toxicity, mobility or volume as a principle element. However,the remaining Alternatives, 4B, and 5 include treatment as a secondary element through inclusion of an active perimeter gas collection and treatment system. The active perimeter trench control system is the most reliable system available for preventing off-Site migration of landfill gases in the subsurface, and for addressing potential risks from air emissions of landfill gases. An additional benefit of the active system is that withdrawal of landfill gases has potential to reduce ground water contamination by volatile organic compounds (VOCS) such as benzene and vinyl chloride by withdrawing these VOCs in the vapor phase along with other landfill gases, and thus preventing them from recondensing at the perimeter of the landfill and contaminating ground water. No significant short-term risks nor implementability problems are expected from construction of an active perimeter gas system.

2. Site cover alternatives:

The site cover fully consistent with RCRA Subtitle C technical guidance, which is included in Alternative 5 is estimated to cost $4,400,000 more than the Alternative 4B site cover, which also includes a composite barrier layer. However, Table 1 indicates that the Alternative 4B site covers would be expected to reduce

infiltration to negligible levels, even if leaks in the FML occur. Therefore, the Alternative 5 site cover is not cost effective. The Alternative 5 site cover also has more implementability problems than the Alternative 4B site cover due to more disturbance of nearby businesses and residents from transportation of a much larger quantity of soil in order to construct the five foot thick cap over a grading layer with a 3% slope, and more potential to affect nearby properties and structures due to the thicker capping requirement. Therefore, the site cover option in Alternative 5 is screened out.

The use of a site cover with a composite FML/clay liner barrier layer is included in Alternative 4B, but not in Alternatives 3C, 4, 4A, or 4C. As stated before, the FML by itself can be very effective in minimizing infiltration through the landfill as long as the FML is of good quality. Nonetheless, the FML by itself does not comply with 35 IAC 811 requirements.

In addition, the composite barrier layer would provide considerably more assurance that the site cover will remain very effective over the long-term. The estimated additional cost of use of the site cover with the composite FML/clay barrier layer compared to a site cover using only an FML as a barrier layer is summarized below:

ADDITIONAL CONSTRUCTION COSTS	: $	1,900,000
ADDITIONAL ANNUAL O&M COSTS	: $	0

No additional short term risks are anticipated from construction of a site cover with a composite FML/clay barrier as proposed in Alternative 4B compared to construction of with only an FML. In addition, no significant additional implementation problems are anticipated.

There may be some concern that the Edwards Field portion of the Site should not require as effective a site cover as the Yeoman Creek Landfill portion.

Although leachate seepage from only the Yeoman Creek Landfill portion of the Site had been the primary regulatory concern during the 1970s and early 1980s, the detection of VOCs such as benzene, acetone, trichloroethylene and tetrachloroethylene, in the leachate well samples at Edwards Field along with the similar

operational history indicates that an effective site cover should be placed over both the Edwards Field Landfill and the Yeoman Creek Landfill portions of the Site.

3. Alternatives to further isolate Yeoman Creek from the Landfill leachate along the Yeoman Creek Landfill portion of the Site.

A leachate collection system for the Yeoman Creek Landfill portion of the Site was included in Alternative 4B.

At the Yeoman Creek Landfill portion of the Site, some conditions argue against the need for measures to further isolate Yeoman Creek from the leachate beyond the protection provided by the new Site cover.

The new Site cover will eliminate surficial leachate seeps; so the only mechanism for leachate recharge of the Creek following cover installation would be through migration through the subsurface. A low permeability cover will nearly eliminate leachate generation due to precipitation, which will result in a gradual decrease in the leachate mound in the landfill, and therefore, a gradual decrease in the driving force for leachate recharge to the Creek.

Even after the leachate mounds are dissipated, leachate can be generated by movement of ground water through the portion of the landfilled waste that will remain below the water table. However, shallow ground water recharge to the Creek is apparently minor since the base flow of the Creek is zero during parts of the year. Water level measurements also indicate that discharge of ground water to the Creek occurs only locally. Furthermore, the ground water data indicates that there is significant natural attenuation between the leachate and ground water, which may also apply to the leachate recharge of the Creek. Consequently, there is a reasonable potential that implementation of the Remedy without a leachate collection system, along with natural attenuation, may expeditiously reduce leachate to below levels of concern.

On the other hand, further isolation of the Creek using a leachate collection system or an artificial channel along the Yeoman Creek Landfill portion of the Site would provide

significant additional insurance that leachate would not have a continuing effect on the Creek. The primary concern is that landfilled wastes are within a few feet of the Creek along much of the Yeoman Creek Landfill portion. Some of this landfilled waste may contain high concentrations of hazardous substances.

It is known that wastes likely to contain high concentrations of PCBs were disposed of in the Yeoman Creek Landfill portion over most, if not all, of its period of operation. The attenuation mechanisms that are protecting the ground water may not be effective over the few feet between the landfilled waste and Yeoman Creek. A number of the hazardous substances detected in the leachate at the Yeoman Creek Landfill portion of the Site may have an adverse impact on ecological receptors, including PCBs, lead, zinc, acetone and cyanide. Therefore, even local recharge of Yeoman Creek from the Yeoman Creek portion of the Site is of concern. Since 30-40% of the landfill wastes will remain below the water table even after the leachate mound in the landfill dissipates, some leachate will be generated from movement of ground water through the wastes, and some of this could recharge Yeoman Creek.

It is preferable to construct a leachate collection system or artificial channel now in conjunction with construction of the new site cover because the design can be integrated with the Site cover design to maximize effectiveness. After construction of the site cover construction of the Creek isolation measures would likely be more expensive due to additional mobilization costs, and the need to repair portions of the Site cover damaged during the construction. Furthermore, the Remedial Investigation (see Section 4.2.1.2.2) indicates that it may be difficult to detect the impact of leachate on Yeoman Creek through the monitoring program. As a consequence, concentrations of less mobile contaminants such as PCBs could build up over time without being detected.

The leachate collection trenches as proposed in Alternatives 4 and 4B would provide an effective barrier to prevent leachate from seeping into Yeoman Creek during dissipation of the leachate mounds in the landfill, in the event that the site cover is not effective, and would prevent leachate generated from ground water movement from seeping into Yeoman Creek.

The estimated additional costs for the leachate collection system including treatment and disposal are summarized below:

CONSTRUCTION COSTS FOR LEACHATE COLLECTION	: $	300,000
ADDITIONAL ANNUAL O&M COSTS	: $	87,000
ADDITIONAL PRESENT WORTH	: $	1,500,000

The construction cost of the leachate collection system for the Yeoman Creek Landfill portion is relatively modest. The major portion of the present worth cost is for operation and maintenance. It is expected that as the leachate mound dissipates that the flow into the leachate collection system will decrease, and, as a result, operation and maintenance costs will also decrease.

There are some addition potential short term risks from exposure to leachate during construction and operation of the leachate collection system. However, these risks are controllable through implementation of standard worker safety procedures.

Alternative 4A includes use of a corrugated steel arch pipe with underdrains to collect leachate to isolate Yeoman Creek from the Yeoman Creek Landfill portion of the Site, instead of a leachate collection system. Use of corrugated steel arch pipe is estimated to cost $1,300,000 more to construct than a leachate collection system with no decrease in operation and maintenance costs. This Alternative is not expected to be significantly more effective than the leachate collection system. Therefore, Alternative 4A is screened out.

4. Alternatives to further isolate Yeoman Creek from the Landfill leachate along the Edwards Field Landfill portion of the Site.

Alternative 4B includes no further actions beyond the new Site cover to control leachate from the Edwards Field Landfill portion of the Site. Alternatives 4 and 4A include relocation of Yeoman Creek away from the Edwards Field area to further isolate Yeoman Creek from the leachate.

Conditions are significantly different at the Edwards Field Landfill portion of the Site. Along the Edwards Field Landfill, the Creek is generally a losing stream, which indicates that recharge by the ground water is unlikely. There is no definitive

evidence that wastes containing high concentrations of PCBs were disposed of at the Edwards Field Landfill portion. In addition, PCBs were detected in only one leachate well sample at a very low concentration at the Edwards Field Landfill portion. Cyanide was not detected in the leachate at the Edwards Field Landfill, and lead, zinc and acetone were detected at lower concentrations than at the Yeoman Creek Landfill portion.

Finally, even if the leachate does recharge the Creek, there is an approximately 30 foot buffer between the Creek and the landfilled waste, which would be expected to provide significant attenuation especially for relatively insoluble contaminants such as PCBs and lead.

Therefore, it appears that the Site remedy without further measures to isolate the Edwards Field Landfill portion from the Creek will be effective in protecting Yeoman Creek. As a result, leachate collection or relocation of Yeoman Creek away from Edwards Field does not appear to be necessary (even though the cost of relocating Yeoman Creek is relatively modest ($280,000) and the short term impacts are not expected to be significant).

5. Containment of leachate and contaminated ground water with slurry walls with ground water extraction.

Alternative 5 would contain leachate and contaminated ground water from both Yeoman Creek and the ambient ground water using slurry walls and ground water extraction within the slurry wall. Its primary advantage over Alternative 4B is that it would prevent off-site migration of contaminated ground water. However, this advantage would be gained at a very major increase in costs compared to Alternative 4B ($ 16 million in additional construction costs and $430,000 in additional annual costs). Considering the relatively minor levels of ground water contamination and the fact that the ground water in the vicinity of the Site is not presently being used, this additional cost does not appear to be justified. As previously noted in Section II.B, regarding the risks from ground water exposures, the ground water contamination is presently limited even though the Site does not have an effective site cover.

The substantial reduction in infiltration using an effective site cover would reduce impacts on the ground water, and most likely

would result in the aquifers near the Site eventually meeting the ground water remediation goals (except for parameters that naturally exceed the goals) as a result of controlling the source, natural biodegradation, and other attenuation mechanisms.

The results of the HELP model runs in Table 1, demonstrate that infiltration can be nearly eliminated using the site covers in Alternative 4B, without construction of a site cover that fully complies with RCRA Subtitle C technical guidance. In addition, the leachate collection system along the Yeoman Creek Landfill portion of the site along with the site cover will effectively isolate Yeoman Creek from the landfill without construction of the deep slurry walls.

Alternative 5 has implementability problems including a lack of space along the perimeter of the landfill for construction of slurry walls, more disturbance of nearby businesses and residents due to importing a much larger quantity of soil in order to construct the five foot thick cap over a grading layer with a 3% slope, and more potential to affect nearby properties and structures due to the thicker capping requirement. Therefore, Alternative 5 is screened out.

C. MODIFYING CRITERIA: STATE AGENCY ACCEPTANCE; COMMUNITY ACCEPTANCE.

The State of Illinois concurs in the U.S. EPA preferred alternative.

A representative of the potentially responsible parties (PRP) participating in preparation of the Remedial Investigation/ Feasibility Study (RI/FS) has indicated that the group favors Alternative 3C, which does not include a leachate collection system along the Yeoman Creek Landfill portion, and includes the active landfill gas control system, and a site cover using only an FML for the barrier layer. Alternative 3C is estimated to cost $22,000,000 in present worth. U.S. EPA agrees with use of the active gas control system, but also believes that the additional long-term protectiveness and permanence, and reduction in leachate generation justifies the additional $ 1.7 million construction cost for a site cover with a composite FML/clay barrier layer. In addition, a barrier layer consisting of only an FML does not comply with either the capping ARAR 35 IAC 811 or

the current capping requirements applicable under 35 IAC 807 as proposed by PRP representatives.

The City of Waukegan, the Waukegan Park District and Waukegan School District #60, which are PRPs, have expressed concern regarding their budgetary constraints, and, in particular, urged U.S. EPA to use discretion in regarding the costs of the cap alternatives, the slurry wall, leachate collection, relocation of Yeoman Creek, and ground water remediation.

It should be noted that U.S. EPA's preferred alternative does not include the expensive site cover, slurry wall or ground water control measures included in Alternative 5. U.S. EPA's preferred alternative also does not include a leachate collection system along the Edward's Field Landfill nor relocation of Yeoman Creek away from Edward's Field.

In its comments on the draft Feasibility Study, the Lake County Health Department supported the following components in the selected remedy: a site cover with a composite FML/clay; a leachate collection system along Yeoman Creek; an active gas control system; and soil and sediment remediation. U.S. EPA's preferred Alternative includes all of these components.

Residents in the vicinity of the Site are expected to favor U.S. EPA's preferred alternative since it will eliminate the landfill gas migration problem without causing potential off-site risks and odor problems. In addition, U.S. EPA's preferred alternative will not entail nearly as much disruption of local businesses as Alternative 5 because the Site cover will not be as thick and because less soil would have to be imported onto the site. In spite of this, U.S. EPA's preferred alternative will impact some local businesses, potentially including consolidation of wastes from, or construction of the site cover over business property in locations where landfilled wastes extend onto the properties, including property at 1401-1451 Golf Road, 2122 Yeoman Street, and 1615 Sunset Avenue. The exact dimensions and location of the cover will be developed during the design of the U.S. EPA's selected remedial alternative.

X. THE SELECTED REMEDY

The selected remedy is Alternative 4B. Alternative 4B, includes the following components (these components are further expanded including discussion of ARARs for each component):

A. Construction of a new cover over the Landfill to minimize infiltration precipitation through the landfill, consisting of the following (see options 4A and 4B Figure 7):

- a 3 foot frost protection layer including top soil and vegetation;

- a geosynthetic drainage layer with a hydraulic conductivity of at least 20 cm/sec and with a protective geotextile filter fabric above the layer to prevent plugging;

- a 3 foot Compacted Clay Layer, or a barrier of equal or exceeding performance, such as a composite barrier layer consisting of a 40 mil very low density polyethylene liner (or equivalent) over either a geosynethic clay liner (GCL) or a 2-foot compacted clay layer;

- a gas ventilation layer with a hydraulic conductivity of at least 10^{-3} cm/sec with a protective geotextile filter fabric above it if the compacted clay layer option is implemented;

- a grading layer to provide a 2% slope after settlement;

1. Further Description:

   The construction quality control staff must be certified by the National Institute of Certification and Engineering Technologies.

   A GCL consists of a thin layer of bentonite clay incorporated into a geosynthetic mesh. The GCL must be capable of producing a continuous low permeability clay layer below the FML. The GCL must be able to withstand construction without tearing and must be self healing.

   Remedial Design concepts (i.e. mounding cap design; limited consolidation) to minimize the volume of grading materials

and the aerial extent of the landfill cover will be considered during the Remedial Design phase.

The 3 foot Compacted Clay Layer must have a hydraulic conductivity of less than 1 X 10 -7 cm/sec. A composite barrier must have compacted clay or equivalent construction material must have a hydraulic conductivity less that 1 X 10^{-6} cm/sec. The compacted clay layer, or equivalent material, would make up some of the grading layer over the Site so as not to increase the quantity of imported soils needed. Along the edges of the landfill where a grading layer would not be needed, the compacted clay layer can be constructed by scarifying and compacting the existing soil cover to the greatest extent possible.

The composite layer landfill cover will provide source control, the mechanism for preventing future ground water contamination. Natural attenuation will abate existing ground water contamination.

2. ARARs:

This final cover system will meet the requirements of State of Illinois regulations 811.314 (which requires a barrier layer at least as effective as 3 feet of compacted clay with a hydraulic conductivity of 10^{-7} cm/sec), and 811.322 (slope, vegetation and on-site structure requirements), for new solid waste landfills. In conjunction with other portions of the remedy, it also meets the closure performance standard for solid waste landfills in 35 IAC 807.502 (minimize future maintenance and releases). In addition, Ambient Air Quality Standards 40 C.F.R. § 50.6 and 35 IAC 811.103 are ARARs for the construction operation. Impacts on wetlands shall be subject to Executive Order 11990, 40 CFR 6 Appendix A, and Section 404 of the Clean Water Act.

RCRA hazardous waste landfill site cover requirements are not considered ARARs because there is no documentation that listed RCRA hazardous wastes were disposed of at the Site, and because none of the leachate samples even came close to meeting the definition of the RCRA hazardous waste by characteristic. However, because of the presence of PCBs

and other hazardous substances at the Site, the RCRA site cover requirements should be considered.

The selected site cover meets all of the criteria recommended in RCRA technical guidance documents for a hazardous landfill covers, with the following exceptions: use of a 2% slope instead of a 3% slope and acceptance of a 1 X 10^{-6} cm/sec compacted clay instead of 1 X 10^{-7} cm/sec in a composite barrier. Use of a 2% slope instead of 3% will reduce the quantity of soil that must be imported to the Site substantially, which is a significant consideration both because of the costs and because the disruption that the construction will cause to adjacent businesses and residents. Use of 1 X 10^{-6} cm/sec instead of 1 X 10^{-7} cm/sec as the hydraulic conductivity requirement for the composite barrier compacted clay will increase the likelihood that local clays can be used for the construction, and may reduce costs. Neither the reduced slope requirement nor the reduced hydraulic conductivity requirement is expected to significantly increase infiltration through the landfill.

B. Implementation of a comprehensive, long-term monitoring system which shall include sampling for leachate, groundwater at the edge of the landfill contents, surface water and creek sediments. Action levels will be established in the monitoring plan and shall include Maximum Contaminant Levels (40 CFR 141) and 35 IAC 620.

In the event that Action Levels are exceeded for a specified number of sampling events (to be determined and approved by U.S. EPA after construction of the Site cap), construction and operation of a leachate collection system along both sides of Yeoman Creek adjacent to the Yeoman Creek Landfill portion of the Site to prevent leachate and leachate contaminated ground water from entering or seeping into Yeoman Creek will be required.

1. Further Description: If determined necessary, the leachate collection system is expected to consist of a trench extending 12 to 18 inches below the level of Yeoman Creek. The trench will be lined with a membrane on the creek side in order to attempt to limit infiltration of creek water.

   The trench will be capped with a clay surface seal.

Leachate will be collected in a 2 inch diameter pipe and will drain to a sump, from which it will be pumped to a storage and treatment system. It is anticipated that the leachate would either be treated (if necessary) and discharged to the North Shore Sanitary District treatment system, or transported off-site for disposal.

Excavated material, which will include landfilled wastes, from the leachate collection trench shall be consolidated and temporarily stored on-site before being contained under the new Site cover, in the same manner as the contaminated sediments as described in Section X.D. The construction and consolidation shall be conducted in a manner that prevents any release of contaminants from the Site into Yeoman Creek, the wetlands, or other off-site soils.

2. ARARs:

If the leachate is discharged to the North Shore Sanitary District, the following ARARs will be applied: 40 CFR 403.5 (pretreatment standards); Northshore Sanitary District regulations; 35 IAC 307.1101-1103 (sewer discharge criteria); 35 IAC 310.201(a) and (c) (pretreatment standards); 35 IAC 310.202 (pretreatment standards); and 35 IAC 309(d) and 309(e) (leachate treatment and disposal).

If the leachate is discharged to Yeoman Creek, the following ARARs will apply: surface water standards in 35 IAC Part 302; effluent standards 35 IAC 304.

40 CFR 122.44 (requires permit for direct discharge), 35 IAC Part 302 (water quality standards), 35 IAC 811.103 (run off from disturbed areas), Federal Water Pollution Control Act Section 111(b)(3), 40 CFR 110.6 (discharge prohibited), Clean Air Act Section 101, 40 CFR 52, 40 CFR 61 shall be construction requirements.

Although no testing of excavated wastes and soils will be required, it is possible that some of the waste and soils excavated for the leachate collection system may contain PCBs exceeding 50 ppm. Excavation of these wastes and soils and consolidation on-site could be considered disposal of PCBs pursuant to 40 CFR 761.1(b).

In this case, 40 CFR 761.60(a)(4) would require any non-liquid PCBs at concentrations of 50 ppm or greater in the form of contaminated soil, rags, or other debris shall be disposed of: (i) In an incinerator which complies with 761.70; or (ii) in a chemical waste landfill which complies with 761.75.

The selected remedy provides for disposal of the PCBs in a landfill that does not meet the following chemical waste landfill requirements of Section 761.75(b): bottom liner requirements because the landfill does not have a bottom liner (761.75(b)(1) or (2));leachate collection requirement and requirement for a fifty foot distance between bottom liner and historical high water table (761.75(b)(3) and (b)(7)), and landfill operation requirement (761.75(b)(8). However, pursuant to 761.75(c)(4), the Regional Administrator has determined that for this Site the requirements in 761.75(b)(1), (2), (3),(7), and (8) are not necessary to protect human health and the environment. For this Site, the low permeability site cover, leachate collection system, if indicated, long term monitoring, access restrictions, and institutional controls included in the selected remedy provide protection to the public health and the environment. Since the remedy provides for containment of the bulk of the PCB contamination, which will not be moved, below the new site cover, no additional protection to the public health or the environment would be added by off-site transport and disposal of the leachate collection material in an incinerator complying with 761.70 or in a chemical waste landfill complying with 761.75(b). The written statement of this finding and waiver by the Regional Administrator, as required in 761.75(c)(4), is provided by signing this Record of Decision.

The material excavated for the leachate collection system will be consolidated and temporarily stored above the 100 year flood elevation. The remedy will comply with 40 CFR 761.75(b)(4)(ii), which requires diversion of surface water run-off from a 24-hour, 25-year storm.

The remedy will also comply with 761.75(b)(5), which requires a site to have a moderate relief, 761.75(b)(6), which requires surface water and ground water monitoring, and 761.75(b)(9), which includes requirements for support facilities.

Regulations relevant to active landfilling operations such as

the waste handling requirements of 811.105, 106, and 107, are not ARARs but should be considered. These regulations should not be ARARs because the operations and conditions for this remedial action are very different from the operations and conditions at operating landfills.

The Yeoman Creek Landfill along with adjacent and downstream contaminated sediments within Yeoman Creek, and contaminated soils adjacent to the Landfill, constitute a single area of contamination. Therefore, excavation of contaminated sediments in Yeoman Creek and excavation of soils and landfilled wastes away from Yeoman Creek and consolidation on-site for final containment under the Site cover along with the rest of the landfilled wastes, does not constitute placement or disposal and, therefore, will not trigger the storage, handling or disposal requirements of RCRA, TSCA, or the State of Illinois Waste Disposal Regulations (the treatment and air emission requirements relevant to hazardous waste in 40 CFR 260-268 and 35 IAC 724 are not anticipated to be ARARs since no listed hazardous wastes are known to have been disposed of in the Landfill and the leachate samples collected were not even close to the criteria for a hazardous waste by characteristic.) The leachate collection system requirements in 35 IAC 307, 308 and 309 [except for 309(d) and 309(e)] shall not be ARARs since these requirements relate to construction of new landfills having a bottom liner and drainage system.

Regulations relative to stabilization of hazardous wastes such as 40 CFR 264.228(a)(2), which requires elimination of free liquids by removal or solidification, and stabilization of remaining wastes and waste residues to support a cover are not ARARs because the consolidation operation on the existing Site cover is much different than the type of operation in a surface impoundment. In addition, there is no documentation identifying that listed hazardous wastes were disposed of on the Site, and leachate samples from the Site have not even come close to meeting the criteria for a RCRA hazardous waste.

Construction and operation of an active perimeter landfill gas collection and treatment system.

1. Further Description: A landfill gas collection trench will be constructed along the perimeter of the Landfill except

along the sides that are adjacent to Yeoman Creek or the wetlands (see Figure 8). A blower or fan will be used to remove the gases from the perimeter trench system. One trench system and blower will be located on the northern portion of the landfill, and another in the Edwards Field area. The gases collected will be directed to the center of either the northern portion of the Site or to the center of the Edwards Field area for treatment by flaring or some other equally effective method.

2. ARARS: The following ARARs will be applied: Clean Air Act Sections 101 and 40 CFR 52 (requires design of an odor free operation, and filing an air pollution emission notice); 40 CFR 61 (limits on hazardous air pollutants); 35 IAC 811.311 (requires active gas control system) ; 35 IAC 811.312 (requires treatment of collected landfill gas); and 35 IAC 211, 212, 214, 215, 216, and 217 (emission regulations).

C. Excavation and consolidation of contaminated sediments and surface soils in limited wetland areas exceeding cleanup action levels:

1. Further Description: It may be advantageous to excavate sediments within the main channel of Yeoman Creek and wetland sediment as shown in Figure 5 in order to facilitate compliance with floodplain/floodway regulations. In this case the excavation can be conducted without preliminary sampling provided that the excavation is conducted in a manner that will not negatively impact the wetland hydrology.

Following the excavation, the sediments shall be consolidated and contained as described below.

Otherwise, only sediments within the main channel of Yeoman Creek and sediments in the wetland south of Edwards Field that exceed the following cleanup action levels (CALs) shall be excavated, consolidated on-site, temporarily contained under a temporary site cover to prevent wind and water erosion, and then permanently contained under the new site cover provided that the excavation is conducted in a manner that will not negatively impact the wetland hydrology. Prior to the excavation, composite samples should be

collected on every 100-500 feet of stream length and 40,000 square feet of surface area to evaluate whether the relevant portion of the sediment attains the CALs.

However, if it is demonstrated to the satisfaction of U.S. EPA that a parameter within an area exceeds the CAL for that parameter solely because of a source other than the Site, then sediment excavation within that area need not be performed.

The excavation, consolidation, and temporary containment shall be conducted in a manner that minimizes release of contaminants from the Site into Yeoman Creek, the wetlands, or other off-site soils. It is anticipated that for temporary containment, a berm will be constructed around designated areas on the Site. The excavated sediments will be placed within these bermed areas to a depth not expected to exceed 1 foot. After the excavated sediments have dewatered to a consistency that can support low ground pressure earthwork equipment, the sediments will be covered with at least 6 inches of clean soil.

2. Definition of CALs: Following is a list of the sediment CALs. The derivation of these CALs is described in Attachment 1.

   For PCBs[8]: [A-1242]/2+[A-1248]+10 X [A-1254] = 3.4 mg/kg

   For Lead: 180 mg/kg

   For PAHs: 26 mg/kg

   For Zinc: 317 mg/kg

3. ARARs: The following ARARs shall be applied: 40 CFR 110.6 (discharge prohibited); Water Quality Standards 35 IAC Part 302; 35 IAC 811.103 (run off from disturbed areas); Executive Order 11990 (wetland protection); 40 CFR 6 Appendix A (wetland protection); 40 CFR 6.302(g) (fish and wildlife protection); Clean Air Act Section 101; 40 CFR 52;

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[8] A- means Arochlor.

40 CFR 61.

Regulations relevant to active landfilling operations such as the waste handling requirements of 811.105, 106, and 107, are not ARARs but should be considered. These regulations should not be ARARs because the operations and conditions for this remedial action are very different from the operations and conditions at operating landfills.

Some of the excavated sediments may contain PCBs exceeding 50 ppm. Excavation of these sediments and consolidation on-site could be considered disposal of PCBs pursuant to 40 CFR 761.1(b). In this case, 40 CFR 761.60(a)(5) requires either: disposal of the sediments in an incinerator complying with 761.70; a chemical waste landfill complying with 761.75; or by an alternative method approved by the Regional Administrator. Pursuant to 761.75(c)(4), the Regional Administrator has determined that for this Site the requirements in 761.75 (b)(1),(2),(3),(7) and (8) are not necessary to protect human health and the environment, and that on-site consolidation, temporary containment, final containment under a low permeability cover, long term monitoring, access restrictions, and institutional controls provide adequate protection to health and the environment. Since the remedy provides for containment of the bulk of the PCB contamination, which will not be moved, below the new site cover, no additional protection to the public health or the environment would be added by requiring the very costly off-site transport and disposal of the contaminated sediments exceeding 50 ppm of PCBs in an incinerator complying with 761.70 or in a chemical waste landfill complying with 761.75(b).

The written statement of this finding and waiver by the Regional Administrator, as required in 761.75 (c)(4), is provided by signing this Record of Decision.

As previously noted in Section X.C, RCRA and State of Illinois Solid Waste regulations will not be applicable to the movement of contaminated sediments because the action constitutes consolidation and not placement or disposal. Also as noted in Section X.C, regulations relative to stabilization of hazardous wastes such as 40 CFR 228(a)(2)

are not considered relevant and appropriate.

It should be noted that excavated sediments will be allowed to dewater on-site. This will result in seepage of a small amount of additional water through the existing site cover and generation of some additional leachate. However, the quantity of leachate generated will be very minor compared to the total estimated quantity of leachate generated by infiltration of precipitation through the site cover (the estimated maximum volume of sediment excavated will be 7,220 cubic yards, of which possibly 20% will infiltrate through the cover, compared to 67,000 cubic yards per year of leachate generated under existing conditions).

D. Actions, including investigations, modeling, alternative evaluation, and implementation necessary to comply with the Illinois Department of Transportation regulations (92 IAC 708) and the Lake County Storm Water Management Commission Watershed Development Ordinance. Compliance may entail: creation of compensatory storage for lost flood plain and floodway storage; use of artificial channels combined with detention facilities or other technologies to maintain stream capacity without increasing the average velocity through the Site; excavation of landfill wastes and soils at the Site out of the floodway and flood plain and consolidation and temporary containment on-site for final containment under the new Site cover; approval of a variance from the floodway and flood plain regulations by the regulatory Agencies.

If excavation and on-site consolidation and temporary containment of wastes occurs, it shall be conducted in the same manner as described in Section X.B for excavation of wastes for the leachate collection system.

1. ARARs: The following ARARs shall be applied: 92 IAC 708; Lake County Watershed Development Ordinance; 40 CFR 6.302(g) (wetlands protection); 35 IAC 811.103 run off from disturbed areas); 35 IAC 311(b)(3); 40 CFR 110.6; Water Quality Standards 35 IAC Part 302; Executive Order 11990; 40 CFR 6 Appendix A; 40 CFR 230.70; 40 CFR 6.302(g); Clean Air Act Section 101; 40 CFR 52; 40 CFR 61.

   If excavation and on-site consolidation and temporary

containment of wastes occurs, the same ARARs for these operations identified in Section X.B shall apply.

E. Rerouting and sealing storm drains that go through the Landfill.

1. Further description: It is expected that two storm drains that go through the Yeoman Creek Landfill portion will have to be rerouted and sealed (see Figure 6). Drains that originate on-site will be sealed under the new site cover, and so will not need to be relocated or sealed.

2. ARARs: Executive Order 119990; 40 CFR 6, Appendix A; 40 CFR and 40 CFR 6.302(g) (fish and wildlife protection). In addition, the Lake County Watershed Development Ordinance Article IV.D should be considered.

F. Actions to minimize the destruction, loss, or degradation of wetlands, including compensation for wetlands that will be adversely affected by the selected remedial action.

1. Further Description: This shall include actions to prevent or minimize negative impacts on the wetlands due to construction activities and the final remedy. Compensation shall be provided for wetlands that are lost or negatively impacted by the remedial actions. A detailed wetland mitigation plan is required.

2. ARARs: The following ARARs shall be applied: Clean Water Act Section 404; Executive Order 119990; 40 CFR 6, Appendix A; and 40 CFR 6.302(g). In addition, the Lake County Watershed Development Ordinance Article IV.D should be considered.

G. Attainment of surface water quality standards by control of the source of contamination.

1. Further Description: No active surface water remediation will be conducted, but surface water quality standards shall be attained and the potential risk identified in the Remedial Investigation due to detection of cyanide and acetone eliminated (except for parameters that exceed the standards because of reasons not related to a release from

the Site) by controlling the source including construction of the new site cover, and the leachate collection system along Yeoman Creek along the northern portion of the landfill.

2. ARARs: The following ARARs shall apply unless the exceedance is due to a condition that is not related to a release from the Site: 35 IAC 302. Federal Ambient Water Quality Criteria are not ARARs because fish are usually not present in Yeoman Creek because it is an intermittent stream.

H. Attainment of ground water quality standards by control of the source of contamination with no contingency for initiating direct remediation of ground water is included.

1. Further Description: No active ground water remediation will be conducted, but ground water quality standards shall be attained and the potential risk identified in the Remedial Investigation due to detection of vinyl chloride, benzene, bis(2-ethylhexyl)phthalate, pentachlorophenol, arsenic, beryllium, and lead shall be reduced or eliminated to the extent that the contamination is due to a release from the Landfill by controlling the source by construction of the new site cover, and operation of the active landfill gas control system. No contingency for initiation of active ground water remediation is included for the following reasons:

   - the ground water is already close to meeting cleanup requirements (except for constituents that may not be Site related) -- apparently considerable ground water protection is being provided even without an improved cap through natural mechanisms such as biodegradation, adsorption onto organic deposits, and other attenuating mechanisms;

   - the ground water is not used in the vicinity of the Site and usage restrictions are in place;

2. ARARs: Within a three dimensional region of ground water that exceeds Illinois Ground Water Quality Standards in 35 IAC 620.410 and 620.420 as appropriate due to a release at

the Site, a ground water management zone shall be defined consistent with 35 IAC 620.250. The source containment measures implemented under the selected remedy shall constitute an approved corrective action for the ground water as it relates to 35 IAC 620.250. Therefore, implementation of the selected remedy will satisfy the criteria defined in 35 IAC 620.250(a). Ground water management period required pursuant to 620.250(b) shall be 30 years from the date of completion of construction. In accordance with 35 IAC 620.450, at the end of the 30 year period, the ground water standard for each constituent shall either be: the IGWQS in 35 IAC 620.410 or 620.420 as appropriate if such standard is attained for that constituent; or the concentration as determined by ground water monitoring, if such concentration does not attain the relevant IGWQS.

The remedy shall also attain the Primary Federal Maximum Contaminant Levels (40 CFR 141).

I. Additional investigation to define a ground water management zone, the extent of sediment excavation, and baseline wetland conditions.

1. Additional ground water sampling is needed to define the three dimensional area of the ground water management zone. Additional sampling may be required to define the required extent of sediment excavation, including collecting composite samples every 100-500 feet of stream length and 40,000 square feet of surface area in the limited wetland areas identified in Figure 5. The Remedial Investigation did not adequately define the baseline quality of the wetlands south and east of the Site. Therefore, a more thorough ecological evaluation shall be conducted, including characterization of water, habitat, and vegetative quality in the wetlands. These will be used as a baseline for the long term monitoring.

2. ARARs: The following ARARs shall be applied: 35 IAC 250.

J. Enclosing Yeoman Creek in a corrugated steel semi-arch pipe, as necessary for construction of the site cover. ARARs would be the same as others identified for actions that may impact

wetlands and wildlife.

K. Excavation and consolidation under the new cover of limited soils and wastes potentially contaminated by the Site that will be outside of the site cover, and that exceed 10 mg/kg polychlorinated biphenyls. ARARs are the same as other actions that involve moving soil that may be contaminated by PCBs. In addition, the 10mg/kg action level is from the PCB Spill Cleanup Policy for non-restricted access areas (40 CFR 761.125(c)(4)(v).

L. Continuation of landfill gas interim measure: To provide continued protection from potential landfill gas entry into adjacent buildings, the landfill gas monitoring and interim actions provided for in the present Amended Consent Order for the Remedial Investigation/Feasibility Study shall continue until full operation of the active perimeter gas control system is initiated.

M. Long term monitoring of ground water, surface water, surface sediments, landfill gas emissions, and wetland conditions to verify the effectiveness of the remedial action.

1. Further Description: Long term ground water, surface water, surface sediment, landfill gas emissions, and wetland monitoring shall be conducted to evaluate the effectiveness of the remedial actions.

2. ARARs: Applicable ARARs include 35 IAC 807.318.

N. Implementation of access restrictions, including enclosing the entire Site in a fence and posting warning signs.

O. Imposition of deed restrictions prohibiting future usage of the Site for purposes that are inconsistent with the selected remedy;

P. Long term maintenance or post-closure care.

1. Long term maintenance shall be provided to the site cover, the leachate collection system, and the active landfill gas control system.

2. ARARs: Applicable ARARs include 35 IAC 811.111(c), 807.318,

811.316.

IX. STATUTORY DETERMINATIONS

U.S. EPA's preferred alternative is believed to provide the best balance of trade-offs among alternatives with respect to the criteria used to evaluate remedies. Based on the information available at this time, therefore, U.S. EPA and the State of Illinois believe the preferred alternative would protect human health and the environment, would comply with ARARs, would be cost-effective, and would utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. The preferred alternative will not satisfy the preference for treatment as a principal element.

X. DOCUMENTATION OF SIGNIFICANT CHANGES

The U.S. EPA Proposed Plan, May 1995, identified Alternative 4B as the recommended alternative for Yeoman Creek Landfill. In addition to a landfill cover with a composite barrier layer consisting of a Flexible Membrane Liner over a Geosynthetic Clay Liner or a Flexible Membrane Liner over a Compacted Clay Liner with Active Gas Control, a leachate collection system was also proposed.

During the public comment period, the Yeoman Creek Steering Committee submitted comments relating to the type of landfill cap (see Responsiveness Summary for U.S. EPA responses) and leachate collection system proposed by U.S. EPA. At a July 30, 1996, meeting with the Yeoman Creek Steering Committee, the committee again urged U.S. EPA to reconsider the need to construct a leachate collection system during the initial implementation of Remedial Action.

The current site conditions indicate that the Yeoman Creek portion of the landfill is discharging only limited volume of leachate (500 gallons per day or 0.3 gallons per minute into Yeoman Creek.) Furthermore, construction of a composite barrier cover, as recommended in the U.S. EPA Proposed Plan, will minimize the production of leachate within the landfill; therefore, the volume of leachate discharging into Yeoman Creek will be further reduced.

Based upon review of the current site conditions, U.S. EPA has determined that in lieu of initially constructing the leachate collection system, a long-term monitoring system shall be implemented. The long-term monitoring system will monitor the leachate production in the landfill and monitor quantity and quality of leachate discharging into Yeoman Creek.

The sampling and analysis shall include leachate/groundwater sampling along Yeoman Creek, sediment and surface water sampling in Yeoman Creek, and leachate sampling within the landfill. Furthermore, the installation of additional monitoring wells and piezometers will be necessary to evaluate whether the leachate/groundwater from the landfill continues to discharge into Yeoman Creek.

Action levels for surface water and leachate/groundwater levels shall be MCLs and 35 IAC 620 standards. The impact on the sediments would be determined by comparing the level of contaminants in the sediments during the monitoring period with the level of contaminants in the sediments immediately after sediment excavation in Yeoman Creek.

In the event that the specified standards are exceeded, construction, operation and maintenance of the leachate collection system shall be required of the parties responsible for implementation of Remedial Action and long term operation and maintenance.

ATTACHMENT 1 TO THE RECORD OF DECISION SUMMARY

Attachment 1 to the Record of Decision Summary explains the development of sediment cleanup action levels (CALs) by U.S. EPA. The risk calculations for development of these CALs were performed by ICF Kaiser under U.S. EPA oversight and are incorporated into the Remedial Investigation Report.

I. Sampling

Sampling area: A composite sample should be collected every 100-500 feet of stream length and 40,000 square feet of surface area to evaluate whether this portion of the sediment attains the CALs.

II. Polychlorinated Biphenyls CAL

According to the ecological risk calculations, PCBs may cause a toxic hazard to mink even from the A-1248 present in the wetland soils. Since we are not excavating the wetland soils, it would be unreasonable to require excavation of sediments unless the PCB concentrations significantly exceed that concentration in the wetland soils. The 95% UCL of the average concentration for A-1248 of 3.4 mg/kg will be used to indicate that A-1248 significantly exceeds concentrations in the surface soil. For Arochlors other than A-1248, the CALs should be adjusted to take into account the relative toxicities of the Arochlors. The risk from 3.4 mg/kg of A-1248 is equal to the risk from 6.8 mg/kg of A-1242, or 0.34 mg/kg of A-1254. To take into account cumulative effects in case more than one Arochlor is present, the following equation will be used:

$$[\text{A-1242}]/2 + [\text{A-1248}] + 10 \times [\text{A-1254}] = 3.4 \text{ mg/kg}$$

III. Lead CAL

According to the ecological risk calculations, lead may cause a toxic hazard to red-winged black birds even from lead that may be present in the wetland soils. Since we are not excavating the wetland soils, it would be unreasonable to require excavation of

sediments unless the lead concentrations significantly exceed that concentration in the wetland soils. The 95% UCL of the average for lead in surface soil of 180 mg/kg will be used to indicate that lead significantly exceeds concentrations in the soil.

IV. PAH CAL

According to the calculations, cumulative PAHs may cause a toxic hazard to red-winged black birds even from PAHs that may be present in the wetland soils. Since we are not excavating the wetlands soils, it would be unreasonable to require excavation of sediments unless the PAH concentration significantly exceeds the concentration in the wetland soils. The 95% UCL of the average for PAHs in soil of 10 mg/kg could be used, but the maximum background stream sediment concentration of 18 mg/kg is larger. This amount can be adjusted to 26 mg/kg to account for uncertainty in the analytical method. Therefore, the CAL for cumulative PAHs is 26 mg/kg.

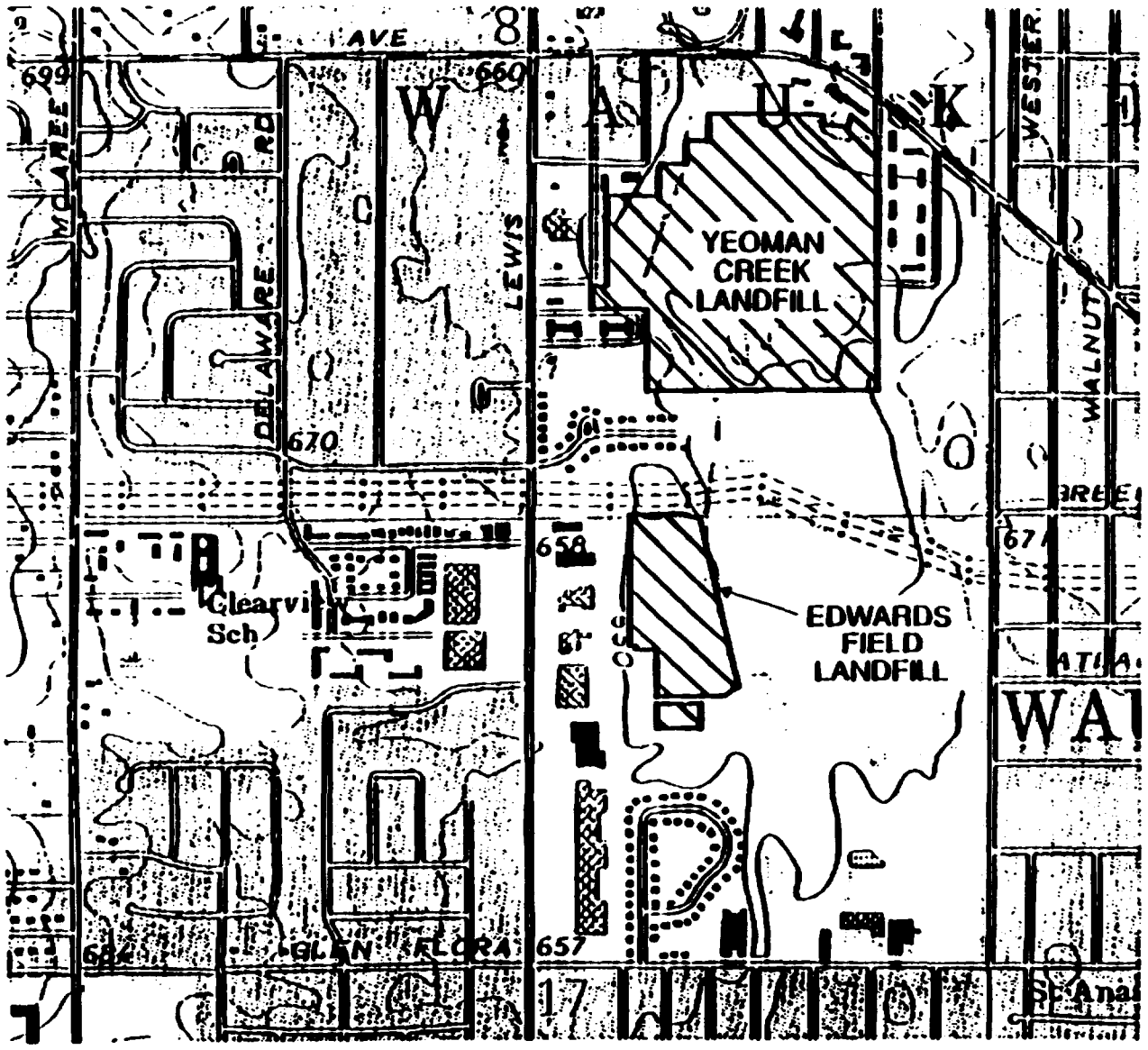
V. Mercury

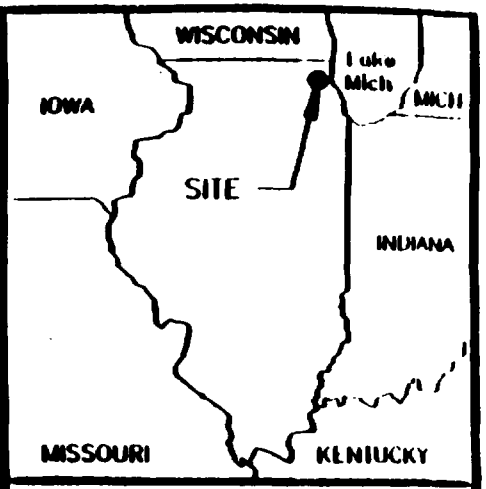
According to the calculations, mercury may cause a toxic hazard to red-winged black birds even from mercury that may be present in the soils. Since the maximum mercury concentration in sediments is less than the 95% UCL of the average concentration in the wetland soils, and the wetland soils are not being excavated, no sediment CAL is proposed for mercury.

VI. Zinc CAL

According to the calculations, zinc may cause a toxic hazard to red-winged black birds even from zinc that may be present in the soils. Since we are not excavating the wetlands soils, it would be unreasonable to require excavation of sediments unless the zinc concentrations significantly exceed concentration in the wetland soils. The 95% UCL of the average for zinc in soil of 223 mg/kg could be used, but the maximum background sediment concentration of 276 mg/kg is higher. This value can be adjusted to 317 mg/kg to account for uncertainty in the analytical method. Therefore, the CAL for zinc is 317 mg/kg.

FIGURE 1





VICINITY MAP

SITE PLAN

0 1000 2000

SCALE IN FEET

PRP/YEOMAN-EDWARDS' RI-FS/IL

Golder Associates

Chicago, Illinois

REGIONAL LOCATION MAP

DRAWN	CHECKED	REVIEWED	DATE	SCALE	FILE NAME	JOB NO.	DWG NO.	REVISION
KMK	AAH	KP	7/21/93	AS SHOWN	8136135	933-8136		2

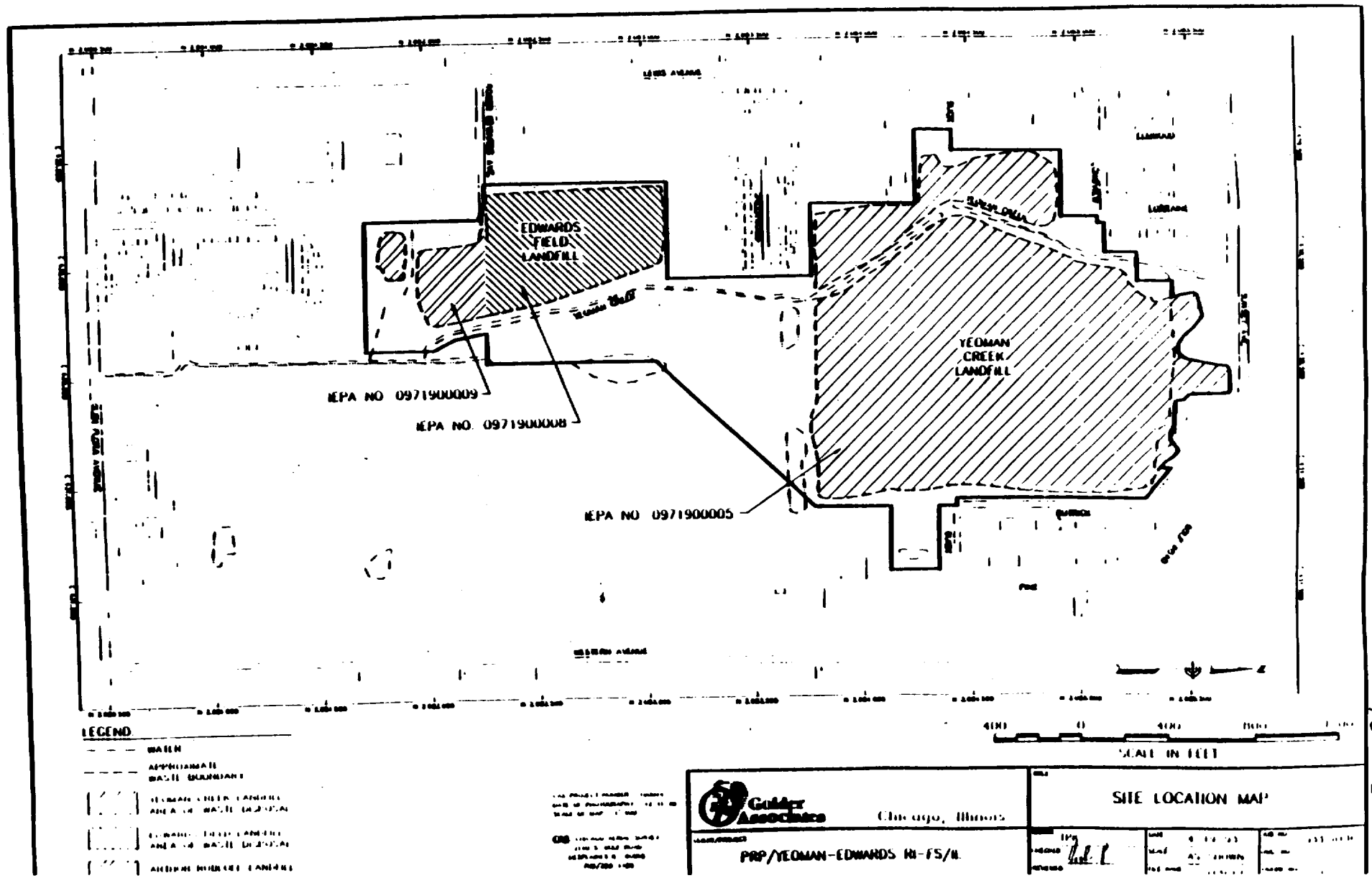
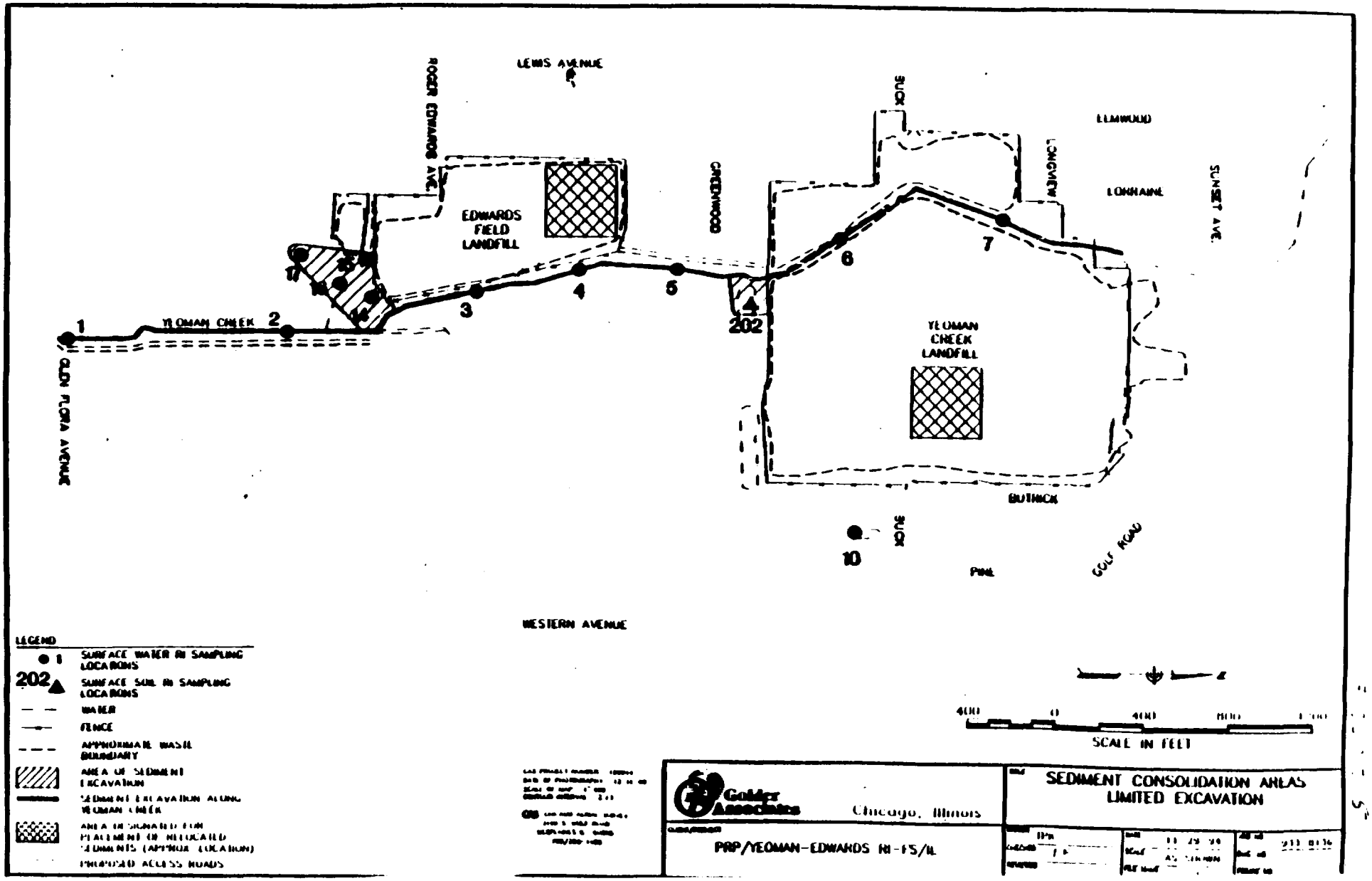
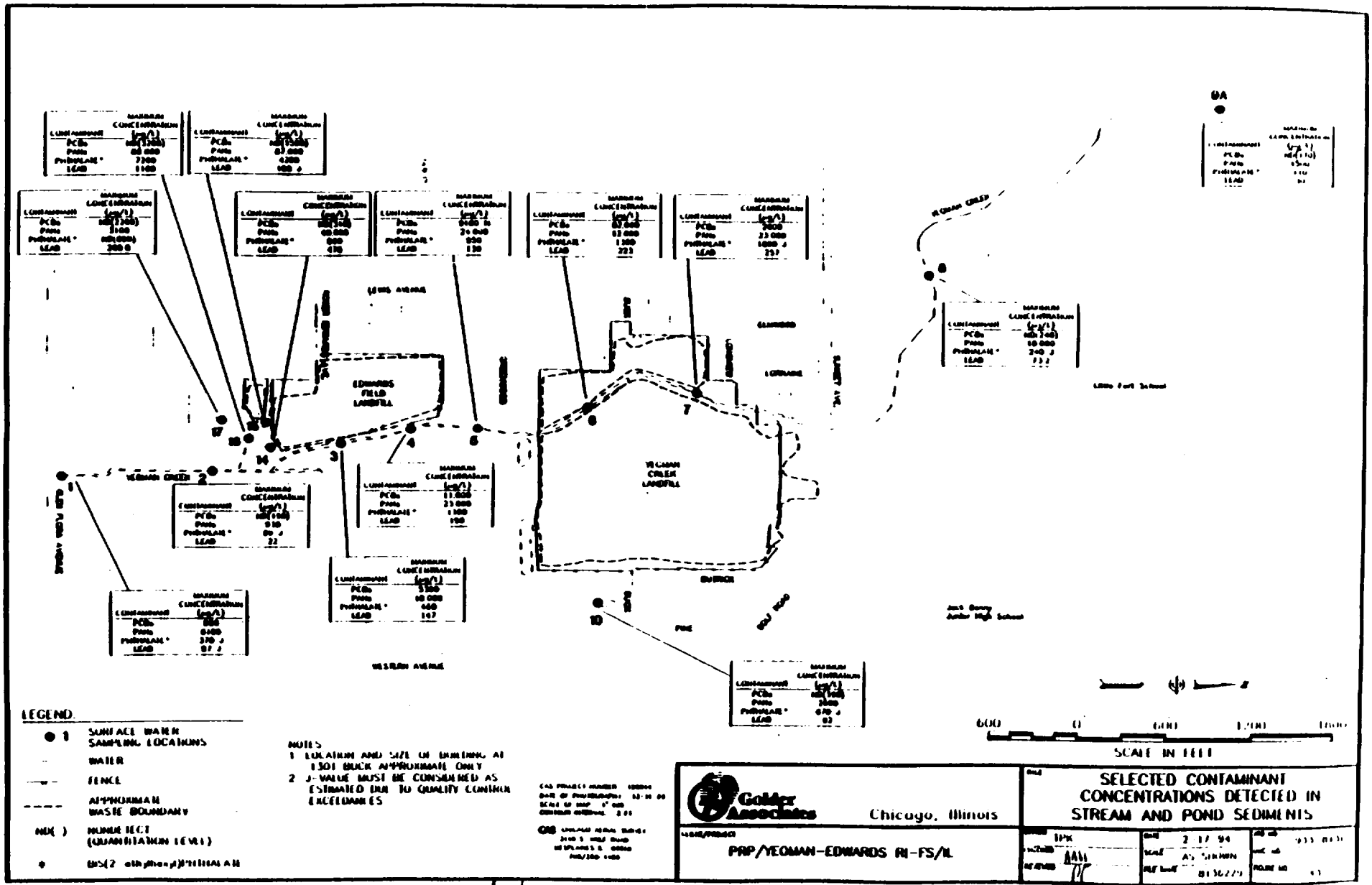
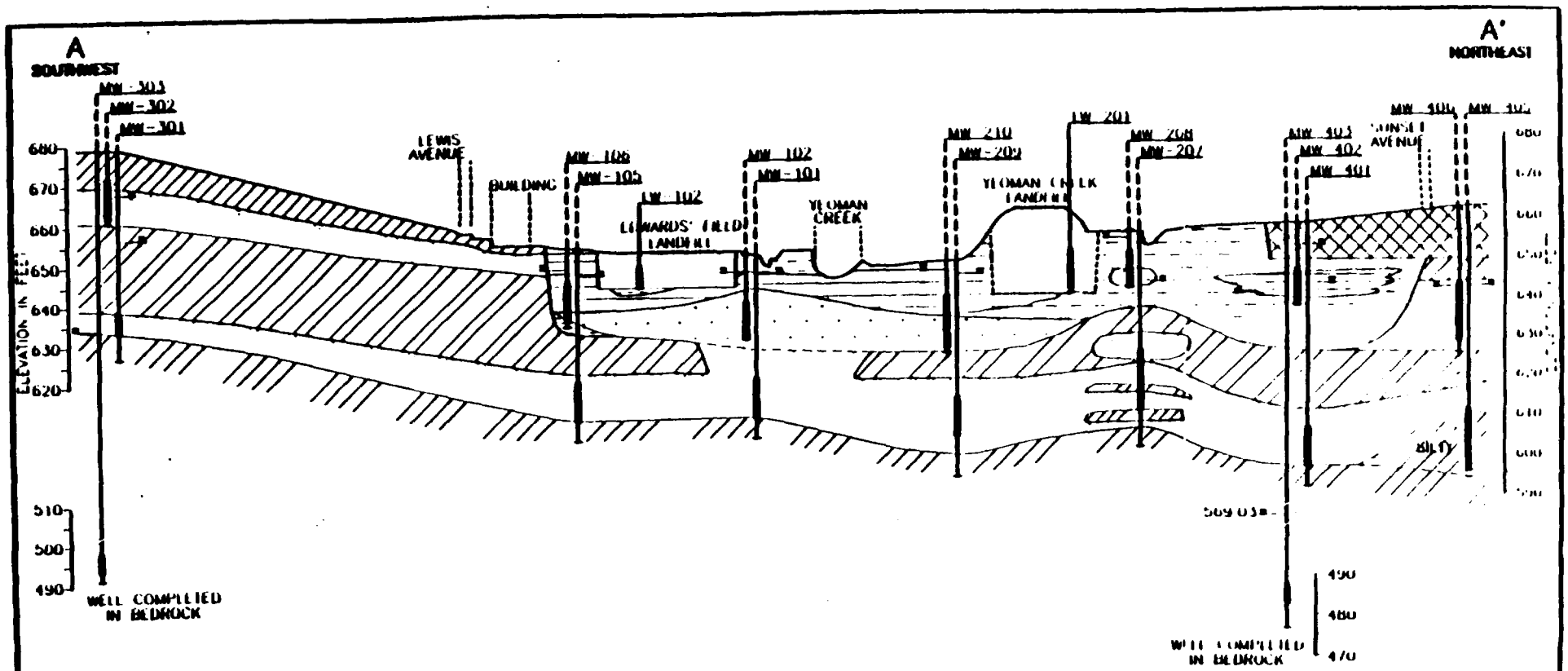

EDWARDS FIELD LANDFILL
YEOMAN CREEK LANDFILL
IEPA NO 0971900009
IEPA NO 0971900008
IEPA NO 0971900005
LEGEND
WATER
SCALE IN FEET
Geraghty & Miller, Inc.
Chicago, Illinois
SITE LOCATION MAP
PRP/YEOMAN-EDWARDS RI-FS/R

FIGURE 2


LEWIS AVENUE
ROGER EDWARDS AVE.
EDWARDS FIELD LANDFILL
GREENWOOD
SUCK
ELMWOOD
LONGVIEW
LORRAINE
SUNSET AVE.
YEOMAN CREEK
1
2
3
4
5
6
7
202
YEOMAN CREEK LANDFILL
GLEN FLORA AVENUE
BUTRICK
SUCK
10
PINE
GOLF ROAD
WESTERN AVENUE
LEGEND
SURFACE WATER IN SAMPLING LOCATIONS
SURFACE SOIL IN SAMPLING LOCATIONS
WATER
FENCE
APPROXIMATE WASTE BOUNDARY
AREA OF SEDIMENT EXCAVATION
SEDIMENT EXCAVATION ALONG YEOMAN CREEK
AREA DESIGNATED FOR PLACEMENT OF RELOCATED SEDIMENTS (APPROX. LOCATION)
PROPOSED ACCESS ROADS
400
0
400
800
1200
SCALE IN FEET
Golder Associates
Chicago, Illinois
PRP/YEOMAN-EDWARDS RI-FS/IL
SEDIMENT CONSOLIDATION AREAS
LIMITED EXCAVATION



should be ug/kg ... sediments



Lower outfall in FS shadow

NOTES
1 SOIL STRATIGRAPHY IS KNOWN OR INFERRED AT WELL LOCATIONS ONLY SOIL STRATIGRAPHY BETWEEN WELL LOCATIONS IS INTERPOLATED AND ACTUAL STRATIGRAPHY MAY VARY SUBSTANTIALLY FROM THAT WHICH IS SHOWN
2 GROUND SURFACE ELEVATIONS OBTAINED FROM BASEMAP DATED DEC 11, 1989 PROVIDED BY CHICAGO AERIAL SURVEY
3 WELL LOCATIONS AND ELEVATIONS SURVEYED BY PERLEY SURVEYING CO., LTD BOREHOLE LOGS AND WELL LOGS
4 STRATIGRAPHIC DATA AND SCREEN ELEVATIONS OBTAINED FROM EXISTING BOREHOLE LOGS AND WELL LOGS
5 ILLUSTRATED DEPTH OF REFUSE IS APPROXIMATED BASED UPON NEAREST REACHABLE WELL LOG
6 WATER LEVEL ELEVATIONS TAKEN ON 9-2-92

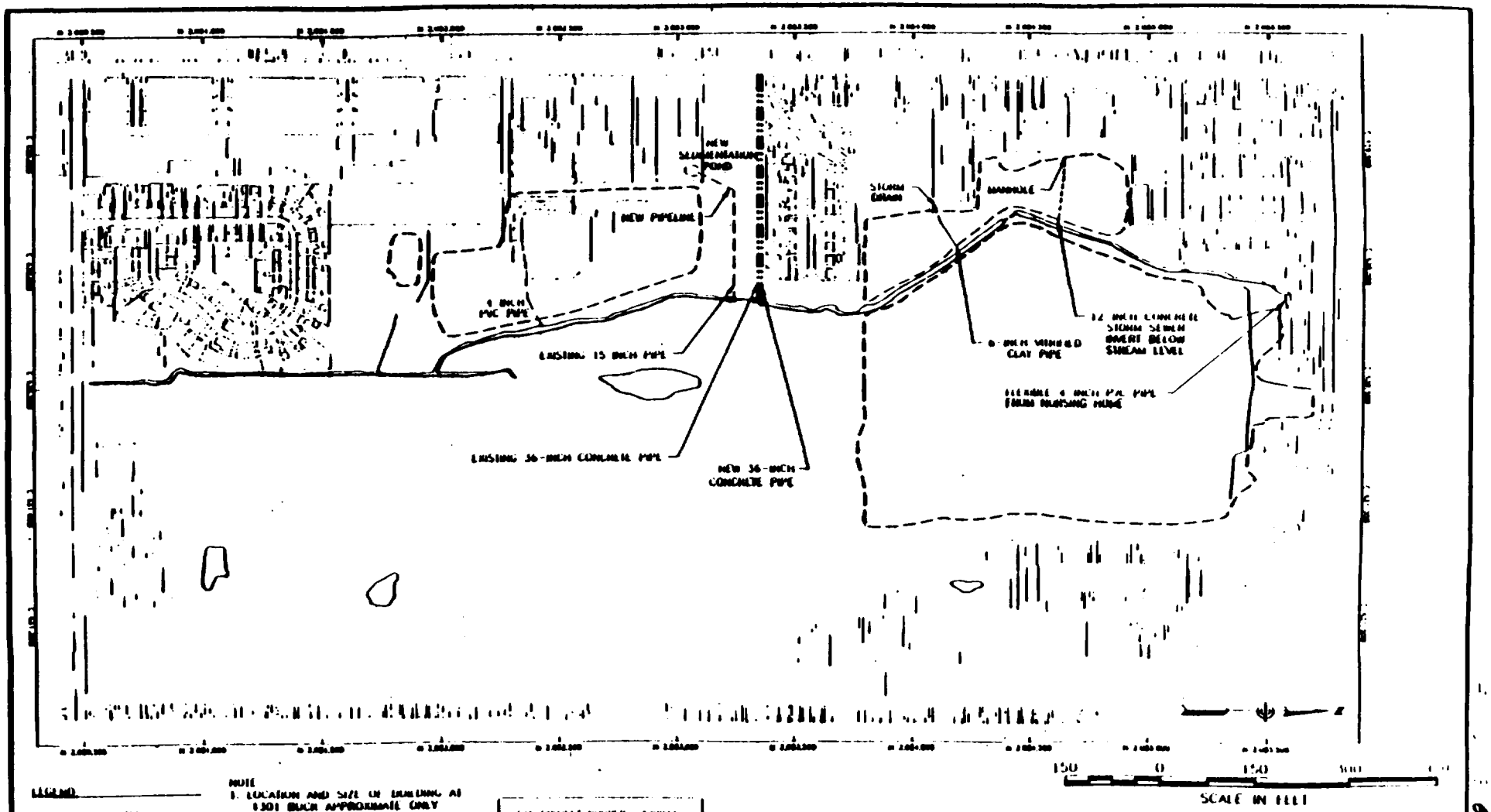
LEGEND
MW-103 MONITORING WELL
MEASURED WATER LEVEL
WELL SCREEN
FILL
REFUSE
UPPER TILL
UPPER OUTWASH
WEATHERED TILL
LOWER OUTWASH
LOWER TILL
LACUSTRINE CLAYS
ORGANICS
ILLINOIAN ALLUVIAL SANDS

VERTICAL SCALE 1" = 20'
VERTICAL EXAGGERATION 20X
500 0 500 1000 1500
SCALE IN FEET

Golder Associates Chicago, Illinois

PRP/YEOMAN-EDWARDS RI-FS/IL

REGIONAL CROSS-SECTION A A'



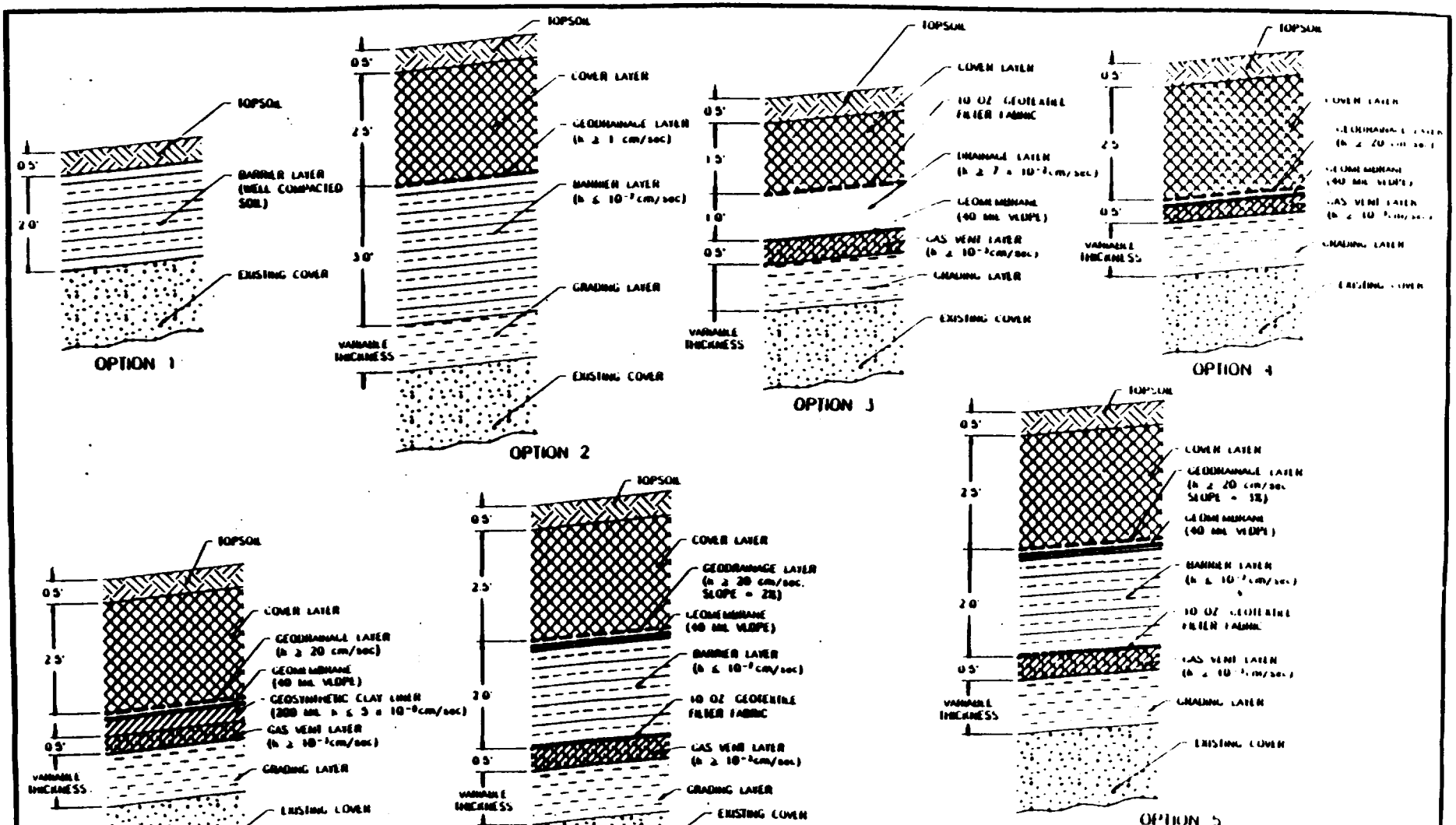
LEGEND

NOTE
1. LOCATION AND SIZE OF BUILDING AT 1301 BUCK APPROXIMATE ONLY

Golder Associates
Chicago, Illinois

PIPE AND CULVERT LOCATIONS AT YEOMAN CREEK AND EDWARDS FILED LANDFILLS

PRP/YEOMAN-EDWARDS RI-F/IL


TOPSOIL
0.5'
2.0'
BARRIER LAYER (WELL COMPACTED SOIL)
EXISTING COVER
OPTION 1
TOPSOIL
0.5'
COVER LAYER
2.5'
GEODRAINAGE LAYER (k ≥ 1 cm/sec)
3.0'
BARRIER LAYER (k ≤ 10⁻⁹ cm/sec)
GRADING LAYER
VARIABLE THICKNESS
EXISTING COVER
OPTION 2
TOPSOIL
0.5'
COVER LAYER
10 OZ GEOTEXTILE FILTER FABRIC
1.5'
DRAINAGE LAYER (k ≥ 7 x 10⁻³ cm/sec)
GEOMEMBRANE (40 MIL VLDPE)
1.0'
GAS VENT LAYER (k ≥ 10⁻³ cm/sec)
0.5'
GRADING LAYER
VARIABLE THICKNESS
EXISTING COVER
OPTION 3
TOPSOIL
0.5'
2.5'
0.5'
VARIABLE THICKNESS
OPTION 4
TOPSOIL
0.5'
COVER LAYER
2.5'
GEODRAINAGE LAYER (k ≥ 20 cm/sec)
GEOMEMBRANE (40 MIL VLDPE)
GEOSYNTHETIC CLAY LINER (200 MIL k ≤ 5 x 10⁻⁹ cm/sec)
GAS VENT LAYER (k ≥ 10⁻³ cm/sec)
0.5'
GRADING LAYER
VARIABLE THICKNESS
EXISTING COVER
OPTION 4A
TOPSOIL
0.5'
COVER LAYER
2.5'
GEODRAINAGE LAYER (k ≥ 20 cm/sec, SLOPE = 2%)
GEOMEMBRANE (40 MIL VLDPE)
BARRIER LAYER (k ≤ 10⁻⁹ cm/sec)
2.0'
10 OZ GEOTEXTILE FILTER FABRIC
0.5'
GAS VENT LAYER (k ≥ 10⁻³ cm/sec)
GRADING LAYER
VARIABLE THICKNESS
EXISTING COVER
OPTION 4B
TOPSOIL
0.5'
COVER LAYER
2.5'
GEODRAINAGE LAYER (k ≥ 20 cm/sec, SLOPE = 5%)
GEOMEMBRANE (40 MIL VLDPE)
BARRIER LAYER (k ≤ 10⁻⁹ cm/sec)
2.0'
10 OZ GEOTEXTILE FILTER FABRIC
0.5'
GAS VENT LAYER (k ≥ 10⁻³ cm/sec)
VARIABLE THICKNESS
DRAINAGE LAYER
EXISTING COVER
OPTION 5
Geotech Associates
Chicago, Illinois
LANDFILL CAP OPTIONS
PRP/YEOMAN-EDWARDS HI-15/IL

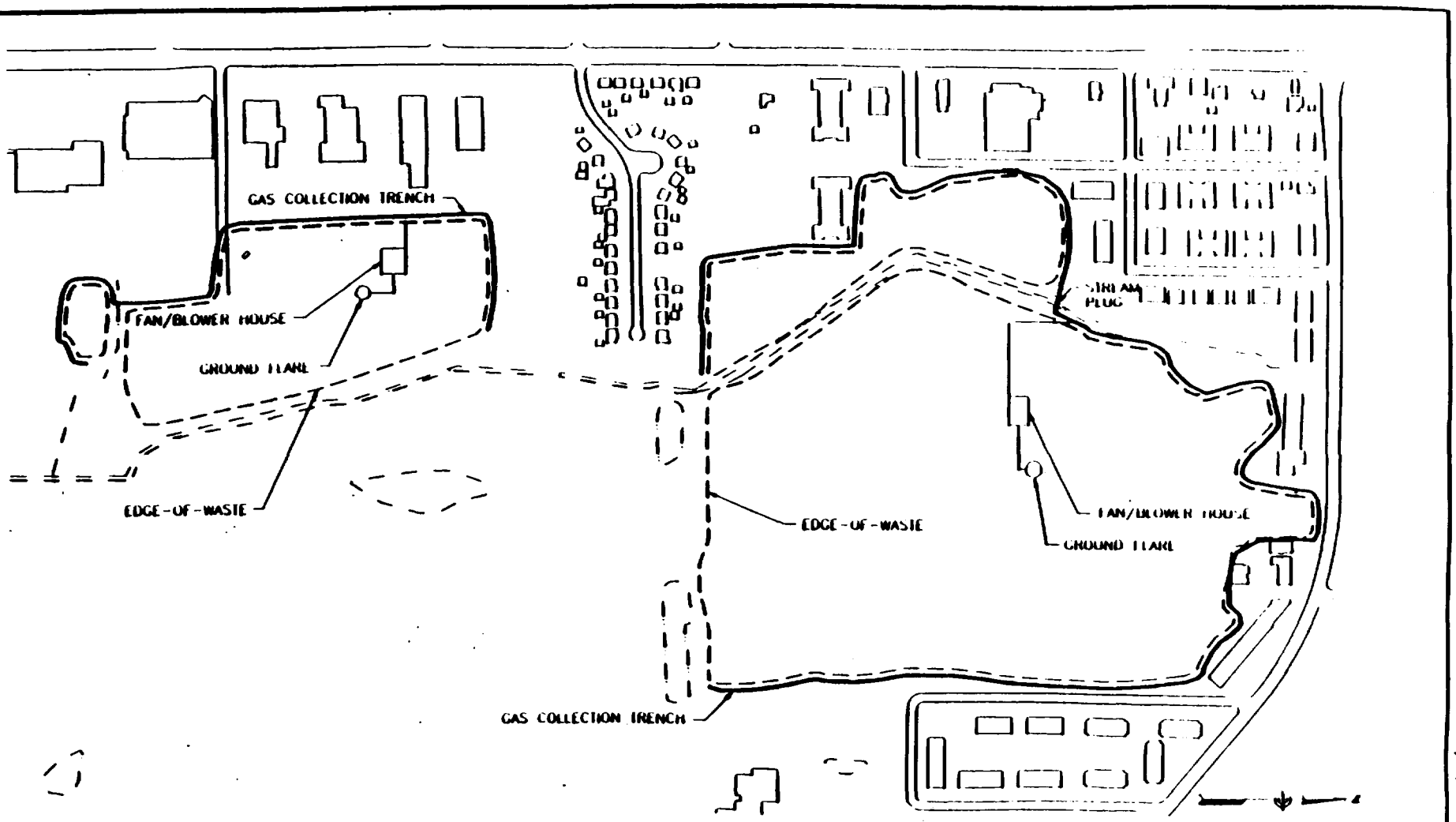
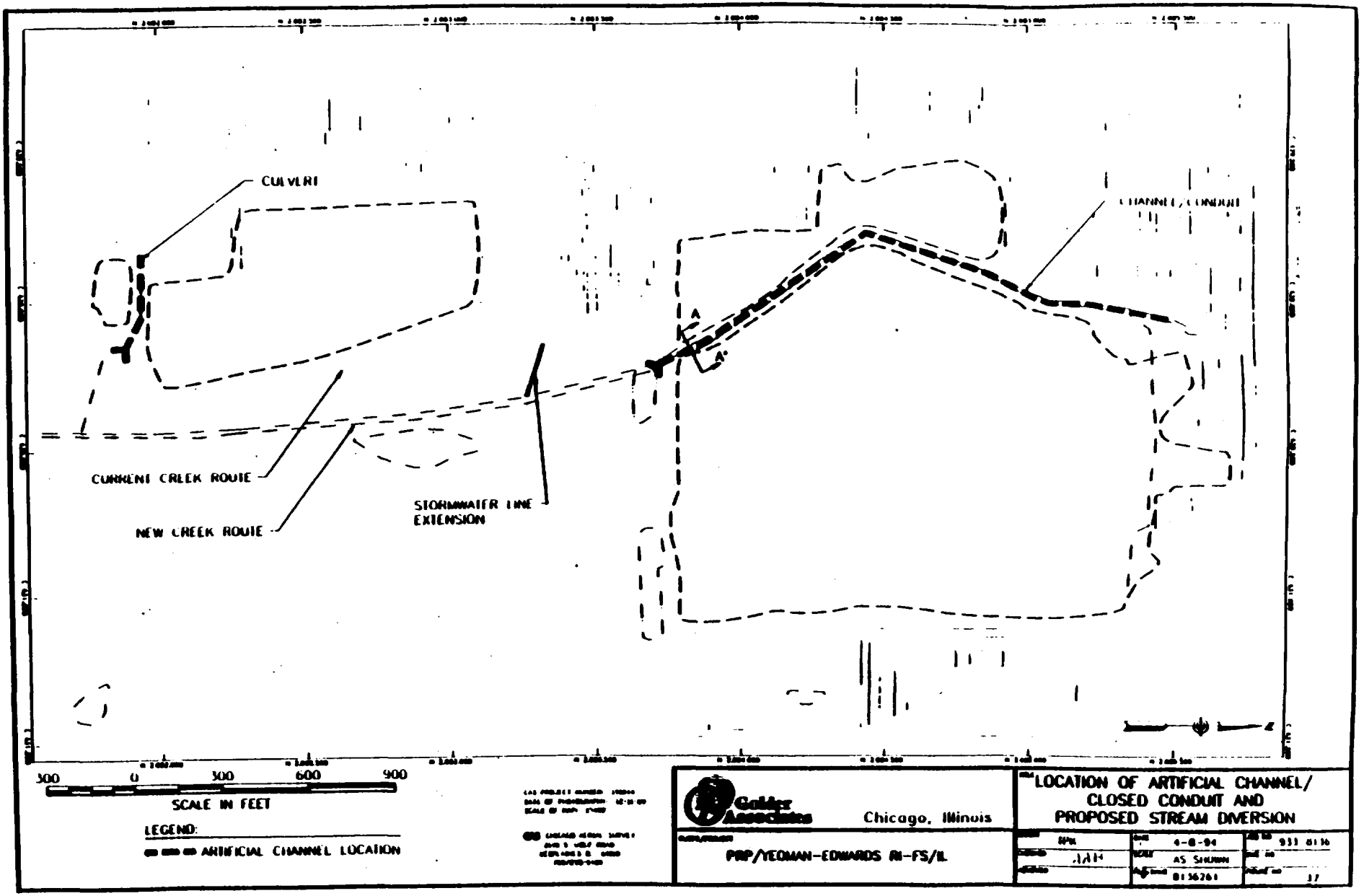

GAS COLLECTION TRENCH
FAN/BLOWER HOUSE
GROUND FLARE
EDGE-OF-WASTE
EDGE-OF-WASTE
GAS COLLECTION TRENCH
FAN/BLOWER HOUSE
GROUND FLARE
500 0 500 600 1000
SCALE IN FEET
Geddes Associates
Chicago, Illinois
PRP/YEOMAN-EDWARDS RI-FS/IL
LOCATION OF ACTIVE
GAS COLLECTION TRENCH
AND MAJOR COMPONENTS

FIGURE 00


CULVERT
CHANNEL / CONDUIT
A
A'
CURRENT CREEK ROUTE
NEW CREEK ROUTE
STORMWATER LINE EXTENSION
300 0 300 600 900
SCALE IN FEET
LEGEND:
ARTIFICIAL CHANNEL LOCATION
Gulder Associates
Chicago, Illinois
PRP/YEOMAN-EDWARDS RI-FS/IL
LOCATION OF ARTIFICIAL CHANNEL/ CLOSED CONDUIT AND PROPOSED STREAM DIVERSION
4-8-94
AS SHOWN
81362.61
933 8136
37

U.S. EPA RESPONSES TO PUBLIC COMMENTS ON THE EVALUATION OF ALTERNATIVES AND PROPOSED PLAN FOR THE YEOMAN CREEK LANDFILL SITE

I. RESPONSES TO COMMENTS FROM THE YEOMAN CREEK STEERING COMMITTEE AND TO COMMENTS MADE DURING THE PUBLIC MEETING BY THE HONORABLE JAMES F. DURKIN, MAYOR OF THE CITY OF WAUKEGAN

ISSUE 1.

COMMENT IN INTRODUCTION TO COMMENTS IN JULY 15, 1995 LETTER: U.S. EPA must consider this balance [a practical balance between protecting human health and environment and the cost of cleaning up this Site] in determining a practical and effective Site cleanup. U.S. EPA must weigh the adverse social and economic effects... It is in this context that we respectfully request that U.S. EPA broaden its consideration of the human health and environment at Yeoman Creek Site to include the health and financial welfare of Waukegan's citizens.

COMMENT BY MAYOR DURKIN DURING PUBLIC MEETING: "The $6 million you are asking us to pay harms the overall wealth, health, and welfare of this City." "Our citizens should not be asked to give up essential services so that a landfill plan can be gold plated"

U.S. EPA RESPONSE:

At all Superfund Sites, the United States Environmental Protection Agency (U.S. EPA) is required by law to select an alternative that will be protective of human health and the environment and that meets applicable or relevant and appropriate State and Federal laws. The cost of an alternative is also a very important consideration. The cost of an alternative is balanced against its long-term effectiveness and permanence, its degree of permanent treatment, its short term impacts, and its implementability. It should also be pointed out that U.S. EPA and Illinois Environmental Protection Agency (IEPA) have made efforts to take into account specific conditions on this Site to reduce costs, while still retaining the additional long term protectiveness of the leachate collection system and the performance requirements of the site cover barrier layer. This

has resulted in an opportunity to demonstrate that an alternative with a leachate collection system for only the northern portion of the landfill is not necessary to be protective, and with a site cover that does not meet many of the technical items normally required for hazardous waste landfills, but are less important at this Site.

Besides costs, community acceptance is a consideration that can lead to a modification of the remedy. The information provided by the officials of the City of Waukegan, Waukegan School District #60, and the Waukegan Park District on their financial difficulties, has been taken into account in the remedy selection, as have comments from a few of Waukegan's citizens expressing concern about costs.

It should be pointed out that a number of viable private parties share liability for costs with the governmental parties; so the entire cost of the remedy will not be born by the governmental parties.

ISSUE 2.

COMMENT 1 (July 15, 1995 letter); COMMENT 2 (August 24, 1995 letter): There is no significant human health risk associated with the current and foreseeable usage of the site. COMMENT 2 (August 24, 1995 letter): Risks associated with Landfill Gas are being addressed both currently and by the Remedy Recommended in the Feasibility Study. COMMENT BY MAYOR DURKIN DURING PUBLIC MEETING: "These old landfills are presenting no significant risk to the health of the people."

U.S. EPA RESPONSE:

As documented in the Remedial Investigation (RI), there are some significant risks to nearby residents due to the Site under current usage conditions (estimated to be 1.6×10^{-5} for the reasonable maximum exposure assumptions, and 2.2×10^{-6} for average exposure assumptions). These include risks due to off-site migration of landfill gases. The off-site migration of landfill gas presents a fire and explosion risk as well as a risk from exposure to toxic chemicals. These risks are temporarily being addressed by monitoring and operation of a basement ventilation system in one adjacent building. In addition, there is a limited risk to nearby residents under current conditions

due to potential for contact with polychlorinated biphenyls (PCBs) and other hazardous substances in surface soils, surface water and contaminated sediments from the Site.

U.S. EPA agrees that the ventilation system installed by the Yeoman Creek Steering Committee combined with periodic monitoring by the Steering Committee is adequate as a temporary measure to address the risks from the off-site landfill gas migration. U.S. EPA also agrees that the risks from the off-site landfill gas migration will be addressed in the final remedial action by construction and operation of an active gas ventilation system.

The RI also documents that ground water contamination from the Site would make the ground water unacceptable for residential use due to the human health risk. Since the Site is surrounded by residential and commercial developments, it appears likely that the Site would have been developed for residential or business use if it had not been used as a landfill. Future development of the Site for residential or business usage would be unacceptable because of the human health risk due to the fire and explosion hazard and due to potential exposure to hazardous substances.

Standard U.S. EPA procedures were used to develop the risk assessment conducted in the RI.

ISSUE 3.

COMMENT 2 (July 15, 1995 letter), and Comment 3 (August 24, 1995 letter): There is no significant ecological risk associated with the current and foreseeable usage of the Site.

U.S. EPA RESPONSE:

It should be emphasized that Congress mandates that U.S. EPA enter agreements allowing potentially responsible parties (PRPs) to conduct risk assessments even though the PRPs have a direct financial interest in minimizing the estimated risks. To balance this bias, Congress also mandates for U.S. EPA to provide oversight of the RI/FS to assure that the PRPs' interests are properly balanced by public health and the environmental concerns. Under these conditions, it is not surprising that PRPs and U.S. EPA have differing points of view regarding risk

assessment procedures. In spite of the disadvantages of this process, it does have the benefit that it assures that the risks were carefully considered during the process, since it is an issue that is very important to PRPs.

The Administrative Record clearly shows that U.S. EPA did suggest use of breeding red-winged black birds and mink as indicator species for the risk assessment but did not "insist" on using these species, and that the PRPs were encouraged to suggest alterative indicators.

A review of mink habitats indicates that mink and related mammals could occur at this Site and may be currently present in spite of the limited access to appropriate contiguous habitats. In fact, the limited access to appropriate contiguous habitats may concentrate mink in the area, leading to higher than average numbers of individuals in the smaller area. Mink do not require fish as a prey source and, in fact, utilize a wide variety of terrestrial and aquatic prey.

It should be noted that improvement of the wetlands in the vicinity of the Site may improve the habitat for various wildlife species, including mink, in the future. While the mink is a sensitive indicator, it may be no more sensitive than many other mammals that have not been adequately tested.

The red-winged blackbird is not a particularly sensitive indicator. During the breeding season, males are very territorial and are not expected to travel far from the nest. Given that the Site is "an island of undeveloped habitat", it is reasonable to assume the life support requirements for breeding red-winged black birds (i.e. food, water, etc.) may all come from the Site. Therefore, while conservative, these assumptions may in fact, be appropriate for this Site. It should be noted that, based on suggested procedures by U.S. EPA, the first draft of the RI Report dated August 1993 (p. 181) used the assumption that all of the food and water was derived from the Site.

The ecological risk assessment is intended to determine whether or not the Site is or may be adversely impacting the environment. The ecological risk assessment does not evaluate risks to only one individual animal but evaluates risks to all individuals in the area surrounding the Site. Since the ecological risk

assessment for the Yeoman Creek Landfill Site determined that a risk exists to red-winged black birds and mink, the Site contamination may be depressing the populations of birds and mammals in the area of the Site.

Other issues addressed by U.S. EPA comments provided to the PRPs required the following changes in the ecological risk assessment:

- Use of standard U.S. EPA procedures for screening background concentrations and for determining the exposure point concentrations.

- Consideration of seep sediments as an exposure point.

- Consideration of soil ingestion as an exposure route.

- Provision of a more complete explanation of the derivation of reference doses.

- Use of uptake factors derived directly from experimental results, and not adjusted by unsupported distributional assumptions.

ISSUE 4.

COMMENT 3 (July 15, 1995 letter): U.S. EPA should rely on the stocastic risk assessment because the deterministic risk assessment relies on default exposure assumptions which are not reasonably expected to be encountered at the Site.

U.S. EPA RESPONSE:

It is very important that for all Superfund sites to be addressed in a consistent manner, and that risks be identified and addressed before adverse affects occur. The first step in this effort is to assure that all risk assessments are conducted in a consistent manner. In order to assure this, U.S. EPA requires that all risk assessments whether prepared by U.S. EPA or by PRPs be conducted consistent with U.S. EPA risk assessment guidance. What the PRPs are requesting in this comment is for U.S. EPA to approve use of a very different risk assessment procedure just for this Site. A second step in this effort is to identify,

characterize and address potential risks from the Site rather than waiting for real adverse effects to occur.

U.S. EPA risk assessments are not data and are not necessarily designed to be realistic. Rather, they are designed to identify and characterize current potential risks in a consistent manner. Hopefully, the end result of this effort will be to identify and characterize human health and environmental threats so that they can be addressed before the adverse effects actually occur. As a result, U.S. EPA risk assessment guidance provides for calculation of risks based on current usage of the Site as well as based on potential future usage of the Site.

Generally, U.S. EPA bases Site decisions on risk estimates calculated based on a reasonable maximum exposure (RME) estimate and on conservative toxicity estimates. The overall risk estimate should be reasonably conservative. U.S. EPA also considers estimates that are less conservative and possibly more likely to occur.

U.S. EPA does not agree that risk estimates calculated in accordance with its guidance documents is "overly conservative". The procedure described by the PRPs in the first two paragraphs of this Comment refers to the maximum or worst case exposure estimates, not to the RME, which is now used for decision making by U.S. EPA. Specifically according to the HHEM (p. 6-19):

> For Superfund exposure assessments, intake variable values for a given pathway should be selected so that the combination of all intake variables results in an estimate of the reasonable maximum exposure for that pathway.

U.S. EPA's risk estimates are generally not designed to reflect actual risks, but to estimate the risk under reasonable maximum exposure conditions. Furthermore, the RME is not tied strictly to numerical distributions, as stated in the HHEM (p. 6-19):

> As discussed previously, a determination of "reasonable" cannot be based solely on quantitative information, but also requires the use of professional judgment.

The PRPs state that the ecological risk assessment conducted by the PRPs uses "worst case data points" (apparently referring to

the concentration term). This is not correct. For the concentration used to estimate exposures, U.S. EPA uses an estimate of the average concentration called the 95% upper confidence level (UCL) of the average concentration. Normally, the 95% UCL of the average concentration is not much larger than the calculated average concentration, unless there are very few samples. In cases where the 95% UCL of the average exceeds the maximum concentration detected, the maximum concentration is used instead of the 95% UCL of the average. During the conduct of the RI, the PRPs showed no interest in collecting additional samples in order to obtain an improved estimate of the average concentration.

The PRPs state that the factors required in U.S. EPA guidance documents (we presume this refers to factors such as ingestion rates for drinking water, soil and food) are "derived from single values for each of a variety of parameters". This is clearly a misstatement. Each of the factors required by U.S. EPA are the best estimates based on all available information, including experimental data and in some cases extensive surveys.

The "stocastic risk assessment" prepared by ICF Kaiser for the PRPs was reviewed by Karen A. Hammerstrom, one of U.S. EPA's foremost experts on use of probabilistic risk assessments. Ms Hammerstrom concluded in a memorandum dated July 8, 1994, that the ICF Kaiser's stocastic risk assessment was:

> about as bad as such assessments can be. Confusing, lack of detail, lack of focus, insupportable assumptions, next to impossible to review.

Ms Hammerstrom made the following comments:

- But many of the input distributions are determined by "subjective judgement", and it is debatable whether these distributions encompass the full range of variability.... In addition, the distributions assigned to other variables are often unsupported by the available data. Dose distributions differing by orders of magnitude can be obtained by using different assumptions.

- The assessment makes no attempt to separate reducible uncertainty from interindividual variability.

- There is a suggestion that uncertainty in the toxicity factors is incorporated in the assessment but no indication of how this was done.

- There is no way to tell which pathways are likely to contribute the most to exposure without doing an independent assessment that would be so complex that it would be equivalent to redoing the risk assessment.

- The support for the input distributions is so poor in almost every case that the ranking of risk levels reported in the assessment is meaningless.

- The exposed population is not clearly defined ....

Ms Hammerstrom's review makes it clear that probabilistic risk assessments can be very difficult to review, and can be misleading unless all assumptions used are accurate and clearly presented. Probabilities can not be simply assumed but have to be based on relevant data. For some parameters this may entail collection of site specific information. As Ms Hammerstrom pointed out: "a probabilistic assessment is not necessarily more accurate than a point estimate. Accuracy depends on the input data."

Clearly, based on Ms Hammerstrom's comments, the PRPs' stocastic risk assessment did not "maximize use of available, quality-assured, site specific data", as stated by the PRPs. It should be noted that data such as "amount eaten" (ingestion rates), and frequency of exposure are very time consuming to collect and normally would not be expected to vary from site to site. Therefore, the approach taken in the RI of using parameters based on experimental studies, surveys, and professional judgement is the most reasonable approach.

An alternative would be to conduct an extensive biological study at the Site to evaluate the actual impact of the contamination from the Site on biota at the Site. However, the cost of such a study is unjustified considering the cost of the sediment excavation, which is the only portion of the remedy that is primarily for protection of biota from existing contamination (estimated cost is $200,000). An extensive biological study is unjustifiably expensive.

ISSUE 5.

COMMENT 4 (July 15, 1995 letter): The cover recommended in the approved Feasibility Study (FS) provides the same degree of protection and reliability as the U.S. EPA preferred options.

COMMENT 5 (July 15, 1995 letter): The U.S. EPA unreasonably assumes that the FML will be poorly constructed and, hence, will not provide a reliable leakage barrier. Adding another layer is not the appropriate solution for increasing reliability.

COMMENT 6 (July 15, 1995 letter): The virtually identical performance offered by the U.S. EPA preferred cover does not justify the large additional cost.

COMMENT 5 (August 24, 1995 letter): U.S. EPA's Preferred Cover Adds Cost Without Any Significant Benefit or Increase in Reliability.

COMMENT 6 (August 24, 1995 letter): Composite Barrier Liners and Covers Are Not Required at Mixed-Waste Landfill Superfund Sites.

COMMENT IN SEPTEMBER 1, 1995 MEMORANDUM FROM RICHARD WILLIAMS: According to Design and Construction of RCRA/CERCLA Final Covers, EPA 625 4-91-025, May 1991, polyethylenes are expected to have a life of about 750 years at temperature of 90 degrees centigrade.

COMMENT IN SEPTEMBER 1, 1995 MEMORANDUM FROM RICHARD WILLIAMS: According to an article by Dr. Rolf Koch, Dr. Erwin Gaube, Dr. Joachim Hessel, Christiam Gondro Ph.D, and Dr. Heiz Heil in Mull and Abfall (Refuse and Waste), August 1988, Heft 8 (Volume 8), ISSN 0027-2957, pages 348-361: The authors conclude that the working life of this material [HDPE pipe] could be expected to be considerably greater than 100 years.

COMMENT IN SEPTEMBER 1, 1995 MEMORANDUM FROM RICHARD WILLIAMS: According to "Remaining Technical Barriers to Obtaining General Acceptance of Geosynthetics" by Robert M. Koerner, Y. Hsuan, and Arther E. Lord, Jr. of the Geosynthetic Research Institute, Drexel University in Geotextiles and Geomembranes 12 1993), pp. 1-52, the projected life of HDPE is in the range of 200 to 750 years.

U.S. EPA RESPONSE:

U.S. EPA included the composite flexible membrane liner (FML)/ geosynthetic clay (GCL, cover Option 4A from the FS) or compacted clay (CC, cover Option 4B) barrier layer in the Proposed Plan because composite barrier layers have the potential to add considerably to the long-term effectiveness of the remedy in reducing infiltration of precipitation into the landfill compared to a site cover with only an FML barrier layer (cover Option 4). These options have been determined to be equivalent to or more stringent than the performance of 3 feet of compacted soil, with a hydraulic conductivity of 10^{-7} cm/sec. We note that the ARAR for the landfill cap has been determined to be 35 IAC Part 811.314. The basis for this determination is discussed below after the technical merits of the questions are addressed. 35 IAC Part 811.314 provides some flexibilty in designing the cover requirements, so long as they are equivalent to or exceed the perforamnce of 3 feet of compacted soil with a hydraulic conductivity of 10^{-7} cm/sec.

As stated by the Yeoman Creek Steering Committee in Comment 4, "any reduction of infiltration reduces leachate production and potential leachate seepage and serves to provide an additional margin of safety in protecting groundwater quality." Based on the RI, the reduction of leachate will also provide further protection to the surface waters in Yeoman Creek and the wetland south and east of the Site.

A site cover with only an FML barrier layer (Option 4), as proposed by the PRPs, can be and often is very effective in reducing infiltration. As stated in the U.S. EPA approved FS, modeling indicates that a cover using only an FML for the barrier layer could be very effective in reducing infiltration through the landfill due to precipitation as long as the FML overall quality is good. For example, if the leakage fraction is 10^{-5} [1], the HELP modeling included in the Feasibility Study (FS) predicts a 99.4% reduction in infiltration compared to current conditions.

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[1] According to Design and Construction of RCRA/CERCLA Final Covers, EPA/625/4-91/025, May 1991, a leakage fraction of 10^{-5} represents a good or excellent quality FML (see Table 2-4 and Figure 9-8).

This corresponds to a reduction in total infiltration from 1,800,000 cubic feet to 11,500 cubic feet per year over the portion of the landfill east of Yeoman Creek. Some factors argue for assuming a low leakage fraction, such as the shallow depth of the landfill, which would limit the amount of settlement due to decomposition of the wastes. In addition, through strict quality control measures, a good quality FML cap should be constructable at this Site. Construction quality assurance measures that will have to be taken during construction of the Site cover include those listed in Comment 5.

U.S. EPA agrees with the Yeoman Creek Steering Committee that FMLs should remain effective for a very long time in site cover applications. If this were not so, FMLs would not be prescribed for hazardous waste landfill lining and capping applications. However, FMLs have only been used for the last 20 years, so their long term effectiveness is not well documented.

The documents providing the estimates of the long term effectiveness of FMLs submitted by the Yeoman Creek Landfill Steering Committee indicate that there is a large amount of uncertainty in these estimates. Indeed the estimates identified in the documents were performed for applications other than site covers, were conducted on materials other than that proposed for the FML (40 mil very-low density polyethylene), and did not take the synergistic effect of stress on the FML into account in the estimate. Uncertainties include:

- swelling from exposure to liquid may cause secondary actions that could lead to other synergistic effects (Design and Construction of RCRA/CERCLA Final Covers, EPA 625 4-91/025, May 1991, p. 36)

- because the temperatures used in the example [which resulted in an estimated lifetime of 752 years for polyethylene shielding of electric cables] are quite high and quite limited (ie. they are bunched together), extrapolation down to the site-specific temperature mentioned may be invalid. One does not know which, if any, of the geomembrane properties will be amenable to the Arrhenius approach, but the various possibilities should be investigated on a project-specific basis and as a general research area. (Design and Construction of RCRA/CERCLA Final Covers, p. 39)

- field feedback is necessary to establish better insight into degradation and aging issues involving polymeric geomembrane and other related geosynthetic materials. (Design and Construction of RCRA/CERCLA Final Covers, p. 40)

- "Regarding synergism of the different phenomena [stress, temperature, oxidation], the situation is just beginning to be explored." "One simply does not know what the effect of various types, and levels, of stress will be on geosynthetic degradations." (Koerner, Robert M, Hsuan, Y., and Lord, Arthur E. Jr. "Remaining Technical Barriers to Obtaining General Acceptance of Geosynthetics". Geotextiles and Geomembranes. 12 (1993) 1-52. Pages 32, 45)

In spite of construction quality assurance measures, leaks in FMLs always occur. In addition, as indicated in the documents submitted by the Yeoman Creek Steering Committee, leaks can develop in the FML over time due to settling and long term degradation. It is uncertain how long it would take for long term degradation to be significant, but some estimates have been in the vicinity of 200 years. Any leaks can substantially increase the quantity of infiltration through an FML if it is underlain by a highly permeable material.

This is demonstrated in Table 2-4 of Design and Construction of RCRA/CERCLA Final Covers, U.S. EPA, May 1991. As can be seen, the flow rate through holes in FMLs can increase from 330 gal/acre/day for excellent FMLs to 10,000 gal/acre/day for poor quality FMLs. This is also demonstrated using site specific HELP model assumptions in Table 1, which predicts that infiltration would increase from 12,000 cubic feet per year for a good/excellent quality FML to 276,000 cubic feet per year for a poor quality FML. Table 1 is shown on the following page.

It should be noted that there is little possibility of addressing FML leaks through increased maintenance once the soil cover has been installed over it, since leaks likely would not be detected.

TABLE 1
COMPARISON OF INFILTRATION RATES
FOR FML AND COMPOSITE FML/CLAY BARRIER LAYERS
FOR GOOD AND POOR QUALITY FMLS USING HELP MODEL[2]

TYPE OF BARRIER	INFILTRATION ASSUMING 10^{-5} LEAKAGE FRACTION[3] % REDUCTION[4]	CUBIC FT	INFILTRATION ASSUMING 10^{-3} LEAKAGE FRACTION[5] % REDUCTION	CUBIC FT
FML	99.4%	12,000	84.9%	276,000
FML/GCL	100.0%	0	100.0%	15
FML/2-feet compacted clay @ HC=10^{-7}cm/sec	100.0%	2	100.0%	141
FML/2-feet compacted clay @ HC=1^{-6} cm/sec	100.0%	14	99.9%	1,374

[2] Help Model Assumptions are shown in Appendix B, December 1994 Feasibility Study for the 10^{-5} leakage fraction runs. The 10^{-3} leakage fraction used the same assumptions as the corresponding Appendix B run, except for changing the leakage fraction.

[3] According to Table 2-4 of Design and Construction of RCRA/CERCLA Final Covers, U.S. EPA, May 1991, good to excellent quality FML (or geomembranes) can be characterized by having one 1 cm^2 to 0.1 cm^2 hole per acre. According to Figure 9-8 of the same reference, this corresponds to a leakage fraction in the vicinity of 10^{-5}.

[4] Cubic feet of infiltration using new cap divided by the cubic feet of infiltration under existing conditions times 100. Cubic feet of infiltration was estimated using the HELP model.

[5] According to Table 2-4 of Design and Construction of RCRA/CERCLA Final Covers, U.S. EPA, May 1991, poor quality FMLs (or geomembranes) can be characterized by having 30 0.1 cm^2 holes per acre. According to Figure 9-8 of the same reference, this corresponds to a leakage fraction in the vicinity of 10^{-3}, assuming a 0.33 foot head.

However, if the FML is underlain by a clay layer, it is likely that infiltration will be very low even if leaks occur in the FML, whether it is due to installation, landfill settling, or degradation. Since it is desired that this remedy be permanent, it is desirable for the site cover to remain effective even if FML degradation starts after 200 years. The GCL or CC below the FML complements the FML's capability by essentially plugging leaks in the FML with a low permeability layer of clay. The potential effectiveness of the composite FML/GCL and FML/CC is demonstrated in Figure 2-4 from Design and Construction of RCRA/CERCLA Final Covers, U.S. EPA, May 1991. For site specific application, it is also demonstrated using the HELP model in Table 1, above.

Under these circumstances the Agency's position is that a composite barrier layer is worth the 12-19% increase in cost compared to the cost of the site cover with an FML barrier layer (7-11% increase in the cost of the total remedy). In order to obtain the added long term protectiveness of a site cover having a composite barrier layer at a reduced cost, U.S. EPA is allowing a number of compromises of the normal hazardous waste capping requirements. This includes allowing a 2% slope instead of a 3% slope in order to reduce the quantity of soil that is needed for grading, allowing use of a GCL instead of two feet of CC, allowing use of the existing cover as part of a two foot CC layer, and allowing the CC to have a hydraulic conductivity of as high as 10^{-6} cm/sec rather than the usual requirement of 10^{-7} cm/sec.

Footnote 7 advocates use of a GCL rather than a CC layer for the composite barrier layer because of short-term impacts of construction of the 2-foot CC layer. Use of the GCL (instead of CC) along with an FML in the composite barrier layer is acceptable to U.S. EPA. However, regarding the concern about excavation of soils and wastes along the edges of the landfill for construction of the CC layer, it should be noted that if testing indicates that the existing site cover has adequate properties along the edges, excavation will not be necessary. It is also possible that the cap design can be adjusted to avoid excavation in the areas where the existing cover needs to be replaced. Furthermore, while excavation of large quantities of wastes is considered hazardous, excavation of small quantities is not expected to present a significant hazard or odor problem since the excavated material can be quickly covered and other

dust and vapor control measures can be taken including temporary containment structures, chemical supressants, temporary covers, water sprays, and scheduling excavations during cooler and wetter seasons.

If construction of an Option 4A Site cover is shown to present a significant hazard that can not be controlled, U.S. EPA will not allow construction of the Option 4A site cover. Investigation of this issue can be addressed during the remedial design phase.

Regarding the increased truck traffic concern in Footnote 7 due to construction of the 2-foot CC layer, it should be noted that increased truck traffic for transportation of soil and other materials onto the Site is entailed for construction of either Option 4, 4A or 4B site covers. Measures can be taken to reduce the nuisance of the increased truck traffic by regulating the time of delivery and the delivery route. The Yeoman Creek Steering Committee contends that the CC site cover (Option 4B) would entail more truck traffic than the Options 4 and 4A site covers because clay is bulkier than other soils that the clay would replace in the grading layer. Although this may be true, the impact of this incremental increase in truck traffic would be minor.

An effective Site cover over the Yeoman Creek Landfill Site is very important. The Federal government and the State of Illinois have recognized that even normal household wastes can contain hazardous substances. For this reason, requirements for landfills accepting even normal household wastes have become much more stringent within the past few years. The State of Illinois now requires that landfills accepting household wastes have a bottom liner consisting of either 5 feet of low permeability compacted earth or a composite barrier layer consisting of a 60 mil FML and a three foot compacted clay layer, and a low permeability final cover consisting of 3 feet of low permeability compacted earth or an FML of equal performance. The bottom liner must be overlain by an effective leachate collection system. The Yeoman Creek Steering Committee is correct in stating that it is cost prohibitive to "transform [old municipal landfills] into a state-of-the art RCRA hazardous waste landfills." This is true also for transforming old municipal landfills into landfills that meet the new requirements for landfills accepting only household wastes. It would be too expensive to excavate the entire

landfill and place it into a landfill having a bottom liner and leachate collection system. Therefore, U.S. EPA is proposing to only install an effective site cover over the Site. In other words, U.S. EPA is depending on only the Site cover to provide all of the protection, which under current regulations would be provided by a combination of a bottom liner, leachate collection system, and final site cover. This is true even though U.S. EPA has information indicating that some of the wastes disposed of in the Yeoman Creek Landfill Site would not be allowed in municipal waste landfills under current waste disposal regulations. This includes oily wastes likely containing PCBs, used laboratory chemicals, waste solvents, and waste paint. Some of these wastes may have been listed hazardous wastes pursuant to RCRA.

Beyond the technical benefits of a composite landfill cover, the commentors' proposal to utilize a site cover with only an FML barrier layer, as proposed by the PRPs, does not comply with the site cover ARAR. U.S. EPA has determined that 35 IAC Part 811 is the ARAR for the Yeoman Creek Landfill Site cover. 35 IAC Part 811 requires a site cover of at least 3 feet of compacted soil with a hydraulic conductivity of 10^{-7} cm/sec or less, or an alternative which has equivalent or greater performance. The performance of an FML barrier, alone, is not expected to meet this performance criteria.

ARARs are defined as Applicable or Relevant and Appropriate Requirements. 35 IAC Part 807 appears to be directly applicable to the Yeoman Creek Landfill due to the date closure was initiated and waste was last accepted, prior to September 18, 1992. 35 IAC Part 811 standards are not applicable for the same reason. However, 35 IAC Part 811 standards are relevant and appropriate for any municipal landfill where revised environmental control systems need to be employed.

The Yeoman Creek Landfill was closed and cared for in substantial compliance with the requirements of 35 IAC Part 807. Despite this, the Landfill has made the National Priorities List, has had releases of hazardous contaminants from the Landfill and has had infiltration of water identified as part of the problem. In light of the historically demonstrated inadequecy of 35 IAC Part 807 for this Site, to specify 35 IAC Part 807 as setting the standards for remedial actitivies at the Yeoman Creek Landfill would not be protective of human health and the environment.

Therefore it seems relevant and appropriate to consider the requirements of 35 IAC Part 811 for effective landfill standards. The cover requirements of 35 IAC Parts 807 and 811 are not mutually exclusive; Subpart 811.314 will satisfy Subpart 807 requirements. 35 IAC Part 811 was developed through an exhaustive process for applications such as the Yeoman Creek Landfill situation, and are specifically designed to overcome the shortcomings of 35 IAC Part 807. It seems particularly appropriate that a site with identified problems should follow the latest standards, such as cap design, to limit infiltration. It is further supported where the facility does not have any of the other control features such as a constructed bottom liner and leachate collection blanket that are now considered a standard necessity in landfill construction.

ISSUE 6.

COMMENT 7 (July 15, 1995 letter): The leachate collection system required in the Proposed Plan is not necessary since the new landfill cover will virtually eliminate leachate impacts on Yeoman Creek.

COMMENT 8 (July 15, 1995 letter): The leachate collection system is unnecessary because groundwater recharge to Yeoman Creek is not a significant factor at this Site.

COMMENT 9 (July 15, 1995 letter): The leachate collection trenches are not cost effective since they only collect a nominal volume of leachate.

COMMENT 11 (July 15, 1995 letter): The proposed leachate collection trenches have potentially adverse environmental impacts at this Site.

COMMENT 7 (August 24, 1995 letter): The Leachate Collection System Proposed by U.S. EPA Is Neither Reasonable nor Cost-Effective for this Site.

U.S. EPA'S RESPONSE:

Current documented conditions at the Yeoman Creek Landfill portion of the Site demonstrate that leachate is unacceptable.

However, some conditions argue against the need for measures to further isolate Yeoman Creek from the leachate beyond the protection provided by the new Site cover. The new Composite Barrier Site cover will cover all of the wastes and extend into the ground water. This design will eliminate surficial leachate seeps to a high degree of confidence in long-term effectiveness; so the only mechanism for leachate recharge of the Creek following cover installation would be through migration through the subsurface. It also may reduce the rise in the water table within the landfill during flooding by increasing the flow path. This may reduce backflow of this ground water back into the Creek when the water level in the Creek drops. A low permeability cover will nearly eliminate leachate generation due to precipitation, which will result in a gradual decrease in the leachate mound in the landfill, and therefore, a gradual decrease in the driving force for leachate recharge to the Creek.

Even after the leachate mound is dissipated, leachate can be generated by movement of ground water through the portion of landfilled waste that will remain below the water table. However, shallow ground water recharge to the Creek is apparently limited since the base flow of the Creek is zero during parts of the year.

Water level measurements also indicate that discharge of ground water to the Creek occurs only locally. Furthermore, the ground water data indicates that there is significant natural attenuation between the leachate and ground water, which may also apply to the leachate recharge of the Creek. Finally, it can be argued that any problems caused by migration of contaminants through the ground water into Yeoman Creek can be addressed by monitoring and implementation of a remedial action, if a problem is detected.

On the other hand, further isolation of the Creek using a leachate collection system or an artificial channel along the Yeoman Creek Landfill portion of the Site would provide significant additional insurance that leachate from the landfill would not have a continuing effect on the Creek. The primary concern is that landfilled wastes are within a few feet of the Creek along much of the Yeoman Creek Landfill portion. Some of this landfilled waste may contain high concentrations of hazardous substances. Even though the flow rate of leachate into

Yeoman Creek may be small, if the leachate contains high concentrations of hazardous substances, it could recontaminate the sediments and result in a significant detrimental effect on the ecology. Measurement from leachate monitoring wells indicates that the leachate exceeds industrial pretreatment standards for chemical oxygen demand, ammonia, cyanide, iron, lead and zinc. A number of chemicals detected in leachate may have an adverse effect on ecological receptors based on the ecological risk assessment in the RI, including PCBs, lead, zinc, acetone, and cyanide. The attenuation mechanisms that are protecting the ground water may not be effective over the few feet between the landfilled waste and Yeoman Creek. Although the leachate is too contaminated for discharge without treatment into a sewer, the Yeoman Creek Steering Committee indicates no concern about its release without treatment into Yeoman Creek.

The leachate collection system will provide Yeoman Creek with protection from impacts of landfill leachate during the dissipation of the leachate mound. In Comment 9, the Yeoman Creek Steering Committee states that they estimate that the flow into the leachate collection system will be 500 gallons per day. Although Comment 8 states that the base flow in Yeoman Creek is negligible, in the FS, Golder Associates, Inc. estimated that the maximum ground water flow through the west side of the landfill would be 5 gpm, which corresponds to approximately 350,000 cubic feet per year and 16% of the estimated flow through the landfill due to infiltration of precipitation under existing conditions. Since 30-40% of the landfill wastes will remain below the water table even after the leachate mound in the landfill dissipates, the ground water flow through the west side of the landfill will generate leachate, which would eventually recharge the lower aquifer and possibly Yeoman Creek. Although the Yeoman Creek Steering Committee has proposed anchoring the FML barrier layer below the water table, this would not be expected to significantly reduce ground water flow into the Creek due to the ground water flow gradient within the shallow aquifer.

Ground water flow into Yeoman Creek can also be generated as a result of the rise and fall in the level of Yeoman Creek. As stated on page 63 of the RI:

> During the Spring, the potential for discharge will be greatest at the time when the creek level, which fluctuates

on a short time scale in response to precipitation and freeze-thaw cycles, is lower than the adjacent groundwater levels which respond much slower to precipitation events.

Anchoring the FML liner below the water table may reduce this effect to some degree by increasing the length of the flow path between the waste and Yeoman Creek. However, because the wastes are so close to Yeoman Creek, groundwater flow to and from Yeoman Creek due to the rise and fall of the water level in Yeoman Creek could be significant.

Neither the potential impact of ground water flow through the west side of the landfill nor the impact of the fluctuating water tables in response to water levels of Yeoman Creek are taken into account in the estimated volume included in Comment 9. Furthermore, there is a high level of uncertainty in the volume estimate in Comment 9 principally because the average hydraulic conductivity of the waste is unknown. Preferential pathways could exist within the waste that would result in a much higher hydraulic conductivity than 10^{-4} cm/sec. A higher flow rate would result in higher operation and maintenance costs until the leachate mound dissipates.

Because of the proximity of the landfill to Yeoman Creek and the potential variability in leachate quality and migration, it appears that only a costly ground water monitoring program could detect leachate before it enters Yeoman Creek. Simply monitoring the surface water and sediments in the Creek would not be acceptable because it would be difficult to determine the source of the contamination, and because it would not detect contamination until after the stream is contaminated.

If a contamination problem is detected due to leachate migration, it would be expected to be considerably more expensive to address at that time. The Yeoman Creek Steering Committee estimates that it would cost an additional $40,000 to $70,000 to "retrofit" the site cover after construction of the leachate collection system.

Although the Yeoman Creek Steering Committee did not provide a basis for their cost estimate, it is clear that they did not include the cost of the repeated sediment excavation to remove contaminated sediments. At that time, the sediments would probably have to be disposed of off-site, and, if contaminated

with PCBs at concentrations of 50 ppm or more, would have to be disposed of in a permitted chemical waste landfill, or by incineration.

Besides the cost savings, the design of the system can be made more effective by integrating the leachate collection system into the site cover design. For example, recharge of the leachate collection system by Yeoman Creek can be minimized by extending the Site cover over the leachate collection system and into the ground water.[6]

Finally, addressing the leachate collection system will be administratively more difficult and may even be administratively unimplementable in the future, depending on the Agency's funding and priorities at that time.

The estimated costs for implementing the leachate collection system including treatment and disposal concurrent with the cap construction is summarized below:

CONSTRUCTION COSTS FOR LEACHATE COLLECTION	:	$ 390,000
ADDITIONAL ANNUAL O&M COSTS	:	$ 115,000
ADDITIONAL PRESENT WORTH	:	$ 2,000,000

This adds 9% to the estimated total cost of the alternative proposed by the PRPs. The major portion of the present worth cost is for operation and maintenance. It is expected that as the leachate mound dissipates that the flow into the leachate collection system will decrease, and, as a result, operation and maintenance costs will also decrease.

Comment 11 expresses a concern regarding the potential for the leachate collection system to negatively affect the ecology of Yeoman Creek and the adjacent wetlands due to seepage of water from the stream into the leachate collection system. In Comment

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[6] It should be noted that the diagram of the leachate collection system in Figure 3 of the Yeoman Creek Steering Committee's July 15, 1995 comment letter, is defective. This diagram indicates that drainage from the site cover would flow into the leachate collection system. As stated previously, the site cover could extend over the leachate collection system.

11, the PRPs estimate that 270 gpd, which is 100,000 gallons per year, could seep from the Yeoman Creek into the leachate collection system.

Section 4.5 of the FS provides information on the potential for the remedial action to impact the nearby wetlands. Although Section 4.5 of the FS voices no concern about seepage of water from Yeoman Creek into the leachate collection system (nor was any concern about this affect expressed in any portion of the FS, which was prepared by the Yeoman Creek Steering Committee's consultant), it includes an estimate that the total annual runoff into the wetlands within the Yeoman Creek basin is 486,000,000 gallons per year. The estimated approximately 100,000 gallons which may be removed by the leachate collection system is only 0.02% of the total flow entering the basin that recharges the wetlands. Section 4.5 also includes an estimate of increased drainage from the landfill due to the improved site cover of 8,200,000 gallons per year (the 8,200,000 gallons is partially off-set by a decrease in recharge of Yeoman Creek and the wetland by ground water, but the FS concludes that most of the ground water migrates into the lower aquifer, not into Yeoman Creek or the wetland). Therefore, the increased drainage due to the new site cover will more than make up for the small amount of water removed by the leachate collection system. As stated in Section 4.5, the drainage from the site cover can be controlled to eliminate adverse environmental impacts. It should also be noted that flow into the leachate collection system from Yeoman Creek will primarily occur during periods of high flow in Yeoman Creek, when the surface water flow into the wetlands would already be high. Collection of the seepage from Yeoman Creek during the high flow periods would have the beneficial effect of preventing a rise in the landfill water table and subsequent seepage of the water back into the Creek after it is contaminated by the wastes in the landfill.

In conclusion, for various reasons, the commenters expressed confidence that the leachate collection and treatment system is unnecessary. While EPA concurs that leachate will be reduced by the Site cover, concern remains that leachate will continue to be generated at levels containing high concentrations of hazardous substances, or otherwise adversely affecting the Creek.

This ROD allows the opportunity to demonstrate that the leachate

collection and treatment system does not need to be implemented. This determination was made based upon the required monitoring program, the composite Site cover, and the risks and obligation, if determined necessary after construction of the Site cover is completed, to construct, implement and operate a leachate collection system, and to remediate contaminated soils and sediments.

ISSUE 7:

COMMENT 10 (July 15, 1995 letter): U.S. EPA has failed to consider short-term risks due to waste excavation required in the construction of the leachate collection system.

U.S. EPA RESPONSE:

U.S. EPA has considered short-term risks of waste excavation for the leachate collection system. Uncontrollable risks can be caused by excavation of large quantities of wastes (such as excavation and removal of the contents of an entire landfill). However, risks from excavation of relatively small quantities of waste should be controllable. This is indicated in Section 5.5.5 of the FS prepared by Golder Associate, Inc., which states that:

> However, it is anticipated that construction of leachate collection trenches along Yeoman Creek would require a limited amount of excavation of waste at the southern end of Yeoman Creek Landfill. Consequently, additional worker health and safety precautions would be required.

Note that the FS, which was prepared by the PRP contractor, states that the quantity of waste excavated would be limited, and indicates that additional risks to workers can be addressed by taking health and safety precautions. The FS goes on to state that similar risks are involved in the excavations for the active gas collection system. However, the PRPs have made no comment about risks due to construction of the active gas collection system.

U.S. EPA also believes that measures can be taken so that the excavation for the leachate collection system can be completed without discharging leachate to Yeoman Creek. Roy F. Weston,

Inc. (Weston) states in a letter dated August 23, 1995 that "leachate from the wastes during construction can be contained from going into Yeoman Creek by sound construction practices." Weston suggests use of leachate sumps to dewater the excavation. If a small quantity of leachate does discharge to Yeoman Creek, it will be less important than eliminating the long term seepage of leachate into the Creek.

Landfill gases are presently seeping through the site cover and into the ambient air at the Site although it has been determined that the health impact of this emission is negligible. Opening a trench along Yeoman Creek may temporarily increase landfill gas emissions somewhat, but because the trench will be open for only a limited period of time and the trench will not be near residences, the health effects would be negligible.

Measures such as construction of temporary containment structures, use of chemical suppressants, use of temporary cover, use of water sprays, and conducting work during seasons of lower temperature, can be used to reduce emissions of dusts and vapors from excavation.

ISSUE 8:

COMMENT 12 (July 15, 1995 letter): It is inappropriate to conduct additional investigation of soil contamination as part of pre-design activities.

U.S. EPA RESPONSE:

PCBs were detected at 90 mg/kg at a leachate seep near the northern boundary of the Site. There were no samples collected between the leachate seep and residences and businesses located north of the Site. Although run-off from the leachate seep is apparently not directed towards the residences and businesses, it is prudent to collect a number of samples to confirm that surface soils at the residences and businesses have not been affected. This will involve no delay in the project since other tasks such as sampling of Yeoman Creek sediments can be conducted at the same time. In addition, the cost of this effort will be minor compared to the total cost of the remedy.

ISSUE 9:

COMMENT 13 (July 15, 1995 letter): U.S. EPA's Proposed Plan is ambiguous in the discussion of PCB action levels and related site remedial activities.

COMMENT 14 (July 15, 1995 letter): There is no information in the Feasibility Study which justifies the establishment of PCB action levels for soils as set forth in footnote 5 of the Proposed Plan. In addition, the suggested action levels of 10 ppm in non-residential areas and 1 ppm in residential areas is inappropriate for this Site.

U.S. EPA RESPONSE:

U.S. EPA has clarified the applicability of the various action levels for PCBs in the ROD. The action level of 1 ppm for residential areas was meant to apply to residential and commercial areas as defined in 40 CFR 761.123, while the action level for non-residential areas was meant to apply to undeveloped property. It should be noted that these action levels are being set as a precaution, and it is not expected that any PCBs from the Site are present on residential properties.

U.S. EPA agrees that the proposed 1 ppm action level for PCBs is more stringent than is required under U.S. EPA's, PCB Spill Cleanup Policy (40 CFR 761.125). Under the PCB Spill Cleanup Policy, 1 ppm is the criteria for "clean soil", but the criteria for requiring excavation and replacement of soil contaminated by PCBs is 10 ppm (761.125(c)(4)(v)). 1 ppm of PCBs is also identified as a "starting point action level" in "Guidance on Remedial Actions for Superfund Sites with PCB Contamination", OSWER Dir. 9355.4-01, p. 26. According to this guidance document, a 1 ppm PCB concentration corresponds to a 10^{-5} lifetime incremental cancer risk level, using standard U.S. EPA exposure assumptions, while a 10 ppm concentration corresponds to a 10^{-4} risk.

Since the soil action levels for protection of human health are higher than the sediment action levels for protection of ecological receptors, U.S. EPA agrees that it is unnecessary to set separate action levels for non-residential soils, residential soils, and sediments. Inasmuch as contamination in non-resident

and residential area soils also may impact ecological receptors such as red-winged black birds, the action level for non-residential areas and residential soils, is changed to the same action levels used for sediments (Arochlor-1242 = 6.8 mg/kg, Arochlor-1248 = 3.4 mg/kg, and Arochlor-1254 - 0.34 mg/kg). Therefore, any soil exceeding this action level (other than extensive wetland areas) must be excavated to a depth of 10 inches and replaced with clean soil (containing less than 1 ppm of PCBs). This should provide protection to human health to more than the 10^{-5} risk level, since the portion of any property having a concentration between 1 ppm and 3.4 ppm, if any, will be very limited.

PCBs of 50 mg/kg is an action level that triggers disposal regulations under the Toxic Substances Control Act (TSCA) for excavated sediments, soils, and wastes. If sediments, soils or wastes are excavated and contain PCBs concentrations equal to or exceeding 50 mg/kg, then TSCA regulations become applicable and require disposal of these contaminated sediments, soils or wastes in a Chemical Waste Landfill or by incineration, unless a waiver is approved. The relevant chemical waste landfill requirements have been waived. See response to Issue 13.

ISSUE 10.

COMMENT 15 (July 15, 1995 letter): U.S. EPA's proposed sediment action levels are inappropriately based on unrealistic hypothetical risks to red-winged black birds and non-existent mink.

U.S. EPA RESPONSE:

It should be noted that the proposed sediment action levels have been available to the PRPs since the fall of 1994, but this is the first comment from them specifically criticizing the procedures for deriving these action levels.

The sediment action levels were derived using the following procedures:

1. Reference doses were derived for the chemicals of concern for mink and red-winged black birds. Reference doses were set at exposure rates that are reasonably expected to result

in no adverse effects on the animal based on scientific toxicity studies and application of protection factors.

2. Exposure rates to mink and red-winged black birds were estimated based on feeding rates, contaminant concentrations, and other considerations.

3. Plots were prepared of total hazard index to mink and red-winged black birds versus assumed sediment concentrations (see letter from ICF Kaiser to Richard Boice, U.S. EPA dated August 15, 1995) for each chemical of concern. The hazard index is the ratio of the estimated exposure rate divided by the reference dose. If a hazard index exceeds unity for a chemical, that chemical should be evaluated to determine whether it may be causing an adverse impact on wildlife in the area. For both mink and red-winged black birds, it was assumed that 100% of the diet came from the area near the Site. For calculation of the hazard index for the plots, it was assumed that 75% of the diet came from the areas represented by the soil data. At a sediment concentration of 0, the hazard index is represented by the risks due to the soils alone without any contribution from the sediment contamination. It was assumed that 20% of the diet came from areas represented by the sediment data (5% of the exposure, previously represented by the seep soil data, was assumed to be eliminated by construction of the site cover over the seep soils). The plots show how the hazard index increases in response to assumed increases in concentrations of chemicals in the sediments.

4. U.S. EPA staff intended to evaluate whether the sediment concentrations of each chemical that resulted in a hazard index of unity or above should be used to establish sediment cleanup action levels. However, it was found that for PCBs, lead, PAHs, and zinc the hazard indexes exceeded unity either for mink or red-winged black birds for exposures to soils even without consideration of exposures to sediments.

U.S. EPA ecologists had already advised that the concentrations of contaminants in the wetland soils were not high enough to justify excavation, which would damage the wetlands. However, the ecologists felt that excavation of stream sediments would not cause significant ecological damage. Under this situation, U.S.

EPA reviewers recommended setting the sediment cleanup action levels at concentrations based on the higher of either the upstream sediment concentrations, which were considered background, or on concentrations being left in the adjacent wetlands. For PCBs and lead the recommended cleanup action level is based on the 95% confidence level of the average concentration in the soil samples. Since only Arochlor-1248 was detected in the soil samples, U.S. EPA staff recommended that the action levels for the other Arochlors be adjusted from the level for Arochlor-1248 based on their relative toxicities. For PAHs and zinc, the recommended cleanup action level is based on upstream sediment concentrations since these concentrations were higher than the upper 95% confidence limit of the average concentration in the wetlands.

As described in item 3 above, the exposure rates were multiplied by 0.75 for the fraction of food from the soils, and by 0.2 for the fraction of food from sediments. Therefore, adding the hazard indexes for soils and sediments will not increase the estimated risk by a factor of three as stated in paragraph 2 of Comment 15. The soil concentrations used for the 0.75 fraction will not be covered by the new site cover as indicated in paragraph 2 of Comment 15. As explained in item 3 above, the 5% fraction of food from the seep soil area was assumed to be zero because the new site cover would cover these areas, but it will not cover the wetlands or other soil areas that were sampled.

In contrast to statements in paragraphs 3 and 5 of Comment 15, it should be emphasized that the hazard indexes for the different Arochlors of PCBs and different polyaromatic hydrocarbons (PAHs) should be added since all the Arochlors have the same mechanism of toxicity. Therefore, their ecological impact is additive. As a result, it was proper to depict the baseline risk from soils due to PCBs or PAHs as the sum of the hazard indexes from all of the types of these compounds. It is not clear why it is stated that adding the hazard indexes for Arochlor-1242, Arochlor-1248 and Arochlor-1254 results in an over-estimation by a factor of three. As stated previously the hazard indexes of the three should be added to obtain the total hazard index for PCBs. In addition, the RI assumed that the hazard indexes for the different Arochlors and PAHs should be added. Similarly, for PAHs a single reference dose was used for all of the PAH compounds, and the effects of different PAHs were assumed to be additive.

The concentrations used in calculation of the hazard indexes are actually a conservative estimate of the average concentration called the upper 95% confidence level (UCL) of the average. When large numbers of samples are collected the 95% UCL of the average will be reasonably close to the average concentration. However, to control costs, usually only a limited number of samples are collected and analyzed at Superfund Sites. In these situations where only a limited number of sample results are available, the 95% UCL of the average can be larger than the maximum detected concentration for a parameter. In this case the maximum detected concentration was used instead of the 95% UCL of the average.

Other comments that the PRPs make regarding the sediment cleanup action levels have already been addressed in U.S. EPA's response to Comments 2 and 3.

ISSUE 11.

COMMENT 16 (July 15, 1995 letter): U.S. EPA's proposed sediment remedial action levels are unnecessarily costly to implement as part of a remedial action.

U.S. EPA RESPONSE:

It is anticipated that the first phase of the sampling will be conducted before construction is mobilized, and, as a result, the laboratory turn-around time will not be disadvantageous. U.S. EPA will consider use of field screening techniques to determine the extent of excavation in the field. However, these will have to be followed up by confirmatory laboratory analysis meeting the necessary quality assurance/quality control criteria. It should be noted that the sediment cleanup action levels also apply to lead, zinc, and PAHs. All of these parameters will require a laboratory analysis in addition to PCBs.

ISSUE 12.

COMMENT 17 (July 15, 1995 letter): In accordance with the criteria outlined in the NCP, U.S. EPA should carefully weigh the protection of non-threatened individual animals against the other environmental and human health risks associated with extensive

excavation of soils and sediments.

U.S. EPA RESPONSE:

Mink and breeding red-winged black birds were used as indicator species to detect potential adverse affects of contaminants on wildlife in the area. Protection for these species should also protect other wildlife in the area (see response to Issue 3).

U.S. EPA has already stated that its ecologists recommended that the contaminant levels in the large wetland south and east of the site were too low to justify excavation (although limited excavation was felt to be acceptable). Prior to excavation of the sediments, an evaluation of the impact of the proposed sediment excavation on the large wetland south and east of the Site will have to be completed. U.S. EPA agrees that sediment excavation should be limited or be conducted in accordance with procedures that will not have a significant impact on the large wetland south and east of the Site. For example, if the excavation may result in dewatering part of the wetlands, the excavated sediments may have to be replaced by clean soil.

ISSUE 13.

COMMENT 18 (July 15, 1995 letter): The TSCA regulations dealing with PCB disposal are not applicable to the proposed remedial action.

U.S. EPA RESPONSE:

Although the TSCA regualtions dealing with disposal of PCBs at or exceeding 50 ppm have been determined to be applicable or relevant and appropriate, the relevant chemical waste landfill requirements, 40 C.F.R. §761.75, have been waived to allow these PCB contaminated materials to be consolidated under the Site cover.

ISSUE 14.

COMMENT 19 (July 15, 1995 letter): Even if U.S. EPA considers the TSCA PCB disposal regulations relevant and appropriate,

consolidation of PCB-containing materials on-site is appropriate, whether or not the level of PCBs exceeds 50 ppm.

U.S. EPA RESPONSE:

See Response to Issue 13, Comment 18.

ISSUE 15.

COMMENT 20 (July 15, 1995 letter): Wetlands mitigation should be limited to the areas defined in the approved FS Report.

U.S. EPA RESPONSE:

The FS provided an estimate of the quantity of wetlands that will be eliminated as a result of construction of the new site cover. In addition to this, based on the FS certain limited wetland areas may be adversely impacted by sediment excavation, and limited wetland areas may be adversely impacted by diversion of storm sewers and other actions taken during the remedial action.

Therefore, U.S. EPA will defer the determination of the exact quantity of wetlands that will be adversely affected until a later stage in the project when the wetland impacts are better defined.

ISSUE 16.

COMMENT 21 (July 15, 1995 letter): The cost estimate presented in the Proposed Plan appears to be incorrect.

COMMENT 4 (August 24, 1995 letter): U.S. EPA has failed to account for contingency and engineering cost of the remedial action.

COMMENT FROM MAYOR DURKIN DURING PUBLIC MEETING: "The two pieces would cost $ 6 million more ..."

U.S. EPA RESPONSE:

The difference between the cost for U.S. EPA's preferred

alternative identified in the Proposed Plan and that identified by the Yeoman Creek Steering Committee is approximately $1,200,000. This difference is primarily because U.S. EPA assumed that the less expensive Option 4B cover (FML underlain by 2-feet of CC) would be implemented rather than the somewhat more expensive Option 4A cover (FML underlain by a GCL). However, in the Proposed Plan, U.S. EPA proposed that either the Option 4A or 4B site cover would be acceptable. Following is a list of the components that account for the larger cost estimate by the Yeoman Creek Steering Committee:

+ $800,000: the Yeoman Creek Steering Committee assumed use of an Option 4A instead of an Option 4B cover.

+ $134,000: the Yeoman Creek Steering Committee assumed higher compensatory storage/wetland mitigation costs than used in the FS.

+ $167,000: the Yeoman Creek Steering Committee apparently double counted certain active gas control inspection costs, which were not included in Alternative 4 of the FS.

+ $40,000: U.S. EPA did not adjust health and safety costs to 1% of construction capital costs.

If it is assumed that the less expensive FML/CC site cover is constructed, but correcting U.S. EPA's estimate for the health and safety costs to 1% of construction costs, the cost estimate for the selected remedy would still be $ 25.7 million, which is $ 3.7 million more than the cost estimate for the remedy including a site cover with only an FML barrier layer and without a leachate collection system.

ISSUE 17.

COMMENT 8 (from August 24, 1995 letter): No ground water management zone is necessary nor should one be imposed at this Site.

U.S. EPA RESPONSE:

U.S. EPA agrees that the State of Illinois Ground Water

Management Zone regulations should not be considered applicable or relevant and appropriate to this action. However, the ROD has addressed this concern and has prescribed only adequate ground water monitoring.

II. RESPONSES TO COMMENTS FROM EVOY, KAMSCHLUTE, JACOB & COMPANY (EVOY), AND FROM HARRY HOOKER

ISSUE 1: U.S. EPA MUST EITHER REMOVE THE LANDFILL WASTE FROM EVOY'S PROPERTY OR DETERMINE AND PUBLICLY STATE THAT SUCH REMEDIATION IS UNNECESSARY. (July 14, 1995 letter from Evoy)

U.S. EPA RESPONSE:

U.S. EPA has reviewed this matter and concluded that landfilled residential wastes are present on the Evoy property and are contiguous to the landfilled residential wastes on the Waukegan School District property. As a result, that portion of the Evoy property where the landfilled residential wastes are located has been properly identified as part of the Yeoman Creek Landfill Site. However, U.S. EPA is willing to be flexible in implementing the remedy to allow excavation and consolidation of wastes from the fringes of the Landfill, such as this property, and alternative site cover designs. This is expanded below.

It should be noted that the action level for PCBs in soils applies to surface soils where it may be contacted by people and not to the landfilled waste.

At the Yeoman Creek Landfill Site, it is known that residential wastes were co-disposed with industrial wastes. The best information we have is that the industrial wastes were simply buried along with the residential wastes wherever the filling was occurring at the time of disposal. Therefore, it is believed that industrial wastes are spread throughout the landfill. A number of hazardous substances were detected in leachate from the landfill, including: chloroethane; methylene chloride; acetone; 1,2-dichloroethylene; 2-butanone; trichloroethylene; benzene; 4-methyl-2-pentanone; tetrachloroethylene; toluene; chlorobenzene; ethylbenzene; xylene; phenol; 1,4-dichlorobenzene; 1,2-dichlorobenzene; 2-methylphenol; 4-methylphenol; isophorone; 2,4-

dimethylphenol; benzoic acid; naphthalene; 4-chloro-3-methylphenol; 2-methylnapthalene; diethylphthalate; n-nitrosodiphenylamine; butylbenzylphthalate; bis(2-ethylhexyl)phthalate; polychlorinated biphenyls; and lead. The leachate testing is the best indication we have of the contents of the landfill. We do not know the distribution of these chemicals within the landfill, but we assume that hazardous substances could be distributed throughout the landfill. In general, chemical analyses of the wastes themselves are not very useful since the composition of wastes can vary dramatically from location to location. Furthermore, residential wastes require proper disposal regardless of their chemical make-up.

Figure 8 from the RI, appears to indicate that the following borings on the Evoy property contained landfilled residential wastes: WD-224U, WD-251B through WD-251G, WD-252C, and WD-252D. The logs for these borings described the waste as: metal pieces, paper, cloth, glass, wet-black-decomposed paper and cloth, pieces of aluminum foil, paper-black-wet-decomposed, copper wire, wire, plastic, plastic bag, plastic wrap, wood, hose, and piece of concrete. These descriptions are typical of landfilled residential wastes. In addition, in the judgement of the personnel who observed the cuttings from the borings (from Golder Associates, Inc, and Roy F. Weston, Inc) the wastes were landfilled residential wastes. Chemical analyses would be of no value in this determination since there is no chemical definition of landfilled residential wastes. As stated previously, based on available information, we have assumed that hazardous substances could be present within the landfilled residential wastes. It follows that the landfilled wastes on the Evoy property should be considered part of the Yeoman Creek Landfill Site, and should be addressed in the same manner as the rest of the landfill -- that is by containment under an effective site cover.

On properties where the extent of landfilling and the impact of the proposed site cover is limited, it may be possible to excavate wastes from the property and consolidate it onto the main part of the Site, or to implement an alternative site cover design that would better accommodate use of the property. However, because of the potentially significant costs involved, the potential health and safety problems, and the uncertainty regarding the results of negotiations and litigation that may occur among the parties of concern on this matter, the decision

regarding whether any excavation or alternative site cover design should be conducted will be deferred to a later date. Therefore, U.S. EPA has included the following provision in the ROD:

> For the northern portion of the site in locations where wastes were disposed of outside of the boundaries of the Waukegan School District property, or where the site cover will extend onto otherwise unaffected properties, it will be acceptable to U.S. EPA for wastes to be excavated from these properties and consolidated on the Site, or to implement an alternative cap design that will better accommodate use of the property. This is subject to the following:
>
> - determination by U.S. EPA that the alternative site cover design will meet an equal standard of performance with respect to reduction in infiltration over the long term, and will not require excessive maintenance.
> - if excavation is conducted, followup sampling will be required to assure that excessive levels of hazardous substances are not being left behind.
> - determination by U.S. EPA that the costs to the federal government of implementation of the excavation or alternative design will not be excessive; and
> - determination by U.S. EPA that the action can be conducted in a manner that will be protective of human health and the environment.

The actual allocation of costs for implementation of the remedy will depend on the results of negotiations or litigation.

<u>ISSUE 2:</u> U.S. EPA MUST ADDRESS THE EFFECT OF DRAINAGE AND RUN-OFF ONTO THE SURROUNDING PROPERTIES (July 14, 1995 letter from Evoy).

"My comment would be that whatever plan is adopted that the drainage and impact on the drainage and the impact on the property owners north .... needs to be seriously evaluated." (Harry Hooker during public meeting)

U.S. EPA RESPONSE:

U.S. EPA agrees that drainage onto surrounding properties is an important consideration. It would be unacceptable for the new

site cover to cause flooding or other hazards to the residents of the surrounding properties. Therefore, U.S. EPA has added the following performance standard for construction of the drainage system to the ROD: drainage from the site cover onto adjacent properties and into storm sewers will be adjusted to levels that will result in no increased potential for flooding or other adverse effects.

The drainage from the site cover can be adjusted to flow into the wetland south of the Site, into Yeoman Creek, into storm sewers, or onto adjacent properties and streets. The run-off could be either totally diverted from adjacent properties and storm sewers, or adjusted to levels that result in no adverse effects. Another performance requirement is that the run-off should not have an adverse effect on the ecology of the wetland south of the site. U.S. EPA believes that these performance requirements for the drainage system can be met. The details of the drainage system will be worked out during the design phase. U.S. EPA believes that after the preliminary design is completed, a meeting with adjacent property owners should be held to assure that their concerns are addressed.

Another flooding concern is the impact of the site cover in filling a portion of the floodway and floodplain in Yeoman Creek. This concern is preliminarily evaluated in Section 4.4 of the FS. Although the preliminary evaluation indicates that the impact of the site cover on the floodway and floodplain of Yeoman Creek will be minor, U.S. EPA's Proposed Plan includes provisions for creation of compensatory floodway and floodplain storage and other mitigation measures that may be necessary to assure that construction of the new site cover will not cause problems due to loss of floodway and floodplain capacity in Yeoman Creek.

III. RESPONSE TO COMMENT FROM JAMES D. GRIFFITH, DIRECTOR, LAKE MICHIGAN FEDERATION

"Plan 4B seems to be sound. I do not believe that five year reviews are sufficient. Perhaps initially this should be a review after the first and third year."

U.S. EPA RESPONSE:

Mr. Griffith stated that the actions in U.S. EPA's Proposed Plan seem sound. Regarding the sufficiency of the five year reviews, since annual monitoring of the ground water, surface water, sediments, and wetlands will be required, U.S. EPA will essentially be monitoring the performance of the remedy every year.

IV. RESPONSE TO COMMENTS FROM THE LAKE COUNTY STORM WATER MANAGEMENT COMMISSION

ISSUE 1: It is unclear from the information I have available who the permit applicant will be. If it is the City of Waukegan or if the city is a co-applicant a Watershed Development Permit (WDP) will be required from the Lake County Stormwater Management Commission. There is no mention of a WDP in the USEPA information. I would encourage a meeting with the design engineers as soon as possible. The issue of cost may be moot if one option or another is not permissible under the WDO.

U.S. EPA RESPONSE:

It is very important that the remedial actions at the site do not cause or increase flooding problems. Therefore, U.S. EPA agrees that a meeting is needed between the design engineer, and the Lake County Storm Water Management Commission as well as the Illinois Department of Transportation (IDOT) to work out methods to implement the remedial actions in a manner that will not significantly increase flooding potential, and that will comply with the substantive requirements of applicable or relevant and appropriate State and Federal laws (ARARs). However, it should be emphasized that, under federal law, federal, state or local permits are not required for on-site actions conducted under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (see 40 CFR 300.400(e), and Sections 104, 106, 120, 121, and 122 of CERCLA). Therefore, only the substantive requirements of ARARs have to be complied with.

It should be noted that to the extent that the substantive requirements of the Lake County Storm Water Management Commission Ordinance exceeds the requirements of IDOT floodway and floodplain regulations, the provisions of the Ordinance will not be considered mandatory because they are not State requirements.

This includes the provision for creating compensatory storage for loss of floodplain storage. However, the need for this provision, as well as other provisions of the Ordinance will be seriously considered in the design of the remedial action, in order to avoid significantly increasing the potential for damage due to flooding.

It is also very important that remedial actions at the Site comply with applicable or relevant and appropriate federal and state laws. U.S. EPA and IEPA have determined that the Illinois Department of Transporation (IDOT) floodway and floodplain regulations are applicable to this action; however, to the extent that the Lake County Storm Water Management Commission ordinance exceeds the IDOT requirements, it is not considered applicable.

V. RESPONSE TO COMMENTS FROM ILLINOIS CITIZEN ACTION **"In reviewing the EPA's proposed plan for the cleanup we see one glaring omission: protection of the groundwater currently being contaminated with the leachate from the landfill. The proposal acknowledges that groundwater is being contaminated, and that contamination presents a risk, but the recommended solution does not address this issue, focusing only on the direct contamination of Yeoman Creek. Our concern is twofold: the highly dangerous nature of the contaminants (PCBs) leaching into the groundwater, and the ultimate impossibility of reclaiming the groundwater once it is contaminated. The US Department of Health and Human Services report TP-92/16 Public Health Statement 1.7 states 'for the maximum protection of human health the possible cancer effects of drinking water or eating fish or shellfish that contain PCBs in lakes and streams be not more than 0.001 parts of PCBs per billion parts of water (0.001 ppb).' The Superfund Study by the Congress' office of Technology Assessment (OTA) reveals that once the groundwater is contaminated it cannot be cleaned up. On a normal human timescale, groundwater contamination must be considered permanent. The pump and treat system of cleaning contaminated ground water will go on forever. Illinois Citizen Action respectfully requests that you recommend Alternative 5 in the cleanup of the Yeoman Creek Landfill. It is the only alternative listed that prevents further contamination of the groundwater.**

We are sensitive to the economic burden this alternative places

on Waukegan, the Superfund and the responsible parties. We cannot in good conscience, however, permit a hazardous situation to continue. The protection of public health must be addressed and federal money may well have to be taken from projects where health is not an issue. This site has already been the focus of corrective actions in the past; it is unlikely that the ultimate solutions will become cheaper by being postponed. And in the meantime, the pollution of the ground water continues."

U.S. EPA RESPONSE:

U.S. EPA agrees that it would be desirable to completely contain the contaminated ground water as proposed in Alternative 5, which includes an effective site cover, an active landfill gas ventilation system, deep slurry walls around the entire landfill, and ground water/leachate pumping within the slurry wall to prevent off-site migration of contaminated ground water. However, the cost of this additional protection is estimated to be high compared to Alternative 4B: $ 16 million in additional construction costs and $430,000 in additional annual operation and maintenance costs. Please note that the extent of ground water contamination from the Site is limited, the ground water is not used for residential or commercial purposes in the vicinity of the site, ground water monitoring will be conducted that will be able to detect off-site migration of contaminants, and five-year reviews will be conducted to evaluate whether the selected remedial action continues to be protective. If it becomes apparent that ground water contamination from the Site is a more serious concern, an alternative for containment or remediation of the contaminated ground water can be selected and implemented before any human exposure to the ground water occurs, and before the contaminated ground water reaches Lake Michigan.

It should be noted that part of the reason U.S. EPA selected implementation of a leachate collection system along the northern portion of the landfill, preventing leachate seepage into Yeoman Creek, is because of the potential adverse ecological and human health effects resulting from even very low concentrations of PCBs in surface waters. The Ambient Water Quality Criteria (AWQC) for Protection of freshwater aquatic life is 0.014 ug/l, while the AWQC for protection of human health from cancer at the 10^{-6} risk level due to lifetime exposure to drinking water and

ingestion of aquatic organisms is 0.01 ug/l.[7] The maximum concentration of PCBs in the leachate wells of 190 ug/l is far above these levels, as is the detection limit for the analysis used in the RI of 0.5 ug/l. In addition, PCBs were detected as high as 90 mg/kg in leachate seep soils in the northern portion of the landfill. Although the predominant amount of PCBs detected in leachate wells is probably associated with solids and would probably be filtered out in ground water before reaching the Creek, even low levels of PCBs and even levels below the detection limit that reach Yeoman Creek could have an adverse effect.

On the other hand, in the southern portion of the landfill (the Edwards Field portion), the highest PCB concentration detected in leachate was 0.51 ug/l, and no PCBs were detected in the leachate seep soils. This lower PCB concentration, combined with the 30 foot buffer between the landfill and the Creek and the indication that ground water discharge to the Creek may not be significant, is why a leachate collection system is not recommended between the southern portion of the landfill and Yeoman Creek.

Please note that the effects of PCBs on human health are not magnified when exposure is strictly through drinking water usage (not including exposure to aquatic organisms exposed to a given level of PCBs) as evidenced by the somewhat higher standard level of 0.5 ug/l, which is the Maximum Allowable Concentration (MCL) under the Safe Drinking Water Act. The MCL for PCBs is equal to the detection limit for PCBs attained in the RI. Inasmuch as PCBs were not detected above the MCL even in monitoring wells near the Site, the RI indicates that if any migration of PCBs is occurring through the ground water from the Site, it is very limited. If migration of PCBs from the Site increases, it will be detected during the ground water monitoring. Since ground water is unused in the vicinity of the Site, because ground water will be monitored near the Site, because PCBs migrate very slowly in the ground water, and because there is an approximately two mile distance between the Site and Lake Michigan, there will be plenty of time to implement a ground water action to contain or remediate PCB contamination before it reaches Lake Michigan or

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[7] U.S. EPA. Quality Criteria for Water 1986. EPA 440/5-86-001, May 1, 1986.

any ground water receptor.

VI. RESPONSE TO COMMENTS FROM CITIZENS URGING THAT ACTION BE TAKEN TO ADDRESS THE CONTAMINATION AT THE YEOMAN CREEK LANDFILL SITE

- "We urge you to contain landfill wastes --liquid & solid -- & clean up this 'blotch' on the environment once and for all to prevent any more damage to the ground water & big lake & the health of the residents of the area plus all the areas where the gases & water will migrate.

Protect our children, PLEASE resist the 'E-Z way out!' & do a thorough workman-like job of containment."

- "I respectfully urge the USEPA to take whatever measures are necessary to protect the health of local citizens by protection of the ground water and Lake Michigan from contamination. Yeoman Creek contamination puts at risk local wetlands through hazardous chemicals. Heavy metals found in ground water results in risk to us all. We the citizens of the area look to EPA to protect us."

- "Please stop the contamination of Yeoman Creek and clean up the entire 'mess' as soon as possible. Its a disgrace that it stayed open all these years endangering all of us especially the children. The terrible contents should be carefully removed and deposited w/ hazardous materials in some remote, safe, protected area, to eliminate an explosion in this densely populated area."

- "It is important that the EPA continue the action necessary to protect both the people and the Lake. The Lake is a beautiful natural resource."

- "I urge you to do anything possible to expedite cleaning up the Yeoman Creek Landfill. As residents (over 20 years) of this area, we are concerned with the human health risks, in addition to the ecological risks. The value of our property is also affected, as home buyers will avoid the landfill's surrounding area homes. I respectfully urge the U.S. EPA to take all measures necessary to protect the ground water and Lake Michigan from contamination. Additionally, the lives of local residents must be protected."

- "I feel that whatever action is decided to be taken should be done as quickly as possible so that the least amount of damage can be done to our drinking water."

- "I am very concerned with this situation if not taken care of soon, will lead to addition problems with our leak. Also more risk to future generations. Not knowing how these situations are remedied, your options seen feasible."

- "I am now an adult and think it is EPA's responsibility to clean this mess up, I guess this is our reason for paying taxes. I am particularly concerned about the water supply being contaminated with toxic heavy metals and just the overall safety of the site. Your urgent attention to this matter would be greatly appreciated by all residents in the area and the whole town."

- "It goes without saying that the EPA must take the steps necessary to preclude contamination of ground water or Lake Michigan by leachate of materials in the dump."

- "I respectfully urge the U.S.E.P.A. to do everything necessary to protect the ground water & Lake Michigan from contamination. Please protect the health of local residents."

- "I urge immediate, thorough action to remedy the hazards from these two sites. The remedial action must confine the hazardous toxic gases to the sites * their controlled release must be carefully monitored."

- "We are pleased that steps are going to be taken to clean up this landfill."

- "I respectfully urge the United States EPA to implement all cleanup action necessary to preserve the purity of our groundwater and Lake Michigan water."

U.S. EPA RESPONSE:

U.S. EPA agrees that an action should be taken to address contamination at the Site. U.S. EPA believes that this action should include construction of an effective site cover, construction and operation of an active landfill gas ventilation

system, construction and operation of a leachate collection system along Yeoman Creek for the northern portion of the Landfill, if necessary, and excavation of contaminated sediments and consolidation on the landfill. These actions will remove contaminated sediments from Yeoman Creek, will nearly eliminate leachate seepage into Yeoman Creek, and will substantially reduce leachate seepage into the ground water. Complete containment of contaminated ground water from the site was not selected because the degree of ground water contamination is limited, because the site cover will substantially reduce leachate generation, and because the cost of ground water containment is very high.

VII. RESPONSE TO COMMENTS FROM CITIZENS SUPPORTING U.S. EPA'S PROPOSED PLAN:

- "What was done in the past cannot be undone but we must work together to ensure that the best alternative is taken so we don-t make another error in judgement. Doing it the best way we know how the first time will be less expensive and cause us less grief in the long run. I am also concerned about the cost (since I'm a Waukegan taxpayer) but I think that we need to follow the EPA's recommendation as the minimum (alternative 4B with a composite barrier layer and leachate collection) unless there is data to conclusively show that the EPA's standards are not realistic and that their proposal is an overkill.

In my opinion on cases like this where there are many unknowns, it is better to err on the conservative side rather than do patch up jobs later. We need to protect the homes and people who live around the landfill site or do business around the site (homes, fast food, etc.). More importantly, we should not allow the leachate and whatever is released from the landfill to contaminate more land, the water supply and other yet to be discovered things."

- "We would like Waukegan to follow the EPA's recommendations (Alternative 4B with a composite barrier layer and leachate collection system). We believe the EPA has dealt with many landfills and has the best interests of our environment and people in mind.

As taxpayers of Waukegan, we realize that there will be a cost

associated with the landfill. However, if we have already spent 'millions of dollars to learn about the environment of the Yeoman Creek site', it seems like we should ba able to budget an additional 6 million dollars for the EPA plan. Doing it the best way the first time will ultimately be less expensive in the long run."

- "Mayor Durkin's comments at the meeting are almost frightening -- he is obviously not willing to spend what it take to clean up a mess that, contrary to his comments is harmful to the citizens."

U.S. EPA RESPONSE:

U.S. EPA agrees that the added long term protectiveness of a site cover with a composite barrier layer, and of the proposed leachate collection system is worth the additional costs.

VIII. RESPONSE TO COMMENTS FROM CITIZENS OPPOSING PORTIONS OF U.S. EPA'S PROPOSED PLAN:

ISSUE 1: **"My idea is to do the minimal work at the site and continue to monitor what is happening. At the public hearing Rick Boice stated that there was limited groundwater contamination, risks were very limited and there is no significant amount of landfill gas coming from the site. Again according to Rick Boice, he can smell no landfill gas at the site as opposed to the smell at other landfill sties he has visited. What scares me the most is when the government gets involved spending millions of dollars, ruining peoples lives, property, and businesses only to find out their grand ideas didn't quite work and then we have to spend even more millions to straighten out the 1st and second mess."**

U.S. EPA RESPONSE:

The technologies selected by U.S. EPA (namely construction of a new site cover, an active landfill gas collection system, a leachate collection system, and sediment excavation and consolidation under the new site cover) are standard technologies. The risks from implementing these technologies is

low and controllable by use of proper construction, and worker safety procedures.

Because landfilled residential wastes were found on properties adjacent to the Waukegan School Board property, or in some cases come close to the boundary of the property, the new site cover will impact these adjacent properties. However, U.S. EPA is willing to work with these property owners to reduce the impact on their use of the property while still obtaining the objectives of the remedial action.

During the RI, landfill gas emissions to the ambient air were monitored and found to be insignificant. However, landfill gases were found to be migrating off Site in the subsurface, and apparently are entering a building near the Site. This was causing a fire, explosion and toxic risk in this building. In addition, there is potential for landfill gas entry into other buildings near the Site. The parties conducting the RI have, with U.S. EPA oversight, taken interim measures to address the these risks by installing a basement ventilation system in one building and by periodic monitoring in other buildings. However, U.S. EPA does not consider these to be acceptable measures for the long term. Instead measures should be taken to assure that the landfill gas does not migrate off-site in the subsurface. This will be accomplished by construction of a new site cover and operation of an active landfill gas ventilation system.

No action other than monitoring at the Site and access restrictions, is also unacceptable because without improvements to the site cover and a leachate collection system, leachate will continue to be released to Yeoman Creek and the adjacent wetland. This release is causing an ongoing threat to wildlife in the area as demonstrated in the ecological risk assessment. In addition, ground water will continue to be contaminated to levels exceeding drinking water standards (Maximum Allowable Concentrations under the Clean Water Act), and there will be some risks to nearby residents of contact with contaminated sediments.

<u>ISSUE 2:</u> "I feel that the recommendations of the City are appropriate at this time. The City of Waukegan has other problems beside Yeoman Creek and must use its funds cautiously. From the information presented at the meeting the risks from the

leachate do not appear that great. The trench around the Creek may not be necessary at this time."

"I feel that the clean up in Yeoman Creek should not be the plan proposed by the PEA but the one proposed by the City of Waukegan. The taxpayers of the City can not afford the plan proposed by the PEA. The Waukegan School System does not have funds to pay for any portion of the clean up." "Is it fair? I don't think so. Public health is an important issue, but the costs of the clean up should be keep to only what is necessary to insure public health."

U.S. EPA RESPONSE:

Please refer to U.S. EPA's response to Issues 1, 2, 3, 5, and 6 to the comments from the Yeoman Creek Landfill Steering Committee. It should be noted that a number of private companies are PRPs; so only a fraction of cost of the remedial action will be born by the City of Waukegan, Waukegan School District #60, and the Waukegan Park District.

V. RESPONSE TO OTHER COMMENTS AND QUESTIONS FROM CITIZENS

ISSUE 1: Concern was expressed about development by an organization called "Rebound". Rebound plans to build a large facility with a retention pond which would drain to a ditch, which drains long the south fence of the portion of the Site north of Greenwood Terrace before entering Yeoman Creek.

U.S. EPA RESPONSE:

Measures will have to be taken to assure that drainage from the new site cover does not adversely affect drainage from the new development. The effect of drainage from the new site cover, will be evaluated during the remedial design phase, and may have to take into account or coordinate with the drainage from the new development. U.S. EPA suggests that a meeting be held with adjacent property owners following completion of the preliminary design to discuss their concerns.

ISSUE 2: Who is paying for this? "If the federal government can pay for the cleanup of Love's Canal, why can't they pay for the cleanup of Yeoman Creek?"

U.S. EPA RESPONSE:

The RI/FS was paid for by a group of PRPs including: Browning-Ferris Industries; Outboard Marine Corporation; The Dexter Corporation; T.K. City Disposal; the City of Waukegan, Goodyear Corporation; and the Waukegan School District #60. In addition, these parties have reimbursed U.S. EPA's expenses for oversight of the studies.

U.S. EPA has identified a number of additional PRPs. Following issuance of the ROD, U.S. EPA will attempt to negotiate an agreement with a group of PRPs to implement the remedy. U.S. EPA may issue an order or use litigation to compel an agreement. If this is unsuccessful, U.S. EPA may implement the remedial action using money from a trust fund, which is supported primarily by taxes on chemical feed stocks.

U.S. EPA is mandated by Congress to attempt to reach an agreement under which costs for cleanup of hazardous waste sites are born by parties that caused the pollution. This includes owners and operators of the site, companies who generated hazardous substances that were disposed of at the site, or persons who arranged for transport of hazardous substances to the site. The City of Waukegan owned and operated the site and, therefore, is potentially liable for cleanup costs. However, they are not solely liable for the costs as implied by a number of statements. There are a number of private parties who are also liable for the cleanup.

ISSUE 3: Has the landfill owner been fined? Does he own any other landfills. If so, where, and what is their status?

U.S. EPA RESPONSE:

The owners of the landfill have been notified by U.S. EPA that they are potentially liable for costs for cleaning up the Site. The owners of the major portions of the landfill during its period of operation were the City of Waukegan and the Waukegan

School District #60. The City of Waukegan operated a number of municipal waste landfills within the City of Waukegan, including the Yorkhouse Municipal Landfill #1, and the Adelphi Municipal Landfill #2. All of these municipal landfills have been closed, and none of the other landfills are Superfund sites. These closed landfills are being monitored by the Lake County Health Department and the Illinois Environmental Protection Agency. The City of Waukegan was subject to a legal action by the Illinois Environmental Protection Agency in the late 1970s and early 1980s. An agreement was reached under which the City of Waukegan added additional cover soil to the landfill, constructed a fence at the landfill, and conducted stream monitoring.

ISSUE 4: Are there storm sewers emptying into Yeoman Creek?

U.S. EPA RESPONSE:

There is at least one storm sewer that appears to go through the landfill and into Yeoman Creek. This storm sewer and any other storm sewers found to go through the landfill will be rerouted and plugged.

ISSUE 5: Will an effective leachate collection system so drain the wetlands that our water supply will be affect?

U.S. EPA RESPONSE:

The leachate collection system should have no significant impact on water supplies or on the ecology of the nearby wetland. Mayor Durkin and the Yeoman Creek Steering Committee expressed concern regarding the potential for the leachate collection system to negatively affect the ecology of Yeoman Creek and the adjacent wetlands due to seepage of water from the stream into the leachate collection system. In Comment 11, the Yeoman Creek Steering Committee estimated that 270 gpd, which is 100,000 gallons per year, could seep from the Yeoman Creek into the leachate collection system. Section 4.5 of the FS provides information on the potential for the remedial action to impact the nearby wetlands. Although Section 4.5 of the FS voices no concern about seepage of water from Yeoman Creek into the leachate collection system (nor was any concern about this effect

expressed in any portion of the FS, which was prepared by the Yeoman Creek Steering Committee's consultant), it includes an estimate that the total annual runoff into the wetlands within the Yeoman Creek basin is 486,000,000 gallons per year. The estimated approximately 100,000 gallons which may be removed by the leachate collection system is only 0.02% of the total flow entering the basin that recharges the wetlands. Section 4.5 also includes an estimate of increased drainage from the landfill due to the improved site cover, of 8,200,000 gallons per year (the 8,200,000 gallons will be partially off-set by a decrease in recharge of Yeoman Creek and the wetland by ground water, but the FS concludes that most of the ground water migrates into the lower aquifer, not into Yeoman Creek or the wetland). Therefore, the increased drainage due to the new site cover will more than make up for the small amount of water removed by the leachate collection system. As stated in Section 4.5, the drainage from the site cover can be controlled to eliminate adverse environmental impacts. It should also be noted that flow into the leachate collection system from Yeoman Creek will primarily occur during periods of high flow in Yeoman Creek, when the surface water flow into the wetlands would already be high. Collection of the seepage from Yeoman Creek during the high flow periods would have the beneficial effect of preventing a rise in the landfill water table and subsequent seepage of the water back into the Creek after it is contaminated by the wastes in the landfill.

ISSUE 6: From the amount of pollution present, should the wetlands be drained to prevent contamination.

U.S. EPA RESPONSE:

Ecologists working for the U.S. EPA have reviewed the data, and concluded that the level of contamination in the wetlands south and east of the Site are not high enough to warrant excavation of the contaminated soils, or other actions that may damage the wetland as a habitat.

ISSUE 7: "Where will the run-off go after all this money is spent? Will the adjacent property owners be saddled with the runoff mess?"

"We are concerned about potential problems with flooding of our apartment units should work be done on the landfill that negatively impact Yeoman Creek. This property experienced a severe flood in 1986 that cost in excess of one million dollars to clean up. We are formally requesting that we be consulted during the design phase of the cleanup, once the final decision on which option is made."

U.S. EPA RESPONSE:

U.S. EPA agrees that drainage onto surrounding properties is an important consideration. It would be unacceptable for the new site cover to cause flooding to the residents of the surrounding properties. Therefore, U.S. EPA has added the following performance standard for construction of the drainage system to the ROD: drainage from the site cover onto adjacent properties and into storm sewers will be adjusted to levels that will result in no increased potential for flooding or other adverse effects. The drainage from the site cover can be adjusted to flow into the wetland south of the Site, into Yeoman Creek, into storm sewers, or onto adjacent properties and streets. The run-off could be either totally diverted from adjacent properties and storm sewers, or adjusted to levels that result in no adverse effects. Another performance requirement is that the run-off should not have an adverse effect on the ecology of the wetland south of the site. U.S. EPA believes that these performance requirements for the drainage system can be met. The details of the drainage system will be worked out during the design phase. U.S. EPA believes that after the preliminary design is completed, a meeting with adjacent property owners should be held to assure that their concerns are addressed.

Another flooding concern is the impact of the site cover in filling a portion of the floodway and floodplain in Yeoman Creek. This concern is preliminarily evaluated in Section 4.4 of the FS. Although the preliminary evaluation indicates that the impact of the site cover on the floodway and floodplain of Yeoman Creek will be minor, U.S. EPA's Proposed Plan includes provisions for creation of compensatory floodway and floodplain storage and other mitigation measures that may be necessary to assure that construction of the new site cover will not cause problems due to loss of floodway and floodplain capacity in Yeoman Creek.

State of Illinois
ENVIRONMENTAL PROTECTION AGENCY

Mary A. Gade, Director

2200 Churchill Road, Springfield, IL 62794-9276

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Yeoman Creek Landfill
Waukegan, Illinois

STATEMENT OF BASIS AND PURPOSE

This decision document represents the selected Final Remedial Action for the Yeoman Creek Landfill Site in Waukegan, Illinois. This action was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Re-authorization Act of 1986 (SARA), and to the extent practicable, with the National Oil and Hazardous Substances Contingency Plan (NCP). The decisions contained herein are based on information contained in the administrative record for this site.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from the site, if not addressed by implementing the response action selected in this Record of Decision (ROD), may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE REMEDY

This remedy is intended to be the final action for this site. This final action includes containment of landfilled wastes, excavation and on-site containment of contaminated soils and sediments, collection and treatment of leachate entering Yeoman Creek, and recovery and treatment of landfill gases. This final action addresses the following migration pathways from the Site: releases of leachate to groundwater, surface water, surface sediments, and wetlands; and release of landfill gases to air within adjacent buildings and to the ambient air.

The major components of the selected remedy include;

* construction and maintenance of a new cover over the landfill to minimize infiltration of precipitation through the landfill, consisting cap in compliance with Illinois Administrative Code (IAC) Title 35, Subtitle G, Chapter 1, Subchapter I; Solid Waste and Special Waste Hauling, Part 811.314;

* construction and operation of an active perimeter landfill gas collection treatment system;

* Excavation and consolidation of contaminated sediments and soils under the landfill cap;

* implementation of a long term monitoring system which shall include sampling for leachate/groundwater along Yeoman Creek, surface water and creek sediments, and leachate sampling within the landfill. In the event action levels are exceeded, construction and operation of a leachate collection system will be required as specified in this Record of Decision;

* actions, including investigations, modeling, alternative evaluation, and implementation, necessary to comply with the Illinois Department of Transportation and Lake County Storm Water Management Commission regulation of development within floodways and floodplains as specified in this Record of Decision;

* actions to minimize the destruction, loss, or degradation of wetlands, including compensation for wetlands that will be lost or adversely affected by the selected remedial action;

* rerouting and sealing storm drains that go through the Yeoman Creek and Edwards Field portion of the landfill;

* continuation of interim measures to address landfill gas entry into buildings near the Site until the active gas collection system is installed and demonstrated to be effective, as specified in this Record of Decision;

* additional investigation to define the extent of groundwater contamination, the extent of sediment excavation, the extent of contaminated soil excavation, and baseline wetland conditions;

* enclosing Yeoman Creek in a corrugated steel semi-arch pipe, as necessary for construction of the site cover;

* long term monitoring of groundwater, surface water, surface sediments, and wetland conditions to verify the effectiveness of the remedial action;

* imposition of deed restrictions prohibiting future usage of the Site for purposes that are inconsistent with the selected remedy;

* implementation of access restrictions, including enclosing the entire site in a fence and posting warning signs;

* long term maintenance and post closure care.

STATUTORY DETERMINATIONS

This Final Remedial Action is protective of human health and the environment, complies with Federal and State applicable or relevant and appropriate requirements and is cost-effective. The selected remedial action utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable. However, due to the large volume and heterogeneous distribution of waste at the Site, treatment as a principle element is not considered practicable at the Site. Thus, this remedy does not satisfy the statutory preference for treatment that reduces toxicity, mobility, or volume as a principle element. However, treatment is a secondary element in that landfill gases will be treated resulting in destruction of hazardous substances.

Because this remedy will result in hazardous substances remaining on site above health-based levels, a review will be conducted within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

Mary A. Gade

Mary A. Gade, Director
Illinois Environmental Protection Agency

9/30/96

Date