19

(19)

E.C. JORDAN CO. ENGINEERS & SCIENTISTS

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SUPERFUND STANDBY CONTRACT

NORTH LAWRENCE
OIL DUMP SITE
St. Lawrence County, New York
WORK ASSIGNMENT NO. D002472-10

FINAL

BASELINE ECOLOGICAL AND PUBLIC HEALTH RISK ASSESSMENT

E.C. JORDAN CO.
MARCH 1993

NYSDEC SUPERFUND STANDBY CONTRACT
WORK ASSIGNMENT NO. D-002472-10

FINAL

BASELINE ECOLOGICAL AND PUBLIC HEALTH RISK ASSESSMENT

NORTH LAWRENCE OIL DUMP SITE
TOWNSHIP OF LAWRENCE
ST. LAWRENCE COUNTY, NEW YORK

Submitted to:

New York State Department of Environmental Conservation
Albany, New York 12233

Submitted by:

E.C. Jordan Company
Portland, Maine

MARCH 1993

Submitted by:

Glenn L. Daukas, P.G.
Project Manager
E.C. Jordan Co.

Approved by:

William J. Weber
NSSC Program Manager
E.C. Jordan Co.

KRN/BE&PHRA/2000

6886-05

BASELINE ECOLOGICAL AND PUBLIC HEALTH RISK ASSESSMENT
NORTH LAWRENCE OIL DUMP SITE

TABLE OF CONTENTS

BASELINE ECOLOGICAL AND PUBLIC HEALTH RISK ASSESSMENT
NORTH LAWRENCE OIL DUMP SITE

TABLE OF CONTENTS
(continued)

LIST OF FIGURES

BASELINE ECOLOGICAL AND PUBLIC HEALTH RISK ASSESSMENT
NORTH LAWRENCE OIL DUMP SITE

LIST OF TABLES

LIST OF TABLES
(continued)

1.0 INTRODUCTION

This report presents the results of a baseline public health risk assessment (BPHRA) and a baseline ecological risk assessment (BERA) at the North Lawrence Oil Dump Site (NLODS) in the Township of Lawrence, St. Lawrence County, New York. The BPHRA was prepared in accordance with USEPA (1989a) and New York State Department of Environmental Conservation (NYSDEC, 1989a) guidance documents. The BERA has been prepared in accordance with Habitat Based Assessment (HBA) guidance, which provides an approach for "the characterization of the fish and wildlife values and threats at hazardous waste sites being considered for remediation" (NYSDEC, 1989a and 1991a). This report presents a re-evaluation of the 1990 BPHRA and BERA at the NLODS (E.C. Jordan Co., 1990).

Three phases of field investigation have occurred at the NLODS ("First Phase", "Second Phase", and "Third Phase"). The 1990 BPHRA and BERA considered the results of the First Phase investigation of the NLODS; Second and Third Phase data were unavailable in 1990. The current BPHRA and BERA presents a re-evaluation of the First Phase data, as well as an evaluation of the Second and Third Phase field and laboratory investigations.

The objectives of this report are to:

- determine potential risk to public health, based on exposure to contaminants in media at the site

- provide a characterization of the existing ecological values and habitats at the site

- identify those ecological habitats which may be located within pathways of contamination

- identify the types of fish and wildlife receptors which would utilize those habitats which may be located within pathways of contamination

- evaluate the potential acute, chronic, and bioaccumulation affects expected from site contamination

- identify areas where further sampling is needed (i.e., to identify data gaps, including long-term monitoring requirements)

In accordance with NYSDEC (1989a and 1991a), the BERA includes Step I ("Site Description") and Step II ("Contaminant Specific Impact Analysis") evaluations. The Step I description of the existing environment includes a site description, a characterization of fish and wildlife resources, and identification of applicable contaminant or media specific regulatory criteria. The Step II impact analysis includes a baseline ecological risk assessment, identification of mitigative measures, and an assessment of future risk with and without remediation.

Section 2 of this document presents a site history and general site description. Section 3 updates the BPHRA to include Phase II and Phase III data. Sections 4 through 13 present a comprehensive update of the BERA.

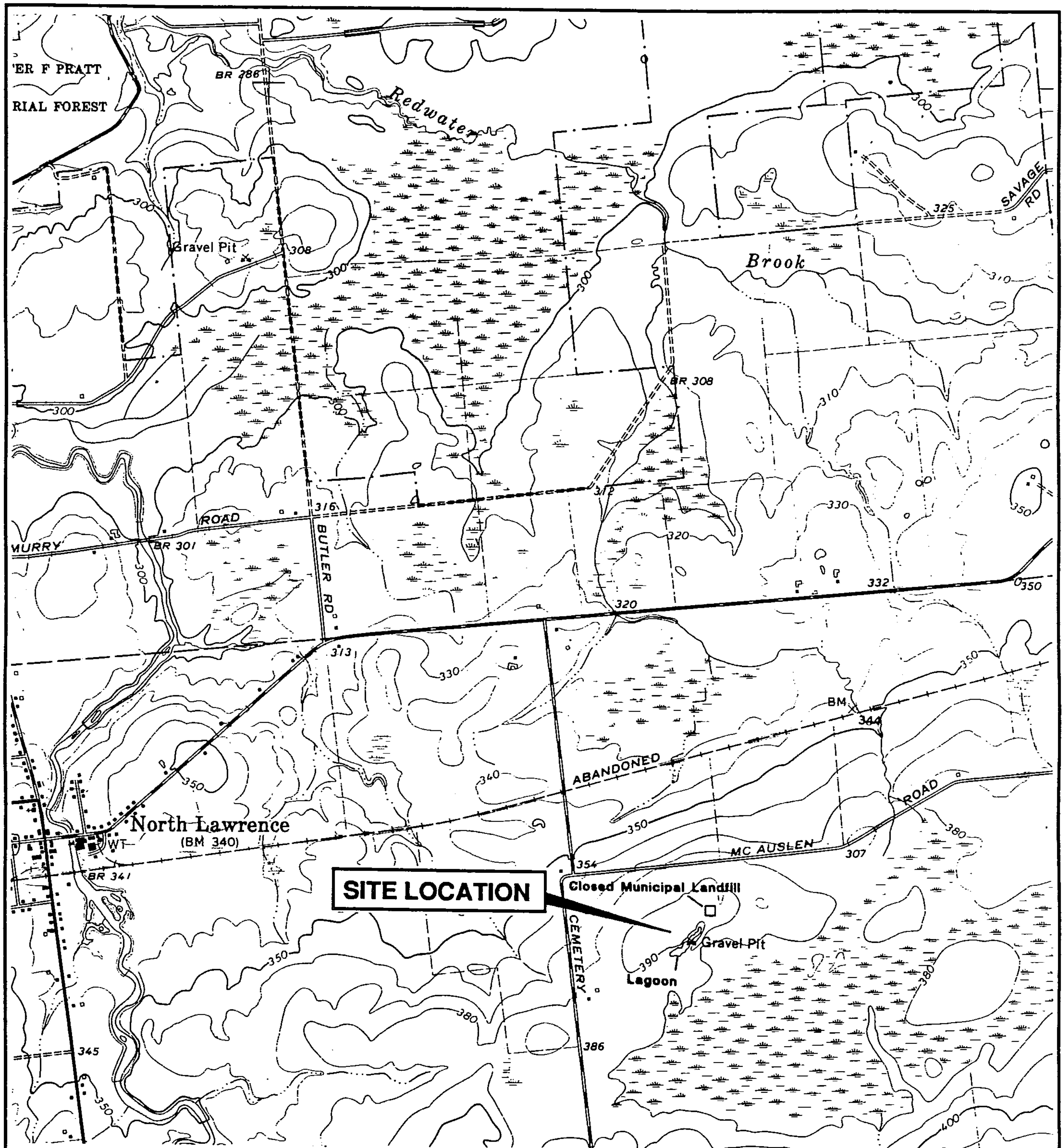
2.0 SITE HISTORY

The NLODS is an inactive hazardous waste site located next to a regulated wetland and the closed North Lawrence Town Landfill (see Figure 2-1). The site occupies portions of two private properties.

The NLODS was identified during an October 1980 investigation of the abandoned York Oil Company waste oil site in Moira in Franklin County, New York. The York Oil site is located approximately two miles from NLODS. Information obtained during interview with Moira residents by NYSDEC personnel indicated the existence of a similar waste oil dump (i.e., NLODS) in North Lawrence, New York. Based on these interviews, the NLODS is potentially associated with activities at the York Oil Company site in Moira.

The NLODS reportedly was operated as a gravel pit before the disposal of waste oil. The excavation operation apparently shaped the site into a depression with a mounded perimeter. During the middle to late 1960s, the NLODS apparently was used for the disposal of waste oil and oil sludge. Evidence of oil deposits over the topographically low perimeter berm at the southwestern end and on vegetation in adjacent wetland areas suggests that the dump was operated as a lagoon. During periods of high water, free-floating oil escaped from the topographically low southwestern end of the lagoon. During a 1980 inspection of the area, NYSDEC personnel observed oil stains on vegetation 18 inches above the ponded water.

Since its discovery in 1980, numerous inspections of the NLODS have been conducted by NYSDEC Regions 5 and 6, and the New York State Department of Health (NYSDOH), Massena District Office. Additional detail regarding the



SOURCE: USGS TOPOGRAPHIC 7.5 MINUTE SERIES, NORTH LAWRENCE, NY, 1964

SCALE IN FEET

0 2,000 4,000

FIGURE 2-1
SITE LOCATION MAP
NORTH LAWRENCE OIL DUMP SITE
RISK ASSESSMENT

E.C.JORDAN CO.

6886-03

history of the NLODS may be found in Subsection 1.4 of the RI (E.C. Jordan Co., 1992b) and in Subsection 1.3 of the 1990 BERA (E.C. Jordan Co., 1990).

2.1 GENERAL SITE DESCRIPTION

The NLODS is located south of McAuslen Road and east of Cemetery Road in the Township of Lawrence. The lagoon, which is reached by an access road off McAuslen Road, is approximately 600 feet long and 75 feet wide. Immediately south and east of the lagoon is a New York State-regulated wetland. Surface water from this wetland drains to Redwater Brook (see Figure 2-1).

The NLODS is situated approximately 390 feet above sea level, with higher terrain south of the site. Topography in the immediate vicinity is generally flat, sloping to the north and northwest, with an approximately 1 percent grade. Reportedly, the site area initially was operated as a gravel pit; currently, it appears as a depression surrounded by a soil berm.

Regional surface drainage flows to the north and northwest, via tributaries of Deer River and Redwater Brook. Wetlands occupy much of the surrounding landscape. Drainage from the site area is directed southwest by surface topography and enters the regulated wetland south of the site. Drainage is then directed northward via tributaries of Redwater Brook.

The lagoon slopes from a high elevation at the northeastern end to a low at the southwestern end. Surface runoff, from spring meltwater and rainfall throughout the year, drains into the lagoon and subsequently ponds to approximately 3 to 4 feet deep in the southwestern end of the lagoon.

During periods of high precipitation and runoff, surface water from the lagoon enters the regulated wetland by flowing over the berm at the southwestern end. The wetland area drains into Redwater Brook, which discharges to Deer River approximately 5 miles downstream of the site. The Deer River discharges to the St. Regis River which flows to the St. Lawrence River. According to NYSDEC, the Deer River, from North Lawrence to the St. Regis is Class B, not classified as suitable for a drinking water supply.

The only known human uses of the site are hunting or infrequent trespassing. Access to the site is limited by a dirt berm built across the lagoon access road. The closed North Lawrence Town Landfill is located along the lagoon access road. The landfill, closed by NYSDEC before 1979, has no current permissible use.

Additional detail regarding the physical setting of the NLODS may be found in Section 2.0 of the RI (E.C. Jordan Co., 1992b) and in Subsection 1.2 of the 1990 BERA (E.C. Jordan Co., 1990).

3.0 REVISED BASELINE PUBLIC HEALTH RISK ASSESSMENT

This section presents the results of the revised Baseline Public Health Risk Assessment (BPHRA) at the North Lawrence Oil Dump Site (NLODS) in the Township of Lawrence, St. Lawrence County, New York.

This section provides a re-evaluation of the 1990 BPHRA at the NLODS (E.C. Jordan Co., 1990). Three phases of field investigation have occurred at the NLODS ("First Phase", "Second Phase", and "Third Phase"). The 1990 BPHRA considered the results of the First Phase investigation. Second and Third Phase data were collected in June 1992. The revised BPHRA presents a re-evaluation of the 1990 BPHRA based on the Second and Third Phase data.

SEDIMENT AND SOIL

Ten sediment samples were collected from the wetland during the First Phase field investigation. The samples were analyzed for Target Compound List (TCL) VOAs, SVOAs, pesticides and PCBs, inorganic compounds, and Total Organic Carbon (TOC). The Second Phase field investigation was conducted to delineate the extent of lead and PCB contamination in wetland sediments (E.C. Jordan Co., 1992). A total of 59 sediment samples were collected during the Second Phase field investigation and were analyzed for one or more of the following: TCL PCBs, TCL inorganics, TOC, and Toxicity Characteristic Leaching Procedure (TCLP) metals. The Third Phase field investigation was conducted to further define the area of wetland impacted by lead contamination. A total of 12 sediment samples were collected and analyzed for lead. Because background samples were collected over one-half mile away from the site, an overview map showing the two different sample areas (Area A and Area B) is shown in Figure 3-1. The locations of the First, Second, and Third Phase sediment samples are presented in Figures 3-2 through 3-4.

The 1990 BPHRA used the maximum concentrations of contaminants found in sediments and surface soils to calculate the risks resulting from dermal absorption and soil ingestion occurring as a result of activities in the wetlands and lagoon and from using the access road. No public health risks associated with exposure to either the sediments or surface soils were identified. Contaminants detected during Phase I were also detected during the Second and Third Phase investigations but concentrations did not exceed the concentrations used in the 1990 BPHRA. These data are presented in Table 3-1. Two additional inorganic compounds, antimony and mercury, were identified in Phase II investigations of the lagoon. Table 3-2 evaluates risks associated with these two compounds using the same equations and exposure parameters presented in the 1990 BPHRA. Carcinogenic risks calculated in the 1990 BPHRA were below the USEPA target risk range of 10^{-4} to 10^{-6} and remain unchanged because neither new compound is carcinogenic. The Hazard Index of 0.4 does not add appreciably to the HI of 4 in the 1990 BPHRA which was not assumed to represent a realistic health hazard because of the conservative exposure assumptions used to develop the HI. Therefore, the conclusion remains that no public health risks are associated with exposure to sediment or surface soil.

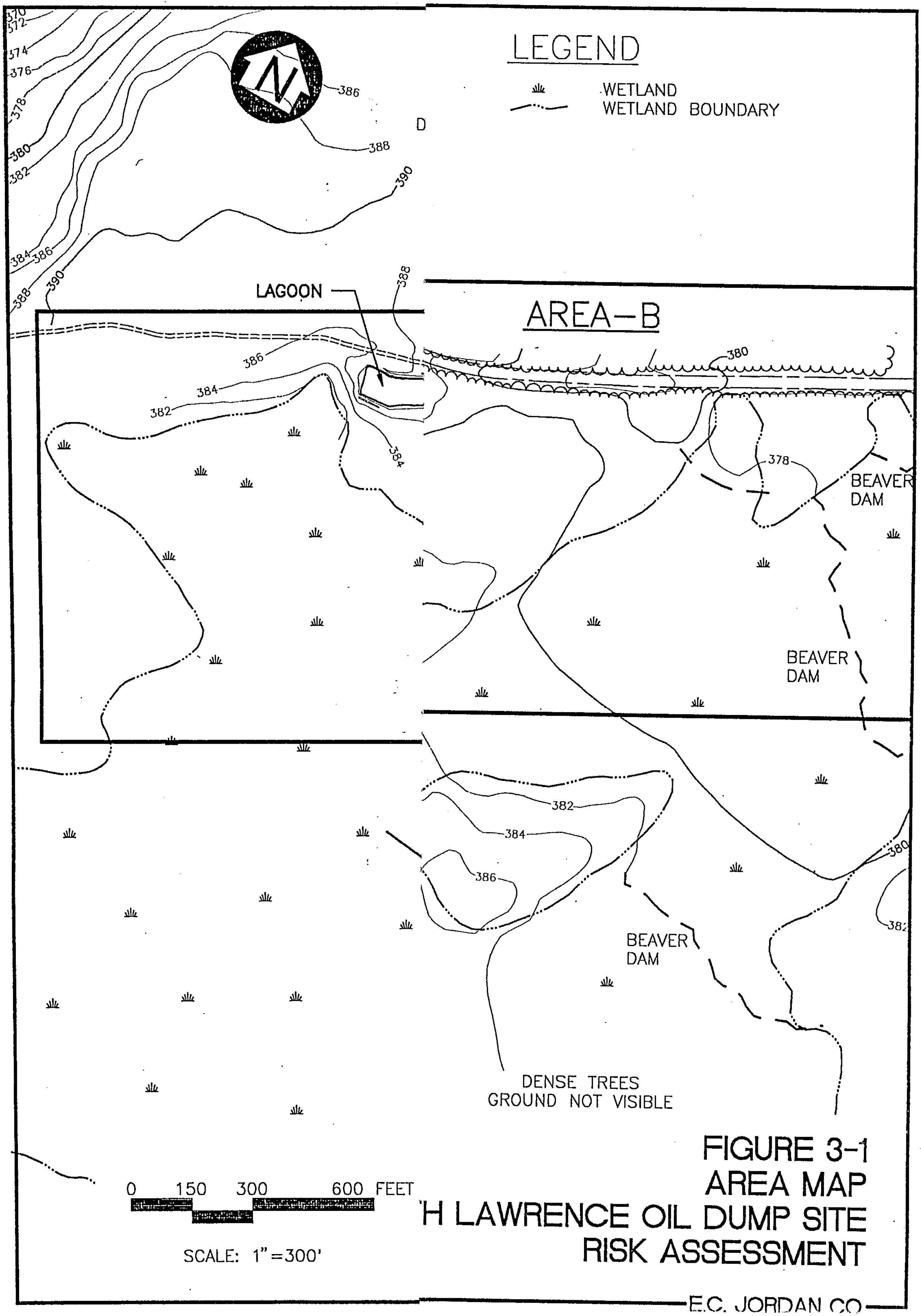


FIGURE 3-1
AREA MAP
'H LAWRENCE OIL DUMP SITE
RISK ASSESSMENT

E.C. JORDAN CO.

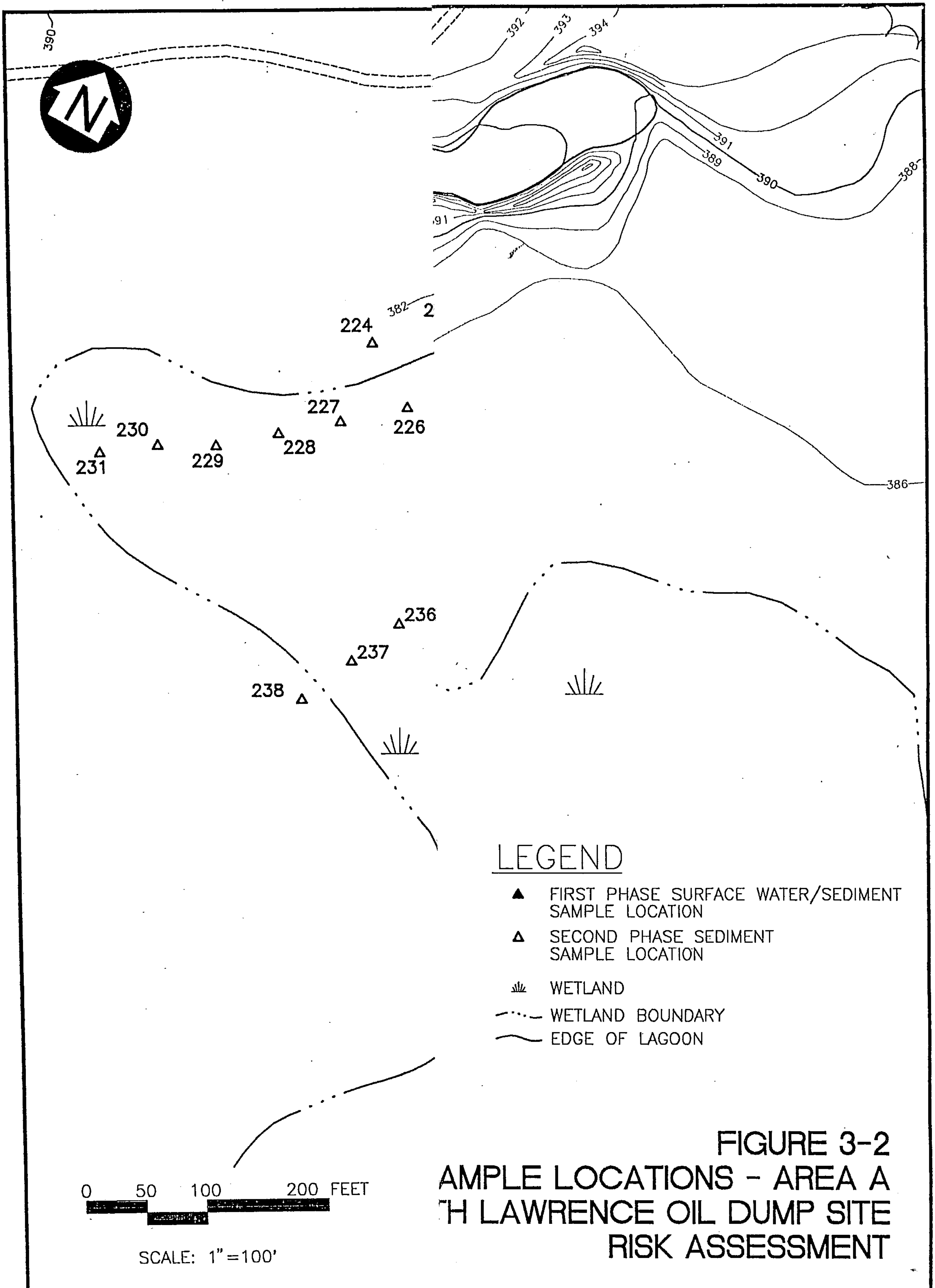
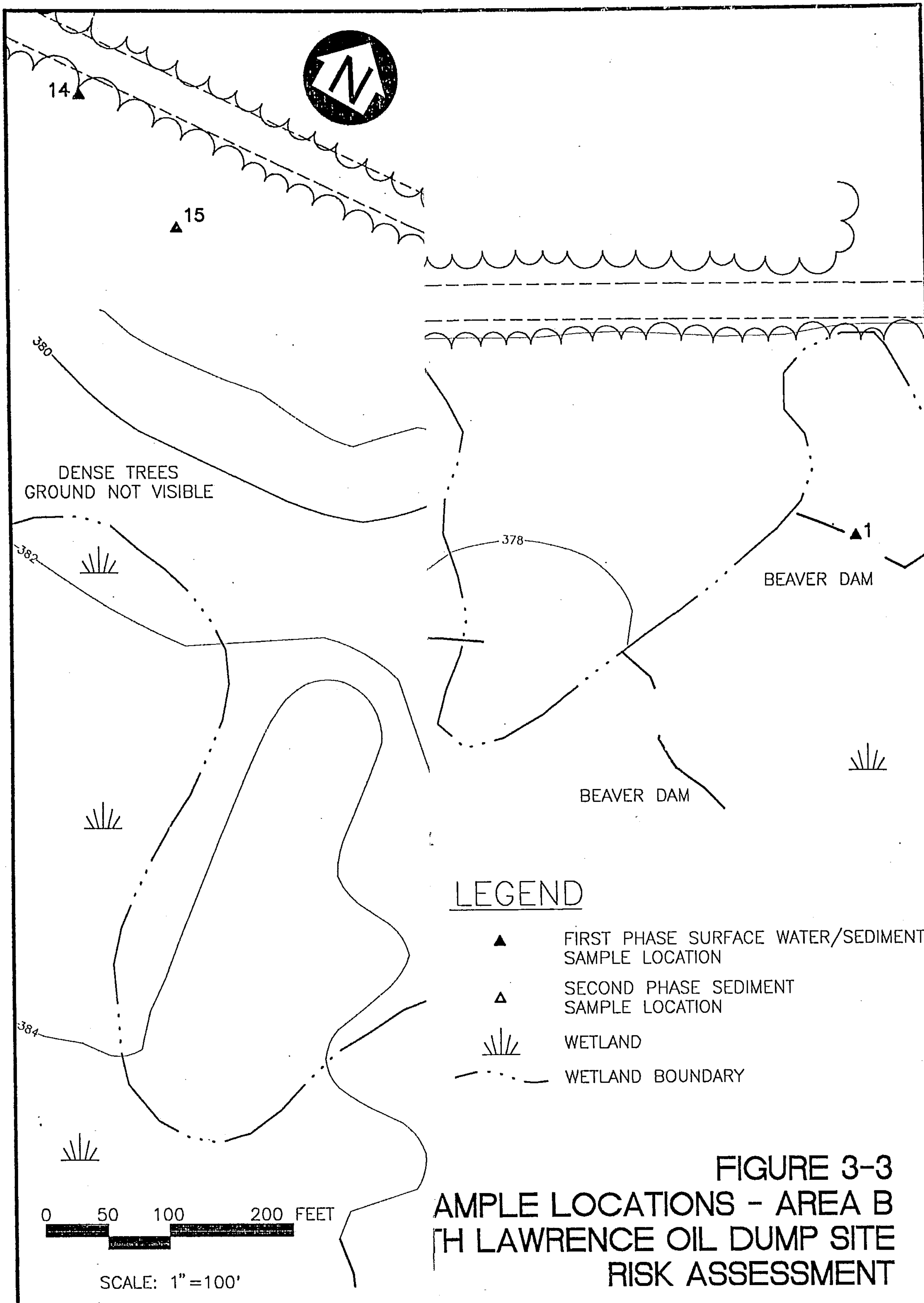


FIGURE 3-2
AMPLE LOCATIONS - AREA A
'H LAWRENCE OIL DUMP SITE
RISK ASSESSMENT

E.C. JORDAN CO.



LEGEND

- ▲ FIRST PHASE SURFACE WATER/SEDIMENT SAMPLE LOCATION
- △ SECOND PHASE SEDIMENT SAMPLE LOCATION
- WETLAND
- WETLAND BOUNDARY

FIGURE 3-3
AMPLE LOCATIONS - AREA B
TH LAWRENCE OIL DUMP SITE
RISK ASSESSMENT

E.C. JORDAN CO.

3 -02 · 39 08 22-

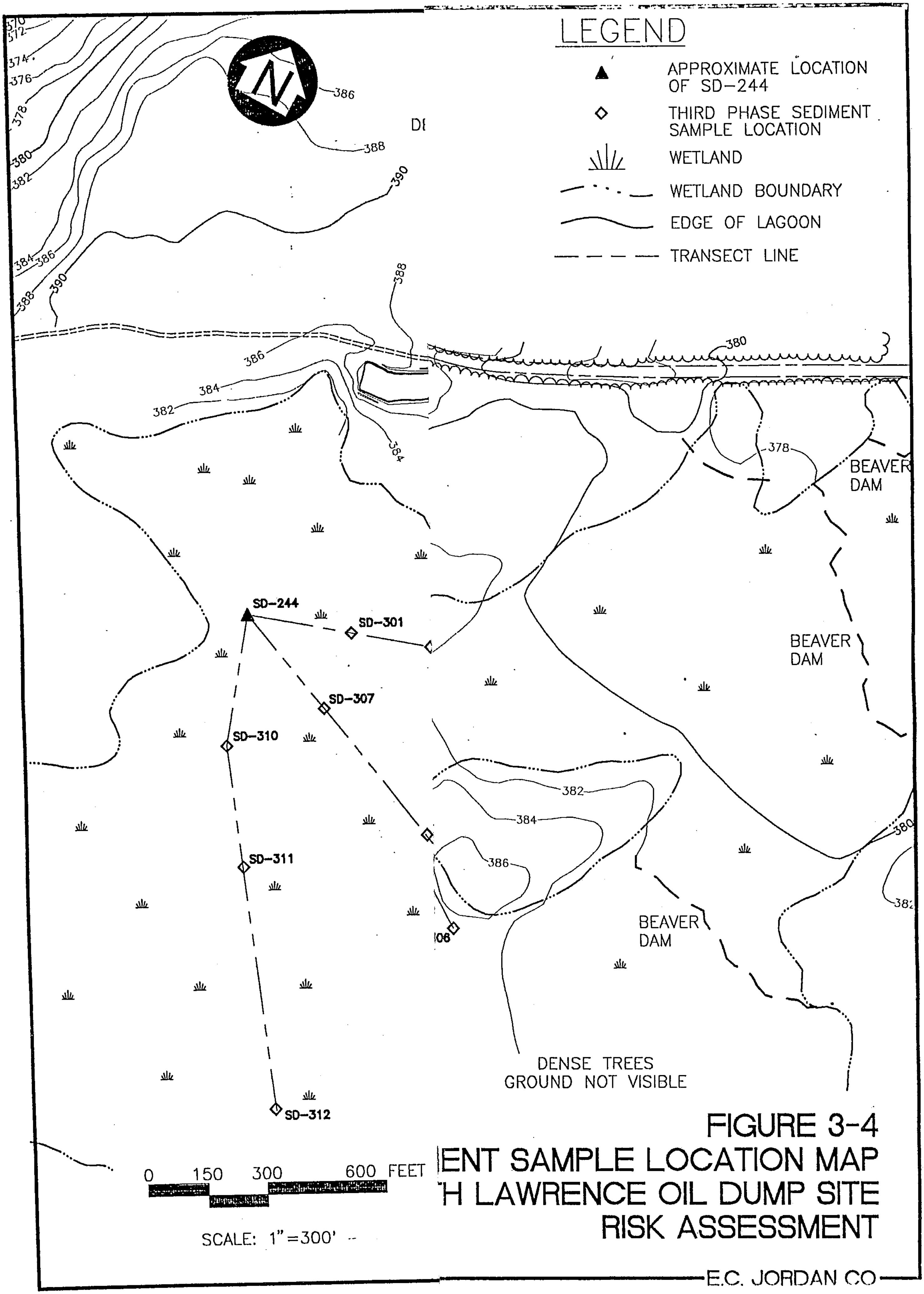


FIGURE 3-4
ENT SAMPLE LOCATION MAP
H LAWRENCE OIL DUMP SITE
RISK ASSESSMENT

E.C. JORDAN CO

TABLE 3-1

SUMMARY OF PHASE I, PHASE II AND PHASE III SEDIMENT AND SURFACE SOILS CONTAMINANTS OF CONCERN (MAXIMUM VALUES)

Chemical	Phase I	Phase II	Phase III[1]
LAGOON			
Inorganic	**mg/kg**	**mg/kg**	**mg/kg**
Antimony	–	2,160	
Barium	11,900	3,180	
Copper	587	–	
Lead	76,200	6,400	170
Mercury	–	1.9	
Zinc	67,400	479	
Organic	**µg/kg**	**µg/kg**	**µg/kg**
Acetone	2,900	–	
Toluene	7,100	–	
Ethylbenzene	11,000	–	
Xylene	67,000	–	
Naphthalene	8,600	–	
TCE	16,000	–	
PCE	33,000	–	
PCB	46,000	17,000	
ACCESS ROADWAY	**mg/kg**	**mg/kg**	**mg/kg**
PCB	5,300	–	

Notes:

– – Not detected.

[1] – Phase III anlaysis was for lead only.

mg/kg – milligram per kilogram.

µg/kg – microgram per kilogram.

TABLE 3–2
DERMAL CONTACT WITH AND INCIDENTAL INGESTION OF SEDIMENT OR SURFACE SOIL
OLDER CHILD (6–16 Years) EXPLORING/PLAYING/TRESPASSING
NORTH LAWRENCE OIL DUMP SITE

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
CONCENTRATION SOIL	CS	Maximum	mg/kg	
INGESTION RATE	IR	100	mg/day	USEPA, 1991
FRACTION INGESTED	FI	100%		Assumption
SOIL ADHERENCE FACTOR	SAF	1	mg/cm²	USEPA, 1992
SURFACE AREA EXPOSED	SA	2,830	cm²/day	USEPA, 1990
CONVERSION FACTOR	CF	0.000001	kg/mg	
BODY WEIGHT	BW	38	kg	USEPA, 1990
EXPOSURE FREQUENCY	EF	10	days/year	Assumption
EXPOSURE DURATION	ED	10	years	Assumption
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1989
NONCANCER	AT	10	years	USEPA, 1989
RELATIVE ABSORPTION FACTOR	RAF			USEPA, 1989
INGESTION		1	unitless	
DERMAL		0.001	unitless	

USEPA, 1989. Risk Assessment Guidance for Superfund
USEPA, 1990. Exposure Factors Handbook
USEPA, 1991. Standard Default Exposure Factors
USEPA, 1992. Dermal Exposure Guidance

EQUATIONS

CANCER RISK = INTAKE (mg/kg–day) x CANCER SLOPE FACTOR $(mg/kg\text{–}day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg–day) / REFERENCE DOSE (mg/kg–day)

INTAKE = (INTAKE–INGESTION) + (INTAKE–DERMAL)

$$\text{INTAKE–INGESTION} = \frac{CS \times IR \times RAF \times FI \times CF \times EF \times ED}{BW \times AT \times 365\ \text{days/yr}}$$

$$\text{INTAKE–DERMAL} = \frac{CS \times SA \times SAF \times RAF \times CF \times EF \times ED}{BW \times AT \times 365\ \text{days/yr}}$$

Note:
For noncarcinogenic effects: AT = ED

CARCINOGENIC EFFECTS

COMPOUND	SOIL CONCENTRATION (mg/kg)	INGESTION RAF	INTAKE INGESTION (mg/kg–day)	DERMAL RAF	INTAKE DERMAL (mg/kg–day)	CANCER SLOPE FACTOR $(mg/kg\text{–}day)^{-1}$	CANCER RISK INGESTION	CANCER RISK DERMAL	TOTAL CANCER RISK
Neither antimony nor mercury have been determined to be carcinogenic.									
					SUMMARY CANCER RISK		0E+00	0E+00	0E+00

NONCARCINOGENIC EFFECTS

COMPOUND	SOIL CONCENTRATION (mg/kg)	INGESTION RAF	INTAKE INGESTION (mg/kg–day)	DERMAL RAF	INTAKE DERMAL (mg/kg–day)	REFERENCE DOSE (mg/kg–day)	HAZARD QUOTIENT INGESTION	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT
Antimony	2160	1	1.6E–04	0.001	4.4E–06	4.0E–04	3.89E–01	1.10E–02	4.00E–01
Mercury	1.9	1	1.4E–07	0.001	3.9E–09	3.0E–04	4.57E–04	1.29E–05	4.70E–04
					SUMMARY HAZARD INDEX		0.390	0.011	0.401

SURFACE WATER

No additional surface water samples were collected during the Second and Third Phase field investigations.

In the 1990 BPHRA, the chemicals determined to be contaminants of potential concern in surface water were the metals barium, zinc, and lead. The exposure route considered was dermal absorption. Dermal absorption of metals, especially concentrations that include solids and dissolved species, is considered to be negligible and not result in a risk, so risks due to surface water exposure were not further evaluated.

GROUNDWATER

Groundwater sampling was conducted during the First and Second Phase field investigations only. Because state and federal health-based standards are available for groundwater, contaminants of potential concern were evaluated qualitatively by comparison with these standards (see Table 3-3). During the First Phase investigation trichloroethene (TCE) and tetrachloroethene (PCE) exceeded Maximum Concentration Limits (MCLs) and New York Standards in monitoring well MW-104B, but were not evaluated as chemicals of concern because they were detected in only 1 out of 12 groundwater samples. These chemicals were to be re-evaluated after the Second Phase field investigation. Maximum concentrations of iron, manganese, and zinc exceeded secondary MCLs (SMCLs) which are based on aesthetics of taste, odor, color, and not on toxicity. According to the 1990 BPHRA (E.C. Jordan Co., 1990) in discussions with New York State Bureau of Public Water Supply (NYSBPWSP), these standards would not be applicable to

TABLE 3-3

COMPARISON OF MAXIMUM GROUNDWATER CONTAMINANT CONCENTRATIONS TO STATE AND FEDERAL STANDARDS AND GUIDLINES

Chemical	Phase I (µg/L)	Phase II (µg/L)	MCL (µg/L)	MCLG (µg/L)	SMCL (µg/L)	NYSDEC (µg/L)
Groundwater						
Acetone	32	24	-	-	-	-
2-Butanone	4,000	ND	-	-	-	-
TCE	93	34	5	0	-	5
PCE	42	14	5	0	-	5
Benzene	12	ND	5	0	-	0.7
BEHP	ND	10	-	-	-	50
Silver	ND	30	-	-	100	50
Aluminum	1,100	65,900	-	-	50 - 200	-
Arsenic	ND	20	50	-	-	25
Barium	520	986	2,000	2,000	-	1,000
Beryllium	5	ND	4 V	4	V	3
Calcium	54,900	274,000	-	-	-	-
Cobalt	70	ND	-	-	-	50
Chromium (total)	ND	146	100 II	100	-	-
Chromium III	ND	ND	-	-	-	-
Chromium VI	ND	ND	-	-	-	50
Iron	2,120	101,000	-	-	300	300
Potassium	34,000	25,100	-	-	-	-
Magnesium	27,400	106,000	-	-	-	35,000 G
Manganese	1,210	2,590	-	-	50	300
Sodium	27,000	81,000	-	-	-	20,000
Nickel	-	321	100 V	100	-	-
Lead	-	47	15 A	0	-	25
Vandium	-	102	-	-	-	-
Zinc	7,390	24,200	-	-	5,000	300

Notes:

MCL - Maximimum contaminant level, Enforceable.

MCLG - Maximum contaminant level goal - Not Enforceable.

SMCL - Secondary maximum contaminant level. Not enforceable.

ND - Not detected.

- = Level not available.

II = Phase II concentrations task took effect on July 30, 1992.

V = Phase V has been signed by EPA Administrator (May 18, 1992) and appeared in Federal Register, July 17, 1992. The Phase V concentrations will take effect 18 months after the Final Rule appears in the Federal Register (December 17, 1993) New proposed concentrations for MCLs and MCLGs for arsenic are expected in 11/92. These will then go through the comment and final process.

G = Guidance values taken from New York State Division of Water Technical and Operational Guidance Series (Ambient Water Quality Standards and Guidance Values, November 15, 1991).

A = Lead and copper will be regulated with Action levels, rather than MCLs as of Dec. 7, 1992. Until then, the MCL for lead is 50 (µg/L)

Sources:

40CFR 161, National Drinking Water Standards. Phase II revised by 56 Federal Register 3578, Jan. 30, 1991 and published in 57 Federal Register 31838, July 17, 1992.

Drinking Water Regulations and Health Advisories, USEPA, Nov. 1992.

New York State Groundwater Quality standards taken from 6NYCRR 703 (September 1, 1991) and Division of Water Technical and Operational Guidance Series (1.1.1) Ambient Water Quality Standards and Guidance Values (November 15, 1991). New York State Public Water Supply MCLs taken from 10 NYCRR 5-1 (March 11, 1992).

groundwater beneath or migrating from the NLODS. Additionally, the shallow groundwater down-gradient of the lagoon does not appear to be migrating towards residential wells along Cemetery Road.

As a result of the Second Phase field investigation, TCE and PCE were confirmed in monitoring well MW-104B, in the shallow aquifer. Monitoring well MW-204 was installed down-gradient of monitoring well MW-104B during the Second Phase investigation but no organic compounds, including TCE or PCE were detected. Table 3-3 indicates that maximum concentrations of TCE and PCE detected in Phase II exceed the federal and state standards. Of the inorganics detected in Phase II, lead exceeded both state and federal standards and nickel and total chromium exceeded their respective MCLs. Iron, magnesium, manganese and sodium continue to exceed SMCLs or state guidance levels. However, since the samples were not filtered in the field, it is likely that the high metal concentrations are due to particulate matter in the samples.

Groundwater from this shallow aquifer is not currently used for any purposes nor is it contaminating other aquifers. Upward groundwater gradients were observed down-gradient (southeast) of the lagoon suggesting that groundwater in the deep aquifer is rising into the shallow aquifer. Contamination in the shallow aquifer will not migrate to the deeper aquifer under these conditions. The absence of organic contaminants in the down-gradient monitoring well MW-204 and the upward gradient southeast of the lagoon is consistent with the shallow groundwater discharging into the wetlands. The absence of TCE and PCE in the wetlands surface water may be due to dilution and volatilization of the TCE and PCE.

The potential for the lagoon waste and wetland sediments to continue to act as a source for contamination in the groundwater was not calculated because these sources will be remediated. The remediation planned for the lagoon waste and wetland sediments will eliminate continued migration of the contaminants to the groundwater.

<u>CONCLUSIONS</u>

Based on the inclusion of the Second and Third Phase data, the 1990 BPHRA was reevaluated. Based on current public use of the site, no risks to public health were identified based on exposures to sediment and soils, groundwater, and surface water. Because concentrations of TCE, PCE, lead and chromium in groundwater exceed federal and/or state standards, remediation goals to limit concentrations of or contact with this groundwater are warranted. Remediation goals established for the lagoon and wetland sediments will not present risks to public health and will eliminate migration of contaminants into groundwater. Additional detail on target cleanup levels is presented in the Final Feasibility Study.

Although no significant public health risks exist at the NLODS based on current public use of the site, access restrictions (i.e., fencing and warning signs), institutional controls (to minimize land and groundwater use), and long-term monitoring will be implemented to limit potential for exposure to site contamination. Public health risks will be periodically reevaluated based on data collected during long-term monitoring. If future public use of the site increases, risks to public health will also be reevaluated.

4.0 PURPOSE AND SCOPE OF BASELINE ENVIRONMENTAL RISK ASSESSMENT

The remaining sections of this document present a comprehensive update of the BERA. This section presents the purpose and scope of the BERA. The primary purpose of the BERA is to provide a screening-level evaluation of actual and potential risks that environmental contaminants pose to the resident and migratory fish and wildlife receptors using the site. This information, in conjunction with the human health risk assessment and other information presented in the Remedial Investigation (RI) report (E.C. Jordan Co., 1992b) and the 1992 BERA (E.C. Jordan Co., 1992a) will be used to determine appropriate future action at the NLODS.

The 1990 BERA (E.C. Jordan Co., 1990) provided a preliminary Polychlorinated Biphenyl (PCB) target cleanup level of five milligrams per kilogram (mg/kg) for wetland sediments at the NLODS. This preliminary target cleanup level was suggested in order to provide guidance for preliminary remedial measures and represented a recommended residual concentration of PCB-contaminated wetland sediments that could remain at the NLODS following remedial action. Data from the Second and Third Phase investigations of the site were unavailable in 1990, and E.C. Jordan Co. (1990) stated that the preliminary "target cleanup level values may change depending on the results of the Second Phase Investigation". This report re-evaluates the wetland PCB target cleanup levels at the NLODS.

Certain Applicable or Relevant and Appropriate Requirements (ARARs) and State Criteria and Guidelines (SCGs) were unavailable in 1990, when the BERA was prepared. Therefore, subsequent subsections of this BERA present a discussion of current ARARs and SCGs which may influence the evaluation of ecological risk at the NLODS.

The RI report (E.C. Jordan Co., 1992b) presents considerable site-specific information regarding the: general physical setting and characteristics of the area at and in the vicinity of the NLODs; technical approach and structure of the field program; ARARs and SCGs; and, nature and distribution of contaminants at the NLODS. The results of the First, Second, and Third Phase field investigations, interpretations and discussions of analytical data and test results, and conclusions regarding the nature and distribution of site contaminants have also been presented in the RI report. The RI report (E.C. Jordan Co., 1992b) also includes several appendices with field laboratory data records, laboratory analytical data, and a number of maps and other figures.

Because the NLODS BERA must meet the statutory requirements of both New York State and federal regulations, this BERA has been conducted in accordance with the following state and federal guidance documents:

- "Risk Assessment Guidance for Superfund (RAGS): Volume 2 - Environmental Evaluation Manual" (USEPA, 1989a);
- "Ecological Assessment of Hazardous Waste Sites: A Field and Laboratory Reference" (USEPA, 1989b);
- "Habitat Based Assessment Guidance Document for Conducting Environmental Risk Assessments at Hazardous Waste Sites" (NYSDEC, 1989a); and

- "Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites" (NYSDEC, 1991a, supersedes NYSDEC, 1989a).

In addition, recent supplemental risk assessment guidance such as USEPA "Eco Update Bulletins" (USEPA 1991; 1992a; 1992b; 1992c) have been incorporated into this BERA, where appropriate.

5.0 SELECTION OF CHEMICALS OF CONCERN (COCS)

This section presents a general overview of the ecological Chemicals of Concern (COCs) at the NLODS. The selection of COCs is a screening process used to define the chemicals requiring evaluation in the BERA. Factors considered when selecting COCs include: the validity of the data for ecological risk assessment; the classification of chemicals (i.e., inorganic, organic, pesticides, etc.); comparison of chemical concentrations with naturally occurring background concentrations; the physical and chemical properties of chemicals; the frequency of release and detection; and the inherent toxicity of exogenous chemicals (USEPA, 1989a).

Additional detail may be found in the RI report and the BERA (E.C. Jordan Co., 1990; 1992b). Subsection 3.1 of the 1990 BERA (E.C. Jordan Co., 1990) presents the selection of COCs based on the First Phase field investigation at the NLODS. The NLODS RI report presents a summary of the First, Second, and Third Phase evaluation of environmental contamination at the NLODS (E.C. Jordan Co., 1992b).

Sampling conducted during the First, Second, and Third Phases of the RI at the NLODS has revealed the presence of organic and inorganic contaminants in the following environmental media of ecological concern:

- Lagoon Sludge
- Lagoon Surface Water
- Wetland Sediments
- Wetland Surface Water

NYSDEC and E.C. Jordan Co. (Jordan) previously determined that lagoon sludge and soil will need to be remediated for PCB contamination (E.C. Jordan Co., 1990c). Since contaminants within the lagoon are physically co-located with PCBs, it was determined that removal or treatment of PCB-contaminated lagoon sludge and soil would, in effect, address the cleanup of the remaining contaminants detected within the lagoon. Since submittal of the 1990 BERA, the New York State Technical and Administration Guidance Memorandum 4046 "Determination of Soil Cleanup Objectives and Cleanup Levels", finalized November 16, 1992, was determined by NYSDEC to be applicable to remedial actions implemented at the NLODS. This Technical and Administrative Guidance Memorandum provides guidance on establishing target cleanup levels for contaminants that will be protective of groundwater quality. As a result, target cleanup levels for PCBs, VOA, and SVOAs were reestablished based on this TAGM. A detailed description of the procedures and assumptions used to calculate cleanup levels for these constituents is presented in the Draft Final FS (E.C. Jordan Co., 1992c). Therefore, the lagoon contamination has not been re-considered in this BERA.

Sixteen wetland surface water samples were collected during the First Phase investigation and analyzed for TCL Volatile Organic Analytes (VOAs), Semivolatile Organic Analytes (SVOAs), and inorganic contaminants. No surface water samples were collected during the Second Phase field investigation. A summary of the surface water data has been presented in Subsection 5.5 of the RI report (E.C. Jordan Co., 1992b).

Wetland surface water COCs considered by E.C. Jordan Co. (1990) in the BERA were aluminum, lead, and zinc (see Table 3-1 of the 1990 BERA). The maximum levels of these contaminants, as well as several other inorganic contaminants, may warrant their inclusion as COCs. However, as discussed in the RI report (E.C. Jordan Co., 1992b), it is likely that wetland sediments are the source of inorganic contamination of the NLODS wetland surface water; therefore, evaluation of the surface water COCs has not been considered in this BERA.

5.1 WETLAND SEDIMENT

Ten sediment samples from the wetland were collected during the First Phase field investigation. The samples (SD-4 through SD-13) were analyzed for TCL VOAs, SVOAs, pesticides and PCBs, inorganic compounds, and Total Organic Carbon (TOC). The Second Phase field investigation was conducted to delineate the extent of lead and PCB contamination in wetland sediments (E.C. Jordan Co., 1992b). A total of 59 sediment samples (SD-201 through SD-25) were collected during the Second Phase and were analyzed for one or more of the following: TCL PCBs; TCL inorganics; TOC; and Toxicity Characteristic Leaching Procedure (TCLP) metals. The Third Phase field investigation was conducted to further define the area of wetland impacted by inorganic (i.e., lead) contamination. A total of 12 sediment samples (SD-301 through SD-312) were collected during the Third Phase and analyzed for lead by NYSDEC. Because background samples were collected over one-half mile away from the site, an overview map showing the two different sample areas (Area A and Area B) is shown in Figure 3-1. Sediment sampling locations for Area A and Area B are illustrated in Figures 3-1 and 3-2 respectively. The Third Phase sediment sampling locations are presented in Figure 3-3.

Sediment samples were analyzed for TOC during the First and Second Phase of the field investigation. Tables 5-32 and 5-33 of the RI report (E.C. Jordan Co., 1992b) present a summary of the TOC data. Excluding one erroneous data outlier (6,030,00 mg/kg TOC), the average wetland sediment TOC concentration from these two phases of study is 185,398 mg/kg (approximately 18.5% TOC).

During the First Phase investigation, five VOAs were detected in wetland sediment. Acetone was detected in four of the ten wetland sediment samples analyzed, and tetrachloroethene was detected in two of ten samples. Methylene chloride was detected in only one sample. Di-n-butylphthalate was the sole SVOA detected in wetland sediments; however, this compound was not considered a COC in wetland sediments (E.C. Jordan, 1990, 1992b). Di-n-butylphthalate was not evaluated because it was detected in a single background sample, near McAuslen Road, and was not detected in any of the sampling stations at or in the vicinity of the lagoon. Heptachlor was the sole pesticide detected in NLODS wetland sediments. This contaminant was found at one sampling station (SD-8) at a concentration of 210 μg/kg. With the exception of acetone (a common laboratory contaminant), all VOAs and pesticides detected in the wetland sediments have been considered as COCs in this revised BERA.

Meetings and consultations with NYSDEC personnel (NYSDEC, 1992c) have indicated that PCB contamination of wetland sediments is of primary concern at the NLODS. PCBs were detected in five of the ten wetland sediment samples directly downgradient from the lagoon during the First Phase investigation. A number of additional sediment samples (SD-206 through SD-224) were analyzed for PCBs during the Second Phase investigation. PCBs were detected in six of the 20 sediment samples evaluated during the Second Phase. PCB concentrations in NLODS sediments range from levels below the detection limit to a maximum of 26 milligrams/kilogram (mg/kg). The average PCB concentration from wetland sediments evaluated in the First Phase and Second Phase studies is 3.01 mg/kg. First and Second Phase PCB data are summarized in Table 5-1. Analytical results for First and Second Phase sediment PCBs and TOC are presented in Table 5-2.

The results of the Second and Third Phase field investigation at the NLODS indicate that, in addition to PCBs, the following inorganic constituents should be considered COCs in wetland sediments: aluminum, antimony, barium, chromium, iron, lead, manganese, mercury, vanadium, and zinc. A summary of the maximum concentrations of the COCs found in the NLODS wetland sediments is presented in Table 5-1.

Based on the First Phase data, wetland sediment COCs chosen by E.C. Jordan Co. (1990) were lead, zinc, and PCBs. These contaminants, as well as the VOAs, SVOAs, pesticides, and other inorganic compounds identified above have been considered as COCs in this BERA.

TABLE 5-1
SUMMARY OF WETLANDS SEDIMENT CHEMICALS OF CONCERN

NORTH LAWRENCE OIL DUMP SITE
ECOLOGICAL RISK ASSESSMENT

COMPOUND	FREQUENCY OF DETECTION	RANGE OF DETECTED CONCENTRATIONS	MAXIMUM WETLAND SEDIMEN CONCENTRATION
VOLATILE ORGANICS (ug/kg)			
Methylene chloride	1/10	260J	260J
Tetrachloroethene	2/10	33J-93J	93J
Toluene	1/10	49J	49J
PESTICIDES/PCBs (ug/kg)			
Heptachlor	1/10	210	210
Aroclor-1242	4/30	820-12000	12000
Aroclor-1260	9/30	620-14000	14000
METALS (mg/kg)			
Aluminum	25/27	403-17900	17900
Antimony	1/17	21.6	21.6
Barium	24/27	71.9-5290	5290
Calcium	26/27	1310J-35200J	35200
Chromium	11/27	2.5-21.2	21.2
Copper	4/10	70.2J-587J	587J
Iron	27/27	800-33300	33300
Lead	64/64	6.9-10900J	10900J
Magnesium	6/27	1730-3960	3960
Manganese	27/27	24.3-868	868
Mercury	12/17	0.14-1.9	1.9
Vanadium	4/17	22-24.2	24.2
Zinc	27/27	7.8-563	563

NOTES:

J= Indicates an estimated concentration because quality control criteria were not met.

TABLE 5-2

PHASE I AND PHASE II TOTAL ORGANIC CARBON (TOC) AND POLYCHLORINATED BIPHENYL (PCB) CONCENTRATIONS

NORTH LAWRENCE OIL DUMP SITE
ECOLOGICAL RISK ASSESSMENT

SAMPLE NUMBER	TOC (mg/kg)	PCBs (mg/kg)		
		Aroclor 1242	Aroclor 1260	Total PCBs
PHASE I				
SD-4	NA	12.0	14.0	26.0
5	3800	8.9	6.5	15.4
6	NA	ND	ND	0.0
7	NA	ND	ND	0.0
8	2400	ND	7.3	7.3
9	NA	ND	ND	0.0
10	NA	ND	ND	0.0
11	760	ND	ND	0.0
12	NA	ND	ND	0.0
13	NA	ND	ND	0.0
PHASE I				
TOC Avg.	2,320			**PCB Avg.** 4.96
TOC Max.	3,800			**PCB Max.** 26.00
PHASE II				
SD-206	6030000J *	7.00	10.00	17.0
207	18500	0.82	0.74	1.6
208	462000	ND	7.30	7.3
209	162000	ND	3.60	3.6
210	370000	ND	ND	0.0
211	108000	ND	ND	0.0
212	102000	ND	5.90	5.9
213	716000	ND	ND	0.0
214	212000	ND	ND	0.0
215	242000	ND	0.62	0.6
216	624000	ND	ND	0.0
217	76100	ND	ND	0.0
218	48500	ND	ND	0.0
219	34800	ND	ND	0.0
220	52200	ND	ND	0.0
221	165000	ND	ND	0.0
222	72300	ND	ND	0.0
223	106000	ND	ND	0.0
224	315000	ND	ND	0.0
PHASE II				
TOC Avg.	215911			**PCB Avg.** 1.98
TOC Max.	716000			**PCB Max.** 17.00
PHASE I AND II SUMMARY				
TOC Avg.	185,398 (18.5%)			**PCB Avg.** 3.01
TOC Max.	716,000			**PCB Max.** 26.00

NOTES:

NA: Not Analyzed; ND: Not Detected

* Value not included in average calculation

6.0 IDENTIFICATION OF POTENTIAL ECOLOGICAL RECEPTORS

The primary ecological receptor area evaluated in this BERA is the wetland downgradient and adjacent to the NLODS lagoon. Based on environmental sampling and expected transport pathways, as well as the previous BERA (E.C. Jordan Co., 1990), forested uplands are not direct receptors of site-related chemicals. Furthermore, as discussed in Section 3.0, the lagoon habitat will be remediated and no further evaluation of ecological receptors in this region will be required.

The RI report (E.C. Jordan Co., 1992b) provides information regarding wetland delineation and classification at the NLODS. The United States Fish and Wildlife Service National Wetlands Inventory maps (NWI) of the region classify the site's wetlands as palustrine, forested, broad-leaved deciduous, and seasonally saturated. Based on Jordan's First and Third Phase ecological field investigations, portions of the NLODS may contain: palustrine, forested/scrub shrub, broad-leaved deciduous wetlands; palustrine forested, dead, intermittently exposed/permanent beaver wetlands; and palustrine, forested, dead/open water, seasonally diked wetlands (classification system of Cowardin et al., 1979).

More than 100 obligate and facultative wetland plant species were observed at the NLODS during Jordan's First and Third phase field investigation. A list of plant species observed at the site is presented in Table 6-1. Plant communities were characterized for the dual purposes of evaluating habitat for terrestrial and aquatic wildlife and delineating wetland boundaries. Dominant tree species in the wetland include red maple (*Acer rubrum*) and northern white cedar (*Thuja occidentalis*). American elm (*Ulmus americana*) and black ash (*Fraxinus nigra*) are

TABLE 6–1
PLANT SPECIES OBSERVED IN UPLAND AND WETLAND AREAS

NORTH LAWRENCE OIL DUMP SITE
ECOLOGICAL RISK ASSESSMENT

Scientific Name	Common Name	Wetland Indicator Status*	Relative Abundance	Habitat
Abies balsamea	Balsam fir	FACW	Common	wetlands
Acer rubrum	Red maple	FAC	Dominant	wetlands
Acer saccharum	Sugar maple	FACU–	Occasional	floodplain forest
Acer saccharinum	Silver maple	FACW	Common	wetlands
Achillea millefolium	Yarrow	FACU	Occasional	upland field
Alnus rugosa	Speckled alder	FACW+	Occasional	wetlands
Aralia nudicaulis	Bristly sarsaparilla	FACU	Common	near lagoon/upland forest
Arisaema triphyllum	Jack–in–the–pulpit	FACW–	Occasional	wetlands
Asclepias incarnata	Swamp milkweed	OBL	Occasional	wetlands
Asclepias syriaca	Common milkweed	UPL	Occasional	old field
Asplenium sp.	Spleenwort	FACU	Occasional	near lagoon
Betula alleghenianais	Yellow birch	FAC	Occasional	wetland
Betula populifolia	Gray birch	FAC	Common	upland, wetland edge, occassionally in wetland, and at edge of lagoon
Calamagrostis canadensis	Common bluejoint	FACW+		wet meadow
Carex stricta	Tussock sedge	OBL	Common	wetlands
Carex vulpinoidea	Fox sedge	OBL	Common	wetlands
Carpinus caroliniana	Ironwood	FAC	Occasional	wetland edge
Carya ovata	Shagbark hickory	FACU–	Common	wetland hummocks
Cephalanthus occidentalis	Buttonbush	OBL	Common	wetlands
Coptis trifolia	Goldthread	FACW	Common	wetlands
Cornus amomum	Silky dogwood	FACW	Occasional	near lagoon
Cornus canadensis	Bunchberry	FAC–	Occasional	upland forest
Cornus stolonifera	Red–osier dogwood	FACW+	Common	wetland
Daucus carota	Queen anne's lace	UPL	Common	old field
Eleocharis sp.	Black rush	OBL	Common	wetlands
Equisetum sp.	Horsetail	FACW	Common	wetlands
Erythronium americanum	Trout Lily	NC	Common	upland forest
Eupatorium perfoliatum	Boneset	FACW+	Common	wetlands/lagoon
Eupatorium purpureus	Joe Pye weed	FAC	Occasional	wetlands
Fagus grandifolia	Beech	FACU	Occasional	upland forest
Fragaria virginiana	Wild strawberry	FACU	Common	upland forest
Fraxinus nigra	Black ash	FACW	Common	wetland tree
Fraxinus pennsylvanica	Green ash	FACW	Occasional	wetland tree
Gallium sp.	Bedstraw	FACU–OBL	Occasional	wetlands
Hamamelis virginiana	Witchhazel	FAC–	Common	upland forest
Hypericum gentianoides	St. Johnswort	UPL	Occasional	roadside
Ilex verticillata	Winterberry	FACW+	Common	wetlands
Impatiens capensis	Jewelweed	FACW	Common	wetlands
Iris versicolor	Blue flag	OBL	Common	wetlands
Juncus sp.	Rushes	FACU–OBL	Common	wetlands
Juniperus virginiana	Red cedar	FACU	Common	upland forest
Larix laricina	Tamarack	FACW	Common	wetland, edge of lagoon
Lemna minor	Duckweed	OBL	Common	wetland
Lonicera sp.	Honeysuckle	FACU–FACW	Occasional	wetland edge
Lysmachia quadrifolia	Loosestrife	FACW+	Occasional	wetlands
Maianthemum canadense	Wild Lily of the Valley	FAC–	Common	upland forest
Mitchella repens	Partridgeberry	FACU	Common	upland forest
Nemopanthus mucronatus	Catberry	OBL	Occasional	wetlands
Onoclea sensibilis	Sensitive fern	FACW	Common	sometimes dominant herb in wetland
Osmunda cinnamomea	Cinnamon fern	FACW	Common	wetland edge

TABLE 6–1 (cont.)
PLANT SPECIES OBSERVED IN UPLAND AND WETLAND AREAS

NORTH LAWRENCE OIL DUMP SITE
ECOLOGICAL RISK ASSESSMENT

Scientific Name	Common Name	Wetland Indicator Status*	Relative Abundance	Habitat
Osmunda claytonia	Interupted fern	FAC	Common	near lagoon, wetlands
Osmunda regalis	Royal fern	OBL	Common	wetlands
Pinus strobus	White pine	FACU	Common	upland forest
Plantago major	Plantain	FACU	Occasional	old field
Polystichum acrostichoides	Christmas fern	FACU–	Occasional	wetland, upland
Populus balsamifera	Balsam poplar	FACW	Common	wetland edges
Populus grandidentata	Bigtooth aspen	FACU–	Common	sometimes dominant in wetland
Populus tremula	Trembling aspen	FACU	Occasional	upland forest
Prunus serotina	Black cherry	FACU	Occasional	upland forest
Pteridium aquilinum	Bracken fern	FACU	Common	upland forest
Quercus bicolor	Swamp white oak	FACW+	Common	wetlands
Toxicodendron radicans	Poison ivy	FAC	Occasional	wetland hummocks
Ranunculus flabellaris	Swamp buttercup	OBL	Occasional	wetlands
Rhamnus alnifolia	Buckthorn	OBL	Occasional	wetlands
Rhus typhina	Staghorn sumac	FACU	Occasional	upland forest
Rubus hispidus	Bristly blackberry	FACW	Occasional	wetland
Rubus sp.	Brambles	FACU–FACW	Occasional	wetland
Rumex verticillatus	Swamp dock	OBL	Occasional	wetlands
Salix discolor	Pussy willow	FACW	Common	wetland tree
Sambucus canadensis	Elderberry	FACW–	Common	wetlands
Scirpus cyperinus	Woolly sedge	FACW+	Occasional	wetland
Sisyrinchium sp.	Blue–eyed grass	FACU–FACW	Occasional	roadside
Smilacina racemosa	False solomon's seal	FACU–	Occasional	upland forest
Solanum dulcamara	Nightshade	FAC–	Occasional	wetlands
Solidago sp.	Goldenrod	FACU–FACW	Occasional	upland forest
Sphagnum spp.	Sphagnum moss		Common	wetlands
Spiraea latifolia	Meadow–sweet	FAC+	Occasional	wetland
Spiraea tomentosa	Steeplebush	FACW	Occasional	wetland
Tilia americana	Basswood	FACU	Common	lagoon edge/upland forest
Thelypteris nove–boracensis	New York fern	FAC	Common	upland edge
Thelypteris simulata	Massachusetts fern	FACW	Occasional	wetlands
Thuja occidentalis	Northern white cedar	FACW	Common	wetlands, sometimes dominant wetland tree
Trientalis borealis	Starflower	FAC	Common	upland
Trillium erectum	Red trillium	FACU–	Occasional	upland forest
Trillium grandiflorum	White trillium	NC	Common	upland forest
Typha latifolia	Common cattail	OBL	Occasional	wetlands
Ulmus americana	American elm	FACW–	Common	wetlands
Vaccinium corymbosum	Highbush blueberry	FACW–	Occasional	near lagoon
Viburnum cassinoides	Witherod	FACW	Occasional	wetlands
Viburnum recognitum	Northern arrowwood	FACW–	Common	wetlands
Vitis sp.	Wild grape	FACU–FACW	Occasional	near lagoon

* – From National List of Plant Species Found in Wetlands: Reed (1988)
OBL (Obligate) – Occurs almost always in wetlands (>99% estimated probablity)
FACW (Facultative wetland) – Usually found in wetlands (67% to 99% estimated probability)
FAC (Facultative) – Equally likely in wetlands or uplands(34% to 66% estimated probability)
FACU (Facultative upland) – Usually occurs in non–wetlands (1% to 33% estimated probability)
NC – Not Considered
NA – No Agreement

also common sub-dominant trees. Common shrub species include red-osier dogwood (*Cornus stolonifera*), northern arrowwood (*Viburnum recognitum*), and winterberry (*Ilex verticillata*). The herbaceous layer includes tussock sedge (*Carex stricta*), with sensitive fern (*Onoclea sensibilis*) and cinnamon fern (*Osmunda cinnamomea*). Duckweed (*Lemna minor*), a small floating species, was also observed in some areas.

Upland forested areas primarily contain deciduous hardwood trees and an understory typical of a hardwood forest. Deciduous tree canopy species include gray birch (*Betula populifolia*), bigtooth aspen (*Populus grandidentata*), and trembling aspen (*Populus tremuloides*). The shrub layer is sparsely populated with tree saplings and an occasional black cherry (*Prunus serotina*). The herbaceous layer includes white trillium (*Trillium grandiflorum*), red trillium (*Trillium erectum*), trout lily (*Erythronoium americanum*), bracken fern (*Pteridium aquilinum*), and christmas fern (*Polystichum acrostichoides*).

Numerous species of birds, mammals, amphibians, reptiles, and invertebrates exist in the vicinity of NLODS. Various species of aquatic and terrestrial organisms were observed at the site during the First and Third Phase field investigation. Table 6-2 is a list of vertebrate species documented or expected at NLODS.

Additional detail regarding the potential ecological receptors at the NLODS may be found in Subsections 2.4 and 5.7 of the RI (E.C. Jordan Co., 1992b) and in Subsection 3.2 of the BERA (E.C. Jordan Co., 1990).

- Flora growing in the wetlands downgradient from the NLODS lagoon

Exposure to aquatic and semi-aquatic receptors (including plants) has been evaluated via direct comparison of state and federal standards to maximum concentrations of COCs in NLODS sediments. Exposure to some semi-terrestrial ecological receptors has been evaluated using computer-generated food web models.

7.1 BIOLOGICAL TISSUE SAMPLING AND ANALYSIS

The results of the preliminary biological tissue sampling and analysis study indicated that food chain contamination in the lagoon had occurred (see Subsection 5.9 of E.C. Jordan Co., 1992b). The preliminary biological tissue sampling and analysis study provided little information regarding possible tissue contaminant burdens in the wetland biota at the site.

7.2 AQUATIC BIOTA

Aquatic fauna (including invertebrates, fish, and amphibians) may potentially be exposed to contaminants through dermal contact with and ingestion of contaminated surface water and sediments (including contaminated sediment particles and interstitial water). Bioconcentration and bioaccumulation may provide significant exposure pathways for consumers of aquatic organisms. Bioconcentration is defined as "the process by which there is a net accumulation of a chemical directly from water into aquatic organisms resulting from simultaneous uptake (e.g., by gill and epithelial tissue) and elimination", whereas bioaccumulation is "a process by which chemicals are taken up by aquatic organisms from water directly or through consumption of food containing the chemicals" (Rand and Petrocelli, 1985).

Bioaccumulation and bioconcentration from contaminated media potentially results in aquatic food chain effects, and could result in exposure to herbivorous, omnivorous, and carnivorous aquatic ecological receptors. Inhalation of VOAs may also present an exposure route to aquatic receptors. Wetland plants may be exposed to contamination via direct contact and root uptake from sediments and water.

To evaluate ecological risks to aquatic receptors, the exposure concentrations employed in this BERA are the maximum measured concentrations of NLODS constituents in wetlands sediment.

7.3 PCB RISK TO SEMI-TERRESTRIAL RECEPTORS

For the purposes of this BERA, the term "semi-terrestrial" refers to those organisms which rely on wetland habitats to meet some, but not all, of their life history requirements (i.e., wetlands wildlife). Semi-terrestrial fauna (including invertebrates, amphibians, reptiles, birds, and mammals) may be exposed to contamination via dermal contact with contaminated water and sediment, direct ingestion of these media, and by feeding on contaminated prey items. Bioconcentration and bioaccumulation from contaminated media potentially results in semi-terrestrial food chain effects, and could result in exposure to herbivorous, omnivorous, and carnivorous semi-terrestrial ecological receptors. Inhalation of VOAs from contaminated media may also potentially affect semi-aquatic receptors. Facultative wetland plants growing in the wetland may be exposed to contamination via root uptake.

Semi-terrestrial receptor's exposure via dermal uptake and inhalation have not been assessed in this BERA because little data regarding these exposure routes are available. Although dermal exposure may be an ecologically significant exposure pathway for amphibians and for young, hairless mammals in subterranean dens (e.g., juvenile muskrats), in general fur, feathers, and chitinous integument will minimize dermal absorption for the majority of ecological receptors. Inhalation exposures by ecological receptors are usually insignificant, except in emergency situations (i.e., following a chemical spill), and were not evaluated in this BERA.

In addition to comparing PCB sediment data from the NLODS to ARARS (see Subsection 5.2), an ecological risk assessment food web model was employed to estimate the potential dietary exposure levels of sediment contaminants for several potential receptor species representing various trophic levels within the ecological community at NLODS. Indicator receptor species were chosen to provide both a taxonomic and trophic level cross-section of the potential receptors in the vicinity of NLODS. Each species evaluated was assumed to be representative of other species within a given trophic level.

The following five indicator species were selected to represent exposure to wildlife via ingestion of food and PCB-contaminated sediments at the NLODS:

- Short-tailed Shrew (*Blarina brevicauda*): small omnivorous mammal
- American woodcock (*Scolopax minor*): small insectivorous bird

- Garter Snake (*Thamnophis sirtalis*): reptile
- Raccoon (*Procyon lotor*): semi-terrestrial omnivorous mammal
- Red-tailed Hawk (*Buteo jamaicensis*): large predatory bird

The food-web model was used to estimate PCB levels in various primary prey items (e.g., invertebrates and plants) consumed by each receptor species. Estimated contaminant tissue residues in each prey species were estimated using specific bioaccumulation factors obtained directly or extrapolated from values in the scientific literature. The potential dietary exposure level for each modeled receptor species was calculated by multiplying each predicted prey species tissue concentration by the proportion of that prey type in the diet, summing these values, adding soil exposure, and multiplying by the site foraging frequency (area of contamination/home range) of the given receptor species. Incidental sediment ingestion associated with foraging, preening, and cleaning activities was conservatively estimated to represent five percent of total dietary intake.

After considering literature-derived receptor-specific ingestion and body weight data, the estimated total body dose for each receptor species was compared to literature derived reference toxicity values for PCB ingestion. This final comparison of the total body dose estimate with the appropriate reference toxicity value results in an index (the "Hazard Index" [HI]) of potential impact associated with exposure to PCBs in the NLODS sediments. Tables 7-2 through 7-4 provide relevant documentation for the food web model. Additional detail regarding the potential ecological exposures at the NLODS may be found in Subsection 3.2 of the 1990 BERA (E.C. Jordan Co., 1990).

TABLE 7-2
ECOLOGICAL EXPOSURE PARAMETERS

NORTH LAWRENCE OIL DUMP SITE
ECOLOGICAL RISK ASSESSMENT

RECEPTOR SPECIES	EXPOSURE PARAMETER	REPORTED VALUES	REFERENCE	VALUE SELECTED FOR ECOLOGICAL RISK
Eastern garter snake *(Thamnophis s. sirtalis)*	Home Range (acres)	5, 2, 35 (males), 22.2 (females)	DeGraaf and Rudis, 1986	5 [a]
	Percent Prey Items in Diet	Earthworms are 80% of diet; rest is amphibians, carrion, fish, leeches, caterpillars, insects, small birds, rodents, slugs, snakes, mollusks, crayfish, and sowbugs	DeGraaf and Rudis, 1986	Invertebrates: 85% Small Mammals: 5% Birds: 5% Soil: 5%
	Ingestion Rate (kg/day)	Allometric relationship between body weight (W) and food ingestion rate (F) for all species: F = 0.065 x W^0.7919		0.023 kg/day
	Body Weight (kg)			0.27 kg [b]
	Drinking Water Intake Rate (l/day)	Allometric relationship between body weight (W) and drinking water rate (L) for all species: L = 0.11 x W^0.7872		0.039 l/day

NOTES:

[a] Selected as conservative value; actual range may be greater.

[b] Estimated assuming the density of water (1 gm/cu.cm), an average length of 55 cm (Conant, 1975), and and an assumed diameter of 2.5 cm.

TABLE 7-2 (cont.)
ECOLOGICAL EXPOSURE PARAMETERS

NORTH LAWRENCE OIL DUMP SITE
ECOLOGICAL RISK ASSESSMENT

RECEPTOR SPECIES	EXPOSURE PARAMETER	REPORTED VALUES	REFERENCE	VALUE SELECTED FOR ECOLOGICAL RISK
American Woodcock *(Scolopax minor)*	Home Range (acres)	0.25 to 100 acres territory size	DeGraaf and Rudis, 1986	50 [a]
	Percent Prey Items in Diet	50 to 90 % earthworms; rest is beetles, flies, insects, and occasionally plants	DeGraaf and Rudis, 1986	Invertebrates: 85% Plants: 10% Soil: 5%
		60% earthworms, 30% insects, 10% plants shrews, rabbits, some small birds, caterpillars of large moths, grasshoppers, crickets, beetles, dragonflies, ants, spiders, crayfishes, earthworms, etc. The percentage of plant material in diet varies seasonally as shown below:	Martin et al., 1951	

Season	No. Months	Percent
Winter	5	9%
Spring	2	13%
Summer	3	2%
Fall	2	6%
Estimated Year-round Average		7%

RECEPTOR SPECIES	EXPOSURE PARAMETER	REPORTED VALUES	REFERENCE	VALUE SELECTED FOR ECOLOGICAL RISK
	Ingestion Rate (kg/day)	100% of body weight/day or more	Terres, 1987	0.22 kg/day
	Body Weight (kg)	Males average 6.2 oz (0.18 kg); females average 7.7 oz (0.22 kg)	Terres, 1987	0.22 kg
	Drinking Water Intake Rate (l/day)	Allometric relationship between body weight (W) and drinking water rate (L) for chickens: $L = 0.13 \times W^{0.7555}$	USEPA, 1988	0.041 l/day

NOTES:
[a] Average of reported values

TABLE 6-2
VERTEBRATES OBSERVED AND EXPECTED AT NLODS

NORTH LAWRENCE OIL DUMP SITE
ECOLOGICAL RISK ASSESSMENT

COMMON NAME	FAMILY	SCIENTIFIC NAME
REPTILES AND AMPHIBIANS		
Eastern painted turtle	Emydidae	*Chrysemys picta*
Eastern garter snake	Colubridae	*Thamnophis sirtalis**
Northern leopard frog	Ranidae	*Rana pipiens*
Green frog	Ranidae	*Rana clamitans**
Wood frog	Ranidae	*Rana sylvatica**
BIRDS		
Sharp-shinned hawk	Accipitridae	*Accipiter striatus*
Mallard	Anatidae	*Anas platyrhynchos**
American black duck	Anatidae	*Anas rubripes**
Hooded merganser	Anatidae	*Lophodytes cucullatus**
American wigeon	Anatidae	*Anas americana**
Gadwall	Anatidae	*Anas strepera**
Blue-Winged teal	Anatidae	*Anas discors*
Wood duck	Anatidae	*Aix sponsa*
Great blue heron	Ardeidae	*Ardea herodias**
Mourning dove	Columbidae	*Zenaida macroura*
Blue jay	Corvidae	*Cyanocitta cristata*
Swamp sparrow	Emberizidae	*Melospiza georgiana*
Yellow warbler	Emberizidae	*Dendroica petechia*
Chestnut-sided warbler	Emberizidae	*Dendroica pensylvanica*
Scarlet tanager	Emberizidae	*Piranga olivacea**
White-throated sparrow	Emberizidae	*Zonotrichia albicollis**
Sparrow hawk	Falconidae	*Falco sparverius*
Red-winged blackbird	Icteridae	*Agelaius phoeniceus**
Northern oriole	Icteridae	*Icterus galbula**
Gray catbird	Mimidae	*Dumatella carolinensis**
American robin	Muscicapidae	*Turdus migratorius*
Black-capped chicadee	Paridae	*Parus atricapillus**
Blackburnian warbler	Parulidae	*Dendroica fusca**
Common yellowthroat	Parulidae	*Geothylpis trichas**
Black-and-white warbler	Parulidae	*Mniotilta varia**
American redstart	Parulidae	*Setophaga ruticilla**
Yellow-shafted flicker	Picidae	*Colaptes auratus**
Downy woodpecker	Picidae	*Picoides pubescens**
Pileated woodpecker	Picidae	*Dryocopur pileatus**
American woodcock	Scolopacidae	*Scolopax minor**
White-breasted nuthatch	Sittidae	*Sitta carolinensis*
Ruffed grouse	Tetraonidae	*Bonasa umbellus**
Winter wren	Troglodytidae	*Troglodytes troglodytes*
Veery	Turdidae	*Catharus fuscesens**
American robin	Turdidae	*Turdus migratorius**
Great crested flycatcher	Tyrannidae	*Myiarchus crinitus*
Eastern phoebe	Tyrannidae	*Sayornis phoebe*
Eastern wood-pewee	Tyrannidae	*Contopus virene**
Creat crested flycatcher	Tyrannidae	*Myiarchus crinitus**
Eastern kingbird	Tyrannidae	*Tyrannus tyrannus**
Red-eyed veiro	Vireonidae	*Verio olivaceus**
FISH		
Red-bellied dace		*Phoxinus eois*
Creek chubsucker	Catostomidae	*Erimyzon sp.*
Golden shiner	Cyprinidae	*Notemigonas chrysoleucas*
Killifish	Cyprinodontidae	*Fundulus sp.*
Three-spined stickleback	Gasterosteidae	*Gasterosteus aculeatus*
Five-spined stickleback	Gasterosteidae	
Central mudminnow	Umbridae	*Umbra limi*
MAMMALS		
White-tailed deer	Cervivae	*Odocoileus virginianus*
White-footed mouse	Cricetidae	*Peromyscus leucopus*
Beaver	Castoridae	*Castor canadensis**
Muskrat	Cricetidae	*Ondatra zibethicus**
Eastern cottontail	Leporidae	*Sylvilagus floridanus*
Mink	Mustelidae	*Mustela vison**
Eastern chipmunk	Sciuridae	*Tamias striatus*
Woodland jumping mouse	Zapodidae	*Napaeozapus insignis*

Notes:

* Personal Communication, James Farquhar, III – Senior Wildlife Technician, New York State Department of Environmental Conservation. All other species or evidence of their presence (e.g., tracks, scat) observed at the site May 1989.

7.0 ECOLOGICAL EXPOSURE PATHWAYS

The purpose of the ecological exposure assessment is to evaluate the potential for ecological receptor exposure to chemical constituents at the NLODS site. This evaluation involves the identification of actual or potential exposure routes to receptors and evaluation of the magnitude of exposure to identified ecological receptors. In this sub-section, exposure concentrations are estimated for each receptor and for each exposure pathway at the NLODS. This exposure information in conjunction with the toxicological information is used to evaluate ecological risk.

Exposure pathways describe the mechanism(s) by which ecological receptors are exposed to contaminated media, and consist of a: (1) contaminant source; (2) environmental transport medium; (3) point of receptor contact; and (4) the exposure route (e.g., ingestion of prey items that have bioaccumulated contaminants in their tissues, drinking of contaminated surface water, incidental sediment ingestion, dermal absorption, inhalation, etc.). A general overview of the exposure pathways considered in the NLODS BERA is presented in Table 7-1. Potential receptors at the NLODS include:

- Aquatic biota in the forested and scrub/shrub wetland

- Semi-aquatic and/or semi-terrestrial biota that depend on the aquatic environment for a portion of their life history requirements (i.e., wetlands wildlife)

TABLE 7–1
ROUTE OF SEDIMENT EXPOSURE FOR ECOLOCIGAL RECEPTORS

NORTH LAWRENCE OIL DUMP SITE
ECOLOGICAL RISK ASSESSMENT

MEDIUM	ROUTE OF EXPOSURE	POPULATIONS EXPOSED
SEDIMENT	Ingestion of contaminated sediment	Aquatic invertebrates
	Dermal contact with contaminated sediment	Fish, aquatic invertebrates
	Root uptake	Aquatic plants
	Indirect exposures associated with consumption of contaminated prey items	Waterfowl, reptiles, and semi–aquatic mammals

TABLE 7-2 (cont.)
ECOLOGICAL EXPOSURE PARAMETERS

NORTH LAWRENCE OIL DUMP SITE
ECOLOGICAL RISK ASSESSMENT

RECEPTOR SPECIES	EXPOSURE PARAMETER	REPORTED VALUES	REFERENCE	VALUE SELECTED FOR ECOLOGICAL RISK
Short-tailed Shrew (*Blarina brevicauda*)	Home Range (acres)	2.88, 1, 0.21, 1.46, 1.39, 0.25, 4.43	Baker, 1983	1.3 [a]
		1, 1.25, 0.5, 1	DeGraaf and Rudis, 1986	
		0.5	Burt, 1987	
	Percent Prey Items in Diet	Insects, invertebrates, small vertebrates, worms	Baker, 1983	Invertebrates: 85% Plants: 10%
		Insects, plants, worms, sowbugs, snails, small vertebrates, centipedes, millipedes, spiders	DeGraaf and Rudis, 1986	Soil: 5%
		Insects, earthworms, vertebrates, invertebrates, occasionally plants	Godin, 1977	
	Ingestion Rate (kg/day)	50% to 300% of its body weight/day	Baker, 1983	0.037 kg/day (175% of BW/day [a])
	Body Weight (kg)	0.018 to 0.030 kg	Baker, 1983	0.021 kg [a]
		0.013 to 0.024 kg	Godin, 1977	
	Drinking Water Intake Rate (l/day)	Allometric relationship between body weight (W) and drinking water rate (L) for mammals: L = 0.10 x W^0.7377	USEPA, 1988	0.0058 l/day

NOTES:
[a] Average of reported values

TABLE 7-2 (cont.)
ECOLOGICAL EXPOSURE PARAMETERS

NORTH LAWRENCE OIL DUMP SITE
ECOLOGICAL RISK ASSESSMENT

RECEPTOR SPECIES	EXPOSURE PARAMETER	REPORTED VALUES	REFERENCE	VALUE SELECTED FOR ECOLOGICAL RISK
Racoon *(Procyon lotor)*	Home Range (acres)	503, 268, 137	Baker, 1983	268
	Percent Prey Items in Diet	Animal; Frogs, crayfish, insects, small vertebrates Plants; Acorns 62% of Diet in Winter	Martin et al., 1951	Invertebrates: 40% Small mammals: 20% Reptiles & Amphibians: 15 Plants: 30% Soil: 5% 0.39 kg/day
	Ingestion Rate (kg/day)	Allometric relationship (all species) F= 0.065 * W ^0.7919 W = Weight = 9.5 kg.	EPA, 1988	
	Body Weight (kg)	5.4 to 13.6 kg	Baker, 1983	9.5 kg [a]
	Drinking Water Intake Rate (l/day)	Allometric relationship (all species) L = 0.11 * W ^0.7872 W = Weight = 9.5 kg.	EPA, 1988	0.65 l/day
	Density (number of Individuals/acre)	1 per 16 acres, 1 per 43 acres, 1 per 523 acres	Baker, 1983	1 per 43 acres
	Lifespan (years)	4 years 6 years	Baker, 1983 Godin, 1977	4 years

[a] Average of reported values

TABLE 7-2 (cont.)
ECOLOGICAL EXPOSURE PARAMETERS

NORTH LAWRENCE OIL DUMP SITE
ECOLOGICAL RISK ASSESSMENT

RECEPTOR SPECIES	EXPOSURE PARAMETER	REPORTED VALUES	REFERENCE	VALUE SELECTED FOR ECOLOGICAL RISK
Red-tailed hawk *(Buteo jamaicensis)*	Home Range (acres)	Breeding: 192– 1376 acres Winter: up to 2560 acres	DeGraaf and Rudis, 1986	500 [a]
	Percent Prey Items in Diet	Small mammals, amphibians, reptiles, nesting birds, insects, carrion, domestic animals	DeGraaf and Rudis, 1986	Small mammals: 60% Invertebrates: 5% Plants: 5% Birds: 20% Soil: 5%
	Ingestion Rate (kg/day)		Terres, 1987	0.23 kg/day [b]
	Body Weight (kg)	1.5 kg	Terres, 1987	1.5
	Drinking Water Intake Rate (l/day)	Allometric relationship (all species) L = 0.11 * W ^0.7872 W = Weight = 1.50 kg.	EPA, 1988	0.151 l/day
	Density (#/acre)	0.0014 (1 pair/2.2 square miles) 0.00076 (1 pair/4.1 square miles) 0.00625 (1 pair/0.5 square miles)	DeGraaf and Rudis, 1986	0.0028 [c]
	Lifespan (years)	4 years	Terres, 1987	4

[a] Selected as conservative value; actual range may be much greater
[b] Ingestion rate based upon ratio of ingestion rate to body weight for golden eagle (Terres, 1980) using 1.5 kg body weight for hawk
[c] Average of reported values

TABLE 7-3
SUMMARY OF INGESTION TOXICITY DATA FOR TERRESTRIAL WILDLIFE

NORTH LAWRENCE OIL DUMP SITE
ECOLOGICAL RISK ASSESSMENT

CHEMICAL	TEST SPECIES	TEST TYPE	DURATION	EFFECT	ACUTE* ORAL LD50 (mg/kgBW)	ACUTE* ACUTE ORAL RISK CRITERIA (mg/kgBW)	CHRONIC* LOAEL (mg/kgBW/day)	CHRONIC* NOAEL (mg/kgBW/day)	REFERENCE
PCBs	Mouse	Oral (acute)	2 weeks	Increased liver weight		6 [c]	1 [b]		Sanders & Kirkpatrick, 1975
	Mouse	Oral (chronic)	6–11 months	Hepatomegaly			13–65		USEPA 1985
(Aroclor 1254)	Rat	Single oral dose		Mortality	500	100 [a]			Eisler, 1986
(Aroclor 1260)	Rat	Single oral dose		Mortality	1300	260 [a]			Eisler, 1986
(Aroclor 1254)	Rat	Oral (chronic)	2 generations	Reduced litter size			7.6		USEPA 1985
	Rat	Oral (chronic)	9 weeks	Fetal mortality/maternal toxicity			6.4		ATSDR, 1987
	Rat	Oral (chronic)	NS	Increase in F1 male liver weights			0.08		USEPA, 1976
	Chicken	Oral (chronic)	NS	Embryonic mortality			0.9 [c]		USEPA, 1976
	Rock dove	Oral (chronic)	NS	Parental incubation behavior		9.1 [b]	0.9 [c]		Peakall and Peakall, 1973
(Aroclor 1254)	Japanese quail	Oral (chronic)	NS	Reproduction unimpaired		50 [b]	5.0 [c]		Eisler, 1986
	American kestrel	Oral (chronic)	69 days	Reduced sperm concentration		90 [b]	9		Eisler, 1986
(Aroclor 1254)	Mink	Single oral dose		Mortality	4000	800 [a]			Eisler, 1986
(Aroclor 1242)	Mink	Single oral dose		Mortality	3000	600 [a]			Eisler, 1986
(Aroclor 1221)	Mink	Single oral dose		Mortality	750	150 [a]			Eisler, 1986
	Mink	Oral (chronic)	4 months	Impaired reproduction			0.0075 [d]	0.0015	Newell, et al., 1987
	Dog (beagle)	Oral (chronic)	2 years	NS			0.37 [c]		USEPA, 1976

TABLE 7-3 (cont.)
SUMMARY OF INGESTION TOXICITY DATA FOR TERRESTRIAL WILDLIFE

NORTH LAWRENCE OIL DUMP SITE
ECOLOGICAL RISK ASSESSMENT

The following ingestion rate and body weight data were used to calculate RTVs:

Species	Ingestion Rate (kg/day)	Body Weight (kg)	Reference
Rat (Male)	0.025	0.58	USEPA, 1988
Rat (Female)	0.02	0.25	USEPA, 1988
Rat	0.015	0.25	NIOSH, 1985
Rabbit	0.059	2.2	USEPA, 1988
Chicken	0.106	1.16	USEPA, 1988
Bobwhite	0.015	0.17	Kenaga, 1973
California quai	0.014 [e]	0.139	USEPA, 1988
Mallard Duck	0.09	1.25	Terres, 1987
Duck	0.112 [e]	1.6	USEPA, 1988
Starling	0.01	0.0437	USEPA, 1988
Kestrel	0.01	0.179	USEPA, 1988
Screech Owl	0.0086	0.169	USEPA, 1988
Mink	0.0465	1.613	USEPA, 1988
Mouse	0.0035	0.03	USEPA, 1988
Dog	0.5	14.47	USEPA, 1988

NOTES:
* Shaded values are Reference Toxicity Values (RTV)
Unshaded boxed values are used as RTVs when examining risk to populations only.
[a] For chemicals lacking LOAEL or NOAEL data, an Acute Oral Criterion (AOC) is calculated by applying a factor of 0.2 to the acute LD50; this value is expected to protect 99.9% of the exposed population from acute effects (USEPA, 1986).
[b] Estimated by applying an acute-chronic ratio of 10.
[c] Converted to dose per kilogram body weight by multiplying by ingestion rate and dividing by body weight.
[d] Estimated by applying a LOAEL-NOAEL ratio of 5 (Newell, et al., 1987).
[e] Ingestion rate estimated from body weight using allometric equation for chickens in USEPA, 1988.

BW = Body Weight
LOAEL = Lowest Observed Adverse Effect Level
NOAEL = No Observed Adverse Effect Level

TABLE 7-4
BIOACCUMULATION FACTORS

NORTH LAWRENCE OIL DUMP SITE
ECOLOGICAL RISK ASSESSMENT

CHEMICAL	log Kow	BIOACCUMULATION FACTORS [a]				
		PLANT [b]	INVERTS	SMALL MAMMAL	SMALL BIRD	HERPTILE
PCBs						
Aroclor-1242	6.04	0.210 [d]	5.82 [e]	2.91 [c]	2.91 [c]	2.91 [c]
Aroclor-1254	6.04	0.210 [d]	5.82 [e]	2.91 [c]	2.91 [c]	2.91 [c]
Aroclor-1260	6.04	0.210 [d]	5.82 [e]	2.91 [c]	2.91 [c]	2.91 [c]

NOTES:

[a] Bio-accumulation Factors (BAFs) were conservatively estimated to be 1 when empirical data were available. Plant BAFs were set equal to 1 when equation presented in [b] exceeded 1.

[b] Calculated using the following equation in USEPA (1990):
log(Plant Uptake Factor) = 1.588 - 0.578 log Kow

[c] Whole body pheasant BAF from USEPA (1985a); used as a surrogate for other pesticides and PCBs.

[d] Arithmetic average of values reported for various plant species in USEPA (1985b)

[e] BCF for earthworms from Diercxsens, et al.,(1985).

8.0 ECOTOXICITY ASSESSMENT

The purpose of the Ecotoxicity Assessment is to describe the environmental risks associated with the identified COCs in each medium of concern, and to evaluate the relationship between the concentration to which an organism is exposed and the potential for adverse effects due to acute and chronic exposure. The toxicological evaluation includes the process of characterizing the inherent toxicity of the COCs and establishing reference or threshold toxicity values for each identified contaminant in all media evaluated. Information contained in the ecotoxicity assessment, in conjunction with exposure information presented in the previous sub-section, is used to evaluate ecological risks to aquatic and semi-terrestrial organisms in the ecological risk characterization.

From the toxicological data set evaluated, the lowest acute and the lowest chronic values for each representative species or medium were selected as the Reference Toxicity Values (RTVs) for each COC. These RTVs, which represent a threshold concentration or dose for effects to aquatic and semi-terrestrial organisms, are expressed in micrograms per liter (μg/l) in surface water, milligrams per kilograms (mg/kg) in sediments, and the mass of constituent per unit body weight per day for semi-terrestrial organisms (mg/kg BW (body weight)/day).

8.1 TOXICITY TO AQUATIC RECEPTORS

Aquatic receptors may be exposed to chemicals in sediments at NLODS. Contaminant toxicity in sediments has been evaluated through comparison with state and federal ARARS and SCGs, laboratory-derived toxicological information, and toxicity threshold values developed using extrapolation techniques. These sources were used to generate RTVs for the majority of NLODS constituents in sediments.

ARARs represent federal and state requirements that may govern the cleanup of hazardous waste sites (USEPA, 1989a). "Applicable Requirements" are those federal and state promulgated requirements that are legally applicable to the response action, whereas "Relevant and Appropriate Requirements" are federal and state requirements that are not directly "applicable" to the site in question, but are designed for sufficiently similar situations to make their application appropriate. In the absence of federal and state regulatory ARARs, state and federal criteria, guidance, advisories, and recommendations have been employed in evaluating risk at NLODS (i.e., SCGs have been employed).

Limited data are available to evaluate the potential for toxic effects of NLODS sediment contaminants on aquatic life. Available information includes state and federal sediment quality criteria and guidance, laboratory-derived toxicity data, and toxicity threshold values developed using toxicological extrapolation techniques.

Sediment Quality Criteria (SQC) for a number of hydrophobic organic compounds have been developed and published by the USEPA (1988a). No USEPA SQC are available to evaluate the effects of inorganic constituents on aquatic life. The USEPA SQC are intended to protect benthic organisms which are primarily impacted by contaminants in the interstitial water between sediment particles. USEPA developed SQC using an equilibrium partitioning approach to identify sediment concentrations which could be associated with interstitial water concentrations equal to chronic federal Ambient Water Quality Criteria (AWQC).

Aquatic organisms are typically exposed to sediment contamination as a result of contact with contaminated interstitial water (NYSDEC, 1989b). For non-polar, hydrophobic organic compounds, such as PCBs, the degree to which compounds are released from sediment particles into the interstitial water is strongly influenced by their low solubility and strong binding affinity to TOC within the sediment particle. The higher the TOC content of the sediments, the lower the potential for contaminant release to the interstitial water. Conversely, those sediments with low TOC concentrations tend to have a higher potential for contaminant release into the interstitial water.

Therefore, the toxicity of sediments containing hydrophobic compounds (and subsequently the associated sediment toxicity criteria) varies on a site-specific basis in an inverse relationship with the fraction of sediment that is organic carbon. For this reason, sediment toxicity threshold criteria are often normalized to reflect TOC: carbon-normalized data are expressed as microgram contaminant per gram of organic carbon ($\mu g/gC$) in sediment. A site-specific criterion can be calculated by multiplying the organic carbon-normalized criterion by the fraction of TOC present in the site's sediments. Because the TOC data for NLODS indicate that wetland sediments samples contain approximately 18.5 percent TOC, the PCB data have been carbon-normalized at 18.5 percent.

The Bureau of Environmental Protection, Division of Fish and Wildlife of NYSDEC has published a document entitled "Sediment Criteria - December 1989" (NYSDEC, 1989b). This report is a guidance document, not a NYSDEC standard or policy. The NYSDEC Sediment Criteria document contains a methodology for developing sediment criteria, a description of the use of these criteria in risk management decision-making processes, and a table of sediment criteria derived for various human and ecological receptors. Organic contaminant sediment criteria developed in NYSDEC (1989b) are based on the TOC equilibrium partitioning approach. The NYSDEC (1989b) guidance document contains recommended criteria for several organic and inorganic constituents found in NLODS sediments.

8.2 PCB FOOD WEB MODEL

Potential impacts to ecological receptors at estimated PCB exposure concentrations were evaluated using published laboratory-derived toxicological data, as well as threshold toxicity values developed using extrapolation techniques. Acute and chronic exposure effects on semi-terrestrial receptors have been considered in the ecotoxicity assessment. Toxicological endpoints evaluated include mortality, behavioral effects, immobilization, growth impairment, physiological changes, fetotoxicity, and changes in organ weight, size, or functionality. Lethal concentration and dose studies (e.g., LC_{50} and LD_{50} studies) and effects studies (e.g., EC_{50} studies) were considered. PCB RTVs for semi-terrestrial receptors are expressed as bodyweight-normalized doses. Relevant documentation of PCB RTVs for the food web model are presented in Table 7-3.

Additional detail regarding the ecological toxicity of contaminants detected at the NLODS may be found in Subsection 3.3 of the BERA (E.C. Jordan Co., 1990).

9.0 ECOLOGICAL RISK CHARACTERIZATION

This subsection characterizes the risk to aquatic and semi-terrestrial receptors potentially exposed to sediment contaminants at NLODS. The ecological risk is dependent on the magnitude, duration, and frequency of exposure to the site contaminants, and on the characteristics of the exposed populations. The NLODS exposure information, combined with the NLODS ecotoxicity information provides the basis for the risk characterization.

9.1 SEDIMENT QUALITY CRITERIA AND GUIDELINES

Comparison of the contaminant concentrations detected in NLODS wetland sediments with RTVs (i.e., USEPA SQC and NYSDEC sediment criteria) for aquatic organisms provides a means to evaluate the potential for adverse effects on aquatic environmental receptors from exposure to sediment contaminants. Table 9-1 presents comparisons of RTVs with average and maximum concentrations of NLODS wetland sediment COCs. This comparison indicates that aquatic life may suffer adverse effects from exposure to contaminated NLODS sediments.

Maximum contaminant concentrations in sediments exceed state and federal sediment guidelines for heptachlor and two PCBs (Aroclor-1242 and Aroclor 1260). Although heptachlor was detected at only one sampling station, the detected concentration of this pesticide was approximately one order of magnitude above the federal SQC, and approximately two orders of magnitude above the state criteria. The maximum total PCB concentration in the wetland sediments

TABLE 9-1
COMPARISON OF SEDIMENT CONTAMINANT CONCENTRATIONS TO
STATE AND FEDERAL STANDARDS AND GUIDELINES FOR THE PROTECTION OF AQUATIC LIFE

NORTH LAWRENCE OIL DUMP SITE
ECOLOGICAL RISK ASSESSMENT

CHEMICAL	MAXIMUM SAMPLE CONCENTRATION (mg/kg)	FEDERAL CRITERIA [a] (mg/kg)	STATE CRITERIA [b] (mg/kg)	USEPA CRITERIA EXCEEDANCE	NYSDEC CRITERIA EXCEEDANCE
VOLATILE ORGANICS					
Methylene chloride	0.26	NA	NA	—	—
Tetrachloroethene	0.09	NA	NA	—	—
Toluene	0.05	NA	NA	—	—
PESTICIDES/PCBs					
Heptachlor	0.21	0.02	0.01	YES	YES
Aroclor-1242	12.00	3.41	0.11	YES	YES
Aroclor-1260	14.0	3.41	0.11	YES	YES
INORGANICS					
Aluminum	12400	NA	NA	—	—
Antimony	21.6	NA	NA	—	—
Barium	5290	NA	NA	—	—
Calcium	35200	NA	NA	—	—
Chromium	21.2	NA	26	—	NO
Copper	587	NA	19	—	YES
Iron	33300	NA	24000	—	NO
Lead	10900	NA	27	—	YES
Magnesium	3960	NA	NA	—	—
Manganese	868	NA	428	—	YES
Mercury	1.9	NA	0.11	—	YES
Vanadium	24.2	NA	NA	—	—
Zinc	563	NA	85	—	YES

NOTES:
[a] USEPA (1989) Interim Sediment Quality Criteria (SQC) for non-polar hydrophobic organic contaminants. Values of organic constituents are carbon-normalized to 17.5% TOC.
[b] New York State Department of Environmental Conservation (NYSDEC) Sediment Criteria (NYSDEC, 1989) Values of organic constituents are carbon-normalized to 17.5% TOC.
NA = Not Available

was 26 mg/kg, considerably higher than the federal (3.4 mg/kg) and state (0.1 mg/kg) sediment criteria.

No USEPA SQC are available for inorganic contaminants; however, New York state criteria are available for many inorganic compounds. Maximum concentrations of copper, iron, lead, mercury, manganese, and zinc exceed NYSDEC sediment quality standards. The maximum lead concentration in the site's wetlands was 10,900 mg/kg, well above the NYSDEC guidance value of 27 mg/kg. Mercury was detected at a maximum concentration of 1.9 mg/kg, an order of magnitude greater than the NYSDEC standard of 0.11 mg/kg. Copper was detected at a maximum concentration of 59 mg/kg, more than twice the NYSDEC standard of 19 mg/kg; manganese was detected at a maximum of 868 mg/kg, above the NYSDEC guideline of 428 mg/kg; iron was detected at a maximum concentrations of 33, 300 mg/kg, slightly higher than the NYSDEC guidance value of 24,000 mg/kg; and, zinc was detected at a maximum of 560 mg/kg, approximately an order of magnitude greater than the state standard (85 mg/kg).

These findings suggest that NLODS sediment contamination may be impacting some components of the aquatic community in wetlands adjacent to the site. Predicted adverse effects from acute and chronic exposures to organic contaminants in NLODS sediments may be similar to those observed in the aquatic laboratory toxicity studies upon which the RTVs for this evaluation are based. Both NYSDEC (1989b) and USEPA (1988a) employ the equilibrium partitioning approach to evaluate the toxicity of many organic chemicals in sediments (see Subsection 8.1); therefore, predicted adverse effects from exposure to sediments contaminated with organic compounds are identical to effects predicted from exposure to these compounds in a purely aqueous medium. No parallel algorithm for inorganic contaminants in sediments exists; however, recent work indicates that, at least for some inorganic contaminants, the amount of bioavailable inorganic contaminant is related to the quantity of acid volatile sulfide in sediments (NYSDEC, 1989a). No information regarding acid volatile sulfides in NLODS sediments is available.

PCBs are man-made contaminants known to bioaccumulate and bioconcentrate. These compounds have the potential to cause food chain effects. Acute mammalian exposure to PCBs may result in mortality, and the chronic effects of PCBs are numerous, and include diarrhea, chromoacryorrhea, loss of body weight, unusual stance and gait, central nervous system degeneration, and a variety of pathological changes (USEPA, 1980a). The toxicological effects of metals in sediments are poorly understood; benthic organisms are thought to be primarily effected by sediment inorganic contamination (NYSDEC, 1989a; Baudo, et al., 1990). Mercury is known to bioaccumulate and bioconcentrate and has the potential to cause food chain effects. Depending upon the physical and chemical forms of mercury evaluated, this contaminant has been shown to cause effects ranging from mortality to a variety of central nervous system effects (USEPA, 1980b). Copper, lead, manganese, and zinc bioconcentrate to a far lesser extent, but may cause a variety of acute, sub-acute, and chronic effects, ranging from mortality to convulsions, depression of enzyme levels, reduced reproductive effort, gastrointestinal effects, nausea, renal effects, high blood pressure, neurological disruptions, weight loss, and other physiological effects (USEPA, 1984; ATSDR, 1988 and 1990).

9.2 FOOD WEB MODELED RISKS TO SEMI-TERRESTRIAL RECEPTORS FROM PCBS

Risks to semi-terrestrial receptors from PCBS in the NLODS wetlands were evaluated through use of the computer model. Risks were quantitatively evaluated using HIs, which were calculated by dividing the estimated exposure level, in terms of TBD of PCBs, by the toxicological benchmark (the PCB RTV). In order to calculate acute exposure HIs, the dose based on the maximum concentration of PCBs was divided by the acute RTV for PCBs; chronic exposure HIs were calculated by dividing the dose based on the average PCB concentration by the appropriate chronic RTV. This conservative approach provides a screening level evaluation of potential effects of individual COCs on semi-terrestrial ecological receptors.

The PCB TBD for each model semi-terrestrial receptor species was calculated as described in Section 8.0. Estimates of acute and chronic ecological exposures and risks from PCBs at NLODS are presented in Tables 9-2 to 9-5, respectively.

A hazard ranking scheme developed by USEPA (1986) was used to characterize the potential risk associated with exposures to NLODS PCB contamination. This ranking scheme evaluates potential ecological effects to individual organisms, and does not evaluate potential population-wide risks. The HI score was classified using the following USEPA (1986) ranking system:

TABLE 9-2
ESTIMATION OF ACUTE EXPOSURES TO SEMI-TERRESTRIAL ORGANISMS VIA FOOD AND SOIL INGESTION

NORTH LAWRENCE OIL DUMP SITE
ECOLOGICAL RISK ASSESSMENT

EXPOSURE CONCENTRATION DATA

CHEMICAL	CONCENTRATION (mg/kg)
PCBs	2.6E+01

ESTIMATED TISSUE LEVELS IN PRIMARY PREY ITEMS

Invert BAF [a]	Tissue Level (mg/kg)	Plant BAF [a]	Tissue Level (mg/kg)
5.8E+00	1.5E+02	2.1E-01	5.5E+00

BAF VALUES FOR OTHER PREY ITEM

Small Mammal BAF	Small Bird BAF	Herptile BAF
2.9E+00	2.9E+00	2.9E+00

SITE AREA:	1.50	acres

TABLE 9-2
ESTIMATION OF ACUTE EXPOSURES TO SEMI-TERRESTRIAL ORGANISMS VIA FOOD AND SOIL INGESTION

NORTH LAWRENCE OIL DUMP SITE
ECOLOGICAL RISK ASSESSMENT

TOTAL BODY DOSE (mg/kgBW-day) [b]

CHEMICAL	*Short-tailed shrew*	*American woodcock*	*Garter snake*	*Raccoon*	*Red-tailed hawk*
PCBs	2.3E+02	1.3E+02	1.3E+01	4.9E+00	3.6E+01

TABLE 9–2
ESTIMATION OF ACUTE EXPOSURES TO SEMI–TERRESTRIAL ORGANISMS VIA FOOD AND SOIL INGESTION

NORTH LAWRENCE OIL DUMP SITE
ECOLOGICAL RISK ASSESSMENT

EXPOSURE PARAMETERS [c]

Indicator Species		Percent Prey in Diet: Inverts	Plants	Small Mammals	Herpeto– fauna	Birds	Soil	Home Range (acres)	Site Foraging Frequency [d]	Ingestion Rate (kg/day)	Body Weight (kg)
Short–tailed shrew	(Small Mammal)	85%	10%	0%	0%	0%	5%	1.3	1.0E+00	0.037	0.021
American woodcock	(Small Bird)	85%	10%	0%	0%	0%	5%	50	3.0E–02	0.22	0.22
Garter snake	(Herptile)	85%	0%	5%	0%	5%	5%	5	3.0E–01	0.023	0.27
Raccoon	(Pred. Mammal)	40%	30%	10%	15%	0%	5%	268	5.6E–03	0.39	9.5
Red–tailed hawk	(Pred. Bird)	5%	5%	55%	10%	20%	5%	500	3.0E–03	0.230	1.5

NOTES:
[a] Bioaccumulation data presented in: Table 5–4
[b] Calculated by summing the products of individual prey type concentrations and percent in diet, multiplying by the SFF and ingestion rate, and then dividing by body weight.
[c] Documentation of exposure parameters presented in: Table 5–2
[d] Site Foraging Frequency (SFF). Calculated by dividing site area by receptor home range (cannot exceed 1.0)

HAZARD INDEX	EFFECTS EXPECTED
HI < 0.1	No Adverse Effects
0.1 < = HI < 10	Possible Adverse Effects
HI > = 10	Probable Adverse Effects

The findings presented in Tables 9-2 through 9-5 suggest that small mammals and birds that forage within a limited home range and specialize on invertebrates (i.e., the short-tailed shrew and the American woodcock) may be impacted if they were to forage regularly in NLODS's wetlands. Larger carnivores and omnivores (i.e., the garter snake, raccoon, and red-tailed hawk) are not as likely to be impacted by NLODS PCB contamination.

Although PCBs are known to bioaccumulate and biomagnify in food chains, no chronic exposure effects for higher trophic level species (i.e., the red tailed hawk) were predicted. The semi-terrestrial food web model examines bioaccumulation through the use of bioaccumulation factors (BAFs); however, it is likely that the larger home range of the higher trophic level receptors may reduce their predicted exposure to PCB contamination in the food web model.

Additional detail regarding the ecological risk characterization at the NLODS may be found in Subsection 3.4 of the BERA (E.C. Jordan Co., 1990).

10.0 TARGET CLEANUP LEVELS FOR ECOLOGICAL RECEPTORS

This section discusses alternative ecological target cleanup levels for COCs at the NLODS. Development of final target cleanup levels for site contaminants is presented in the NLODS Third Phase Feasibility Study (E.C. Jordan Co., 1992c).

10.1 PCB TARGET CLEANUP LEVELS FOR ECOLOGICAL RECEPTORS

Six potential ecological PCB target cleanup levels for the NLODS forested wetland sediments are evaluated in this BERA (Table 10-1). target cleanup levels considered include values developed through use of the Jordan food web model, as well as state and federal ARARS. The ecologically based target cleanup levels evaluated range from 0.11 to 3.61 mg/kg. Three of the six target cleanup level values considered fall between 0.5 and 0.72 mg/kg, two potential target cleanup levels are above this range, and one potential ecological target cleanup level is below this range.

The federal SQC (USEPA, 1988a) for PCBs, 3.61 mg/kg, is the least conservative target cleanup level evaluated. This value represents the mean sediment final residue value, defined as the concentration protecting uses of aquatic life, including consumption of aquatic life by wildlife (USEPA, 1988a). The lower 95% confidence interval value associated with the USEPA mean SQC is 0.72 mg/kg. USEPA (1988a) notes that the PCB criterion included in the SQC guidance does not account for bioconcentration and bioaccumulation in ecological food chains, and may not be fully protective of all aquatic species. Therefore, the PCB target cleanup level of 3.61 mg/kg is considered too high for use at the NLODS, and the lower 95th percent confidence interval target cleanup level (0.72

TABLE 10-1
COMPARISON OF TARGET CLEANUP LEVELS FOR PCBs

NORTH LAWRENCE OIL DUMP SITE
ECOLOGICAL RISK ASSESSMENT

CHEMICAL	SITE CONCENTRATIONS		USEPA SQC [a] (mg/kg sed)	NYSDEC CRITERIA [b] (mg/kg sed)	NOAA (c) CRITERIA (mg/kg)	E.C. JORDAN FOOD CHAIN UPTAKE [d] MODEL - ACUTE EXPOSURE TARGET CLEANUP LEVEL (mg/kg sed)	E.C. JORDAN FOOD CHAIN UPTAKE [e] MODEL - CHRONIC EXPOSURE TARGET CLEANUP LEVEL (mg/kg sed)
	MAXIMUM (mg/kg sed)	AVERAGE (mg/kg sed)					
PESTICIDES/PCBs							
PCBs	26	3.01 (0.72)	3.61 (0.68)	0.111	0.4	1.8	0.72

[a] USEPA 1988, Interim Sediment Criteria Values for Nonpolar Hydrophobic Organic Contaminants, Office of Water Regulations and Standards, Standards and Criteria Division, Washington, SCD# 17.
Values are normalized to 17.5% TOC which is the site average TOC.
Value presented as: Sediment Quality Criteria (95% Confidence Interval)

[b] NYSDEC 1989, Sediment Criteria - December 1989, This document is used as guidance by the Division of Fish and Wildlife. It is neither a standard nor a policy of the Department.
Values are normalized to 17.5% TOC which is the site average TOC.

[c] Long and Morgan (1990), Effects Range-Medium.

[d] These values are derived via the E.C. Jordan food chain model for semi-terrestrial receptors acute exposure to PCBs.

[e] These values are derived via the E.C. Jordan food chain model for semi-terrestrial receptors chronic exposure to PCBs.

mg/kg) may be interpreted as a more appropriate ecological target cleanup level for use at the NLODS.

Long and Morgan (1990) have developed biological effects-based criteria for evaluating sediment contaminant data. Although this National Oceanographic and Atmospheric Administration (NOAA) study is designed primarily for evaluating the toxicity of marine and estuarine sediments, USEPA has suggested that Long and Morgan (1990) criteria may also be used as a primary source of information for the evaluation of freshwater sediments at hazardous waste sites. The Effects Range-Medium (ER-M) of Long and Morgan (1990) represents the 50th percentile concentration of contamination in estuarine sediments with observed (or predicted) effects. The ER-M for PCBs is 0.4 mg/kg. This value can be interpreted as a second potential PCB target cleanup level for the NLODS.

The results of the Jordan food web model suggest that chronic exposure to concentrations of PCBs greater than 0.72 mg/kg may result in risk, and that exposure to 1.8 mg/kg PCBs may result in acute toxicity to certain ecological receptors (see Table 10-2). target cleanup levels derived from the food web model may be interpreted as the highest sediment concentration that will not adversely affect any component of the semi-terrestrial ecological community at the NLODS. Because the food web model does not use the equilibrium partitioning approach, the acute and chronic exposure food web model target cleanup levels have not been carbon-normalized. The chronic exposure food web model of 0.72 mg/kg is approximately equivalent to the lower 95th percent confidence interval associated with the USEPA PCB SQC (i.e., 0.68 mg/kg), and only slightly higher than the ER-M of Long and Morgan (1990).

TABLE 10-2
CALCULATION OF SOIL TARGET LEVELS FOR ECOLOGICAL RECEPTORS
PART 1: BASED ON CHRONIC EXPOSURE
NORTH LAWRENCE OIL DUMP SITE
ECOLOGICAL RISK ASSESSMENT

RECEPTOR	COMPOUND	TARGET RISK [a]	REFERENCE TOXICITY VALUE (mg/kgBW-day)	TARGET INTAKE [b] (mg/kgBW-day)	DIETARY CONTRIBUTION FACTOR [c] (kgBW-day/kg)	SOIL TARGET LEVEL [d] (mg/kg)
Short-tailed shrew	PCBs	1.00	6.4	6.4E+00	1.1E-01	7.3E-01
American woodcock	No Target Levels Necessary					
Garter snake	No Target Levels Necessary					
Raccoon	No Target Levels Necessary					
Red-tailed hawk	No Target Levels Necessary					

Notes: [a] Calculated by dividing the total risk by the number of compounds with a cumulative HI greater than 1.
[b] Calculated by multiplying the target risk by the RTV.
[c] Calculated as the inverse of the function used to estimate TBD, with soil concentrations factored out.
[d] The soil target level is calculated by multiplying the target intake by the dietary contribution factor.

TABLE 9-4
ESTIMATION OF ACUTE RISKS TO SEMI-TERRESTRIAL ORGANISMS FROM FOOD AND SOIL INGESTION

NORTH LAWRENCE OIL DUMP SITE
ECOLOGICAL RISK ASSESSMENT

CHEMICAL	*Raccoon*			*Red-tailed hawk*		
	TBD	RTV	HI	TBD	RTV	HI
PCBs	4.9E+00	1.5E+02	3.3E-02	3.6E+01	9.0E+01	3.9E-01
SUMMARY HAZARD INDEX			3.3E-02			3.9E-01

NOTES: TBD = Total Body Dose (mg/kgBW-day)
RTV = Reference Toxicity Value (mg/kgBW-day)
BW = Body Weight (kg)
HI = Hazard Index (calculated by dividing TBD by RTV)

TABLE 9-5
ESTIMATION OF CHRONIC RISKS TO SEMI-TERRESTRIAL ORGANISMS FROM FOOD AND SOIL INGESTION

NORTH LAWRENCE OIL DUMP SITE
ECOLOGICAL RISK ASSESSMENT

CHEMICAL	*Short-tailed shrew*			*American woodcock*			*Garter snake*		
	TBD	RTV	HI	TBD	RTV	HI	TBD	RTV	HI
PCBs	2.6E+01	6.4E+00	4.1E+00	4.5E-01	5.0E+00	9.0E-02	4.4E-01	5.0E+00	8.8E-02
SUMMARY HAZARD INDEX			4.1E+00			9.0E-02			8.8E-02

TABLE 9-5
ESTIMATION OF CHRONIC RISKS TO SEMI-TERRESTRIAL ORGANISMS FROM FOOD AND SOIL INGESTION

NORTH LAWRENCE OIL DUMP SITE
ECOLOGICAL RISK ASSESSMENT

CHEMICAL	Raccoon			Red-tailed hawk		
	TBD	RTV	HI	TBD	RTV	HI
PCBs	3.2E-03	6.4E+00	5.0E-04	1.2E-02	9.0E+00	1.4E-03
SUMMARY HAZARD INDEX			5.0E-04			1.4E-03

NOTES: TBD = Total Body Dose (mg/kgBW-day)
RTV = Reference Toxicity Value (mg/kgBW-day)
BW = Body Weight (kg)
HI = Hazard Index (calculated by dividing TBD by RTV)

TABLE 9-3
ESTIMATION OF CHRONIC EXPOSURES TO SEMI-TERRESTRIAL ORGANISMS VIA FOOD AND SOIL INGESTION

NORTH LAWRENCE OIL DUMP SITE
ECOLOGICAL RISK ASSESSMENT

EXPOSURE CONCENTRATION DATA

CHEMICAL	CONCENTRATION (mg/kg)
PCBs	3.0E+00

ESTIMATED TISSUE LEVELS IN PRIMARY PREY ITEMS

Invert BAF [a]	Tissue Level (mg/kg)	Plant BAF [a]	Tissue Level (mg/kg)
5.8E+00	1.7E+01	2.1E-01	6.3E-01

BAF VALUES FOR OTHER PREY ITEM

Small Mammal BAF	Small Bird BAF	Herptile BAF
2.9E+00	2.9E+00	2.9E+00

SITE AREA: 1.50 acres

TABLE 9-3

ESTIMATION OF CHRONIC EXPOSURES TO SEMI-TERRESTRIAL ORGANISMS VIA FOOD AND SOIL INGESTION

NORTH LAWRENCE OIL DUMP SITE

ECOLOGICAL RISK ASSESSMENT

TOTAL BODY DOSE (mg/kgBW-day) [b]

CHEMICAL	*Short-tailed shrew*	*American woodcock*	*Garter snake*	*Raccoon*	*Red-tailed hawk*
PCBs	2.6E+01	4.5E-01	4.4E-01	3.2E-03	1.2E-02

TABLE 9-3
ESTIMATION OF CHRONIC EXPOSURES TO SEMI-TERRESTRIAL ORGANISMS VIA FOOD AND SOIL INGESTION

NORTH LAWRENCE OIL DUMP SITE
ECOLOGICAL RISK ASSESSMENT

EXPOSURE PARAMETERS [c]

Indicator Species		Percent Prey in Diet: Inverts	Plants	Small Mammals	Herpeto-fauna	Birds	Soil	Home Range (acres)	Site Foraging Frequency [d]	Ingestion Rate (kg/day)	Body Weight (kg)
Short-tailed shrew	(Small Mammal)	85%	10%	0%	0%	0%	5%	1.3	1.0E+00	0.037	0.021
American woodcock	(Small Bird)	85%	10%	0%	0%	0%	5%	50	3.0E-02	0.22	0.22
Garter snake	(Herptile)	85%	0%	5%	0%	5%	5%	5	3.0E-01	0.023	0.27
Raccoon	(Pred. Mammal)	40%	30%	10%	15%	0%	5%	268	5.6E-03	0.39	9.5
Red-tailed hawk	(Pred. Bird)	5%	5%	55%	10%	20%	5%	500	3.0E-03	0.230	1.5

NOTES:
[a] Bioaccumulation data presented in: Table 5-4
[b] Calculated by summing the products of individual prey type concentrations and percent in diet, multiplying by the SFF and ingestion rate, and then dividing by body weight.
[c] Documentation of exposure parameters presented in: Table 5-2
[d] Site Foraging Frequency (SFF). Calculated by dividing site area by receptor home range (cannot exceed 1.0)

TABLE 9-4
ESTIMATION OF ACUTE RISKS TO SEMI-TERRESTRIAL ORGANISMS FROM FOOD AND SOIL INGESTION

NORTH LAWRENCE OIL DUMP SITE
ECOLOGICAL RISK ASSESSMENT

CHEMICAL	*Short-tailed shrew*			*American woodcock*			*Garter snake*		
	TBD	RTV	HI	TBD	RTV	HI	TBD	RTV	HI
PCBs	2.3E+02	1.0E+02	2.3E+00	1.3E+02	9.1E+00	1.4E+01	1.3E+01	9.1E+00	1.4E+00
SUMMARY HAZARD INDEX			2.3E+00			1.4E+01			1.4E+00

10.3.1 Mercury

The maximum concentration of mercury detected in the NLODS wetlands is 1.9 mg/kg, well in excess of the NYSDEC guidance value of 0.11 mg/kg (NYSDEC, 1989b). Sediments exceeding this NYSDEC criterion are not co-located with regions of the wetland containing PCBs in excess of the 0.5 mg/kg PCB target cleanup level. Because mercury is toxic and bioconcentrable, all mercury in excess of 0.11 mg/kg will require remediation (E.C. Jordan Co., 1992c). Approximately 0.7 acres of additional wetland alteration will be required in order to remediate mercury contamination. However, if screening during the remedial cleanup identifies additional areas with mercury contamination, this compound will be monitored in the proposed long-term biomonitoring program (see Section 12.0).

10.3.2 Potential Lead target cleanup levels

Extensive regions of the NLODS wetlands are contaminated with lead. At least 50 acres of wetlands contain lead concentrations in excess of 27 mg/kg, the NYSDEC sediment quality standard. Background lead sediment concentrations at the NLODS range from 17 to 30 mg/kg (E.C. Jordan Co., 1992b), and the NYSDEC sediment quality standard therefore may be representative of background conditions in the site's wetlands. Because of the ecological consequences associated with wetland alteration in excess of 50 acres, alternative lead target cleanup levels were evaluated (additional detail regarding wetland alteration and restoration is presented in Section 10.3.2.1).

An alternative potential target cleanup level derived from the NYSDEC Sediment Criteria document (NYSDEC, 1989b) is the "limit of tolerance" value: 250 mg/kg. NYSDEC (1989b) states that this value is derived from the Ontario Ministry of the Environment (OME), which has recently published "Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario" (Persuad, et al., 1992). According to the OME, at the limit of tolerance value (also known as the "severe effect level"), "the sediment is considered heavily polluted and likely to affect the health of sediment-dwelling organisms". This level represents a contaminant level in sediments that could potentially impact a significant number of benthic organisms at a site (Persaud et al., 1992).

Lead partitioning between aqueous and particulate phases in wetland systems is affected by a number of factors, including particle composition, texture, organic and inorganic characteristics of the sediment, temperature, redox potential, and ionic competition (Baudo, et al., 1990). Soluble lead complexes with organic and inorganic matter, forming compounds of low solubility; lead tends to concentrate primarily in sediments containing large amounts of clay and organic matter (Baudo, et al., 1990). It is unknown how site specific circumstances at the NLODS affect the quantity of bioavailable lead in wetland sediments at the NLODS; this issue should be addressed in the long-term biomonitoring program at the site (see Section 12.0).

Potential acute, sub-acute, and chronic toxic effects on ecological receptors from lead contamination in the NLODS wetlands may be similar to those described in eco-toxicological literature (see Eisler, 1988; Rand and Petrocelli, 1985; USEPA, 1985). Sublethal effects of lead on vertebrates include neurological effects, kidney dysfunctioning, and anemia. Lead can block nerve impulse transmission and acetylcholine release, and has been shown to strongly inhibit a number of enzymes. Significant increases in vertebrate tissue lead levels may result from diets deficient in calcium (Rand and Petrocelli, 1985). In addition, lead in aquatic systems has been demonstrated to result in a number of physiological effects, including reduced reproductive efforts, gastrointestinal effects, and weight loss (USEPA, 1980). Lead has been shown to inhibit plant growth, and to bioconcentrate in freshwater biota, including snails, stoneflies, caddisflies, and fish (USEPA, 1980). Lethal and sublethal effects of lead have been demonstrated in numerous aquatic taxa, including freshwater algae, invertebrates, and fish (Eisler, 1988); certain amphibian species have been demonstrated to be particularly sensitive to inorganic contamination (Birge, 1978).

At least five acres of wetlands at the NLODS contain lead-contaminated sediments in excess of 250 mg/kg, the NYSDEC limit of tolerance value (E.C. Jordan Co., 1992c). Following removal of all sediments with PCB contamination in excess of 0.5 mg/kg, approximately 3.5 acres of wetlands with lead contamination in excess of 250 mg/kg would remain. Of these 3.5 acres, approximately 1.5 acres contain lead concentrations in excess of 1000 mg/kg.

10.3.2.1 Wetland Alteration Associated with Lead Remediation. Communications with NYSDEC (i.e., NYSDEC, 1992a and 1992b) have indicated that regulatory concerns exist regarding potential wetland alterations at the NLODS associated with the remediation of lead contamination. With the exception of a logged area in the vicinity of the lagoon, lead-contaminated portions of the wetland appear to be physically undisturbed and provide suitable habitat for numerous plant and animal species (see Section 4.0). Remediation for lead in this wetland habitat may result in significant adverse ecological impacts associated with the destruction of wetlands. In addition to the toxicological risks associated with lead contamination, the risks associated with lead remediation (i.e., habitat destruction risks) should be considered at the NLODS. A recent review of relative ecological risks by USEPA's Science Advisory Board (USEPA, 1990) indicates that environmental protection strategies should prioritize remedial opportunities for the greatest overall risk reduction. USEPA (1990) indicates that the relative risks of remedial strategies should be considered, particularly as they relate to natural ecosystem destruction; habitat alteration may result in greater risks than the existing environmental contamination.

In order to remediate for both PCBs and mercury in the site's wetlands, approximately 1.5 acres of wetlands alteration is proposed (E.C. Jordan Co., 1992c). An additional 3.5 acres of wetlands would have to be altered in order to remediate for lead in excess of 250 mg/kg. Physical alteration of NLODS wetland habitat in order to remediate for lead and PCB contamination may result in significant long-term ecological effects, including:

- destruction of wetland vegetation;
- alteration of wetlands hydrology;
- alteration of the ability of the site's wetlands to provide wildlife habitat, including food, shelter, over-wintering, and migratory and breeding areas for wildlife; and,
- alteration of the abilities of the site's wetlands to perform other wetlands functions, including flood water storage, surface water purification, and sediment pollution absorption, and sediment load deposition

If five or more acres of wetlands at the NLODS were altered by remedial activities, successful wetland restoration may be extremely difficult to achieve. Creation and restoration of palustrine wetlands in the glaciated northeast is a relatively "young" science (Kusler and Kentula, 1990), which is frequently driven by state and federal environmental regulations, rather than analysis of relative risk. Although hundreds (and perhaps thousands) of palustrine wetland restoration projects have occurred in the last decade, few, if any, long-term, comprehensive studies evaluating the functions of restored wetlands have been conducted (Lowry, 1990). Available literature indicates that wetland restoration activities in the northeast have been marginally successful; however, proper design, implementation, and monitoring of wetland restoration activities have been shown to increase the likelihood that restored (or created) wetlands will meet project goals (Dobberteen, 1990; Kusler and Kentula, 1990; Larson and Neill, 1986). If complete wetland restoration is required in order to justify the natural resource injuries associated with habitat loss from remedial activities at the NLODS, the intermediate loss of wetlands functions and values (i.e., during the recovery period) must also be considered.

The preferred goal of any wetland restoration activities at NLODS (regardless of acreage) should be to restore self-sustaining freshwater wetlands *in situ* (i.e., in the same "footprint" as the altered wetlands). The surface area of the restored wetland should be at least equal to that of the altered wetlands. Depending upon state and federal regulatory and permit guidance, as well as financial and temporal considerations, a range of approaches to restore self-sustaining wetlands exist. At the minimum, wetland restoration at the NLODS will involve removal of contaminated soils and/or vegetation, backfilling with suitable material, and controlling erosion and siltation. At the other extreme, wetland restoration at the

NLODS could involve the above activities, numerous engineering and design considerations, and transplanting or purchasing nursery stock to partially or fully re-vegetate the altered wetland.

The following activities should be conducted at the NLODS prior to commencing any wetland alteration activities:

1. A functional assessment of the wetlands to be altered should be conducted in order to identify wetland functions and values that may be destroyed. This functional assessment should include a discussion of restoration feasibility, identifying the reliability with which wetland functions may be restored or replaced, and the inherent risks to the natural environment if any functions and values cannot be replaced. This functional assessment should provide site-specific baseline information regarding the ecology associated with NLODS wetlands. Several methods are available to quantify wetland functional performance, particularly as performance relates to mitigation and restoration planning.

2. A detailed site-specific Wetland Restoration Specification (WRS) should be prepared. This WRS should be based on regulatory guidelines and functional objectives, and should include: careful consideration of the NLODS hydrology, topography, vegetation, and soil characteristics; evaluation of the NLODS wetlands functional assessment; examination of regional wetlands replacement literature; consultation with regulatory and technical authorities; and, experience with similar wetland restoration projects. This WRS should be prepared prior to obtaining applicable state and federal permits for wetland alteration, and should be submitted with

all permit applications. The WRS should include a detailed narrative description of all proposed activities, a discussion of goals and objectives based on wetland functional attributes, and a long term monitoring plan (which could be combined with the proposed tissue burden biota monitoring).

All wetland restoration field activities (including construction, planting, monitoring, and maintenance) should be supervised by a qualified wetland restoration specialist. Monitoring of the wetland restoration area will be essential in order to determine the success of the project and the compliance with permitted project objectives. Monitoring requirements should be specifically defined in the WRS and should include an evaluation of restored wetland functions and values, water levels, sedimentation, wildlife utilization, and a variety of vegetative parameters. Monitoring reports should be prepared once or twice yearly (before and/or after the growing season) for at least five years following forested wetland restoration activities. Monitoring of the wetland restoration effort at the NLODS should be conducted concurrently with the long-term biomonitoring program (see Section 12.0). Conducting these two monitoring programs in an integrated manner is essential in order to examine risks that may result from contamination in the wetlands, as well those risks resulting from wetland alteration due to site remediation. This information can be used to adaptively manage the program and provide information for future decisions.

Because of the technical difficulties associated with successful wetland restoration, and the ecological and financial costs associated with wetland habitat destruction and restoration, the alternative of not pursuing a target cleanup level for lead has been recommended (E.C. Jordan Co., 1992c). Rather, remedial alternatives evaluated in the FS involve remediation of areas of the site's wetlands with PCB contamination in excess of 0.5 mg/kg. All lead contaminated soils co-located with PCBs will be removed and treated. The highest concentrations of lead in the site's wetlands (i.e., those concentrations in excess of 10,000 mg/kg) are co-located with PCBs in excess of 0.5 mg/kg. Therefore, although approximately 3.5 acres of lead-contaminated soil in excess of 250 mg/kg will remain in the site's wetlands, PCB source reduction will serve to remediate the worst of the lead contamination (i.e., source reduction of lead will have occurred).

Because sediment lead concentrations following remediation will still be in excess of the NYSDEC guidance values, a long-term biomonitoring plan will be implemented to monitor the impacts that residual wetland contamination is having on the ecosystem (see Section 12.0).

11.0 ECOLOGICAL RISK ASSESSMENT UNCERTAINTIES AND DATA GAPS

The prediction of environmental risks at NLODS involves numerous uncertainties and assumptions. Although many of the assumptions and uncertainties at NLODS are inherent in the ecological risk assessment process (i.e., are inherent in development and formulation of the conceptual model), others are related to lack of data and information, and to natural environmental stochasticity (USEPA, 1992a). The uncertainty evaluation identifies and, whenever possible, qualifies the uncertainty associated with all aspects of the BERA, from selection of COCs to risk characterization. To the extent possible, the uncertainty analysis provides an evaluation of the effects of uncertainties on the risk assessment conclusions. This evaluation can: (1) provide insight regarding strengths and weaknesses of the environmental BERA; (2) contribute towards development of future actions and remedial alternatives; and, (3) provide a basis for obtaining additional information to reduce risk estimation uncertainty (USEPA, 1992c).

Assumptions and uncertainties at NLODS include, but are not limited to the following:

1. The models used to estimate exposures involve numerous exposure parameters, some of which are values from the literature, and some of which are assumed or estimated. Efforts were made to select exposure parameters representative of a variety of species or feeding guilds, so that exposure estimates would be representative of more than a single species. However, numerous extrapolations relating measurement and assessment endpoints have been included in this BERA. These include extrapolations between taxa, between responses, and from laboratory to field studies.

2. The exposure models assume that organisms will spend equal amounts of time in all habitats within their home ranges. In actuality, organisms will spend varying amounts of time in different habitats which would affect their exposures. The limitation of this assumption is that exposures to the particular species modeled may be over-estimated or under-estimated in the model.

3. In selecting RTVs, the lowest toxicity value reported in available literature was selected. Therefore, the RTVs employed in this BERA may conservatively over-estimate ecological risk.

4. Information regarding the presence or absence of ecological receptors at the site was obtained from a review of literature, habitat characteristics, and short-term field studies. Actual occurrence and/or utilization of the site by many ecological receptors listed in Table 6-2 is uncertain.

5. Neither dermal contact nor inhalation were evaluated because of a lack of information concerning uptake rates for wildlife. Therefore, total ecological exposure may be greater than predicted based solely on modeled ingestion scenarios. However, the relative contribution of dermal contact to total ecological risk is expected to be much lower than that of food and sediment ingestion, because of the protective fur, feathers, or hardened skin covering most species of semi-terrestrial wildlife.

6. Chronic toxicity to small mammals, small birds, amphibians, and reptiles may result in reduced reproductive success, whereas acute toxicity may result in mortality in populations of these organisms. If populations of

these smaller organisms are significantly reduced, due to either acute or chronic exposure, fewer prey items would be available for predatory birds and mammals. Although predatory birds and mammals might stop foraging in areas with reduced prey populations, these secondary consumers may not always be otherwise directly affected, unless their total forage base was significantly reduced.

7. The hazard ranking scheme employed evaluates potential ecological effects to individual organisms, and does not evaluate potential population-level risks. In many circumstances, acute or chronic effects may occur to individual organisms with little potential population or community level effects; however, as the number of individual organisms experiencing toxic effects increases, the probability that population-level effects will occur also increases. As a result of this assumption, the calculated risk may over-estimate the true community or population level effects.

8. The exposure modeling does not consider the possibility that many ecological receptors may discriminate and avoid consuming contaminated prey items (especially those that are most contaminated and would pose the most significant toxicological impact). This simplification could result in overly conservative estimates of potential exposure. Conversely, contaminated prey items may be selectively consumed if physiological, morphological, or behavioral effects make them more apparent or vulnerable. If this is the case, the calculated risk could be under-estimated in the model.

9. A number of conservative toxicological and ecological assumptions have been made in this BERA. As a result of the cumulative impact of multiple conservative assumptions, risk to ecological receptors may occasionally be predicted at soil and sediment chemical concentrations near background levels.

10. Comparisons of maximum sediment contaminant concentrations to state and federal SQC results in a "worst case" analysis. This "worst case" approach may be overly conservative and may over-estimate risk in this media at NLODS.

11. An assumption has been made that all lead in the NLODS sediments is bioavailable. Sediment toxicity studies (proposed in Section 12.0) may indicate that only a portion of the site's lead is bioavailable; therefore, this BERA may over-estimate lead-related risk.

12.0 RECOMMENDATIONS FOR LONG-TERM BIOMONITORING AT THE NLODS

Remediation of all wetland sediments with PCB concentrations greater than 0.5 mg/kg has been proposed at the NLODS (see Section 10.0 and E.C. Jordan Co., 1992c). Contaminants that are physically co-located with PCBs will be remediated through treatment of PCBs. Sediments with PCB concentrations less than 0.5 mg/kg may remain in the site's wetlands following initial remediation. Significant lead contamination (i.e., in excess of the NYSDEC limit of tolerance value of 250 mg/kg) will also remain in the site's wetlands following cleanup of PCBs.

Representatives of NYSDEC have indicated that a long-term biomonitoring program will be required at the NLODS (NYSDEC, 1992a and 1992b). The long-term biomonitoring program should evaluate the potential short- and long-term impacts to biota from residual contaminants which will remain in the site's forested wetland sediments following remedial cleanup of PCB's to 0.5 mg/kg. The primary contaminants to be evaluated through long-term biomonitoring are PCBs and lead. If any VOAs, SVOAs, or mercury remain following site remediation (i.e., if screening during the remedial cleanup identifies additional areas with contamination), these compounds will also be monitored in the proposed long-term biomonitoring program.

Biomonitoring methods are diverse and may include traditional field surveys of populations or assemblages, bioassays and/or other bioassessment activities. Bioassays are laboratory-based tests (e.g., toxicity tests) that employ rigorous experimental protocols, whereas bioassessments are field-based analyses that lack strict experimental controls (although they do employ reference sites).

Biomonitoring may include laboratory bioassays of sediment and/or surface water, *in situ* bioassays, toxicity tests, monitoring of effects on individual organisms (i.e., incidence of disease, physiological effects, biochemical effects), monitoring of trends in population densities and community diversity, and/or collection of resident organisms for tissue analysis (NOAA, 1987; USEPA, 1989a; NYSDEC, 1991a).

Biomonitoring of the site's wetlands should be conducted in an integrated manner with the wetland restoration monitoring program (see Section 8.3.2); conducting these two monitoring programs in a coordinated manner is essential in order to balance and prioritize risks that may result from residual lead in the wetlands and from wetland alteration due to site remediation. It is probable that similar studies (i.e., community structure studies of the macrobenthos) will be required for both the wetland restoration and long-term bio-monitoring programs.

Prior to commencing any field biomonitoring activities, a site-specific Biomonitoring Work Plan (BMWP) will need to be developed for the NLODS. In order to develop a site-specific program, a number of questions need to be addressed in the BMWP, including:

a. What are the specific objectives of the biomonitoring program?

b. How will collected data be used and how will performance objectives be evaluated?

c. What media are of primary long-term concern?

TABLE 10-2 (cont.)
CALCULATION OF SOIL TARGET LEVELS FOR ECOLOGICAL RECEPTORS
PART 2: BASED ON ACUTE EXPOSURE
NORTH LAWRENCE OIL DUMP SITE
ECOLOGICAL RISK ASSESSMENT

RECEPTOR	COMPOUND	TARGET RISK	REFERENCE TOXICITY VALUE (mg/kgBW-day)	TARGET INTAKE (mg/kgBW-day)	DIETARY CONTRIBUTION FACTOR (kgBW-day/kg)	SOIL TARGET LEVEL (mg/kg)
Short-tailed shrew	PCBs	1.00	100	1.0E+02	1.1E-01	1.1E+01
American woodcock	PCBs	1.00	9.1	9.1E+00	2.0E-01	1.8E+00
Garter snake	PCBs	1.00	9.1	9.1E+00	2.0E+00	1.9E+01
Raccoon	No Target Levels Necessary					
Red-tailed hawk	No Target Levels Necessary					

Notes: [a] Calculated by dividing the total risk by the number of compounds with a cumulative HI greater than 1.
[b] Calculated by multiplying the target risk by the RTV.
[c] Calculated as the inverse of the function used to estimate TBD, with soil concentrations factored out.
[d] The soil target level is calculated by multiplying the target intake by the dietary contribution factor.

NYSDEC (1989b) presents several freshwater aquatic toxicity and wildlife residue based PCB sediment quality criterion. In accordance with NYSDEC (1989b) guidance, the most conservative of these values, 0.111 mg/kg, has been selected as the BERA guidance value. NYSDEC freshwater wildlife residue basis sediment values range from 0.111 mg/kg (based on a proposed NYSDEC Division of Fish and Wildlife Ambient Water Quality Guidance Value of 0.0004 ug/l) to 0.259 mg/kg (based on the existing NYSDEC guidance value of 0.001 ug/l).

NYSDEC (1989) guidance recommends that the use of NYSDEC sediment criteria in risk management decisions be conducted in coordination with the NYSDEC Division of Fish and Wildlife. A telephone conference call between Jordan and NYSDEC Division of Fish and Wildlife technical experts was held on 29 July 1992 (NYSDEC, 1992a). The purpose of this consultation was to evaluate the various alternative ecologically-based PCB target cleanup levels at the NLODS wetlands. As the most conservative target cleanup level, the NYSDEC guidance value was initially considered as the appropriate target cleanup level for the NLODS. However, the NYSDEC guidance value of 0.111 mg/kg was not chosen because the NLODS RI/FS Contract Required Quantification Limit (CRQL) of 0.16 mg/kg for some PCB congeners was above the 0.111 mg/kg guidance value, thereby rendering the NYSDEC guidance value unsuitable for use at the NLODS site.

As a result of the 29 July 1992 telephone conference call with NYSDEC (NYSDEC, 1992a), a PCB target cleanup level of 0.5 to 1.0 mg/kg was determined for wetland sediments at the NLODS. E.C. Jordan Co. (1992c) proposed using the lower end of this range, 0.5 mg/kg, as the final PCB target cleanup level for the site's wetlands. This target cleanup level is in excess of the

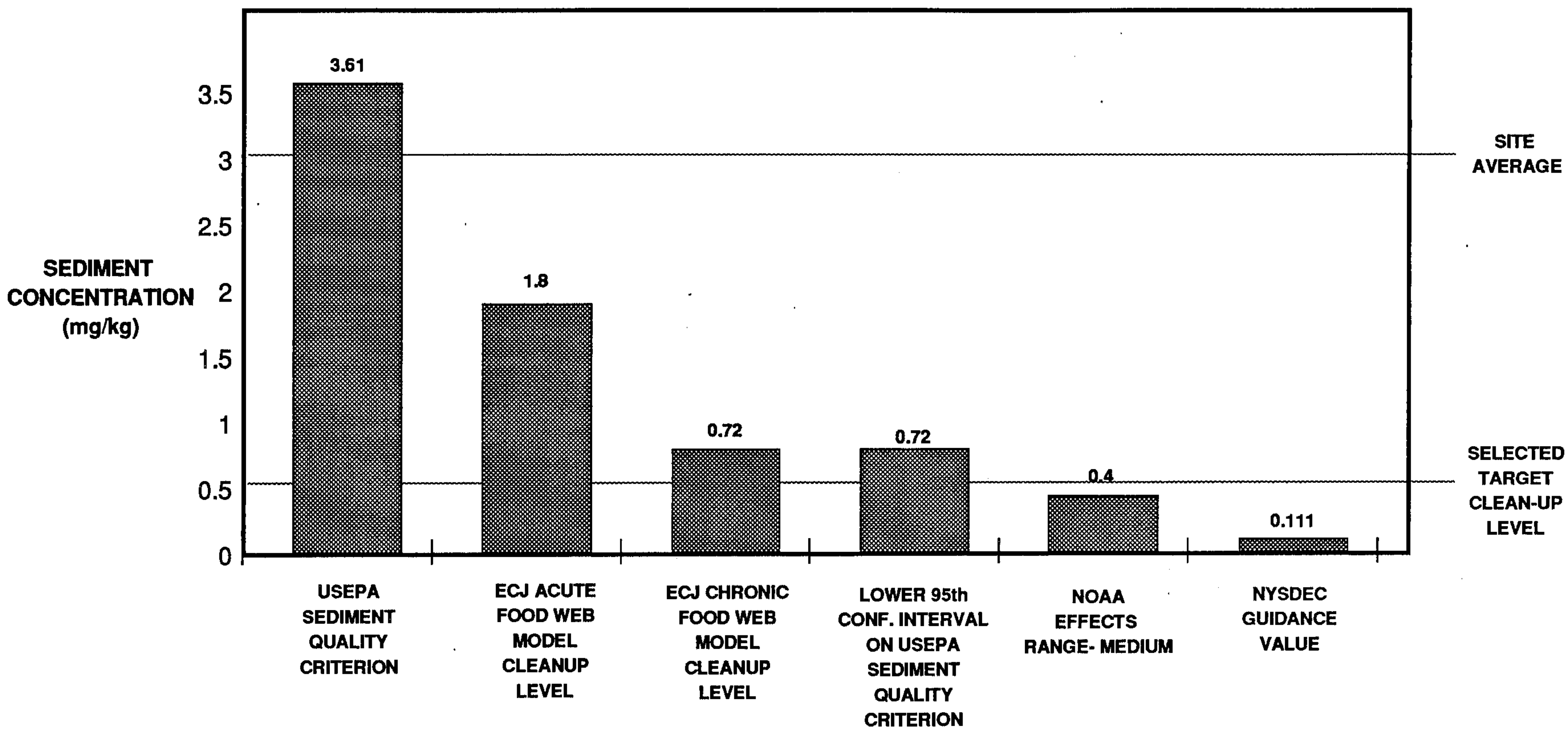
NYSDEC guidance value of 0.111 mg/kg and the NOAA ER-M; however, the proposed target cleanup level is less than the USEPA lower 95th percent confidence interval SQC, and the target cleanup levels from the Jordan food web model (Figure 10-1). Although the selected target cleanup level is above the NYSDEC guidance value, PCBs at concentrations between 0.16 mg/kg (the CRQL) and 0.5 mg/kg (the selected target cleanup level) were detected at only one sampling station; therefore, the majority of PCBs in excess of the CRQL will be treated through use of 0.5 mg/kg as the target cleanup level.

Approximately 0.8 acres of wetlands at the site contain PCB levels in excess of 0.5 mg/kg. Because PCB concentrations in excess of the NYSDEC guidance value will remain in wetland sediments following remedial cleanup, a long-term biomonitoring program will be implemented to monitor the impacts of residual PCBs on the resident biota (see Section 12.0).

Additional detail regarding final selection of the PCB target cleanup level at the NLODS may be found in E.C. Jordan Co. (1992c).

10.2 Organic Contaminants

VOAs detected in NLODS wetland sediments are co-located with PCBs. Source reduction of regions of the site's wetlands containing PCBs in excess of 0.5 mg/kg will remove known VOA contamination. However, if screening during the remedial cleanup identifies additional areas with VOA or SVOA contamination, these compounds will be monitored in the proposed long-term biomonitoring program (see Section 12.0).



POTENTIAL ALTERNATIVE PCB TARGET LEVELS

FIGURE 10-1
PCB TARGET CLEANUP LEVELS
NORTH LAWRENCE OIL DUMP SITE
RISK ASSESSMENT

E.C. JORDAN CO.

9212056D

One out of the ten wetland sediment samples analyzed for heptachlor contained this pesticide. This sampling station is co-located with the region of the wetland containing PCBs in excess of 0.5 mg/kg. Therefore, source reduction of regions of the sites wetlands containing PCBs in excess of 0.5 mg/kg will remove all known heptachlor contamination. However, if screening during the remedial cleanup identifies additional areas with heptachlor contamination, this compound will be monitored in the proposed long-term biomonitoring program (see Section 12.0).

10.3 INORGANIC CONTAMINATION

Inorganic COCs detected in wetland sediments have been compared to available standards and guidance values (Table 7-1). Maximum concentrations of copper, lead, iron, manganese, mercury, and zinc exceed NYSDEC guidance values.

Wetland sediments containing copper, manganese, and zinc in exceedance of their NYSDEC guidance values are co-located with PCBs. Source reduction of regions of the sites wetlands containing PCBs in excess of 0.5 mg/kg will remove all significant copper, manganese, and zinc contamination. Following PCB source reduction, the known residual concentrations of these three inorganic COCs will be less than their respective NYSDEC standards. However, if any additional inorganic contamination is detected during the remedial cleanup, these compounds will be monitored in the proposed long-term biomonitoring program (see Section 12.0).

d. To what extent will existing data and sampling locations be used?

e. What bioassay organism(s), sampling technique(s), assessment and measurement endpoint(s), etc. are most appropriately used for biomonitoring at this site, given project objectives?

f. What are the best biomonitoring methods for the site? Are *in situ* bioassessments or laboratory bioassays more appropriate for the Site? What combinations of studies best meets the requirements of NYSDEC?

g. What are the significant financial, spatial, or temporal constraints to be considered?

h. What Level of Effort, Quality Assurance/Quality Control (QA/QC), analytical techniques, sampling plan, etc. will be required to provide sufficient data to meet the long-term objectives of NYSDEC and other state or federal regulatory authorities?

Development of the BMWP will require a literature review and contact with a number of colleagues and authorities, including NYSDEC and the USEPA. The BMWP should conform to current USEPA and NYSDEC guidance relative to biomonitoring at hazardous waste sites. The BMWP should evaluate field equipment needs, availability and costs of any required biological supplies and assays, assessment endpoints, laboratory costs, QA/QC expenses, labor, field supervision, statistical considerations, etc. Biomonitoring reports should be prepared once or twice yearly for three to five years following completion of remedial activities in the NLODS forested wetland. Biomonitoring reports will provide critical information regarding the success of remedial activities at the NLODS.

12.1 NLODS Biomonitoring Objectives

Specific objectives of the recommended biomonitoring program at the NLODS should be incorporated into the BMWP. A primary objective of any biomonitoring activities at the NLODS is to provide a consistent, well-documented biological assessment. Duplicatable results will provide a basis for trend comparison over time. Baseline conditions must be established prior to commencing any remedial activities. Studies of both plants and animals should be considered at this site. Additional site-specific objectives of the NLODS biomonitoring program may include, but are not limited to, the following:

- Establish baseline ecological conditions at the NLODS, prior to commencement of any remedial or restoration activities

- Determine whether or not residual PCB and/or lead contamination is bioaccumulating in receptor species in the NLODS wetlands

- Determine whether or not PCBs are biomagnifying in ecological receptor species in the NLODS wetlands

- Determine whether or not exposure to lead and/or PCBs in wetlands sediments are resulting in population or community level impacts in the site's wetlands

- Determine whether or not exposure to lead and/or PCBs in the NLODS wetlands are resulting in an increased incidence of disease or other physiological disorders in ecological receptors in the NLODS wetlands

- Confirm that sediment toxicity related to lead and/or PCBs has been reduced or eliminated through implementation of remedial measures

- Determine whether or not physical disruptions of the wetland system at the NLODS have been successful in reducing overall risk to ecological receptors

- Establish baseline and ongoing trend conditions at a non-contaminated reference station, in order to identify any regional impacts that may be occurring

- Determine the relative toxicity and bioavailability of residual lead and/or PCBs in wetland sediments at the NLODS

12.2 POTENTIAL BIOMONITORING PROTOCOLS AND SCENARIOS

While specifics related to implementation, sequence, and timing of the NLODS biomonitoring program will not be developed until the BMWP has been prepared and approved, several protocols or biomonitoring scenarios are likely to be proposed at this site. These include bioassays, community impact studies, tissue contaminant burden studies, and physiological or anatomical studies. Several different biomonitoring techniques are likely to be required at the NLODS.

Established protocols exist for the majority of studies likely to be implemented at the NLODS.

Bioassays at the NLODS may involve controlled exposure of test organisms to whole sediments (or sediment pore water) under laboratory conditions to determine whether or not lead and/or PCB sediment contamination can induce adverse biological responses. Bioassays provide a quick and economical means to evaluate acute toxicity of a medium (NOAA, 1987). Baseline conditions should be established at the NLODS and at an un-contaminated reference site by conducting initial bioassay studies prior to initiating any remedial actions. Follow-up studies will be required at established milestone dates at the NLODS and at reference sites. Laboratory assays of NLODS sediments may include toxicological studies of algae (i.e., *Selenastrum capricornutum*), an invertebrate (i.e., *Daphnia magna* or *Ceriodaphnia dubia*), or the fathead minnow (*Pimephales promelas*). The BMWP should include considerations regarding the test organism(s), biological endpoint(s), exposure parameters, and confounding factors that may interfere with data interpretation (NOAA, 1987).

Community impact studies may be required to document field conditions at the site. Because the benthic macroinvertebrate community frequently reflects the overall ecological integrity of a wetland resource area, benthic community analyses can be used to detect impairments to aquatic life and to assess the severity of these impairments. Benthic macroinvertebrate communities are valid indicators of localized environmental conditions, and macroinvertebrate communities frequently reflect the effects of short and long-term environmental variations. Furthermore, examination of the macroinvertebrate community is relatively inexpensive when compared to alternative assessments such as toxicity testing or tissue analysis. A study of the benthic macroinvertebrate community at the NLODS may involve biosurvey and data analysis techniques consisting of three basic components: (1) examination of water quality and physical characteristics; (2) assessment of available habitat; and, (3) biosurvey of benthic macroinvertebrates. Baseline conditions should be established at the NLODS and at an un-contaminated reference site by conducting initial community studies prior to initiating any remedial actions. Follow-up studies will be required at established milestone dates at the NLODS and at reference sites.

Bioaccumulation and biomagnification of PCBs and/or lead in plant or animal tissues may need to be evaluated at the NLODS following remediation. Tissue contaminant burden analysis may provide information regarding those compounds that bioaccumulate and/or bioconcentrate in food chains. While contaminants in tissue may indicate exposure to bioavailable compounds, the absence of tissue contamination does not necessarily indicate the converse. Baseline conditions should be established at the NLODS and at an un-contaminated reference site by conducting initial plant or animal tissue contaminant burden studies prior to initiating any remedial actions. Follow-up studies will be required at established milestone dates at the NLODS and at reference sites.

The occurrence of physical or histopathological abnormalities in NLODS biota may also be used as an indication of the effects of contaminants. Although it is difficult to link observed effects with environmental contamination, particularly with mobile organisms, pathological abnormalities are known to be caused by lead and PCBs (USEPA, 1980c; Eisler, 1988). Skeletal deformities, lesions, tumors, fin erosion, and other histopathological abnormalities may be correlated with the presence of contaminated sediments at the NLODS. If these studies are to be conducted, baseline conditions must be established at the NLODS and at an uncontaminated reference site by conducting histopathological studies prior to initiating any remedial actions. Follow-up studies will be required at established milestone dates at the NLODS and at reference sites.

13.0 SUMMARY OF ECOLOGICAL RISK ASSESSMENT

This BERA:

- provides baseline risk for wetlands at NLODS
- provides a screening-level evaluation of actual and potential risks that environmental contaminants pose to the resident and migratory fish and wildlife receptors using wetlands at the NLODS
- updates the 1990 BERA at the NLODS
- re-evaluates PCB Target Cleanup Levels in wetlands at the Site
- evaluates alternative lead Target Cleanup Levels in wetlands at the site
- provides a recommendation for implementation of a long-term biomonitoring program at the NLODS

The wetlands adjacent to the site provide habitat for a variety of flora and fauna. These biota may be exposed to environmental contamination in wetland sediments. The two primary contaminants of concern at the NLODS are lead and PCBs. These two contaminants may be placing ecological receptors at the site at risk. Mercury contamination at the site may also pose a risk to ecological receptors.

Potential risk-based target cleanup levels for PCBs in wetland sediments range from a high of 3.61 mg/kg to a low of 0.111 mg/kg. Based on communications with NYSDEC and analysis of the various potential target cleanup levels, a wetlands sediment PCB target cleanup level of 0.5 mg/kg has been chosen.

Lead contamination in the NLODS wetlands is widespread. Remediation of lead contaminated soil in excess of 250 mg/kg (the NYSDEC limit of tolerance value) would result in substantial wetland alteration. Because the risks associated with habitat destruction may be equal to or greater than those associated with lead contamination, a recommendation to leave lead in excess of the 250 mg/kg NYSDEC guidance value has been made.

Residual lead, mercury, and PCB contamination may remain in the NLODS's wetlands following remedial cleanup; therefore, a long-term biomonitoring program is recommended in order to evaluate the effect of these contaminants in surface water, and sediments, on flora and fauna. Biomonitoring may include laboratory bioassays, benthic invertebrate community studies, contaminant tissue burden studies, and histopathological studies. All biomonitoring at the NLODS should be integrated with the wetlands restoration monitoring in order to provide essential information regarding the success of remediation at this site.

GLOSSARY OF ACRONYMS AND ABBREVIATIONS

ARARs	Applicable or Relevant and Appropriate Requirements
AWQC	Ambient Water Quality Criteria
BAF	bioaccumulation factor
BERA	Baseline Ecological Risk Assessment
BMWP	Biomonitoring Work Plan
BPHRA	Baseline Public Health Risk Assessment
BW	body weight
COC	Chemical of Concern
CRQL	Contract Regional Quantification Limit
ER-M	Effect Range - Medium
FS	Feasibility Study
HBA	Habitat Based Assessment
HI	Hazard Index
Jordan	E.C. Jordan Company
LC	Lethal concentration
LD	Lethal dose
μg/gC	micrograms per gram of organic carbon
mg/kg	milligrams per kilogram
μg/L	microgram per liter
NLODS	North Lawrence Oil Dump Site
NOAA	National Oceanographic and Atmospheric Administration
NWI	National Wetland Inventory
NYSBPWSP	New York State Bureau of Public Water Supply
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
OME	Ontario Ministry of the Environment
PCB	polychlorinated biphenyl
PCE	tetrachloroethene

QA/QC	Quality Assurance/Quality Control
RAGS	Risk Assessment Guidance for Superfund
RI	Remedial Investigation
RTV	Reference Toxicity Value
SCG	State Criteria and Guidelines
SQC	Sediment Quality Criteria
SVOA	semivolatile organic analyte
TBD	total body dose
TCE	trichloroethene
TCL	Target Compound List
TCLP	toxicity characteristic leaching procedure
TOC	total organic carbon
USEPA	United States Environmental Protection Agency
VOA	volatile organic analyte
WRS	Wetland Restoration Specification

ATSDR, 1988. "Toxicological Profile for Lead"; Agency for Toxic Substances and Disease Registry, U.S. Public Health Service, February 1988.

ATSDR, 1990. "Toxicological Profile for Manganese"; Agency for Toxic Substances and Disease Registry, U.S. Public Health Service, October 1990.

Baker, R.H., 1983. Michigan Mammals; Michigan State University Press; 642 pp.

Baudo, R., J. Giesy and H. Muntau, 1990. Sediments: Chemistry and Toxicity of In-Place Pollutants; Lewis Publishers, Inc., Chelsea, MI. 405 pp.

Birge, W.J. 1978. "Aquatic Toxicology of Trace Elements of Coal and Fly Ash", in J.H. Thorp and J.W. Gibbons (Eds). Energy and Environmental Stress in Aquatic Systems; DOE Symposium Series (CONF-77114); NTIS, Springfield, VA

Burt, W.H., 1987. Mammals of Michigan; Ann Arbor, MI, University of Michigan Press, 248 pp.

Conant, Roger, 1975. A Field Guide to the Reptiles and Amphibians of Eastern and Central North America; Houghton Mifflin Co.; Boston, MA; 729 pp.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe, 1979. "Classification of Wetlands and Deepwater Habitats of the United States"; U.S. Fish and Wildlife Service Report FWS/OBS-79/31.

DeGraaf, R.M., and D.D. Rudis, 1986. "New England Wildlife: Habitat, Natural History, and Distribution"; USDA Forest Service, Northeastern Forest Experiment Station, General Technical Report NE-108.

Dobberteen, R.A., 1990. "Analysis of Permitting Activity Involving Wetland Replication Projects in Massachusetts"; Department of Biology, Tufts University.

E.C. Jordan Co., 1990. First Phase Baseline Public Health and Ecological Risk Assessment, Prepared for the New York State Department of Environmental Conservation; February 1990.

E.C. Jordan Co., 1992a. Draft Remedial Investigation/Feasibility Study Baseline Public Health and Ecological Risk Assessment Report for the North Lawrence Oil Dump Site; Prepared for the New York State Department of Environmental Conservation; November 1992.

E.C. Jordan Co., 1992b. Draft Final Remedial Investigation Report for the North Lawrence Oil Dump Site; Prepared for the New York State Department of Environmental Conservation; December 1992.

E.C. Jordan Co., 1992c. Draft Final Feasibility Study Report for the North Lawrence Oil Dump Site; Prepared for the New York State Department of Environmental Conservation; December 1992.

Eisler, R., 1986. "Polychlorinated Biphenyl Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review"; U.S. Fish and Wildlife Service Biological Report 85 (1.7), 72 pp.

Eisler, R., 1988. "Lead Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review"; U.S. Fish and Wildlife Service Biological Report 85 (1.14), 134 pp.

Godin, A.J., 1977. Wild Mammals of New England; The Johns Hopkins University Press, Baltimore, MD.

Kenaga, E.E., 1973. "Factors to be Considered in the Evaluation of Pesticides to Birds in Their Environment"; in Environmental Quality and Safety. Global Aspects of Chemistry, Toxicology and Technology as Applied to the Environment; Volume 2, Academic Press, New York, NY; p. 166-181.

Kusler, J.A., and M.E. Kentula, editors, 1990. "Wetland Creation and Restoration; the Status of the Science. Volume I: Regional Reviews, and Volume II: Perspectives. United States Environmental Protection Agency, Environmental Research Laboratory, Corvalis, OR. EPA 600/3-89/ 038a.

Larson, J.S and C. Neill, editors, 1986. "Mitigating Freshwater Wetland Alterations in the Glaciated Northeastern United States: An Assessment of the Science Base." Proceedings of a workshop held at the University of Massachusetts, Amherst, September 29-30, 1986.

Long and Morgan, 1990. "The Potential for Biological Effects of Sediment-Sorbed Contaminants Tested in the National Status and Trends Program"; NOAA Technical Memorandum NOS OMA 52; National Oceanic and Atmospheric Administration, Seattle, WA.

Lowry, D.J., 1990. "Restoration and Creation of Palustrine Wetlands Associated with Riverine Systems of the Glaciated Northeast", in "Wetland Creation and Restoration; the Status of the Science", J.A. Kusler and M.E. Kentula, editors, Island Press, 1990.

Martin, A.C. et al., 1951. American Wildlife and Plants, A Guide to Wildlife Food Habits; Dover Publications , Inc. New York.

Newell, A.J., D.W. Johnson, and L.K. Allen, 1987. "Niagara River Biota Contamination Project: Fish Flesh Criteria for Piscivorous Wildlife"; Technical Report 87-3, Division of Fish and Wildlife.

National Institute for Occupational Safety and Health (NIOSH), 1985. "Registry of Toxic Effects of Chemical Substances"; NIOSH Publication No. 86-103, U.S. Department of Health and Human Services.

National Oceanic and Atmospheric Administration (NOAA), 1987. "Guidelines and Recommendations for Using Bioassessment in the Superfund Remedial Process"; Seattle, WA.

New York State Department of Environmental Conservation (NYSDEC), 1989a; "Habitat Based Assessment Guidance Document for Conducting Environmental Risk Assessments at Hazardous Waste Sites"; NYSDEC, December 28, 1989.

NYSDEC, 1989b. "Sediment Criteria", NYSDEC, December, 1989.

NYSDEC, 1990. "Ecological Communities of New York State"; NYSDEC, March, 1990.

NYSDEC, 1991a. "Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites"; NYSDEC, Division of Fish and Wildlife; June, 1991.

NYSDEC, 1991b. "Water Quality Standards and Guidance Values"; NYSDEC Division of Water, Albany, NY; November, 1991.

NYSDEC, 1992a. Telephone conference conversation between E.C. Jordan (Mr. John Bleiler, Mr. Norm Richardson, and Mr. Glenn Daukas) and NYSDEC personnel (Ms. Judy Ross, Mr. Richard Koppecicus, Mr. Douglas Hill, and Mr. Raymond Lupe), July 29, 1992.

NYSDEC, 1992b. Telephone conference conversation between E.C. Jordan (Mr. John Bleiler, Mr. Michael Murphy, Ms. Tracy Planinsek, and Mr. Glenn Daukas) and NYSDEC personnel (Ms. Judy Ross, Mr. Richard Koppecicus, Mr. Douglas Hill, and Mr. Raymond Lupe), December 15, 1992.

Peakall, D.B., and M.C. Peakall, 1973. "Effect of Polychlorinated Biphenyl on the Reproduction of Artificially Incubated Dove Eggs"; Journal of Applied Ecology 10: 863-868.

Persaud, D., Jaagumagi, Hayton, A. 1992. "Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario", Ontario Ministry of the Environment, Ontario, Canada, ISBN-0-7729-9248-7, August, 1992

Rand, G.M. and S.R. Petrocelli, 1985. Fundamentals of Aquatic Toxicology: Methods and Applications; Hemisphere Publishing Corporation, New York, 1985, 666 pp.

Sanders, O.T., and R.L. Kirkpatrick, 1975. "Effects of a Polychlorinated Biphenyl (PCB) on Sleeping Times, Plasma Corticosteroids, and Testicular Activities of White-footed Mice"; Environmental Physiology and Biochemistry 5(5): 308-313.

Terres, J.K., 1987. Audubon Encyclopedia of North American Birds; Published by Alfred Knopf, New York, 1109 pp.

U.S. Environmental Protection Agency (USEPA), 1976. National Conference on Polychlorinated Biphenyls, Conference Proceedings, USEPA Office of Toxic Substances, EPA-560/6-75-004. 471 pp.

USEPA, 1980a. "Ambient Water Quality Criteria for PCBs"; Environmental Criteria and Standards Division, Washington, D.C. EPA 440/5-80-068.

USEPA, 1980b. "Ambient Water Quality Criteria for Mercury"; Washington, D.C.; Report No. PB81-117699.

USEPA, 1980c. "Ambient Water Quality Criteria for Lead"; U.S. Environmental Protection Agency, Washington, D.C. Report No. PB81-117681; EPA 440/5-80-057, October, 1980.

USEPA, 1984. "Ambient Water Quality Criteria for Copper"; U.S Environmental Protection Agency; EPA 440/5-84-031, January, 1985.

USEPA, 1985. "Environmental Profiles and Hazard Indices for Constituents of Municipal Sludge: Polychlorinated Biphenyls"; U.S. Environmental Protection Agency, Office of Water Regulations and Standards, Washington, D.C.

USEPA, 1986. "Hazard Evaluation Division Standard Evaluation Procedure: Ecological Risk Assessment"; Office of Pesticide Programs; EPA 540/9-85-001; Washington, D.C.

USEPA, 1988a. "Interim Sediment Criteria Values for Nonpolar Hydrophobic Organic Contaminants"; Office of Water Regulations and Standards; SCD No. 17; Washington, D.C.

USEPA, 1988b. "Recommendations for and Documentation of Biological Values for Use in Risk Assessment"; PB 88-179874, EPA 600/6-87-008, Washington, D.C.

USEPA, 1989a. "Risk Assessment Guidance for Superfund: Environmental Evaluation Manual"; Volume 2; EPA/540/1-89/002; December, 1989.

USEPA, 1989b. "Ecological Assessment of Hazardous Waste Sites: A Field and Laboratory Reference"; Environmental Research Laboratory, Corvallis, Oregon; USEPA 600/3-89/013.

USEPA, 1990. Reducing Risk: Setting Priorities and Strategies for Environmental Protection; Science Advisory Board SAB-EC-90-021.

USEPA, 1991, 1992a, 1992b, 1992c. "ECO Update"; Volume 1: Number 1, September, 1991; Number 2, December, 1991 and Number 4, May, 1992; Publication 9345.0-051.

20

20

STATE OF NEW YORK

NEW YORK DEPARTMENT OF ENVIRONMENTAL CONSERVATION

DEC PUBLIC HEARING
NORTH LAWRENCE OIL DUMP SITE
REMEDIAL INVESTIGATION/FEASIBILITY STUDY
AND PROPOSED REMEDIAL ACTION PLAN

APPEARANCES:

Ray Lupe
NYSDEC Division of Hazardous Waste Remediation

Douglas Hill
NYSDEC Division of Hazardous Waste Remediation

Glenn Daukas
Project Manager
ABB Environmental Services

John Bleiler
EC Jordan Company

Tracy Planinsek
EC Jordan Company

Judy Ross
State Division of Fishing and Wildlife

PUBLIC MEETING,

held at the North Lawrence Fire Hall, North Lawrence, New York, on the 10th day of February, 1993.

ACC-U-SCRIBE REPORTING SERVICE
Tracie A. White
Court Reporter, Notary Public
11 Main Street
PO Box 762
Canton, New York 13617
(315) 379-9216

I N D E X

(The Hearing commenced at 7:21 p.m.)

MR. LUPE: Good evening. I'd like to start the meeting for this evening. I wanted to wait a few minutes because there was a conflict of the press announcements for the meeting. Someone was told it was 7:30 at the Town Hall, and I guess court is going on there. So, 7:00 in the fire hall. So, we wanted to give you people a few minutes to arrive. I apologize for any inconvenience.

My name is Ray Lupe, I'm with the New York State Department of Environmental Conservation, Division of Hazardous Waste Remediation in Albany, New York. When you came in, there was a sign-up sheet and some handouts. If anyone hasn't gotten a handout, there are extras in the box over there.

The purpose of tonight's meeting is to discuss the findings of the Remedial Investigation/Feasibility Study at the North Lawrence Oil Dump Site, and the study is to determine the types and extent of contamination at the site and evaluate the appropriate remedial actions. The other purpose of the meeting is to elicit comments of the State's proposed Remedial Action Plan. This is the plan that sets forth the State's selected remedy or proposed selected remedy and the basis for that determination. The public commentary runs through March 2nd, 1993. We will receive comments here tonight. People can call us or send additional comments to our office in Albany, New York. Doug will give you the address, and I believe it's in the handouts, also.

At the conclusion of the public comment period, the State prepares what they call a Record of Decision, which takes into consideration any significant public comments that may have an impact on our selection of remedy, and that is presented in a Record of Decision document that's released publicly, along with the response to most significant questions that arrives from the meetings through the public comment period.

Also tonight with me, I have several people from the Department of Environmental Conservation and our consultants. Doug Hill is a project manager for the State, Judy Ross is with the State's Division of Fishing and

Wildlife. We have John Bleiler, Tracy Planinsek, Glenn Daukas, who are consultants with EC Jordan and ABB Environmental.

The agenda for the meeting tonight will be a series of presentations, which will last about 30 minutes, at the conclusion of which, we will ask for questions and any statements that the public may have. We will be willing to stay here as long as you would like to discuss the project. If there are other issues that are not properly related and you would like to speak with us about it after the meeting, go ahead and we'll see how far it goes. Again, as I said, at the end of the public comment period, which is March 2nd, 1993, we'll issue our Record of Decision. I'd like to turn the meeting to Doug Hill who will begin the presentations, and I'll take a seat there and write down some of your questions.

MR. Hill: Before I get started, I just wanted to -- I think everybody has a copy of this yellow folder. It's just, basically, some information and a place for you to keep any other paperwork you might get for this site to keep it organized. The information that specifically pertains to the North Lawrence Oil Dump Site is three pages that are on the left, basically, the public meeting agenda which Ray has just described, and also an information sheet which describes the situation at the site, and an explanation of how you can comment on the proposed Remedial Action Plan. Again, those are on the left. There are some documents available at the North Lawrence Town Hall for your view there. There is a document repository there.

We are going to be presenting the findings of the Remedial Investigation/Feasibility Study reports. There's also a copy of the proposed Remedial Action Plan. There may be a couple copies of the proposed Remedial Action Plan floating around in the audience, but -- anyway, you can go to the document repository in the Town Hall and review these documents in greater detail if you've got some questions about this.

The presentation is really a summary of all of the findings, and I'm just going to do a little bit of a description of the site location, the background and the history. And then EC Jordan representatives are going to go into some more of the specific details as far as the findings of the Remedial Investigation and the specific details of the proposed remedy.

I hope everybody is going to be able to see this. This is just a site location map. I'm sure everybody knows where it is. I can give you a little better understanding of where it is. It's located about two miles -- two miles east of the North Lawrence Township, and it's just off the McAuslen Road, back in this area (pointing). It's adjacent to a closed municipal landfill dump area. The lagoon, being in this area (pointing), is approximately -- excuse me, I actually have a little bit better detailed photo that's a blowup, now that you know the general location. The dump area was up in this area (pointing). I'm sure Glenn has a very similar map that he'll be showing you a little later.

This is the general area of the site that we're going to be dealing with. The North Lawrence -- the lagoon is right here (pointing), in the middle, it lays about 600 feet long by 60 or 65 feet wide. It's located immediately adjacent to a 150-acre New York

State DEC regulated wetland. The lagoon received waste, waste oil and oil sludges in the mid to late 1960's. The lagoon, itself, may have been used as a gravel pit. It's shown on some old topo maps as that way, but in the mid to late 1960's, it was bermed around the sides, elevated soil contained the waste, and liquid waste was disposed of along with this access road that you see. Part of the problem that we're going to be discussing tonight is the migration of the contamination into the adjacent wetland area, which, again, Glenn will get into further detail.

The site was really observed by the New York State DEC in 1980 where oil stains were observed on the vegitation in the area, as well as evidence of migration into the wetland I've just discussed. At that time an engineering investigation -- Phase One Engineering Investigation, as it's called, was conducted in 1985, it was completed, and that showed -- PCBs were determined to be in the lagoon area. One hundred parts-per-million was what one of the samples were. That, with some other information that's in the 1985 Phase One Report, included a recommendation for further additional investigation at the site, which is where EC Jordan comes in.

In 1988, the contract was signed with EC Jordan to conduct the RIFS -- Remedial Investigation/Feasibility Study is what RIFS stands for -- with field work in 1989, 1991 and 1992.

I'll turn this meeting over to Glenn now to go over the findings of the RIFS, which was completed this December.

MR. DAUKAS: Again, I'm Glenn Daukus and I'm with EC Jordan Company, ABB Environmental. What we did is, as far as the RIFS goes, we broke it down into three segments, one being the Remedial Investigation, which is the field work, the characterization of the site and contaminants. After that you go -- we went into a risk assessment, assessing the risks of the contamination that we did detect at the site. And then the third phase would be the Feasibility Study or the screening of potential alternatives for dealing with the contamination that had been detected at the site. John Bleiler will be introducing the risk assessment, and Tracy Planinsek will be discussing the Feasibility Study.

What we have -- to just briefly to go over, again, some of the things that Don had -- I'm sorry, Doug discussed a little bit. What we did is, we broke down the site into two smaller areas. Again, we have the lagoon, the area of the local, the town landfill, the haul road going in and out through the berm, and the adjacent wetlands to the lagoon. We also have the general surface water flow of -- in the wetlands arching around and coming back out through a series of beaver dams and crossing McAuslen Road again and heading out. This is sort of the outflow area of the wetlands. We took some samples down there to get a general idea of some background or quote, unquote "unaffected" areas to compare with some of the samples we were collecting in the general area closer to the lagoon.

The objectives of our RI were to characterize the geology and hydrogeology or the groundwater flow direction and rate of flow, and to characterize the nature and the distribution of potential contaminants associated with the lagoon. To do that we installed -- we conducted a number of different explorations beginning with a Geophysical Survey, which is a way of detecting -- looking underneath the ground without actually going and digging up or looking in wells. We started with Seismic Refraction, which is a technique used to determine the depth to the bedrock. It gives you an understanding of the types of soils you may encounter as you're drilling down, and also gives you a rough interpretation where the groundwater level may be. Then we have a Magnetometer Survey, which is, basically, a large metal detector we used to determine the exact boundaries of the town landfill.

The next thing we did was, we were to install eight Piezometers. A Piezometer is basically a rough, very small monitoring well, which is put into the ground with the express purpose of just monitoring the water level at the site. What we did on the eight, five were shallow to a depth of approximately 15 feet, three were deep to a depth of approximately 30 feet. Again, we used these for determining the water levels. From the water levels we can get the approximate flow direction of the water. That allows us to better locate the monitoring well where we will be getting our analytical data from. In addition, while we installed the eight Piezometers we selected some analytical soil samples to get an idea of what the background or unaffected subsurface soil conditions may be.

The next thing we did was install 41 Soil Borings within the lagoon boundaries. These Borings were ranged from depths of approximately 10 to 16 feet. They were sampled continuously, which is basically a two foot sample core collected every two feet during the drilling process. Each one of those samples was field screened on site for PCBs and total petroleum hydrocarbons for basically petroleum content, oil and grease in the content of the soil. That data was then used to determine -- to select 58 analytical samples which were sent out to a laboratory and were analyzed for a variety of inorganic and organic constituents that would be used for the characterization of the site. In addition, the major goal of the Soil Borings was to characterize the lateral and horizontal extent of contamination within the lagoon. We'll be getting into that a little bit later.

We also installed a total of 16 monitoring wells with the help of Piezometers for the location of the monitoring wells in and around the lagoon. Five of those monitoring wells were deep with an approximate depth of 40 feet and 11 were shallow with an approximate depth of 10 feet. Three of the shallow monitoring wells were located around the perimeter of the town landfill to determine whether the landfill was a potential contributor to any contamination that we found around the lagoon. The groundwater was also collected and analyzed, again, for a variety of organic and inorganic contaminants.

We conducted Aquifer Permeability Testing, which is basically measuring the rate of groundwater flow through that soil there, where the wells are installed into. So, you're just measuring the rate of the flow through the ground. We also collected five Surface Soil Samples. They were analyzed for PCBs. We -- the reason for those were to determine whether during the dumping or any subsequent vehicle traffic in and out of the lagoon on the haul road, whether contamination had been possibly spread out on the surface soil and around on the road area.

And then continuing on, we collected 16 Surface Water Sampling Locations -- samples. They were collected in and around the end of the lagoon and also in that area where the outflow comes out. During the drilling process -- I'm getting ahead of myself, I'm sorry. We also collected 87 Sediment Samples throughout the lagoon, the wetland area, and that would determine the vertical and lateral extent of any contamination in the wetlands. During the drilling we collected a number of air monitoring samples to determine whether there was any potential health effects for the workers on site or the near public for any type of particulates coming up into the air that may be contaminated and inhilation.

During the program we also collected 13 Biota Samples. Biota Samples ranged everywhere from cattails, tadpoles, fish, earthworms, a number of small rodent-type animals. Those were used and analyzed for PCBs and were used in the risk assessments, which John Blieler will be getting into a little bit later.

Last but not least, we also collected 17, what we call Treatability Samples. Now, these were samples to test the efficiency of the treatabilities of Solidification/Stabilization, Solvent Extraction and Thermal Desorption. What we wanted to do was to take some samples to analyze how effective these treatment or potential treatment alternatives are. So, we needed to analyze the sample prior to the treatment, and then we could analyze it again after the treatment, therefore, getting an idea of how effective that treatment is.

And then, in the end we conducted a survey of the area, which a lot of our basemaps that you'll be seeing are based off of, and the location of all our samples. Based on the information that we generated, what we found was that we were dealing with three different types of soil matrices we have in the lagoon. Approximately the top four feet was a very heavily oil-soiled sludge that transitioned between four to six feet into natural, somewhat non-contaminated natural soil, in addition to the soil that we were collecting out of the

Piesometers, natural soil. Then we have the sediment that we were collecting into the lagoon -- I'm sorry, the wetland areas. What we found was that the lagoon was primarily contaminated with PCBs, lead, trichloroethene, tetrachloroethene, which are, basically, solvents, chlorinated solvents or degreasers. What we've also found was that all of those three wastes are common contaminants of waste oil, and it's not unusual that you find those types of contaminants with waste oil deposits.

What we have here is a three dimensional view of the lagoon starting with -- well, let me do it this way -- starting with zero to two feet, two to four feet, four to six feet, six to eight feet. The colors ranging from the -- I guess you might want to call them the warmer colors -- are the higher concentrations ranging down to the green, which is below the detection limit. And what this one we can see here is -- as all my notes get blown away -- we're seeing basically that, again, the contamination of the highly contaminated levels are contained within the top six feet, four to six feet within that sludge layer, and then gradually decrease --

actually rather significantly decreases as you head down. We're also seeing a pattern where the contamination of PCBs are located on either end of the lagoon and very small amounts of contamination in the middle of the lagoon where there is actually a road that crosses -- crosses the lagoon there. So, we're seeing high concentrations of PCBs on either end, with the depth down to about six feet with a couple of smaller -- you see the bluer hits (pointing) down to six feet to eight feet deep to ten feet. Those hits are rather low in the concentration range.

We move onto what are the PCE or TCE, the solvents that we were detecting. Again, we're seeing concentrations in the north and the south ends of the lagoon, not the high concentrations in the center. We're seeing them with depths within four to six feet and then decreasing as we go down with the exception of a couple of minor hits below the six foot level, very similar to what we saw with the PCBs, same distribution.

The last one that we'll look at will be lead. The concentrations of lead -- a little bit contrary to the solvents and the PCBs seem to be more concentrated in the two to four foot range and drop out rather significantly below the four to six, six to eight as you head down.

After we were finished looking at the lagoon, what we did is went down into the wetlands. This is a summary of our Sediment Samplings and Surface Water Sampling locations. The primary contaminant of the surface waters were inorganic. We did not see the PCBs or the solvents in the water. However, we did not necessarily expect to because the solvents are highly volatile and evaporate off very rapidly, and the PCBs, again, are highly insoluble, so you would not -- they would not tend to dissolve and become a solution in the water.

What we found was that the major -- what we wanted to concentrate our efforts on was not in the surface water, but in the sediment. What we see here is a -- I'll move it up a little bit -- distribution of the PCBs in the sediment. And what we are seeing is that the greater concentrations of contaminants in the sediments were located in a vicinity approximately within 300 feet of the end of the berm of the lagoon.

300 feet of the end of the berm of the lagoon. The primary contaminants in that area consisted of -- very similar to the contaminants that were found in the lagoon, which were the lead, the solvents, the PCBs and some mercury.

The lead moved on out -- seemed to migrate further out than the rest of the contaminants. And as we moved out further away from the lagoon, the concentrations of the other materials, other contaminants seemed to drop off, and the lead seemed to prevail a little bit more. What we see also is, again, some higher concentrations of lead in and around the end of the lagoon, and then it decreased in concentration as we moved away from the lagoon in the direction of the surface water flow out all the way around. We are seeing some low levels of lead out in this area (pointing). Again, the general pattern of it is in the direction of the surface water.

So, what our determination is, is that we are seeing high concentrations in the area near -- adjacent to the end of the lagoon with a decrease in concentration of contaminants in the direction of surface water flow as you move out beaver dams and the outflow of the lagoon. And the idea for that is, is that during high season flow, high season water, you'll have water flowing out of the lagoon over the berm into the wetlands bringing contaminated sediment with it. In addition, we believe that there was also, because of the high concentration adjacent to the lagoon, that there was some potential for direct dumping, trucks driving up to the end of the berm and actually dumping it into -- maybe sometimes dumping it into the lagoon, sometimes dumping it into the wetlands. And that surface water flow is the general mechanism for the distribution of the contamination out away from the lagoon and the sources into the wetlands.

The groundwater flow generally flows -- let me use a marker here -- in an easterly direction. We did get a detect of some of the solvents in one monitoring well, which is located in this area. We installed another monitoring well down gradient of it or downstream, you might want to say, of that where we did not get any detection of it. We were not surprised because, as before, we discussed the solvents seemed to be concentrated in this end of the lagoon and down at this end of the lagoon (pointing). So, it's not uncommon that we might find some of the contamination in the groundwater migrating with the direction of flow.

So, that basically concludes a rough scenario -- synopsis of our -- of our remedial investigation. We did not detect any PCBs or any particulates in the air while we were doing our air monitoring during the drilling program. So, now that we know exactly what we have as far as the distribution and types of contaminants, the next thing we need to ask ourselves is what does this mean to you and I and the risks to you and I and to the environment? So, then we go into the Risk Assessment to determine what those potential risks may be, and that's why I'm going to turn it over to John Bleiler.

MR. BLEILER: Thank you, Glenn, and thanks everybody for coming out tonight. Again, for the record, my name is John Bleiler, and I'm with the Risk Assessment Team at EC Jordan, ABB Environmental. Before I get going here, I thought I'd just define a few terms. I'm not sure if people are familiar with the term Risk

Assessment. This is sort of a textbook definition of the term, "A qualitative and/or quantitative appraisal of actual or potential effects of a hazardous waste site on ecological or human receptors." As I'll be discussing here in the next ten minutes or so, we did both a qualitative and a quantitative appraisal of the North Lawrence Oil Dump Site. We did evaluate both actual and potential effects, actual effects through examining the tissue levels of Biota, for instance, potential effects through a variety of modeling tools. And we also conducted two separate Risk Assessments, an ecological and a public health Risk Assessment.

As Glenn just mentioned, Risk Assessments could be a useful tool to provide a linkage between the site characterization, the extent of the contamination and -- which is sort of defining the problem -- and actually fixing the problem, Feasibility Study, evaluating various alternatives. So, Risk Assessment tends to be a bit of a hinge between these two phases of the study. We can help direct data collection activities, for instance, the extending of the study area beyond the lagoon into the wetlands as a high-value wetland, forested wetland with quite a bit of wildlife habitat with a diverse plant species assembly, so we can help direct the data collection activities.

We can evaluate the data to determine if a problem does exist, are humans or ecological receptors potentially at risk from environmental contamination at the site. We can help direct solutions to the problem, which again, you'll hear about later through the Feasibility Study and the evaluation of various alternatives.

What I'll be discussing here was done in compliance with the New York State DEC and also according to US EPA guidelines. So, it's a fairly standard Risk Assessment using the tools of the trade, as they are. And lastly, Risk Assessment is a pretty good tool to address citizens' concerns and to try to communicate what actually the environmental contamination at the site might mean.

One last sort of a general slide, and then I'll get into more specifics at the North Lawrence site. This, again, just sort of presents a textbook process of a paragon of Risk Assessment. The hazard identification is typically the first thing that's done. Glenn discussed the hazard identification, lead, PCBs, some volatile organic compounds, mercury, and so forth. In order for there to be risk, you need to both have an exposure scenario, people have to be exposed to the hazard, animals have to be exposed to the hazard, and also it has to be toxic. We know that PCBs are very toxic. They're a man-made chemical that's no longer in use. They have been shown to have quite a good deal of adverse affects on fish and wildlife species and on human beings.

Lastly, what we do in Risk Assessment is we take this exposure assessment, combine it with the toxicity assessment and form a Risk Characterization. Is there actually a problem at the site? So, again, that's just sort of a general background on the Risk Assessment process.

At the North Lawrence site, we did, again, two Risk Assessments, a Human Health Risk Assessment and an Ecological Assessment. I'll present the results of the Human Health or the Public Health Assessment first and then get into the Ecological Study. The Ecological

Assessment, again, addresses the question, does contamination, environmental contamination at the site of the North Lawrence Oil Dump Site have the potential to cause adverse short- or long-term affects on human beings?

The public health risk assessors looked through a variety of chemicals ranging from several organic compounds up at the top, PCBs and a variety of inorganic compounds. For now, note the asterisks adjacent to a couple of the compounds in this list, PCBs and lead. These are compounds that, as Glenn described earlier, are widespread at the site and are present in relatively high levels, and, again, from my perspective, are known to be environmental contaminants that cause concerns for human beings and for ecological receptors.

The Public Health Risk Assessment at this site was conducted through some Computer Modeling Techniques. Primarily, the nature of the study was to try to make it as conservative as possible to sort of evaluate a worse-case scenario. Some of the assumptions that were made in the Public Health Assessment were that a child, rather than an adult, would be the human being who could be exposed to contamination at this site. Children are known to be much more susceptible than adults to the affects of environmental contaminants. The scenarios that were created typically involved a child trespassing at the site, hunting, fishing, catching frogs, this sort of thing at the site, and exposing he or she to environmental contaminants through accidental ingestion of soil sediments, and also through thermal exposure, getting covered in mud and sediments and so forth from the site. A couple more conservative assumptions that were made in the Human Health Risk Assessment was that a child would be exposed at least ten times a year at the site over the course of a ten-year period. And lastly, that each time the child is exposed, that he or she would be exposed to the maximum amounts of concentration of contaminants at the site. So, again, these, from a Risk Assessment perspective, had to be very conservative assumptions.

The results of the Public Health Risk Assessment indicated that there is basically no risk to human beings from environmental contaminants at the site. Again, you will recall that we did use some conservative assumptions. Primarily, the lack of risk at the site is due to the remote location and limited use -- limited access at the site from a human being's perspective. There aren't really any residences near the site, people aren't drinking groundwater and so forth. However, the risk assessors did make some recommendations that, again, even though there is no public health risk from the site, that institutional controls might be appropriate for the North Lawrence property, for instance, fencing the lagoon area, posting the site, putting signs up so that people are aware that there is environmental contamination in the region. And lastly, if land use patterns do change in the area, reevaluate the risk. If people do, for whatever reason, move closer to the lagoon, it may be necessary to reevaluate the risk.

So, that's the summary of the Public Health Risk Assessment. Again, the second assessment that was done out here was an Ecological Assessment. As you heard earlier, the wetland adjacent to the site is extensive, over 150 acres in size, providing quite a bit of wildlife habitat. And the Ecological Risk Assessment at this site tended to be more broad based, looking at the entire wetland, looking at balancing the habitat at the site with the environmental contamination and the risks that are associated with the contamination. Ecological Risk Assessment can involve looking at individual organisms, a frog or a raccoon, for instance. The population of organisms, all the frogs, all the raccoons in the wetlands at the site were included in an ecological community in this case, cattails, as Glenn mentioned earlier, some of the plants at the site, amphibians, reptiles and so forth. We, for an Ecological Assessment, used a similar list of chemicals of concern for the wetlands of the lagoon. Again, several organic contaminants -- note the asterisk adjacent to PCBs and the asterisk adjacent to mercury and lead, and a variety of inorganic contaminants. The asterisk, once again, signifies those compounds that were present at relatively high concentrations at the site, widespread in both the lagoons and the wetlands -- the lagoon and the wetlands, and known to be contaminants of concern.

For the Ecological Risk Assessment, we used several different techniques to evaluate site risk. We used -- that doesn't show up very well, does it? I'm sorry about that. We used Computer Food Web Modeling, similar to what was done for the Public Health Risk Assessment. And through the Food Web Modeling, we evaluated the effects on Aquatic Biota at the site, fish species, aquatic invertebrates, semi-terrestrial or semi-aquatic, fish and wildlife species, for instance, a muskrat, a raccoon, frogs and so forth. And lastly, terrestrial organisms, foxes, red-tailed hawk, some small rodents, mice.

We also looked at some tissue sampling and analysis, as Glenn mentioned earlier, primarily from the lagoon. The organisms that were examined ranged from several plants, primarily cattail, species to turtles, tadpoles, frogs, earthworms and, again, a small mammal, the white-footed mouse.

And lastly, for the Ecological Assessment, both the US EPA and New York State have a variety of criteria that are considered protective criteria. If that environmental contamination exceeds that criterion point, there may be a problem. So, we compared the actual concentrations of contaminants at the site to these protective concentrations that the state and federal agencies provided us with. In contrast to the Human Health or Public Health Risk Assessment, again, no current or foreseeable problems to public health in this site. We did find some ecological risk. The surface water contamination was not a significant problem, as Glenn stated earlier. The bulk of the surface water contamination was probably due to sediments suspended in the surface water rather than contaminants that are actually in the water itself.

So, although surface water wasn't the problem in the lagoon and in the wetlands, the soils, the sludge in the lagoon and the wetland sediments did have high levels of lead, PCBs and mercury that may cause Risk Ecological Receptors. These three compounds exceeded state and federal criteria, protective criteria. They were found in a variety of the Biota that we analyzed the tissues for, and the Food Web Model also predicted risk from these compounds.

So, the summary of the Ecological Risk Assessment, again, indicates that there may be some problems to Ecological Receptors of the site. Based on that conclusion, several recommendations were made. The first recommendation is that, again, it is a high value wetland resource area out there, a lot of wildlife use. And from the visual appearance, it looks like a pretty healthy system. Any removal of contamination from the site should balance the environmental destruction, the habitat loss that would occur from removing the contamination with the benefits that would occur from the removal of contamination. So, there's a bit of a cost-benefit analysis that we recommend should be considered.

If wetlands are altered in the course of cleaning up the site, we recommend that the wetlands should be restored in compliance with all local, state and federal guidelines. And we also recommend that a long-term bio-monitoring program should occur at this site. We know that as of today, if you go out there and analyze earthworms, cattails and so forth, you will find

PCBs and lead in very high levels of these organisms. Following the cleanup, we should go back and test the organisms again over the course of several years to see if, indeed, the cleanup is working, if the contaminant levels of these organisms are getting reduced.

And lastly, in conjunction with the Feasibility Study people, we helped develop cleanup goals. The Feasibility Study that you'll hear about next, again, presents the various remedial alternatives and the proposed recommendations to clean up the site and to reduce the ecological risk. So, with that, I think I'll turn it over to Tracy.

MS. PLANINSEK: My name is Tracy Planinsek, and I'm also with EC Jordan. And as John said, I'd like to discuss the findings of the Feasibility Study with you. Based on the results of the Remedial Investigation and the Risk Assessment that was conducted at the North Lawrence Site, a Feasibility Study was conducted in order to evaluate remedial alternatives for the NYLOD, the North Lawrence Site.

One of the first steps in the FS process is to identify remedial objectives for the site, that form the basis for selecting remedial alternatives for the North Lawrence Site. With the conceptual objectives towards the site include selecting a remedy that will prevent or mitigate the release of contaminants to the environment, reduce risks to human health and the environment, and also reduce the volume, toxicity or mobility of contaminants at the site.

Cleanup goals are then established which will not only meet the remedial objectives of the site, but also reduce any risk associated with contaminants that are detected at the site. Cleanup goals -- I'm not getting these on here very well. Cleanup goals were established for the lagoon, sludge and soils based on New York State criteria for soils. Those criteria, being protective of groundwater quality and in the lagoon area levels, were established for PCBs with selected volatile contaminants, solvents that were detected there and lead.

Cleanup objectives were established for PCBs in the wetland area, for sediments in the wetland area based on the Ecological Risk

Assessment that John just spoke to you about, and for mercury based on a New York State sediment criteria that's protective of the environment.

So, based on these cleanup goals that were established for the site, this -- I think it can be seen fairly well -- this is the approximate horizontal extent of excavation that would be required in the lagoon area, which is this area in here (pointing), and the wetland area. This is the horizontal extent of contaminants that were detected that exceeded the goals that I just presented to you.

The vertical extent of contamination in the wet -- excuse me, the lagoon area, excavation to a depth of approximately four feet throughout most of the area, will get any contamination that was detected above the levels with the exception of this kind of northeastern area up here (pointing). I don't know if you remember Glenn's discussion. There was some solvents that were detected at rather high concentrations at depth. You'll probably have to go down around eight feet, and then in this area of the lagoon, we may have to go a little bit deeper. In the wetland area, we're assuming that a depth of -- excavation to a depth of one foot will remove any contamination above the levels that we discussed. This extent of excavation is based on data that we currently have, and when we would actually go into the field to begin remediation of the site, this -- the extent of excavation would be confirmed -- would be a confirmation sampling to make sure that we remove any of the sludge or soils or sediments that exceed criteria in those areas.

Remedial alternatives were then developed that would be capable of meeting the response objectives and meeting the cleanup goals that were identified for the site. We identified six alternatives, the first being a Minimal Action Alternative, which involves no treatment of the waste, just an alternative that's carried through in order to provide a base line to compare other alternatives to.

The second alternative, On-Site Solidification/Stabilization, is a technology where you mix an additive with the waste, an additive being something like Portland cement, lime, kiln dust, something along that line, that forms a product that physically solidifies the contaminants in a solidified mass. The stabilization aspect of it is, more or less, a chemical fixation or a chemical modification that gives the material -- or puts the material in a least toxic or mobile form. Once the sediments from the wetland and the sludge and the soils from the lagoon are excavated, they would be solidified, stabilized on site and then that treated material placed back into the lagoon area and a low permeable cap placed over the top of it.

The second alternative that we looked at on site was On-Site Incineration and Solidification. And incineration, probably most of you are familiar with, is a combustion process. It destroys the organics that are in the waste. So, you would incinerate the sludge and the soil. And the final end product, the treated residuals, would still contain high levels of lead. Incineration only would destroy the organics. It would have no affect on the metals in the waste. And for that reason, we would then solidify the treated residuals so that the lead would be tied up and not reach that the lead would be tied up and not reach into the groundwater. That treated solidified material would then be placed back into the lagoon, and, again, covered with the cap.

The fourth and fifth alternatives, Solvent Extraction and Low Temperature Thermal Desorption, are similar in the fact that they are both separation technology. They physically separate the organics from the contaminated waste. The Solvent Extraction technology uses a solvent to extract PCBs and volatile -- PCBs and solvents from the waste and literally separate it, separates it so you have a concentrated liquid that would be transported off site for treatment. And you're left, again, with a treated residual that still contains lead, because neither one of these technologies will treat the metals, they only treat the organics.

And so, again, the treated residual would be solidified, placed back in the lagoon area and covered. The Low Temperature Thermal Desorption removes the organics by exposing the contaminated material to heat, and then the organics are vaporized, condensed and then, again, you have a concentrated liquid that is residuals that still contain lead are solidified and placed back on site.

The last alternative, Off-Site Disposal, is just that. We would go in, excavate all of the contaminated material, transport it off site and put it in a permitted landfill off site and then refill it with clean backfill.

So, those are the alternatives that we evaluated. And there are seven evaluation criteria that we used in order to look at the alternatives and try to choose the alternative that would best meet the goals and the objectives of the site cleanup. We'd like to select or need to select a remedy that's going to protect human health and the environment and comply with all state and federal standards, be effective in the long term. We want something that's going to last, reduce the toxicity, mobility and volume of contaminants that are at the site, not have a significant impact on the local community or the environment, be not -- not be too difficult to implement. We don't want something that's going to take two years to try to implement, and we want it to be fairly easy to implement, to go in and do it quickly, and also to be cost-effective.

Based on these criteria -- let me put this slide back up. The first alternative, Minimal Action, obviously would not meet any of the regulatory or state criteria. It would leave contaminants on site that are above the cleanup goals and objectives. So, it's not really considered. The last five alternatives would meet the response objectives and would meet the cleanup goals established for the site. However, Alternative Two, the On-Site Solidification/Stabilization, would likely be easier to implement than any of these other alternatives and is also much more cost-effective.

So, just to give you an idea of the proposed remedy, the On-Site Solidification, this is, more or less, kind of a conceptual plan of what would be involved in going to the site and implementing this remedy. The first thing that we would do -- first, we have to go and do some site preparations, build some access roads, do some clearing to be able to bring in the equipment, and then go in and excavate the lagoon's sludge, soils and wetland sediments that exceed the cleanup objectives established for the site. We would solidify and stabilize those contaminating materials on site. Once they're solidified, we place them back into the lagoon area. The sediment, as well as the sludge and soil, would go back into the lagoon area. A low permeable cap would be constructed over the waste in order to protect the integrity of that solidified material. Because we are going in and basically destroying a part of the wetlands, because we need to go in there and excavate, we have to remove trees and such, we would need to restore that wetlands back to its original state or close to its original state. We would put up fences and warning signs to keep people off of the lagoon area that's capped. Institutional controls, as John talked about, we wouldn't let anyone go in and place a monitoring well or drink the groundwater or build anything on top of the lagoon.

We would have to do some environmental monitoring, continue to monitor groundwater to make sure that the integrity of the solidified material is maintained, and also, because we are leaving levels of lead in the wetland, make sure that's not having any impact on the environment. Because we are leaving treated waste on site, the regulations require that a five-year review is conducted, again, just to evaluate to make sure that the remedy is affective and it's done what it's supposed to do, make sure that the lead remaining in the wetland isn't having an adverse impact on the environment.

And then the last thing that I skipped, Educational Programs, would also be conducted just to let you know what we've collected during this environmental monitoring, so that you know what's happening and the data that's been collected.

And I forgot to mention also that Treatability Studies were conducted on three of the technologies that we looked at. Treatability Studies are conducted in order to evaluate how effective or if that technology is going to be capable of treating the waste to the levels that have been established for the site. And we conducted tests on solidification and stabilization, as I mentioned. We went out and collected samples from the site, sent those to a vendor who conducted the test. We also conducted tests on Solvent Extraction and Low Temperature Thermal Desorption. All of those tests did show that the technologies were effective for treating, but, again, solidification and stabilization would be easier to implement and is more cost-effective. So, this was the technology that was chosen.

And that's about all that I have. I'll pass it over to Doug and he can carry on.

MR. HILL: Basically, now all that's left is the public comment period that Ray described a little bit earlier. The purpose of this meeting is to present proposed remedial action at the site, which has just been presented to you, and you're free to comment on this very shortly as far as a question answer period that we're going to open up, where you can ask any sort of detailed questions you might have, or if you choose to, you could submit your comments in writing to either my office or the regional office, which are -- the addresses and phone numbers, if you want them, are described on this sheet, that basically -- the top has, "North Lawrence Oil Dump Site. Thanks for participating in tonight's public meeting." At the bottom of that are places where you can send call for your comments, give your written comments. And right now, I really just would open it up to any questions or comments that you would have.

MR. HOURIHAN: I got a question.

MR. LUPE: Excuse me, Doug, could I just say one thing?

MR. HILL: All right, sorry.

MR. LUPE: I have a request that when people give a comment, if you could give your name and speak up. With the blower, sometimes it's difficult to hear, and our stenographer may ask you to repeat yourself.

MR. HOURIHAN: My name is Leo Hourihan. I live just about a mile north of this site. You have your facts sometimes a little bit mixed up, I think. In 1978, I had some cows, I boarded them, right, I thought at first it was Mitosis, but now, in this respect, I think about it, I think probably lead probably caused it all. But anyway, in 1978, I went up there and investigated on my own. There was three lagoons there. The lagoon you're talking about in question is the deepest one. It's closest to the Cemetary Road. Farther on back there's two more. So anyway, I called anyway and talked to one of the companies at the time about that being a contaminated area, but, apparently, them folks in Albany are deaf mutes or something, but I never got no response anyway.

MR. HILL: About the two additional --

MR. HOURIHAN: I lost seven of my cows that were boarded.

MR. HILL: Okay. You said '78 and '79?

MR. HOURIHAN: Yeah.

MR. HILL: Possibly the fact that the region was out there in 1980 -- the regional office of the DEC was out there in 1980 and looked at the site. It may have been because of your phone call. I don't know if it was, specifically, your phone call, but they did get out there --

MR. HOURIHAN: Yeah, well, it's just a matter for the record so --

MR. HILL: Okay.

MR. HOURIHAN: -- if you go back and look a little farther, you might find one more lagoon.

MR. HILL: All right.

MR. HOURIHAN: Further east of the Cemetary

Road is the deepest one.

MR. HILL: Okay. Let me just clip a map up here. If you can describe, I guess, where it would be. We walked back in there quite a ways taking samples -- if I can find my map. There, I got one. Where do you think the other two lagoons might be?

MR. HOURIHAN: It would be farther east.

MR. HILL: Over this way?

MR. HOURIHAN: Right, right.

MR. HILL: You don't think it had anything to do with the landfill?

MR. HOURIHAN: No, it didn't. It was just as black as could be then.

MR. HILL: Okay. I haven't seen --

MR. HOURIHAN: Well, also the one you're talking about now still has liquid in it, '78, if you go up farther east, pretty well dried up. They got some organic matter in them, see.

MR. HILL: Okay.

MR. HOURIHAN: I'd say out of the first two, one was used. As you come down towards the Cemetary Road, the last one was being used and is as the deepest one.

MR. HILL: You think it might be along the access road that was --

MR. HOURIHAN: Oh, yes, the road -- I'd say it's a lumber-like-type road.

MR. HILL: Okay. Not necessarily the one that was shown here, then, not necessarily this road, but maybe another one out in there?

MR. HOURIHAN: Right, right, just a logging trail, like.

MR. HILL: Well, I'll make a note of it.

MR. HOURIHAN: It would be south of the old dump -- south of the old dump. It would be east of the region -- lagoon.

MR. HILL: Okay. All right. Due to the time that's elapsed, maybe that's not as visually noticeable now and --

MR. HOURIHAN: I expect not. We're talking 13 years ago.

MR. HILL: All right. Well, I'll see that that's followed up on.

MR. HOURIHAN: There's two farther east, they're not as deep. I imagine they're still there. They were visable then.

MR. HILL: Okay.

MR. HOURIHAN: The sludge is still there. Another concern I have is, I'm not too -- I don't care about PCBs because those break down themselves over a period of time, but the lead and mercury -- I think if you dig that area up and keep moving it around, you're making it worse. Leave sleeping dogs lie.

MR. HILL: Well, actually, it really would be best to excavate the material and to tie it up in a solidified mass and that would keep it from being mobile at all.

MR. HOURIHAN: It still contains PCBs that break down by themselves over a period of time.

MR. HILL: Well, I guess it's not a project that they're trying to do, I don't know.

MR. HOURIHAN: It contains heavy metals, mercury or lead is my main concern. I still say if you start stirring them up, they're going to fly around on you one way or the other. If we have a heavy rain storm, you know, the land is exposed again, and it will make the puddle muddier probably, so to speak.

MR. HILL: Well, I think I see where you're going with it, with your comment, but I think those concerns will be addressed during the actual implementation of the remedy with all the backhoes and whatnot. They'll make sure they take all the proper precautions. If anything is left uncovered, it would be the clean soil. Is that --

MR. HOURIHAN: It's wishful thinking.

MR. HILL: Well, I guess that's the best I can tell you right now, but I'm not --

MR. LUPE: I think the gentleman's point about precautions are going to be needed when they do excavations, to the extent that it's practical. And again, the one thing that we'd like you to recognize is, we're not proposing to go throughout a large portion of the wetlands. We're talking a mere portion of the lagoon approximately 200 to 300 feet, I believe. It's that area where you also have some mercury, some of your higher leads and your high PCBs. We're not proposing to go through the entire wetlands to try to take all of the lead out. We'll end up destroying the wetlands and other organisms.

MS. PLANINSEK: I think it's also important to remove the source, and that's what we're really trying to get at, to keep the high concentration continuing to migrate out into the wetlands. We want to get rid of that source.

MR. HOURIHAN: Yeah, I know, you break open that soil now -- I know how people are when 4:00 comes, they pack up and go home. If we get a hell of a rain storm, the land is exposed, right, it's got to go somewhere. It ain't going to stay there.

MS. PLANINSEK: They would take precautions.

MR. HOURIHAN: At least I can tell --

MS. PLANINSEK: They would berm the area to make sure there was no runoff from the area.

MR. HOURIHAN: That's wishful thinking on your part.

MR. HILL: Well, there will be another opportunity for you to comment on the final design on that subject.

MR. NEWTOWN: How about all them tankers of oil that --

MR. HILL: I'm sorry, could you state your name for the record, sir?

MR. NEWTOWN: Norman Newtown, Brasher Falls, Route 2. Like that oil that is spread twice a year, running probably 40 foot from somebody's well to keep dust down.

MR. HILL: Okay. What you're --

MR. NEWTOWN: They were tankers at 40 foot long, probably five foot high, the tank, eight foot wide.

MR. HILL: What you're --

MR. NEWTOWN: In no time they would empty one. They did it twice in the summer for years. Now, what about that oil? Where the hell did it go?

MR. HILL: Well, that's -- that's really not related -- I think I had a discussion with you a little earlier today. It is oil, and it was spread on the roads to keep the dust down. It was a common practice.

MR. NEWTOWN: Yeah, well, how about the other now, what they call mulch? I worked on highways, so --

MR. HILL: But I think we're getting away from the North Lawrence Oil Dump Site, and that's really all we can comment on today.

MR. NEWTOWN: This is all the North Country, Gouverneur, Edwards, everywhere.

MR. HILL: Yeah, well, I'm sorry, but unless it's specifically related to this site, it's really not --

MR. NEWTOWN: The other thing is the mulch on the North Country, they took plain gravel, mixed it in a mixture so it was like a heavy cement, come up with oil and gravel and call it mulch and road, anywheres from eight foot to five foot all over the shoulder of the roads.

MR. HILL: But they didn't do it on this site?

MR. NEWTOWN: Well, oil was in that gravel. Man, they had a -- just like a big mixer mixing oil, and it wasn't good oil. It was low-grade oil is what they were using, the worse they could get, because you ain't going to use number one motor oil to mix with gravel and spread on the ground, and that was mixed all over the North Country, just like every township here in the North Country got sprayed, dirt roads I'm talking about, twice a year with these big tankers of oil. Some going by -- what I mean, not just drip, they were pouring right out so you could see it right in the water in the ditch. Now, what are they going to do about that?

MR. HILL: Well, that would be handled under a different program, I believe.

MR. NEWTOWN: It's still oil pollution.

MR. HILL: Yes, it is.

MR. NEWTOWN: Oil pollution.

MR. HILL: Yes.

MR. LUPE: Yes, I think, sir, you're raising points that I believe are very valid. All right. This was a common practice in a lot of areas where a lot of oil was spread on the ground. That's left a variety of problems throughout the state. I believe what Doug is indicating is that the inactive hazardous waste program -- we deal with a list of sites that are on our registry of sites that have been identified and sampled. And our charge is to clean them up using the State Superfund. We're here, primarily, to receive comments on this site. I understand your concern about the other issues, but we're not equipped to do anything about those tonight.

MR. NEWTOWN: No one can do anything. This other -- what I'm talking about -- you've been going all over Northern New York and every township and cleanup, and what I mean, within a quarter of a mile, there was more oil -- I'm talking about one trip with a big tanker -- there was more oil spread in a quarter of a mile than they used in that dump in the last 20 years. What I mean, there were pretty near inch holes, four inches apart just pouring right out of the back of that big tanker just moving ahead, and you got it twice a year.

MR. LUPE: And I understand exactly what you're saying.

MR. NEWTOWN: But up here, what you're talking about, you're about four or five miles from nowhere, nothing but a field. I know where the dump is, and there's no houses or nothing. But what I'm explaining, if it's so dangerous, why go by somebody's house 30, 40 foot -- a lot of them had dug wells, some has drill water -- and rather than worry so much about that, why don't they worry about what the hell's wrong here, everybody's dying of cancer in North Lawrence, young people, young people. I blame it on the goddamned water because that's -- and the beaver pollution. And when the people are getting sick and stopping off at beaver ponds, it's beaver fever. There's no such thing as beaver fever. It's acid from the wood -- rotten -- because if it's beaver fever -- why, I know a guy all spring long lifts the beaver out that people catch in traps to eat. Now, if they have the fever, they get it from the meat, I'd think, but not being in the pond.

MR. LUPE: Now, when you're talking about beaver fever, that's a common phrase for a disease called Giardia, which is in the wastestream from the beavers and small organisms where, if you ingest them in drinking water, what they typically do is, they get into your intestinal system and cause chronic diarrhea.

MR. NEWTOWN: I got a letter here the other day from Cornell University. That I -- I spent all my life in the woods, and they wanted to know if I had any suggestions on wildlife, and I got sick of it. And I wrote them a letter and told them I am so disgusted with conservation -- what they're doing down in the state land here, cutting little pine trees four and eight inches through, going by trailer truck after trailer truck. They're cutting off that whole Adirondacks. Jesus Christ, what's next after all them is just dumps and putting them through chippers. Chippers cost a million and a half dollars. Where are they coming from? Then it comes over the news a few days ago, they steal 11 garbage trucks in New York City, and they can't find them. They're probably up here now in our garbage.

MR. LUPE: Well --

MR. NEWTOWN: No, but it's sickening, I'm getting sick of it.

MR. LUPE: Well, as a state taxpayer -- and I have similar concerns, so, I'll be glad to talk to you after the meeting.

MR. NEWTOWN: Yeah, I know, I know, but I'm explaining what I figure about the whole thing, and why do they want me to give them answers from Cornell University on why the deer -- what's happened with the deer. Jesus Christ, the deer -- you can't poison the deer. You can feed a deer strychnine, he won't die. He has no gall bladder.

MR. LUPE: We're getting a little away from the point. Could we talk with you -- no, I understand what you're saying. Could we talk with you after --

MR. NEWTOWN: Yeah, yeah, any goddamned time.

MR. HILL: -- a little bit informally after the meeting?

MR. NEWTOWN: You're losing your bible.

MR. HILL: But I'll talk to you a little bit after we get done answering everybody's questions.

MR. NEWTOWN: Well, I got to go home. I left my wife home alone.

MR. HILL: Okay. Well, I'd like to give other people an opportunity to ask questions.

MR. NEWTOWN: Yeah, thanks a lot for everything.

MR. HILL: Are there any other questions that people have? Yeah, one in the back?

MR. WHITE: What do you have for a time frame after the PRAP is done for actually getting on the site?

MR. HILL: Ray, do you want to answer that? Do you know better or do you want to correct me on what I say? I believe it will take about -- after the ROD is signed, which will be by the end of March, it takes about two years for the design, detailed design to be made -- to be completed, and then another six months to a year for the actual design or even a year and a half. Would that be correct, Ray?

MR. LUPE: I would say about a year and a half to complete the design. It takes approximately a year and a half to implement the actual construction of it.

MR. HILL: I guess two and a half, maybe three years until completion.

UNIDENTIFIED SPEAKER: Sounds like you got something in mind. What have you got in mind?

MR. HILL: In mind as far as the remedy?

UNIDENTIFIED SPEAKER: Yeah.

MR. HILL: That was described a little earlier. We're going to dig up the contamination in the lagoon, in this area here (pointing). I don't know if I can do any coloring any better than -- well, actually Deb's got --

UNIDENTIFIED SPEAKER: Dig it up and do what with it?

MR. HILL: We're going to -- it's going to be solidified and stabilized. Basically, think of it as mixing it with Portland cement and then placed back in a disposal cell on the site and capped. And that will prevent further migration of contamination. If it's all immobilized like that, you won't have any more worry about contamination migrating off site. Does that answer your question?

UNIDENTIFIED SPEAKER: If it's not harming humans, it's only harming the beavers and the animals. Is that who we're protecting here? In other words, wouldn't it be cheaper to build a fence around the thing and keep the people out of it?

MR. HILL: Well, that's one of the alternatives, the Minimal Action Alternative that was described. It is one of the alternatives we looked at. However, there are seven criteria -- I'm glad you came prepared because I don't have any slides. There are the seven criteria that we're required to evaluate for the site, and we have to be protective of the human health and the environment. Maybe human health isn't a concern at this site because of the lack of exposure with the type of contaminants we're dealing with, but the environment is still at risk. And there's also a need to be compliant with the standard criteria, the values that are established for these contaminants in soils and sediments.

UNIDENTIFIED SPEAKER: So, in other words, if you don't drink it or ingest it, it's not going to hurt you?

MR. HILL: That's correct, or also -- well, yes, that's correct for this site. I was going to say --

UNIDENTIFIED SPEAKER: So, as long as we don't drink it, we can put a fence around it and keep them out of there, right?

MR. HILL: As far as the public, that's correct.

UNIDENTIFIED SPEAKER: The beavers -- the beavers, I think we can let them drink a little bit then. In other words, leave a hole in the fence for the beavers.

MR. HILL: All right. There's a question over here, if -- if you're done. Do you have anything further to add?

UNIDENTIFIED SPEAKER: Yes, how much money have you spent so far for the work that's been done on this project?

MR. HILL: One million dollars. Is that what's in the budget? One million dollars.

UNIDENTIFIED SPEAKER: Okay. How much more money will it take to finish or to intomb the area?

MR. HILL: For the intombment of Alternative 2, that will be five million dollars. There's a question here?

MS. DEMO: Yes, my name is Mary Donahue Demo, and the vicinity that I'm talking about is in the -- what they call Brasher Flats, which is just below Brasher Iron Works, which is just below the Brasher Preserve. We're on the Bombay line, my family home. Now, this area gets what we call -- it's almost like a flood plain, because the hills are above us. That's why it's called Brasher Flats. Those hills above us. Those hills above us extend into the Brasher Preserve, which is the back end of this lagoon.

MR. HILL: Okay.

MS. DEMO: The lagoon, in other words, would be in the back end of the Brasher Preserve area.

MR. HILL: You mean down in this area (indicating)?

MS. DEMO: Well, wherever Brasher Iron Works is --

MR. HILL: All right. This would be North Lawrence and this is north. I'm sorry, I'm not too familiar where you are.

UNIDENTIFIED SPEAKER: Farther north.

MS. DEMO: Farther north, he said.

MR. HILL: So, you'd be up here (indicating)?

MS. DEMO: All right. And in -- usually it starts in March and moves along through -- right through into April -- end of April. This Brasher Flat area -- Bombay/Brasher Flat area floods, and I mean really floods. My concern is, will that water content that's coming from the highlands above us -- and naturally, it's coming out of the Brasher Preserve area -- will that source of contaminants, that is in that lagoon and the wetlands, can it affect the flooding in the Brasher Flat area because the water is coming from there? We're at the bottom of the highland.

MR. HILL: I think what you're asking, then, is the contamination of the North Lawrence Oil Dump Site going to be --

MS. DEMO: Through the Brasher Preserve and then down through the Bombay, Brasher Flats.

MR. HILL: Have you got that groundwater flow map?

MS. DEMO: This same water -- this same water drains into the St. Regis Basin, more often called the Beaver Meadow.

MR. DAUKAS: One of the things that we did determine was that as far as surface water samples in this area, which is closest to the lagoon, the lagoon is actually the source of the contamination. We took surface water samples in and around this area, and also surface water samples down in this area (pointing). So, you have the source going through the wetlands, and then exiting the wetland and then -- into a tributary, which, apparently, goes down to Brasher Woods and down into the Brasher Flats.

MS. DEMO: And then into the Beaver Meadow draining into the St. Regis River, yes.

MR. DAUKAS: Well, what we determined throughout our sampling, in this area close to the lagoon, there are some minor contaminations with the surface water, but it's believed to be in particulates, meaning, it's not in solution of the water, it's part of the suspension as to why the contamination in the sediments were moving around. When we were sampling the surface water down in this area (pointing), which is actually the exit for the water out of the wetlands, the water was not contaminated.

So, what we're seeing is that the surface water is contaminated a little bit close to the lagoon, but as it travels out through the wetland, through the beaver dams and exits the lagoon, it is not carrying contamination. So, I would assume that as it continues, if there were to be some contamination, it's picking it up elsewhere, not from the lagoon.

MS. DEMO: Is the soil content around the lagoon and the wetland, is it clay soil?

MR. DAUKAS: There is a -- there is clay content to the soil. I would not consider it to be a clay, per se, soil. It is a tight soil, that's why we have the wetlands.

MS. DEMO: So, you can't really project into the future and sort of give me a comfortable feeling that years down the road this contaminated area will work its way into this flood plain of this size?

MR. DAUKAS: If we do the proposed remediation, I can tell you that. At this point in time, I can't tell you that.

MS. DEMO: It was mentioned about the -- when you placed the treated solidified materials back into the ground, it would be in a cell structure you said. Is that cell structure made of the same sediment material as the landfill structure?

MR. HILL: It would be very similar to it. It would have some of the key components that are so successful in landfills. It would also have a cap over the top, and it would be designed to prevent groundwater and surface water from infiltrating the waste.

MS. DEMO: You mean you would be bringing clay into that area when you construct that cell structure?

MR. HILL: The final design of the cell isn't -- hasn't yet been established, but in all likelihood, it will have clay or a geomembrane plastic liner system.

MS. DEMO: Similar to the landfills?

MR. HILL: Yes.

MS. DEMO: The capping, what will the capping be?

MR. HILL: The clay -- the proper -- we haven't got a slide for that or anything. It would be clay. I don't know the exact measurements of the clay, but it would be covered with clay with some topsoil on top of the clay, preventative clay, and designed as far as the remedial slope to --

MS. DEMO: Would the cap then be man-made after you have the soil content for the capping?

MR. HILL: Yes.

MS. DEMO: Where will the clay come from, from the surrounding area?

MR. HILL: That hasn't been established. It would probably -- if there's a place for it up here, that would be the best place for it, but that would all be finalized in the design.

MS. DEMO: So, the DEC -- we're assuming because they need clay for this structure, the DEC, financially and economically, would probably get the clay from the surrounding lands?

MR. HILL: I don't know what sources we would be looking at.

MS. DEMO: Does anyone here know that this cell structure --

MR. HILL: That does make the most sense, if it's available.

MS. PLANINSEK: That would be something that they would consider during the design, looking at sources around the area, and if there is a sufficient source, we'll go to that area.

MS. DEMO: So, they will issue permits, then, if they wish to take the clay from the surrounding farmland or the land. They will issue permits to excavate the land for clay?

MS. PLANINSEK: With the permission of the landowners, is that what you're saying?

MS. DEMO: Yes, okay. Thank you.

MR. LUPE: One of the things also, as Tracey indicated, when they do the design, they need to establish the best specifications the clay has to be. Normally, it's cheaper for the contractor to find it locally. This is competitive to bid. If we get a source as close to the site as possible, we're free to choose anywhere that meet these specifications, but this is up for competitive bid. So, there becomes problems in terms of trucking material, longer distances, that affects the bid price.

The other thing that's important to note is during the design, there is two ways to design the cap. One is to put in a gravel layer with about 18 inches of clay above it. And normally that layer is approximately four feet of fill to protect the clay layer from freeze or thaw. Again, that protective layer above the clay varies depending on how far soil freezes in this area. It varies in the design. If a design is established, and it's better to follow a geomembrane instead of clay, they can also do that. The geomembrane is the heavy plastic, geotextiles, I believe they are referred to. Those are also acceptable, in fact, in most cases preferred.

Another question that you asked earlier about assurances for contamination coming down the wetland area, the intent is to take the most heavily contaminating materials out of there. As part of the remedy, we will also be monitoring the program, which will include surface as well as sampling in different locations. So, that would be one way to keep track of contaminants coming down from the site area where remedial action is implemented.

MR. ROMIGH: My name is Dave Romigh. I have two quick questions. First of all, will local contractors be used to place -- to employ cell structure in this area?

MR. HILL: I don't know that they necessarily would. I don't know who the local contractors were that would really qualify for the work. For example, they need to have hazardous material training, some of the gear that they would have to wear and have available at their sites. I'm not sure whether local contractors would have that, if they might be considered.

MR. ROMIGH: Okay. And what is the actual mixing of certain solvents and you mentioned Portland -- and would the actual mixing occur on site?

MR. HILL: Yes, it is on site. Is that -- okay.

MR. ROMIGH: Yes, that's all.

MR. HILL: Were there some other questions up front here?

UNIDENTIFIED SPEAKER: You have a million dollars invested in this already. I hoped you could have more specific examples of what this is going to look like when it's done. When you're talking about this intombment, what's this going to look like when it's done? Is it going to be 8-by-12 inch blocks? Are they going to be massive-sized blocks? Is it going to look like a monument or is --

MS. PLANINSEK: The final visual will look like a landfill, basically, if you have seen a landfill. The material will be in the cell and then it will have the cap on it. So, it will visually look like a landfill.

UNIDENTIFIED SPEAKER: Okay. Blocks the size of --

MS. PLANINSEK: As far as that, it would depend because there are different vendors and they have specific processes that they use. So, depending on their processes, it would depend on the size of blocks.

UNIDENTIFIED SPEAKER: Have these things been done before? Is there a typical size?

MS. PLANINSEK: They have been done before, and I'm not sure of the size. We can get back with you on that.

UNIDENTIFIED SPEAKER: Would these blocks be above ground level?

MS. PLANINSEK: That's another design consideration that we have to consider because the groundwater table is rather high in that area. And so, we need to evaluate the distance that we need between the groundwater table and the solidified mass. So, depending on that area, the landfil may be spread out more, but there are criteria for how high it can go. So it wouldn't -- I think it's like a two percent --

MR. HILL: I think it's a two or three percent slope.

MS. PLANINSEK: Yeah, two or three percent, so that it is made to spread out further in a wider area than the lagoon is. Right now we can only go a certain height as regulation requires.

MR. HILL: You had mentioned if it would be out of the ground surface, as Tracey indicated earlier, it will be under the cap. I don't know if that was really where you were going with that question.

UNIDENTIFIED SPEAKER: What would the -- another question I have is, what does the cap consist of?

MR. HILL: Clay, a filter pack to separate the waste from the clay and topped off with topsoil to promote drainage and prevent burrowing animals from going into the clay and disturbing the integrity of the clay, rather.

UNIDENTIFIED SPEAKER: Have you done a survey of anything like how many more people have cancer in that area? I mean, I know there aren't many people that live there in that area as compared to, like, one street maybe that has three or four within two or three blocks that have cancer?

MR. HILL: Not at this site, John.

MR. BLEILER: No, that hasn't been done at this site. Again, the Risk Assessment was conducted using conservative assumptions, and the results of that indicated that there shouldn't be any problems whatsoever to public health.

MR. HILL: Question in the back, again?

MR. WHITE: You mentioned solidification on the ball or the mass you're putting back in the landfill. Does that get to any point -- you're talking about the cleanup level one part-per-million of PCBs and so on. Does the actual mass that you put back into the lagoon have to be tested to some certain criteria?

MS. PLANINSEK: Yeah, there are standards -- it's called a Leaching Procedure, and they would conduct that test on the solidified mass to make sure that none of the contaminants would leach or come out of the myself. It's set up in such a way that they qualify the consultants prior to the work so that they have a list of approved consultants that they know can do the work. And then they go down that list and determine which consultant would be best for the job. There are contractors -- consultants in New York State that have other Remedial Investigation/Feasibility Study work with the DEC. Does that, more or less, answer your question or --

UNIDENTIFIED SPEAKER: Sounds like you got a shortage of them here. You said that you dig down four feet and intomb the contaminated area and then monitor it for the next five years after the job is done. In the meantime, they can change the rules where the next four feet underneath the concreted area could need the same treatment, which means now that you got concrete to dig out of there plus another four feet of material. Would this be possible to happen?

MR. HILL: As far as the rules changing, I don't believe that that would apply to this site because the remedy would have been determined solidified mass. So, there are specific criteria they would test for, and also like the permeability, they would test that to make sure that nothing would infiltrate into it and the strength of it, also. So, there are a number of criteria.

MR. HILL: Question up there?

MS. ALLISON: My name is Heather Allison. Would the landfill, whatever you're incapsulating, is it going to go beyond the lagoon area into the wetland area?

MS. PLANINSEK: Probably not. It would go probably the other way because you wouldn't want to -- I wouldn't think you would want to do anything to the wetlands, to have any effect on the wetland area. That's the whole idea, is to try to keep that intact so that the whole lagoon and beyond --

MS. ALLISON: Do you know how much acreage we're talking about?

MS. PLANINSEK: See, that again would be how far above the water table you'd have to be and how much you'd have to build out and that, again, is designed.

MS. ALLISON: One more question, I think it was you that said you would need to excavate one foot of the wetland? What are you going to do to --

MR. BLEILER: From a regulatory perspective, it's very likely that some sort of a wetland restoration activity be required. EPA in New York State has jurisdiction over -- again, that's a design question that hasn't been addressed yet prior to the work being conducted. It's highly likely that a regulatory government would have some sort of a wetland restoration plan of the site.

MS. ALLISON: Okay. Thank you.

MR. BLEILER: Sure.

MR. HILL: Another question in the back?

UNIDENTIFIED SPEAKER: I noticed that the contractor that's doing the work is from Maine?

MR. HILL: That's correct.

UNIDENTIFIED SPEAKER: Nobody in New York? Is this put up for bid or how does -- nobody in New York gets a crack at this or what?

MR. HILL: This was done under standby. All right. The standby contract system is set up in such a way that -- and actually I guess Ray would be a better one to explain this than final, and the five-year review would be to determine or would be to evaluate the effectiveness of final remedy. Another consideration might be rather than putting waste over the top of the lagoon, it might be put beside the lagoon so that you could get down --

UNIDENTIFIED SPEAKER: The present rules you're going by right now, how long have they been in effect? How many years?

MR. HILL: There's different variations from the south -- excuse me, from the fish and wildlife, they are revised on various bases. They really all stem back to CERCLA and SARA regulations, which are federal regulations, which were brought into effect in '76?

MS. PLANINSEK: '74.

MR. HILL: '74.

UNIDENTIFIED SPEAKER: So, that could change -- that could change yearly actually -- be more stringent or whatever.

MR. HILL: Be more stringent in areas -- the whole regulation isn't going to change, it's going to be modified. It may be modified somewhat for specific circumstances and contaminants.

UNIDENTIFIED SPEAKER: Okay. So, once they've dug the four foot clay out and they discover there's another -- they better go deeper to get more of it, then are 15,000 -- or what did you say, 5,000 --

MS. PLANINSEK: 5,000.

UNIDENTIFIED SPEAKER: -- 5,000 could become easily 10 million?

MR. HILL: I don't foresee that happening. We've had quite adequate samples to determine the extent of contamination at the site.

UNIDENTIFIED SPEAKER: Yes, but it's very important once you've opened that up, to be able to take the tests on the site -- on the site to determine whether you should go deeper or not. So, really, as we sit here tonight, we really don't know.

MR. HILL: Well, I think we do know because we do have soil borings in the lagoon area where the deepest and heaviest contamination is -- are down to a depth of 8, 10 and 12 feet. Furthermore, there is also going to be some predesigned sampling where they will go in and verify the extent of the contamination in those areas and fine-tune it.

UNIDENTIFIED SPEAKER: All of this work is done from the Superfund, correct?

MR. HILL: That's correct.

UNIDENTIFIED SPEAKER: How much money is available in the Superfund right now?

MR. HILL: I don't know, it was established in 1986 as the Environmental Quality Bond Act. The total amount of money -- and it goes towards some 100 sites in New York. I don't know the number, but I could get it back to you if you'd be interested in that.

UNIDENTIFIED SPEAKER: And where does this money come from? How does it get to the Superfund?

MR. HILL: His question was just where did the money come from in the 1986 Bond Act.

UNIDENTIFIED SPEAKER: In other words, where are we today? How much have we got there? How much are we going to borrow to put there or how does -- where does it come from?

MR. HILL: Okay. As far as how much money is left, as I just finished saying, I don't know the exact number now. I can see about researching that and getting it back to you. Correct me if I'm wrong, Ray, but the 1986 Bond

Act came from the 1986 funding source or I don't really --

MR. LUPE: It was authorized -- it was authorized a billion dollars in state bonds. There has been a commitment of a few hundred million. I don't know the exact figure, but I can get that information for you.

MR. HILL: And as far as more money going in, I guess we'd have to --

MR. LUPE: All the work -- when we say state cost, it's all coming out of state taxpayers, either, you know, taxes to pay off bonds or actual taxes that people pay. And I think that's something that's very important when we talk about the remedies. In fact, we do look at cost as a final determining factor, the gentleman's concern about can the costs increase. Yes, they can increase and it would depend on things that are on speculative fields. We try additional sampling, as Doug explained, to address that.

The other aspect is, prior to the closing of the site, they would take additional confirmatory samples to see if what they are leaking there and make an assessment as to whether or not we can continue some excavation or whether we feel we have reached an adequate point. We try to calculate the different cleanup levels also with procedures that are outlined in our guidance memorandums, which relate to the solubility of some of the materials to come off, soils in the groundwater.

So, we do make those attempts to address some of those issues, and even though we said PCBs and lead are the primary contaminants, there are some organics that also will be excavated when you take out the lead. There is also going to be a lot of oil that's going to be on that soil, also. So, you have visual determinations that have to be made in the field as well as just arbitrarily saying we're going to cut it off at four feet.

UNIDENTIFIED SPEAKER: Do we have any input on what -- whether or not this work is done or this happens, or are we just informed or kept abreast of what has been decided, of what is going to happen?

MR. HILL: I would guess, if there is significant public opposition to the selected remedy, it, of course, can be changed as far as you know, in this town there are children and young people, you know, dying everyday with cancer, and there's got to be something. And if that site isn't hurting anyone, why can't we find a way to test around here or something?

MR. HILL: As far as the public health, I would recommend you call the Department of Health. The number is at the bottom of one of the sheets in the handout. Do you have the handout?

UNIDENTIFIED SPEAKER: Mm-mm.

MR. HILL: There is a 1-800 number for the Deparment of Health that can direct your call. I don't know what program they have set up for specific testing in the community.

UNIDENTIFIED SPEAKER: Well, don't they have to call in the DEC in the end?

MR. HILL: The DEC is really working on the site while the Department of Health is consulting as far as the public health.

MR. LUPE: One of the things on the public health -- one of the things on the public health that the Health Department takes is a cancer registry. And if they receive enough input from the public of concern, what they can do is take the -- as far as the selected remedy can be modified based on public opinion. If there's significant opposition to what we intend to do out there, it could probably be re-opened. Is that correct, Ray?

MR. LUPE: It would have to be on the basis of concerns that would show that the remedy would be inadequate or completely un-needed. It would have to be something that would be significant. The other aspect about it is, there can be modifications to some of the proposals based on some input. So, if someone has some information we may, you know, modify the conceptual outline of the plan and have that addressed during the design -- during the design and instruction that are similar to public meetings and documents that are generated or presented to the public for information. So, that if there are facts that we're not aware of or overlooking, that can be accommodated in the project.

MR. HILL: Okay. There's a question.

UNIDENTIFIED SPEAKER: Yes, being you're testing and, you know, looking for something to clean up and everything, how do you go about --

a look at the local cancer rates and see if they're out of the ordinary versus similar areas in the state, and that is all done by the Health Department. They have the technology. Similar input could be made through our Health Department contact on there and could be given for more information.

MR. HILL: Is there another question?

(No response was given.)

MR. HILL: Well, I guess that about wraps things up. Again, you're welcome to contact me at -- my card is in front of the yellow booklets there. You're welcome to contact me there or in writing prior to March 2nd to have your comments included in the response in the summary. That's about it.

(The Public Hearing concluded at 9:03 p.m.)

* * * * *

C E R T I F I C A T E

I, TRACIE A. WHITE, do hereby certify that the foregoing transcript is a true, accurate, and complete record of my stenotype notes, taken to the best of my ability, at the public hearing held in North Lawrence, New York, on the 10th day of February, 1993.

Tracie A. White

TRACIE A. WHITE
Court Reporter, Notary Public
ACC-U-SCRIBE REPORTING SERVICE
PO Box 762
Canton, New York 13617