00-17-1 (10/83)

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

TRANSMITTAL SLIP

TO Anita Kobalski	DATE 6/7
FROM Nelson	
RE: Final ROP - Creeks + Sewers enclosed FYI	

FOR ACTION AS INDICATED:

- ☐ Please Handle
- ☐ Approval/Signature
- ☐ Prepare Reply for _____ Signature
- ☐ _____
- ☐ For Your Information
- ☐ File
- ☐ Comments
- ☐ Return to me by _____

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

MAY - 1 1985

MEMORANDUM

SUBJECT: Authorization to Proceed with Remedial Action at the Love Canal Site, New York -- Record of Decision

FROM: William N. Hedeman, Jr., Director
Office of Emergency & Remedial Response

TO: Jack W. McGraw
Acting Assistant Administrator

The attached Record of Decision is presented for your authorization of remedial action at the site.

We request your approval of a cleanup plan that includes hydraulic cleaning of storm and sanitary sewers adjacent to the Love Canal site, dredging of contaminated sediments in Black and Bergholtz Creeks, and the erection of a temporary earth berm to contain sediment at the 102nd Street Outfall delta area. In addition, an administration building within the fenced area of Love Canal to complement existing facilties is recommended.

The actions recommended above represent only a portion of the remediation that is on-going or is proposed for the Love Canal Site and the adjacent environs known as the Emergency Declaration Area (EDA). These activities are being managed by the New York State Department of Environmental Conservation (DEC) as part of an existing Cooperative Agreement, awarded July 12, 1982.

FY-85 monies will be utilized for the design of the recommended sewer and creek cleanup alternatives, as well as the implementation of the sewer remediation and construction of the administration building.

Attachment

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

APR 25 1985

OFFICE OF
GENERAL COUNSEL

MEMORANDUM

TO: Jack W. McGraw
Acting Assistant Administrator
Office of Solid Waste and Emergency
Response (WH-562A)

FROM: Lisa K. Friedman
Associate General Counsel
Solid Waste and Emergency Response
Division (LE-132S)

SUBJECT: Love Canal Remedial Action - RECORD OF DECISION

We have reviewed the Record of Decision for the Love Canal site. We are satisfied that it is consistent with the National Contingency Plan and raises no significant legal issues.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

APR 12 1985

MEMORANDUM

SUBJECT: Record of Decision for Approval of Remedial Action at the Love Canal Site, New York

FROM: John J. Stanton, Director
CERCLA Enforcement Division,
Office of Waste Programs Enforcement (WH-527)

TO: William N. Hedeman, Jr., Director
Office of Emergency and Remedial Response (WH-548E)

The Record of Decision for the Love Canal Site, New York, has been reviewed by my staff.

I Concur ✓

I Do Not Concur _____

I Concur With the Attached Conditions _____

Date 4/17/85

Comments:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II

DATE: MAR 28 '85

SUBJECT: Record of Decision
Love Canal Sewer and Creek Remediation

FROM: Christopher J. Daggett
Regional Administrator

TO: Jack McGraw
Assistant Administrator
Office of Solid Waste and Emergency Response (WH562A)

This is to provide you with the draft Record of Decision (ROD) prepared by my staff for the Love Canal site in the State of New York.

The ROD document reflects Region II's recommendations for addressing the contamination that has migrated from the Canal via storm and sanitary sewers and the deposition of this waste in area waterways. Our recommendations were developed based on the results of a feasibility study performed by Malcolm Pirnie, Inc. under the existing cooperative agreement with the State of New York, and a supporting document by CH2M Hill, and under the existing REM/FIT Zone II contract as well as an evaluation of additional documentation submitted by the New York State Departments of Health and Environmental Conservation.

Specifically, we are proposing that the storm and sanitary sewers adjacent to the Canal be hydraulically cleaned and that the contaminanted sediments in Black and Bergholtz Creeks be dredged. The waste collected is proposed for on-site interim storage on the Love Canal site followed by incineration or disposal at a RCRA permitted facility at a later date. In addition, a temporary berm is proposed to contain contaminated sediment within the 102nd Street Outfall delta area.

The proposed actions, I feel, are consistent with the goals and objective of the Comprehensive Environmental Response, Compensation and Liability Act and the National Contingency Plan to provide adequate protection of public health and the environment. The recommended action conforms with the overall remedial strategy for the Love Canal site.

These options have the approval of the State of New York which will serve as lead agency for all remediation activity.

If you should have any questions regarding the attached ROD, do not hesitate to contact me.

Attachment

cc: Herbert Barrack (OPM)
Bob Quinn (WH-548E)
Jim Spatarella (WH-548E)
Rob Ogg (ERRD-SIC)

MARCH 29, 1985

BRIEFING FOR THE ASSISTANT ADMINISTRATOR
RECORD OF DECISION
LOVE CANAL, NEW YORK

PURPOSE

- To select the appropriate remedial action at Love Canal that is consistent with the requirements of CERCLA and the NCP. The Assistant Administrator has been delegated the authority for that approval.

ISSUES

- This remedial action is designed to achieve cleanup levels of less than one part per billion of dioxin. Certain remedial activities, i.e., the dredging of creeks and cleaning of sewers, will take place outside the boundaries of the Emergency Declaration Area.

- Interim on-site disposal is recommended for the dioxin-contaminated waste. On-site disposal would be designed as a separate cell located adjacent to the Canal's cap.

MAIN POINTS

- The Love Canal Site is located in the southeast corner of the city of Niagara Falls and is approximately one-quarter mile north of the Niagara River.

- Between the years 1942 and 1952, Hooker Chemical and Plastics Corporation (now Occidental Chemical Corporation) disposed of over 21,000 tons of various chemicals into Love Canal. The solid and liquid wastes deposited into the canal include acids, chlorides, mercaptans, phenols, toluenes, pesticides, chlorobenzenes and sulfides.

- In the mid-late 1970's continued periods of high precipitation resulted in rising water table elevations. Water accumulated in the landfill and carried chemically contaminated leachate to the surface and into contact with basement foundations.

- In October 1978, a initial remedial action was instituted that included the construction of a tile drain (leachate collection) system, placement of a clay cover over the Canal, and the erection of an on-site treatment facility.

° On December 20, 1979, the U.S. Department of Justice on behalf of EPA filed suit against Hooker pursuant to numerous environmental statutes alleging an imminent and substantial endangerment to health and environment. New York State filed a lawsuit in state court in April 1980 against Hooker for damages sustained at Love Canal. Hooker has refused to assume responsibility for remedial actions at Love Canal. The legal actions are still pending.

° In June 1980, EPA began an extensive environmental sampling program at the Canal which extended over the area designated as the Emergency Declaration Area (EDA). Based on the data collected during this study, completed in May 1982, the Department of Health and Human Services (DHHS) stated that outside Area 11 (the Canal itself and the land occupied by the two rings of homes surrounding it) is as habitable as the control areas with which it was compared. This judgment includes the requirements that Area 11 be safeguarded against future leakage from the Canal and that cleanup is required for existing contamination of local storm sewers and their drainage tracts.

° On July 12, 1982, a cooperative agreement was entered into between the DEC and EPA in which $6,995,000 of CERCLA monies were obligated. An amendment in September 1982, brought the obligation close to $8,000,000.

° In the Fall of 1982, the sewers were severed at the canal to deter future contaminant flow via these pathways. While the contamination that currently exists in the sewers should not increase, these pollutants could eventually migrate from the sewers and end up in creek and river sediments.

° On July 18, 1984, Lee Thomas was briefed on this Record of Decision (ROD). Although he concurred with the intent and extent of the recommended alternative, he deferred his decision on the ROD until a more comprehensive alternative evaluation could be completed.

° On March 5, 1985, a public meeting was held in Niagara Falls to discuss the draft report and present the selected alternatives. The comment period was initiated on March 1, 1985, and continued until March 23, 1985. Many public meetings and workshops were held in order to accomodate the substantial public interest. The public is in general agreement with the selected options.

° The EPA has established a Technical Review Committee (TRC), consisting of representatives of various state and federal agencies, to act as a management group that coordinates the interrelating activities necessary to resolve the habitation and remediation issues surrounding the site.

DESCRIPTION OF SELECTED OPTION

1. North, South, and West Storm and Sanitary Sewers - hydraulically clean designated sewers, remove and dispose of contaminated sediments and inspect specific sewer reaches for defects that could act as pathways for contaminant migration. Waste will be disposed in a interim disposal cell located adjacent to the Canal's cap.

2. 102nd Street Outfall - perform temporary in-situ stabilization via the erection of an earth berm until issues concerning the source of contamination from 102nd Street Landfill are resolved.

3. Black and Bergholtz Creeks - limit access, and dredge designated portions of the creeks. Waste will be disposed in a interim disposal cell located adjacent to the Canal's cap. Install a sediment trap at the confluence of Cayuga Creek, to prevent contamination under backflow conditions.

4. Cayuga Creek - New York State will continue to sample and monitor the creek until sufficient information has been developed on the other sources and extent of dioxin contamination into the creek both above and below the influent of Bergholtz Creek.

In addition, the on-site installation of a permanent administration building is being recommended.

Total costs for the selected alternative is estimated to be $560,000 for design and $7,600,000 for construction.

LOVE CANAL REMEDIATION

3-26-85

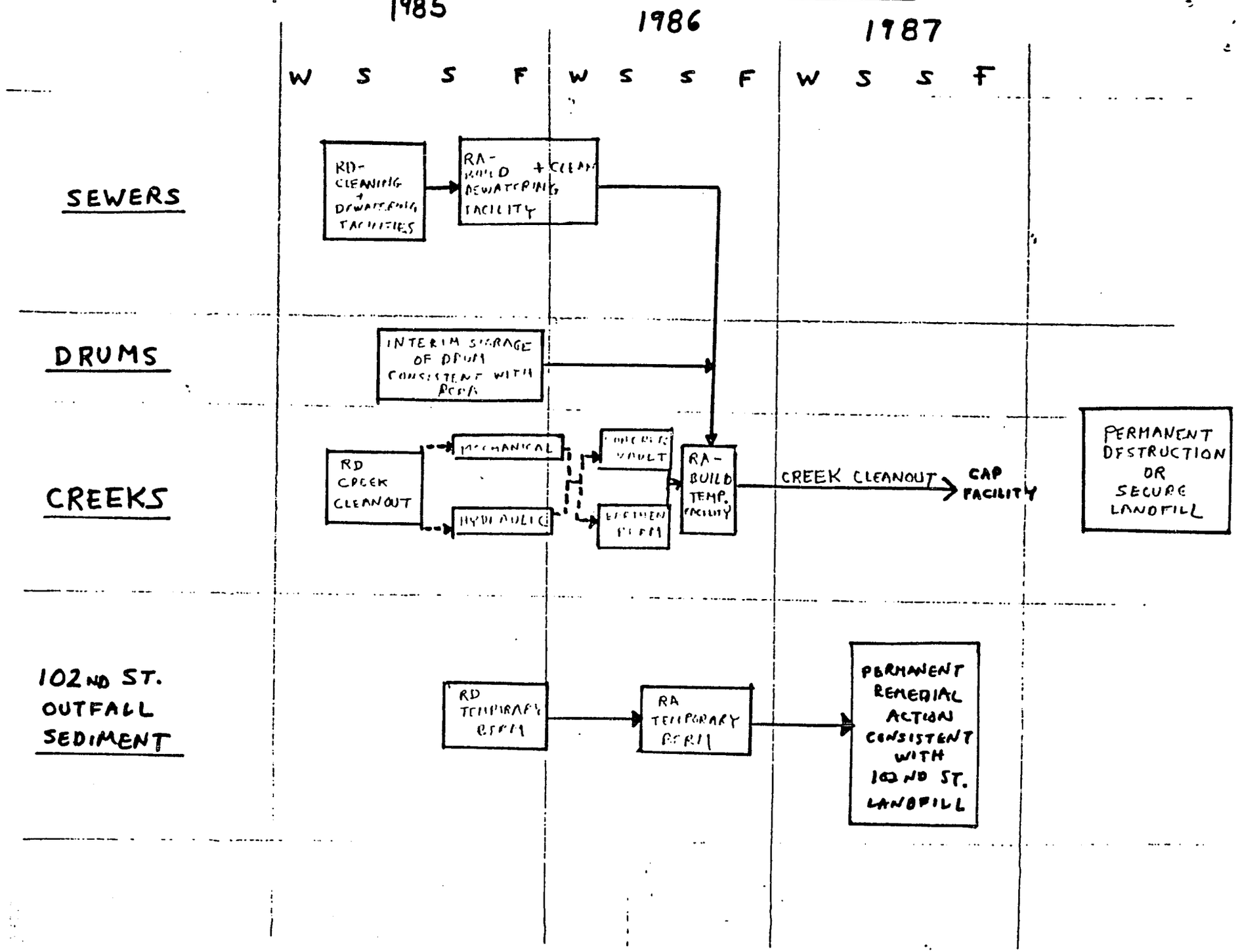


Table 1-8
SUMMARY OF ALTERNATIVES AND CONCERNS

Location/ Remedial Action	A Status	B Estimated Cost (1,000's) Present Worth	C Technical Feasibility	D Public Health Concerns	E Anticipated Public Response	F Environmental Concerns	G Other
1. Sewers							
a) No Action	To be considered	--	Feasible	Unchanged exposure potential	Not acceptable	Continued contaminant migration	Would not permit rehabilitation of EDA homes.
b) Hydraulic cleaning	To be considered	1,348	Feasible	Minimal potential exposure	Acceptable	Short-term remedial action impacts.	Must precede creek cleaning; dewatering technique decision must be made.
c) Abandon and replace with new lines	Eliminated (B,C,E,F,G)	7,080	Feasible	Reduced exposure potential	Not acceptable	Continued contaminant migration	May not permit rehabilitation of EDA homes.
2. 102nd Street Outfall							
a) No Action	To be considered	--	Feasible	Unchanged exposure potential	Not acceptable	Continued contaminant migration	Continued exposure potential in Niagara River and beyond.
b) Tidal gate repair	To be considered	1.5	Feasible	Unchanged exposure potential	Acceptable as interim measure	Continued contaminant migration	Reduces contaminant migration from river into storm sewer.
c) Immediate stabilization							
- Filter fabric and stone	Eliminated (D, E, F)	207	Feasible	Reduced exposure potential	Not acceptable	Reduced contaminant migration	Cannot assess success.
- Stone berm & sheeting	To be considered	509	Feasible	Reduced exposure potential	Acceptable as interim measure	Reduced contaminant migration	Adaptable to final remedial action.
- Steel wall	To be considered	636	Feasible	Reduced exposure potential	Acceptable as interim measure	Reduced contaminant migration	Adaptable to final remedial action.
d) Long-term remediation							
- No action after berm or wall	To be considered	See 2.c.	Feasible	Reduced exposure potential	Not acceptable	Reduced contaminant migration	Will fail eventually.
- Berm or wall and hydraulic dredging	Eliminated (B, C)	443	Not feasible	-	-	-	Insufficient water depth and area for dewatering.
- Berm or wall with shore based excavation	To be considered	350	Feasible	Minimal exposure potential	Acceptable	Short-term remedial impacts	Must be coordinated w/102nd St. Landfills remediation; storage facility must be built first.
- Berm or wall and in-place contaminant	To be considered	598	Feasible	Minimal exposure potential	Acceptable	Short-term remedial impacts	Must be coordinated w/102nd Street Landfills remediation.

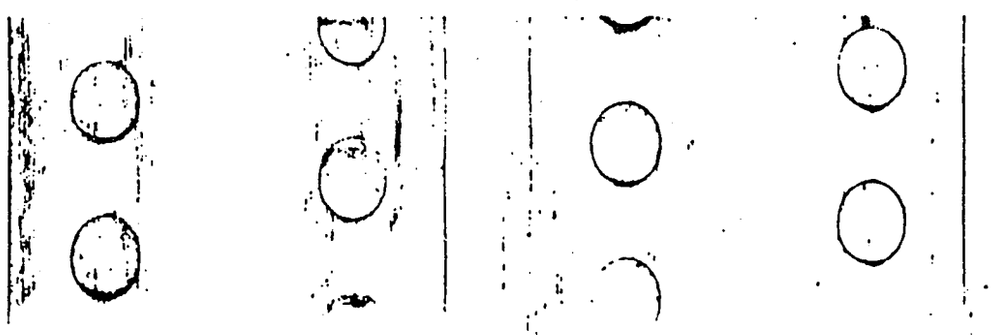


Table 1-8
SUMMARY OF ALTERNATIVES AND CONCERNS
(Continued)

Location/ Remedial Action	A Status	B Estimated Cost (1,000's) Present Worth	C Technical Feasibility	D Public Health Concerns	E Anticipated Public Response	F Environmental Concerns	G Other
1. Creeks							
a) No Action	To be considered	--	Feasible	Unchanged exposure potential	Not acceptable	Continued contaminant migration	Would not permit rehabilitation of EDA homes.
b) Fencing/ordinances	To be considered	141	Feasible; See G	Unchanged exposure potential	Not acceptable	Continued contaminant migration	Limited reliability; may be undertaken in conjunction with other measures.
c) Stabilization							
- Filter fabric and stone	Eliminated (C)	--	Not feasible	-	-	-	Remedial area too large.
- Culverts	Eliminated (C)	--	Not feasible	-	-	-	Remedial area too large; would cause flooding.
d) Hydraulic dredging	To be considered	1,026	Feasible; see G	Minimal exposure potential	Acceptable	Short- and long-term remedial action impacts	Serious potential problems with dewatering; would delay closing of interim storage facility by year(s). Major impacts from pipelines during remediation; cannot use "Times Beach Vault" with this option; cannot clean banks with this option. See 4b below.
e) Mechanical excavation	To be considered	1,178	Feasible	Minimal exposure potential	Acceptable	Short-term remedial action impacts	Only feasible alternative for Black Creek or if creek banks need cleaning; major impacts from truck traffic (1,400 trips); block roads at times during remediation; would require some tree removal
4. Sediment Transport and Dewatering							
a) Transport							
- Trucks	To be considered	Costs included in 3d and 3e above	Feasible	Minimal exposure potential	Acceptable	Short-term remedial action impacts	Required for both hydraulic dredging and mechanical excavation, but latter requires 1,400 trips.

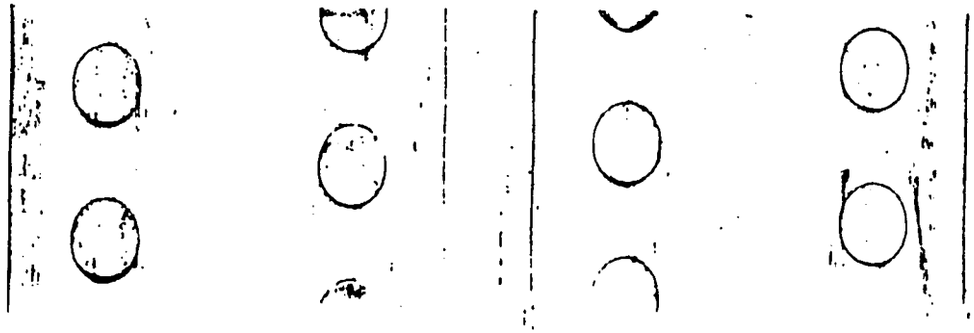


Table 1-8
SUMMARY OF ALTERNATIVES AND CONCERNS
(Continued)

Location/ Remedial Action	A Status	B Estimated Cost ($1,000's) Present Worth	C Technical Feasibility	D Public Health Concerns	E Anticipated Public Response	F Environmental Concerns	G Other
- Pipeline	To be considered	Costs included in 3d above	Feasible	Minimal exposure potential	Acceptable	Short-term remedial action impacts	One mile long double pipelines required for hydraulic dredging; major impact on traffic; noise impact.
b) Dewatering							
- Mechanical	To be considered	391 (for minimal volume only; See G)	Feasible, See G	Minimal exposure potential	Acceptable	Short-term remedial action impacts	Costs calculated for 5,000 cy only; suitable for sewer sediments only; creek sediment volume too large.
- Use of interim storage facility (passive dewatering)	To be considered	For sewer sediments: 280	Feasible	Minimal exposure potential	Acceptable	Short-term remedial action impacts	Sewer sediments can be dewatered and temporarily stored in system similar to one previously used at Love Canal; system would be dismantled and dewatered sediments placed in interim storage facility when built.
		For mechanically excavated creek sediments: included in 5d below	Feasible	Minimal exposure potential	Acceptable	Short-term remedial action impacts	Interim secure storage facility either design (see below) would dewater mechanically excavated sediments using leachate collection system. Interim secure storage facility must be built before remedial action begins.
		For hydraulically dredged creek sediments: included in 5c below (see G)	Feasible	Minimal exposure potential	Acceptable	Short- and long-term remedial action impacts	Interim secure storage facility must be built before remedial action begins. Major design changes needed to adapt system to use for dewatering hydraulically dredged material. Requi facility to be 2.6 times larger than for mechanically excavated sediments. May have serious difficulty in dewatering and stabilizing sediments; may require facility remain open for year(s). Hydraulic dredging option cannot be used without this type of dewatering facilit which also is to be used for wa recirculation to dredge.

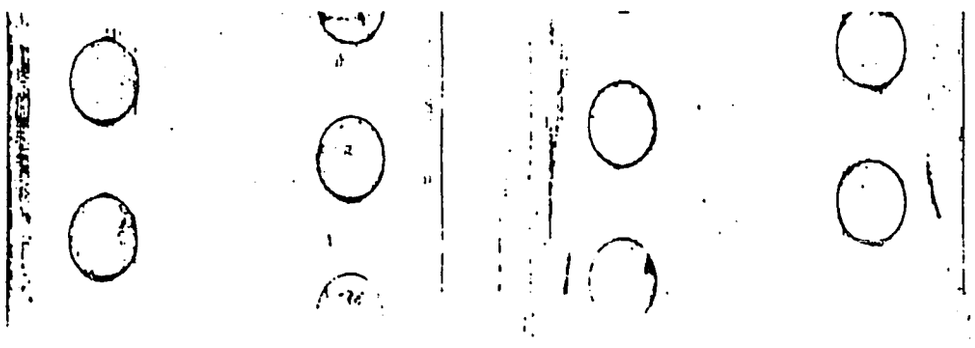


Table 1-8
SUMMARY OF ALTERNATIVES AND CONCERNS
(Continued)

Location/ Remedial Action	A Status	B Estimated Cost (1,000's) Present Worth	C Technical Feasibility	D Public Health Concerns	E Anticipated Public Response	F Environmental Concerns	G Other
5. Interim Secure Storage Facility							
a) Below cap	Eliminated (C, D, E)	--	Not feasible (See G)	Increased exposure potential	Not acceptable	Short-term remedial action impacts	No volume available in cap below liner; would require excavation of more contaminated material.
b) Earthen berm in cap	Eliminated (C, D, E)	--	Not feasible (See G)	Increased exposure potential	Not acceptable	Short-term remedial action impacts	Insufficient volume in cap; would require excavation of more contaminated material.
c) Earthen berm above cap or at 93rd Street School	To be considered	1,131	Feasible	Minimal exposure potential	Acceptable	Short-term remedial action impacts	Only feasible design (with modifications) for hydraulic dredging dewatering. May remain open for year(s).
d) Concrete vault	To be considered	1,135	Feasible	Minimal exposure potential	Acceptable	Short-term remedial action impacts	Cannot be used to dewater hydraulically dredged sediments.
e) Concrete vault at LaSalle	Eliminated (C, E)	--	Not feasible (See G)	Minimal exposure potential	Not acceptable	Short-term remedial action impacts	Permitting would delay remediation for year(s).
6. Treatment/Disposal							
a) Offsite landfills	Eliminated (C)	--	Not feasible (See G)	--	--	--	No facilities able or willing to take sediments.
b) Offsite incineration (Rollins)	To be considered	31,500	Feasible	Minimal exposure potential	Acceptable (See G)	Short-term remedial action impacts	Impacts of lengthy truck transport difficult to determine.
c) Biological treatment	Eliminated (C)	--	Not feasible (See G)	--	--	--	Not demonstrated effective on dioxin in soils.
d) Chemical stabilization	Eliminated (C)	--	Not feasible (See G)	--	--	--	Not demonstrated effective on dioxin in soils.
e) Onsite incineration							
- Stationary	Eliminated (B)	(See G)	--	--	--	--	Cost effective only for 100,000 cy; 2-6 years to build and permit.
- EPA Mobile	To be considered	42,000	Feasible	Minimal exposure potential	Acceptable (See G)	Short- and long-term remedial action impacts	Several years to process waste.

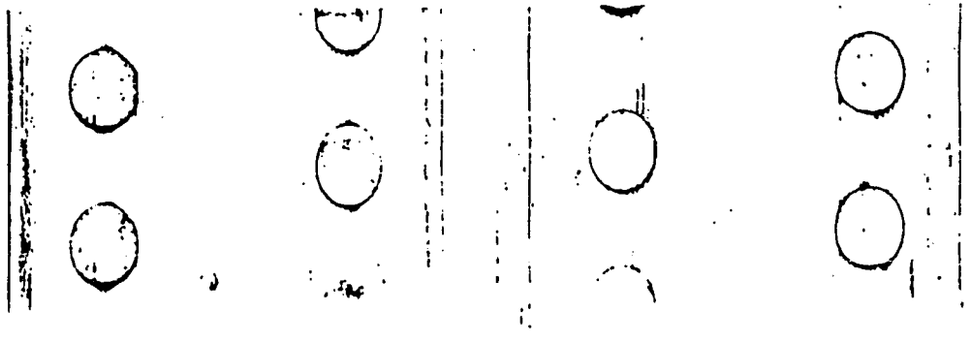


Table 1-B
SUMMARY OF ALTERNATIVES AND CONCERNS
(Continued)

Location/ Remedial Action	A Status	B Estimated Cost (1,000's) Present Worth	C Technical Feasibility	D Public Health Concerns	E Anticipated Public Response	F Environmental Concerns	G Other
- Huber AER	To be considered	18,060	Feasible (See G)	Minimal exposure potential	Acceptable (See G)	Short- and long-term remedial action impacts	No unit of sufficient size exists; not yet permitted for dioxins.
- ENSCO	To be considered	16,800	Feasible (See G)	Minimal exposure potential	Acceptable (See G)	Short- and long-term remedial action impacts	Not yet permitted to incinerate dioxins.
7. Bank and Cayuga Creek Sampling	To be considered	169	Highly Desirable	--	--	--	Needed for better determination of cleaning/dewatering options, and to determine size of storag facility.

NOTE:

1. This table is an extremely abbreviated summary of the material contained in this report and MUST BE EVALUATED ONLY IN CONJUNCTION WITH THE FULL REPORT. Not all alternatives that were evaluated are listed; not all technical, public health, monetary and environmental concerns are noted. A simplistic indicator (e.g., "Acceptable) is used in this table whereas full discussion in the report may occupy several pages.

2. Unless otherwise noted, alternatives pertain to remedial actions that are based on a total sediment volume of 280 cubic yards for the sanitary and storm sewers, and 20,000 cubic yards of sediment from the Black Creek culverts, Black Creek from the culverts to the confluence of Bergholtz Creek; Bergholtz Creek from 150 feet upstream of Black Creek to the confluence with Cayuga Creek; and various haul roads, berms for dewatering creeks, the drums onsite, etc.,

3. Column A indicates if the alternative is to be considered in the EPA/NYSDEC/public decisionmaking process. Letters in parentheses below the word "Eliminated" indicate the column pertaining to the reason for elimination.

4. Column B indicates the maximum estimated present worth (1984 dollars, 10 percent interest, 20 year time frame) of the alternative, unless otherwise indicated. See Chapters 6 and 8.

5. Column C indicates the technical feasibility of an alternative; see Chapters 5 and 6 and Appendix A.

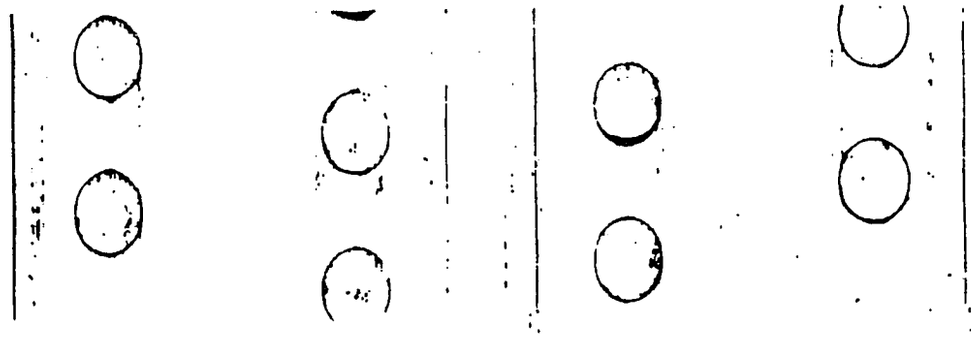
6. Column D indicates the perceived public health concerns associated with the results of the alternative (i.e., how does the remedial action effect the public health when completed?) See Chapters 3, 5, 6, and 7 and Appendices B and C.

7. Column E indicates the perceived public response to the results of the alternative based on comments received at public meetings, through letters and phone calls, and through conversation with EPA and NYSDEC personnel. This is only an educated guess of the public response; and a complete responsiveness summary will be prepared following the scheduled public information meetings and workshops. See Chapters 2, 3, 5, 6, and 7 and Appendices A, B, and C.

8. Column F indicates an estimate of the environmental concerns associated with the implementation of the remedial action. See Chapters 3, 6, and 7 and Appendices B and C.

9. Column G contains comments and explanations.

WDR102/007



Record of Decision
Remedial Alternative Selection

Site: Love Canal, Niagara Falls, New York

Analyses Reviewed:

I am basing my decision primarily on the following documents which describe the analysis of cost-effectiveness consistent with the National Contingency Plan for evaluating remedial alternatives and which provide relevant background information.

- Love Canal Sewer and Creek Remedial Alternatives Evaluation and Risk Assessment CH2M - Hill, March 1985
- Responsiveness Summary, March 1985
- Environmental Information Document-Site Investigation and Remedial Action Alternatives at Love Canal, Malcolm Pirnie, Inc., October 1983
- Environmental Monitoring at Love Canal, USEPA, May 1982
- Habitability of the Love Canal Area - A Technical Memorandum, OTA, June 1983
- Responsiveness Summary prepared by NYSDEC - June 1984
- Staff summaries and recommendations
- Documentation provided by New York State

Description of Selected Option:

Five areas have been defined for remediation under this recommended action. Specifically:

1. North Storm and Sanitary Sewers - hydraulically clean designated sewers, remove and dispose of contaminated sediments and inspect specific sewer reaches for defects that could act as pathways for contaminant migration. Waste will be stored within the Love Canal containment system.

2. Black and Bergholtz Creeks - limit access, dredge designated portions of the creeks, and hydraulically clean Black Creek culverts. Waste will be stored within the Love Canal containment system.

3. South Storm and Sanitary Sewer - hydraulically clean designated sewers, remove and dispose of contaminated sediments and inspect specific sewer reaches for defects, and repair damaged flood gate. Waste will be stored within the Love Canal containment system.

4. 102nd Street Outfall - (if found consistent with the 102nd Street Superfund Site project plan) perform temporary in-situ stabilization of the contaminated sediment via the erection of a berm until issues concerning the source of contamination from 102nd Street Landfill are resolved.

5. West Storm and Sanitary Sewers - hydraulically clean designated sewers, remove and dispose of contaminated sediments, inspect specific sewer reaches for defects, and investigate further downstream areas. Waste will be stored within the Love Canal containment system.

In addition, the installation of a permanent administration building is being recommended on-site.

Consistent with the Comprehensive Environmental Response Compensation, and Liability Act of 1980 (CERCLA), and the National Contingency Plan (40 CFR part 300), I have determined that the remediation of the Love Canal sewers and creeks and the construction of a temporary berm in the Niagara River adjacent to the 102nd Street outfall is a cost-effective remedy and provides adequate protection of public health, welfare, and the environment. The State of New York has been consulted and agrees with the approved remedy.

I have also determined that the action being taken is appropriate when balanced against the availability of Trust Fund monies for use at other sites. In addition, the interim storage of contaminated sediments is more cost-effective than other remedial actions and is necessary to protect public health, welfare or the environment.

I have also determined that a need exists for the construction of a permanent administration building. This action is cost-effective and in the best interest of the health and safety of site workers.

6/18/85
Date

Jack W. McGraw
Acting Assistant Administrator
Office of Solid Waste and
Emergency Response

Remedial Implementation Alternative Selection

Love Canal Site

Niagara Falls, New York

HISTORY:

The Love Canal Site is located in the southeast corner of the city of Niagara Falls and is approximately one-quarter mile north of the Niagara River (see Figure 1). It was one of two initial excavations in what was to be a power canal to provide cheap hydroelectric power for industrial development around the turn of the century. The abandoned excavation, partially filled with water, was used largely for recreational purposes. Between the years 1942 and 1952, Hooker Chemical and Plastics Corporation (now Occidental Chemical Corporation) disposed of over 21,000 tons of various chemicals into Love Canal. The solid and liquid wastes deposited into the Canal include acids, chlorides, mercaptans, phenols, toluenes, pesticides, chlorophenols, chlorobenzenes and sulfides.

The Love Canal property was sold by Hooker in April 1953 to the City of Niagara Falls Board of Education. During the mid-1950's home construction accelerated in the area and in 1954 a public elementary school was built on the middle portion of the Canal. By 1972, area lots were almost completely developed including those with backyards directly abutting the landfill.

In the mid-late 1970's continued periods of high precipitation resulted in rising water table elevations. Water accumulated in the landfill and carried chemically contaminated leachate to the surface and into contact with basement foundations. In response to complaints from residents of homes abutting the Canal, the New York State Department of Environmental Conservation (DEC), with the assistance of United States Environmental Protection Agency (EPA), conducted studies on ground water pollution and basement air and sump water contamination in late 1977.

In April, 1978, on the basis of this initial study data, the Commissioner of the New York State Department of Health (DOH) issued an order to the Niagara County Health Department to restrict access to the site and to remove surficial chemical contamination and cover exposed areas. Additional monitoring studies by DEC, DOH and EPA in 1978 led the DOH Commissioner to declare a state of emergency at Love Canal on August 7, 1978. President Carter also declared an environmental emergency at the Canal which enabled the Federal government to provide financial assistance to the State for the initiation of remedial measures.

In October 1978, a three-stage initial remedial program was instituted by DEC that included the construction of a tile drain (leachate collection) system, placement of a clay cover over the canal, and the erection of an on-site treatment facility.

This initial remedial effort was completed in December 1979. On December 20, the U.S. Department of Justice on behalf of EPA filed suit against Hooker pursuant to numerous environmental statutes alleging an imminent and substantial endangerment to health and environment. New York State filed a lawsuit in State court in April 1980 against Hooker for damages sustained at Love Canal.

In March/April 1980, EPA constructed a six-foot chain link fence as part of a removal action on both sides of Black Creek to deter human and animal contact with contamination from storm sewer drainage from the canal.

On May 22, 1980, President Carter declared a second Federal emergency at Love Canal. This declaration was based upon environmental and health-related studies, one of which indicated that there may have been an unusual level of chromosome damage in the Love Canal residents tested. While this study did not purport to be at all conclusive, or to link chromosome damage to exposure to chemicals from the Canal, it was a factor. When taken together with other environmental and health studies, the uncertain risks to residents in the area, resulted in the determination to move more people from the area. Residents were moved from the area under an authorization by Congress that appropriated $15 million. This action was carried out under a memorandum of understanding between the State of New York and the Federal Emergency Management Agency through the newly-formed Love Canal Revitalization Agency.

In June 1980, EPA began an extensive environmental sampling program at the Canal which would extend over an area designated as the Emergency Declaration Area (EDA) (blocked off area - Figure 2). This study was completed in May 1982 and revealed no clear evidence of environmental contamination in the study area that could be explained by transport through pathways, i.e. groundwater flow, air transport etc. leaving the site, other than storm sewers that discharge into area creeks and rivers. Based on the data collected during this study, the Centers for Disease Control (CDC) stated that the adjacent areas to Love Canal were no less habitable than other areas within Niagara Falls basically characterized as industrial in nature. This statement was contingent upon the remediation of the storm sewers and subsequent waterways into which they drain.

In October 1981, the Love Canal appeared on the initial National Priorities List, which made the site eligible for newly-appropriated Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) monies.

On July 12, 1982, a cooperative agreement was entered into between the DEC and EPA in which $6,995,000 of CERCLA monies were obligated. An amendment in September 1982 brought the obligation close to $8,000,000. Nine tasks were identified in this agreement with major impetus placed on three areas:

- Construction of a wall and extended cap system (including the demolition of the 99th St. School)
- Evaluation of the extent of the contamination in adjacent storm and sanitary sewers as well as area waterways
- Development of a long term monitoring program

Contractors were selected to perform work in the three areas listed above, which started in the fall/winter of 1982. The results of the above investigations led to a decision to delete the wall and reevaluate the options for total containment of the canal.

In October 1983, Malcom Pirnie, Inc., completed a report which presented site investigation findings and an evaluation of remedial action alternatives. CH2M HILL was then contracted under the existing REM/FIT Zone II contract to augment information provided in the Malcolm Pirnie report. CH_2M HILL evaluated additional remedial alternatives, as well as the costs and risks associated with the various alternatives. The report was completed by CH2M HILL in March 1985.

COMMUNITY RELATIONS:

Community involvement at Love Canal has been extensive. A rather comprehensive public relations strategy has been developed by DEC to keep concerned parties cognizant of CERCLA activities. Since the onset of Malcolm Pirnie's involvement, numerous public meetings have been held informing the area residents of the objectives and progress of the storm and sanitary sewer studies. On November 29, 1983, a public meeting was held in Niagara Falls to discuss the draft report and present the selected alternatives. The thirty day comment period initiated in the beginning of November was extended into February 1984, in order to accomodate the large number of comments. Except for minor technical questions, the public was in general acceptance of the selected options. The DEC prepared a Responsiveness Summary (attached) which was distributed to the public as a response to the comments received.

A public meeting and a workshop were held on March 5, 1985, and March 12, 1985, respectively to discuss the CH_2M HILL draft report. dated (March 1, 1985). Although the selected alternatives were again generally accepted by the public, a second Responsiveness Summary (attached) was prepared and will be distributed to the public.

ENFORCEMENT:

On December 20, 1979, the U.S. Department of Justice, on behalf of EPA, filed suit against Hooker pursuant to numerous environmental statutes alleging an imminent and substantial endangerment to health and the environment. New York State filed a lawsuit in State court in April 1980 against Hooker for damages sustained at Love Canal. New York State also joined as a plaintiff in the Federal case. On December 8, 1983, the United States filed a motion for leave to file an amended complaint under Sections 106 and 107 of CERCLA. The legal actions are still pending.

On April 16, 1982, the U.S. sent Hooker a CERCLA notice letter. On July 26, 1982, the U.S. and State met with Hooker to explain what they planned to do under Superfund. Hooker has refused to assume responsibility for remedial action at Love Canal.

CURRENT STATUS:

The storm sewers continue to be a source of contamination, transporting contaminants to area waterways. Sanitary sewers also transport contaminated material through the sewer system with overflows and surcharging creating a potentially hazardous situation. As a result of the environmental monitoring study performed by EPA in 1980 (report - May 1982), a determination was made by U.S. Department of Health and Human Services (HHS) that the area surrounding the Canal (i.e., the EDA) would be no less habitable than adjacent areas if the Canal itself were safeguarded against future leakage and local storm sewers and their drainage tracts were cleaned of existing contamination.

In the fall of 1982, the sewers were severed at the Canal to deter future contaminant flow via these pathways. While the contamination that currently exists in the sewers should not increase, these pollutants could eventually migrate from the sewers and end up in creek and river sediments.

During the first three weeks of January 1983, an intensive field investigation was performed and nearly 1,000 samples were collected. Laboratory analysis and contamination assessments were performed and as a result, engineering alternatives to remediate the sewers and creeks were developed and evaluated. More recent sampling by the DOH was undertaken in April 1984 to confirm the presence of dioxin in Bergholtz Creek.

This study revealed dioxin concentrations above 1 ppb in Bergholtz Creek sediments west of 93rd Street.

In addition, the EPA has established a process to work with various State and Federal agencies to evaluate the potential for habitation of the EDA. Initial results are expected in 1985.

During any remediation at Love Canal, special consideration must be given to the remedial activities underway at the 102nd Street Landfill, a CERCLA site adjacent to the Canal. Remediation recommended for the 102nd Street outfall area must factor in the potential of contamination by this landfill and should be coordinated with any cleanup activities to be undertaken at the 102nd Street Site.

ALTERNATIVE EVALUATION:

The Malcolm Pirnie investigation was divided into five (5) study areas;

- o North storm and sanitary sewers
- o Black and Bergholtz Creeks
- o South storm and sanitary sewers
- o 102nd Street outfall
- o West storm and sanitary sewers

For each area, samples were taken of aqueous and sediment media to determine the levels of contamination. In addition, the bedding materials encircling the sewers were also sampled. The basis for selecting a remedial alternative was the development of a contamination assessment which established a ranking of remedial actions that incorporated both relative concentration and sampling location.

Subsequently, remedial alternatives were developed for each task area, and then evaluated with emphasis placed on effectiveness, reliability, worker safety, ease of implementation, environmental impacts and public acceptance. Feasible alternatives were then selected and reevaluated including cost to arrive at a recommended cost-effective alternative.

No-Action Alternative:

The no-action alternative was considered for each study area, but was eliminated for the following reasons.

- o Prior to the initiation of the Malcolm Pirnie investigation, studies by EPA (Monitoring Study - 1982) identified the sewers leaving the Canal as pathways of contaminant migration and a direct cause of local waterway contamination. A previous recommendation by CDC supported rehabitation if various remedial actions were initiated, including the cleaning of the storm sewers and contaminated sediment in the receiving waters.

- As part of the initial cleanup under Superfund, the storm and sanitary sewers were severed from the Canal area, thus deterring contamination from continuing to leave the site. It is the intention of State and local authorities to continue to utilize these utilities if the area becomes rehabitated. With or without residential influence, contaminants in the sewers will continue to migrate due to area runoff as well as pipe infiltration. Storm sewers will discharge this hazardous material to area waterways, while sanitary sewers will transport the material to downstream points in its system that are subject to overflows to the storm sewer system.

- The detailed sampling effort performed by Malcolm Pirnie provided evidence that contamination does exist, some at high ppm levels, within the sewer system. Within the samples taken, benzene and its derivatives were identified at 2,600 ppm, toluene up to 280 ppm, and trichlorobenzene at up to 310 ppm. Many inorganics such as arsenic and zinc were also identified at levels over 100 ppm. Metals were found throughout the study area and beyond at high concentration levels (ppm's). There is potential for deposition of these hazardous materials in the creeks.

- Of major concern, however, is the presence of dioxin (2,3,7,8 TCDD) in the study area and, because of its toxicity, the potential harm to public health and the environment. The toxic effects of TCDD have been extensively studied in animals. These studies indicate that on a molecular basis TCDD is perhaps the most poisonous synthetic chemical. Human exposure to TCDD has induced chloracne, polyneuropathies, liver dysfunction, and enzyme induction. In animals, TCDD has been shown to be teratogenic, fetotoxic, and carcinogenic. Other chronic effects of TCDD in animals include hepatotoxicity (liver effects), renal toxicity, endocrine effects, immunologic effects (impairment of cellular immunity), and hematologic effects. TCDD has been also shown to accumulate and concentrate in aquatic and terrestrial organisms directly from water uptake as well as from food contaminated with dioxin. TCDD is suspected of being a human carcinogen because of multiple-positive animal carcinogenicity studies. The EPA recognizes no "safe" level for a carcinogen. The recommended concentration in water for maximum protection of human life is "zero." The Centers for Disease Control (CDC) has recommended that residential soils should not contain TCDD at average concentrations exceeding 1 ppb.

  The EPA sampling effort (1980) detected dioxin in a number of storm sewer sediment samples at decreasing concentrations with distance from the Canal. Dioxin levels as high as 650 ppb were detected. The Malcolm Pirnie study also identified dioxin in various creek and sewer sediments. Eleven samples proved positive, with six exceeding 1 ppb in the waterway sediments and five in the sewers. Figure 3 indicates where these positives were identified. The DOH has been taking dioxin samples since 1978. If Figure 3 depicts some of their results as well as the Malcolm Pirnie data.

Four sediment samples were taken by N.Y.S. in the vicinity of the 93rd Street storm sewer outfall and analyzed by DOH for dioxin during April 1984. Results revealed significant levels of dioxin (6.4-10.2 ppb). Sampling of Bergholtz Creek sediments by DEC in the summer of 1984 indicated dioxin at 11 ppb as far downstream as 90th St.

The dioxin in the EDA has been found in sediment deposits. The potential has existed and will continue to be present for exposure since the location of the dioxin is found in creeks bordering residential areas. These are areas that are inhabited and are considered for rehabitation, and potential increased populations will subsequently increase the population at risk. Since dioxin is persistent in the environment; has been shown to bioaccumulate in the tissues of plants and animals; and has low solubility in water, the contamination will remain in the environment unless efforts are undertaken to contain it. This has been recognized in other cases such as U.S. v. Vertac, 489 F.SUPP. 870 (E.D. Arkansas, 1980), and in consent decrees, such as United States v. Hooker Chemicals and Plastics Corp., 540 F.SUPP. 1067 (W.D.N.Y.,1982), where Occidential Chemical Corporation agreed to clean up TCDD laden sediment from a local creek and clean out contaminated sediment in a storm sewer system. This consent decree demonstrates that TCDD remedial actions are feasible and have been ordered by the courts or agreed to by responsible parties.

There are several pathways of human exposure to contaminated waters and sediments, as summarized below:

- Ingestion of fish. A compelling rationale for the elimination of stream and sewer sediments as sources of TCDD is that the discharge of TCDD and TCDD-laden sediment from these sewers and streams is contributing to levels of TCDD in many fish in the Niagara River and Lake Ontario that exceed New York Department of Health, Canadian, and Federal Food and Drug Administration health advisories (10 ppt, 20 ppt, and 25 ppt, respectively).

  Chemical analyses of various species of fish indicate levels of TCDD up to 417 ppt (near Love Canal) and an average level of approximately 34 ppt. EPA and New York State have identified a limited number of sources of TCDD along the Niagara River and Love Canal is one of the most significant sources. TCDD concentrates at high levels in fish tissue from the water, sediment, and ingestion of other fish through what is known as bioconcentration, bioaccumulation, and biomagnification. EPA, States, and other researchers have also detected significant levels of TCDD in fish near other TCDD sites, particularly sites in the State of Missouri, and the State of Michigan.

  As a matter of general practice, New York State and EPA would not permit additional discharges to a river where the existing discharges already cause violations of health based fish advisories. New York, Canada, and FDA have already issued health advisories for fish based on concentrations of mirex, PCBs, and mercury.

The discharge of these chemicals, therefore, should also be eliminated from the streams and sewers to the Niagara River.

- Sewer maintenance. If maintenance is required on a typical sewer, standard practice would be to ventilate the sewers before entry and to use no special equipment, such as respirators. The no action alternative would necessitate the use of higher levels of protection for entry into the EDA sewers in order to minimize worker exposure.

- Inhalation of volatile organics by public. Volatile organics were detected in some samples in the sewers. Although emissions through manholes or the outfalls will be dispersed to some degree by winds and atmospheric turbulence, there will remain the potential for the public to inhale volatile organics from the sewers.

- Surcharging of sediments to surface. Surcharging to within a few feet of the surface was observed in the manholes by Malcolm Pirnie. Surcharging of the sanitary sewers has been reported in the area of 91st, 92nd, 93rd streets and Reading Avenue during periods of high rainfall, and of the storm sewers to the surface along 93rd street. Chemical concentrations in material surcharged to the surface will become diluted as mixing with water and surface material occurs. The amount of deposited sediment will depend on local conditions. Human exposure will depend on the duration of the condition (e.g., surface washing by city services, rain and chemical degradation will decrease concentrations), contact time, and the rates of soil ingestion, intestinal absorption, dermal absorption and inhalation of entrained soil.

- Backflow of sanitary sewer sediments to basements. Backflow preventers were not installed in the EDA homes. Therefore, the potential exists that the sanitary sewer sediments may be discharged to the homes. If the discharge remains undetected, exposure to contaminated material may result.

- Exfiltration to ground water. The spread of contaiminants that may have left pipes, may be enhanced in the EDA by the absence of a drainage system to channel the groundwater away from the pipes. The shallow ground water increases the potential release. Certain chemicals, such as benzene are highly soluble and may migrate with the ground water.

Transport of creek sediment with stream flow will tend to decrease the concentrations over time, but this possibility is reduced by the continued loading from the storm sewer outfalls. Potential human exposure may occur in two scenarios:

- Recreational activities. Exposure will occur during swimming, wading or other recreational use of the creeks. Access is temporarily limited along Black and Bergholtz Creeks because of fencing along the banks down to the 93rd Street School grounds. While the general effect of fences is to reduce exposure, they can be breached, and therefore, are neither an effective nor a permanent remedy pursuant to CERCLA. Access to Cayuga Creek is

open but the sediment here had the lowest concentrations. During recreational activities, water may be ingested or absorbed through the skin. The exposure factors and their uncertainty is much the same as discussed in the section on sewer surcharging. Ingestion of dried sediment along the creek banks is a potential additional exposure route.

- Migration to residential yards. A high rainfall rate and/or a high stage of the Niagara River could produce flooding of the creeks into local residential yards. The qualitative nature of the human exposure potential is much the same as discussed above for surcharged sewer sediments.

Correspondence (February 22, 1984) by the NYSDOH (Attachment 1) states, "It is clear that the presence of Love Canal associated chemicals, especially dioxin, in the sewers and creeks does pose a direct threat to children playing in the creeks, and persons exposed to biota downstream subject to exposure to chemicals being washed down to them."

- The potential exists for contamination of the drinking water supply taken from the Niagara River through creek sediment transport and suspension of the 102nd St. outfall sediment.

The no-action alternative was thus eliminated based upon the existence of hazardous chemicals (especially dioxin) within the study area waterways and fish populations and the potential that exists for continued exposure to the local community.

Sewer Remediation Evaluation:

The remedial options that are available for storm and sanitary sewers in areas are identical. Based on the sampling results, contamination exists at levels within the sewer sediments that warrant cleanup. The same sampling effort, however, indicated that the bedding material surrounding the sewers was quite clean and no remediation would be necessary for these areas. A positive note was that the sewers, barring minor defects, were structurally sound. As a result various alternatives were developed.

- o No-action - While the no action alternative for the sewer system has been rejected, portions of these lines were found relatively clean and would require no or minimal remediation.

- o Monitoring - One option that exists is to periodically sample the sewers in lieu of a physical remediation measure. This may not be cost-effective in light of the high cost of analysis and the potential that a future cleanup may be required.

- o Abandonment in Place - While this would be a detriment to future rehabitation efforts, cutting off or plugging the sewer lines and abandoning the system is a viable alternative.

However, contaminant migration via exfiltration would remain a future threat. The structural integrity of lines is a major factor in evaluating the usefulness of the current system.

- Television Inspection or Similar Methods - Physical inspection of the sewers as a diagnostic tool should be performed in conjunction with any remediation. Defects such as offset joints, root intrusion, broken or collapse pipe and leaky connections can be identified.

- Sewer Cleaning - Numerous methods exist to remove accumulated sediment from existing sewer lines. Power rodding, hydraulic scouring and flushing, bucket dredging, suction cleaning with pumps or vacuums, chemical treatment or combinations of these are available.

- Sewer Repair - Depending on the remedial option selected, sewer repair via grouting or pipe relining may be required to deter ground water infiltration and/or sewer exfiltration.

- Removal and Replacement - The actual excavation of portions of the sewers to remove contaminated pipe and bedding material followed by disposal is a possibility. This option is necessary when the degradation of the sewers and/or the degree of bedding contamination is sufficiently high to preclude current or future service via these facilities.

The above alternatives were evaluated to arrive at a selected alternative. Certain assumptions were applied, many being derived from information accumulated during the sampling effort, these included;

- The potential for sewer use to continue is high;

- The physical, structural condition of the sewers is good;

- The bedding material is basically uncontaminated;

- The degree of contamination found in the sewers is significant;

- The level of contaminants, though found in sediment (no standard exists), are high enough to present risk and, therefore, warrent concern;

- The creeks will continue to be the repository for this material if conditions remain unchecked;

- Options selected would be consistent with remedial efforts at the 102nd Street Landfill to the degree feasible at this time.

The following recommendations (Figures 4 through 10) were drawn from the evaluation:

North

All of the storm sewers should be cleaned utilizing a hydraulic flushing technique since this method would provide the most complete cleanup option. Of most concern are areas down gradient of Love Canal connection points located at 97th and 99th Streets. Also cleaned will be storm sewer tributary lines that may have been subject to surcharging and the 1,400 foot portion of Black Creek which is enclosed in corrugated metal pipes. All sanitary sewers will be cleaned. Additional smoke testing is recommended for some sewer areas as well as the Black Creek culverts to assure the integrity of these segments, i.e., to identify possible pipe breaks, leaky laterals and connection points to other manholes.

South

All of the storm sewers in this area will be hydraulically cleaned. Of greatest significance are those lying downgradient of Love Canal connection points, i.e., 97th and 99th Streets and Wheatfield Avenue as well as tributaries to these areas. All sanitary sewers will be cleaned. Television inspection is recommended in three distinct locations to verify the presence of unknown connections and/or the existance and nature of structural pipe damage.

Of special concern is the relationship of this system to the 102nd Street Landfill. The Malcolm Pirnie report recommends cleaning of the storm sewers up to the landfill property line. It has been reported, however, that the backflow within this line caused by peak and reversed flows in the Niagara River (natural and man-made conditions) has resulted in contaminant migration from the landfill upgradient in the storm sewer. It is, therefore, recommended that the storm sewer through the landfill be television inspected and subsequently cleaned. This would insure that no extraneous connections or major faults exist along this stretch. In addition, the contamination can be removed, thereby eliminating the potential for further sewer contamination from this source. To deter future surcharging through the storm sewers, the currently inoperable tidal gate at the 102nd Street Outfall should be repaired and monitored.

West

The storm sewers recommended to be hydraulically cleaned are those which have been contaminated due to overflow bypassing from the main intercepting sewer which collects all the wastewater flows from the Declaration Area. This bypassing occurs at Lift Stations No. 1,4 and 5 and at 93rd Street and Colvin Blvd. The majority of sanitary sewers will be cleaned and some television inspection will also be necessary. It should be noted that a portion of the sewers recommended for cleaning are located outside the boundaries of the Declaration Area.

Malcom Pirnic had recommended that the segment of the main interceptor sanitary sewer from Lift Station No. 6 to the intersection of 66th Street and John Avenue be sampled for Love Canal related contaminants. Due to the high probability that contamination will be found and remediation will be necessary, it appears to be more cost-effective to forego the costs of additional sampling ($34,000) and proceed with the cleaning of this sewer segment (approximate cost $67,000).

Black and Bergholtz Creeks Remediation Evaluation

The contamination assessment identified specific portions of Black and Bergholtz Creeks requiring remedial action. Cayuga Creek has been recommended for further sampling. The remedial alternatives assessed were included within the following major catagories:

- o No Action
- o Restrict access
- o Stabilization in-situ
- o Removal and Disposal
- o Combinations of the above

One major assumption applied was that any contaminated storm sewer or sanitary sewer overflows discharging to the creeks would be cleaned prior to implementing any creek remediation. Common to all alternatives would be the development of a detailed monitoring program to access the effectiveness of any option selected.

No Action - Beyond periodic sampling no remedial action in the creeks would involve leaving the sediment intact, therefore, this option is unacceptable for reasons explained above.

Restrict Access - This activity can be accomplished in numerous ways such as increasing public awareness, posting signs and erecting fences or a combination of these. The effectiveness of this option alone is considered very low. This is envisioned as a temporary measure.

In-Situ Stabilization - This involves the securing of contaminated sediments in place to minimize or prevent further contaminant migration. Options viable for this scenario would be the placement of small stones or filter fabric on the sediment, piping the creeks, and, treatment in place.

Removal and Disposal - Two major methods for creek sediment removal are hydraulic dredging and mechanical excavation. Various on-site and off-site disposal options exist which involve new (unproven) technologies. Transport to a secure landfill as well as interim storage at Love Canal are viable options.

The detailed evaluation included consideration of the following factors:

- o Rehabilitation of the area is being evaluated and cannot be ruled out.
- o There is presently an apparent stable population in the EDA.
- o Creeks form the border of the EDA; therefore, there is a population that will always exist adjacent to the creeks.
- o Dioxin has been found in the creeks at levels significantly higher than the one ppb CDC "action level" used at other sites. No standards currently exist for chemicals within sediment and, therefore, the impacts on the human population are unknown. Fish sampled in the study area contain significant levels of dioxin, levels that exceed by over three times the FDA advisory levels.

Based on the above, the conclusion has been reached that the length of Bergholtz Creek from 150 feet upstream of the confluence of Black Creek to the confluence of Cayuga Creek and the stretch of Black Creek from the 98th St. culverts to the confluence of Bergholtz Creek should be dredged. Of major concern is the dioxin that has been found in the sediment.

Sampling has indicated that the potential exists that Love Canal-related contaminants might have been discharged (or may be discharged in the future) to Cayuga Creek and ultimately the Niagara River. It is being recommended that Bergholtz Creek be cleaned to its confluence with Cayuga Creek, and that a sediment trap be placed there to deter the backflow of sediment. It has been assessed that Bergholtz Creek is just one point source of contamination, specifically dioxin, that may be entering Cayuga Creek. Additional sampling of Cayuga will determine a strategy for the remediation for this creek.

Black Creek must be mechanically excavated, because of engineering constraints associated with hydraulic dredging. The decision to go with either hydraulic dredging or mechanical excavation for remediating Bergholtz Creek will be finalized during the design phase. Both options have comparable capital costs (see Table 2). The selection will be dependent on technical considerations. If it is determined that the banks of Bergholtz Creek need to be cleaned, mechanical excavation can only be used since this method will adequately clean these sloped areas. Based upon settling tests that are planned during design to determine the filtering and dewatering characteristics of this clayey sediment, hydraulic dredging may be ruled out due to the high water content of the waste that will be generated.

The DEC has recommended that interim storage of these dioxin-tainted sediments be at the Love Canal or the 93rd St School. A discussion regarding this issue follows. In addition, it is recommended that the above reaches be fenced during creek cleaning to restrict access.

102nd Street Outfall Remedial Evaluation:

Based on the contamination assessment performed by Malcolm Pirnie, an "action zone" map has been established which identified the areas of relatively high and medium contamination levels. Alternatives considered for alleviating the problem associated with contaminated sediments in this zone include:

- No action
- Temporary in-situ stabilization followed by removal and disposal or long-term stabilization
- Long-term in-situ stabilization
- Immediate removal and storage/disposal

A premise for the alternative evaluation was that the identified action zone lies adjacent to the 102nd St. Landfill site, which is currently being investigated as a separate CERCLA action. Since the contribution attributed to this site and the subsequent permanent, long-term remedial actions have not been established, the alternative selected here must be flexible to conform with future strategies for this area. In any case, a long-term monitoring program would be required to assess the effectiveness of any option selected.

The selection of an alternative should be geared toward the effectiveness achieved by the action. In the case of the 102nd Street Outfall sediments, the potential impact on the use of downstream public docks, private marinas, power plant intakes and water supply intakes are important in consideration for implementing remediation.

Alternatives should be evaluated based upon their technical, environmental and economic feasibility in mitigating any such negative impacts.

As a result, the following alternatives were developed:

- o No Action - This activity would provide no physical remediation beyond long-term sampling and monitoring of the contaminated sediments.
- o Temporary Stabilization - This action would require either the placement of a filter fabric and stone fill covering on the contaminated sediments or the erection of a berm or wall with a mounted weir around the most contaminated areas to deter future migration. Such activities would be taken if they are consistent with the 102nd St. Landfill investigations and subsequent remedial activities.
- o In-Place Solidification or Destruction - Unproven methods currently exist that transform sediments into concrete-like materials. Biological and chemical destruction techniques also are available, but their effectiveness on the organic materials at the site is unproven.

- Burial In-place - This option is feasible providing it is consistent with future remediation at 102nd Street. This alternative would be the logical sequence if a temporary berm is installed.

- Removal and Storage/Disposal - The sediments can be removed via various dredging and excavation techniques. To undertake such an operation, temporary berm access roads or a barge with mounted excavation equipment would be required to reach all the contaminated sediment. This option would be optimum if the 102nd Street Landfill is to be excavated and removed as well. Disposal of this material, however, is of major concern. A secure facility would be required, but due to the large quantity of material anticipated and the potential that dioxin may be present, this option appears inappropriate. Ideally, if the area is to be dredged, deposition on the Love Canal and/or 102nd St. Landfill sites prior to capping would be more advantageous.

In the selection of a remedial action, the overall remediation of the sediments as well as the landfill must be considered, and as a result a combination of the above options is most appropriate. Based on the evaluation of alternatives, two broad based approaches exist, i.e., in-situ stabilization and dredging, in each a decision is strictly dependent upon the investigations and subsequent remedial actions to be conducted at the 102nd Street Landfill. However, activities can proceed that would not only contain the potentially hazardous sediment from migrating but also would not undermine remedial activities at the landfill. To this end, the erection of a temporary berm (Figure 11) would be a multipurposed as well as relatively inexpensive option.

The berm would prevent further migration of the contaminant material downstream and would contain future discharged waste. In addition, the berm would constitute the initial step for in-place disposal of the sediments. Furthermore, if a dredging option is selected, such a berm would provide an ideal access road for the operation of the dredging equipment as well as containing resuspended materials stirred up during excavation activities. Some questions, however, still exist regarding the actual design of the berm. The effectiveness of the berm in containing all of the contaminant flow from the outfall is unclear at this time. Also unknown is the acceptable percentage of contaminant that would overflow the berm considering the temporary nature of this structure. The discharge flow rate from the outfall must be determined and considered. The answers to these questions are important and necessary to adequately design the berm. Conceptually, however, this action provides the mitigation of the sediment migration that is of the most concern.

Storage/Disposal of Contaminated Materials

The sediment which is proposed to be removed from the creeks and sewers is known to contain dioxin and therefore is subject to stringent disposal procedures. Approximately 16,000 cubic yards of sediment would be removed from the proposed cleaning of Bergholtz and Black creeks and the sewers (280 cubic yards). The volume would increase to approximately 21,000 cubic yards if the creek banks are determined to require excavation. Removal to a secure landfill was considered, but no facilities were willing and/or able to take the wastes. Incineration was also considered but did not seem to be a viable alternative for the immediate future. However, these options may become more feasible and may prove to be the ultimate source of disposal.

Because the sediments can be removed more rapidly than they can be treated or disposed of, and because all treatment or disposal methods require preparation of the sediments (dewatering, sizing, etc.) all sediments must be stored. An interim secure storage facility meeting all technical requirements of RCRA is proposed. The wastes will be stored until such time as one of the above means of disposal/destruction becomes available or until another method becomes technically feasible.

Construction of the storage facility is expected to take place during the 1986 construction season with creek cleaning to follow and be complete in 1987. Since the sewer cleaning will take place in the Fall of 1985 a dewatering facility similar to the one used for dewatering sediments during the first sewer cleaning operation at Love Canal is planned. The facility would have a double liner leachate and leak detection systems and would dewater from below. It would allow the sewer sediments to be removed during the fall of 1985, placed in a dewatering facility and eventually relocated to the interim storage facility upon its completion in 1986.

The type of storage facility, either earthen berm or concrete vault, will be determined during the design phase. The location of the facility must also be designed. Several places inside the Love Canal fenceline are suitable as are the 93 Street School grounds. If the facility is located on the 93 St. School property, a new leachate treatment facility would have to be constructed or a leak protected pipeline would have to run to the existing facility at the Canal. The potential locations for a concrete storage facility are restricted. The facility cannot be located over the capped areas of former residences within the fenced portion of Love Canal because of uncertain settlement problems. Also it is not desirable to place a concrete structure on the cap covering the canal proper because of uncertain settlement and potential slippage caused by the HDPE liner in the cap. The concrete storage facility can be located on the roadbed of 97th or 99th Street in the Canal area or on the 93rd Street School property. An earthen berm facility would most likely be located on the southern end of the Love Canal fenced area.

It should be noted that space requirements for the two types of facilities (concrete vs. earthern) are very different. The concrete facility would measure approximately, 100 feet wide, 200 feet long, and 20-25 feet high, if placed on the road bed within the fence area at Love Canal proper or about 165 feet by 165 feet by 20-25 feet high, if placed on the 93rd St school grounds. An earthen bermed facility used for hydraulically dredged sediments would measure approximately 260 feet wide by 1250 feet long by 12 feet high. If used for mechanically excavated sediments an earthen berm facility could measure 260 feet wide by 400 feet long by 12 feet high.

A major factor influencing the selection of the type of facility will be the method which is finally chosen for dredging the creek sediments. Both options have comparable capital costs (see Table 2), therefore the selection will be based on technical considerations.

The increased surface area provided by the earthen berm facility (vs. the concrete vault design) is compatible with the dewatering and storage of sediment should they be hydraulically dredged. The greater surface area would improve evaporation rates and ensure a depth of sediment suitable for efficient dewatering from below. If the facility is used to dewater hydraulically dredged sediments it may be a year or more before it could be closed.

Because of its lesser surface area a concrete vault would probably not be able to adequately dewater hydraulically dredged sediments. In the case where creek sediments where mechanically excavated, both the earthen berm and concrete facilities would be suitable for interim storage of the sediment.

Construction of a Permanent Administration Building:

The existing on-site leachate treatment plant was completed in December 1979. Many deficiencies have been identified in this structure. Of major concern is the lack of adequate and separate space for storage of clean and contaminated equipment, materials, and supplies, and the lack of adequate facilities for personnel decontamination procedures. Additional space is necessary to conform with the requirements of the Occupational Safety and Health Administration Act 29 CFR Part 1910.14 (e) and (g).

Various options were evaluated. Rejected immediately were options that located an administration building off-site utilizing existing uninhabited structures, since the chance for off-site contamination would increase and security procedures would be more complex. On-site alternatives were evaluated that looked at the construction of additions to the existing facilities, erection of a new permanent building, or the placement of temporary (trailers) facilities.

Since it is assumed that these facilities would be required for an indeterminate period of time and that a well constructed facility would be more cost-effective than a lesser quality building that would require more frequent repair and/or replacement, the option to utilize temporary structures was dropped from consideration. In addition, a permanent facility would be in keeping with the long-term commitments made by the State of New York to maintain, indefinitely, the integrity of any Love Canal remediation.

It is also proposed that the new building be constructed apart from the existing leachate treatment facility. The possibility of adding space to the existing leachate treatment facility is not an acceptable alternative for the following reasons:

- There is no room adjacent to the existing facility. To the north of the plant is a parking lot/driveway which provides access to the carbon transfer platform behind the plant. To the immediate east is the carbon transfer pad is the leachate collection drain. To the south are the sludge storage tanks and space dedicated to a pilot scale plasma arc furnace for experimental use in destructing contaminants in these sludges. To the west is 97th Street.

- By separating the two buildings, the chance of contamination of the proposed facilities is reduced. Despite all efforts and care in keeping the existing facility clean, there is a continuing potential for workers to carry contaminants on their person from the process room to the shower/toilet facilities and office. Also volatile organics emitted in the process room often permeate the other rooms of the existing facility.

- Soils to the east of 97th Street are generally found to be chemically contaminated. The excavation of soils adjacent to the existing facility required to construct a foundation for an addition would likely result in the generation of contaminated soils requiring special handling and disposal. It appears possible to avoid the problem of contaminated soils by building on the west side of 97th Steet, although additional sampling must be performed to confirm this.

The DEC has assembled preliminary plans and specifications for a permanent structure across from the existing leachate treatment facility (figure 12) that will include:

- Approximately 140 square feet of floor space for a locker room to store work clothes, work shoes, hard hats, etc., worn in the treatment plant and during maintenance activities on-site.

- Approximately 168 square feet of floor space for a clean shower/toilet facility removed from the sources of contamination in the leachate treatment plant.

- Approximately 140 square feet of floor space for a clean locker room to store clean clothing as workers dress for work on-site.

- Approximately 465 square feet of floor space for an office separate from the sources of contamination in the existing leachate treatment plant. Space is provided within the office for a lunch room.

- Approximately 462 square feet of floor space for equipment storage and work space.

- Approximately 704 square feet of floor space to serve as a garage and workshop to house site dedicated vehicles and equipment.

- Approximately 210 square feet of floor space for utilities.

- Approximately 222 square feet of floor space for a laboratory.

CONSISTENCY WITH OTHER ENVIRONMENTAL LAWS

This section compares the recommended action with the technical requirements established by other environmental laws (see the proposed policy on CERCLA compliance with other environmental statutes published in 50 FR 5928-32, February 12, 1985).

The recommended action, i.e, the cleaning of Love Canal sewers and creeks, have been reviewed for consistency with the technical requirements of the Resource, Conservation and Recovery Act (RCRA). The remediation of the sewers and creeks will result in the collection of large amounts of contaminated material, complicated by the fact that it contains dioxin.

Currently, no RCRA permitted disposal facilities will accept the dioxin contaminated wastes, and incineration has not reached a level of reliability and flexibility to be considered at this time. Therefore, it is proposed that this material be placed in secure interim storage at Love Canal within the fenced in area off the canal itself or at the 93rd St. School. The interim storage facility will be consistent with the technical requirements of RCRA for the storage of dioxin contaminated wastes.

The facility will either be an earthen berm or a concrete vault. Design of the earthen bermed facility would include the following:

- Installation of a synthetic membrane liner, e.g. high density polyethylene (HDPE) on the bottom of the facility to prevent migration of wastes out of the facility. A compatibility test using actual creek and sewer sediment leachate will be performed during detailed design to determine if HDPE is suitable for use as a liner for the storage facility.

- Installation of both leak detection and leachate collection systems separated by a synthetic membrane liner. Sand will be utilized as the initial layer of the leachate collection

system to facilitate sediment dewatering. A particle size distribution analysis of the sediment will be performed as part of the detailed design in order to properly size the sand and prevent blinding of the filter fabric and the leachate collection system.

- Design of the berms to include a minimum of 1.5 feet of freeboard.

- Design of the berm for the hydraulic facility would include a minimum of 2.0 feet of ponding depth. This assumes that the sediment would be deposited at an even depth over the entire facility. During actual operation, if this facility is to be used as a dewatering facility for the hydraulic creek cleaning, the majority of the sediment will be deposited at the inlet end of the facility.

- Placement of a synthetic membrane liner along the inside and outside faces of the berms.

- Placement of drainage fabric along the inside face of the berm underneath the synthetic membrane liner to facilitate leak detection.

- Cap construction identical to the recently installed synthetic membrane liner system.

It is also possible for the contaminated material to be stored in a concrete facility. The concrete facility would also be contructed in a manner which is consistent with RCRA guidelines for storage of dioxin-contaminated wastes. Various materials would be placed below the contaminated material to drain moisture out of the containment and keep groundwater from it. An impervious synthetic liner protected by layers of geotextile fabric on each side would be placed above the prepared base. Above this liner, a leak detection system would be embedded in a graded rock drain. While this system should collect very little water, any water it did collect would be drained by gravity to a leak detection sump and pumped to the leachate treatment system.

A drainage collection system would be embedded in a graded rock drain above the leak detection system and the concrete floor and would be covered with a layer of geotextile fabric. Collected leachate would also be sent to the leachate treatment system.

The concrete interim containment facility, when closed, would be covered with an impermeable cover. The cover would prevent water percolation, promote drainage, minimize erosion, accommodate settling, and minimize maintenance.

The cover system would consist of nine layers. The layers (from the contaminated material up) would be stabilized sand, geotextile fabric, an impervious synthetic cover, (e.g., hypalon or CPE) geotextile fabric, drainage layer, geotextile fabric, compacted

clean soils, erosion matting, and a vegetative cover (planted grass). The cover would be formed into a dome. The final slope of the cover over the containment facility would be no greater than 10 percent and no less than 5 percent.

A concrete storage facility will be easily seen and rise 20 to 25 feet above the ground. To make the facility blend into the surroundings a berm with a 4 to 1 slope can be placed around it and planted with grass. This can easily be done with a facility located on the 93rd Street School property, but on Love Canal it is very difficult due to space constraints.

It should be noted that the storage facility location and design decided upon may impact possible plans for interim storage of sediments from possible future remediation of Cayuga Creek or the 102nd Street outfall.

The creek sediments will be placed directly into the facility while the sewer sediments would be dewatered and placed in the facility upon the completion of its construction. The sewer sediment dewatering facility itself will also be consistent with RCRA. The dewatering facility will be similar to the one originally used at the first sewer cleaning operation at Love Canal. It will have two 80 ml HDPE liners with a leak detection system in between and a leachate collection system above. An overflow weir would allow water above the sediment in this facility to flow into a second compartment where it would await filtering through a low pressure sand filter (along with collected leachate) prior to being pumped to the existing Love Canal Treatment Facility.

The 650 or so drums presently at Love Canal will also be temporarily stored in accordance with technical requirements set forth in RCRA. The facility will probably be located in the northwest corner of the fenced area at the Love Canal and will be roofed. The drums will be placed on wooden pallets and underlain by a concrete pad. There will be walkways (two feet minimum) between drums to allow easy inspection. The drums may be moved to the larger interim storage facility when it is constructed in 1986.

The wastes will be stored until such time as on-site or off-site RCRA permitted incineration facilities are available or until a RCRA permitted landfill facility is willing to accept the waste. If the wastes are incinerated, the residue or ash will be disposed of in a RCRA permitted facility or retained on-site if the ash is delisted by EPA.

The remediation of the sewers and creeks will incur some temporary adverse environmental impacts. Table 1 presents both short and long term impacts associated with the remedial alternatives. Work plans will address and incorporate measures to minimize possible effects of remedial activities.

To comply with Occupational Safety and Health Administration Act (OSHA) requirements, it will be necessary to provide adequate working facilities for on-site employees. The proposed construction of an administration building will serve to meet current OSHA guidelines.

Finally, the assessment of floodplans and wetlands impacts, as set forth in the section 404(b)(1) Guidelines, will be included within the design of the recommended berm and within the design of the creeks cleanup if it is deemed necessary to excavate their banks.

RECOMMENDED ALTERNATIVES:

The underlying goal of the remedial program at Love Canal has been to provide an environment as free of contamination as practically possible, within cost-effective guidelines. Actions that were selected for design and eventual implementation reflect activities commensurate with this objective. In light of the potentially hazardous situation that exists, the sewers should be cleaned and the contaminated creek sediments dredged as described in this document.

The erection of a berm is also recommended. This option will not only provide temporary containment of the migrating contaminated sediments at the 102nd Street Outfall, but can be subsequently utilized in any future remedial action that is selected at the landfill. During the conceptual design phase, the required effectiveness of the berm to contain the contaminated sediment will be determined, and the final design will reflect any necessary additions. Thus berm will not be designed until it can be shown that its construction would be consistent with the remedy chosen in connection with the 102nd Street Landfill Superfund site.

It is further recommended that on-site interim storage of the contaminated sediments be approved. To assure that this waste will remain secured on-site until ultimate disposal, the interim storage facilities will be constructed in accordance with the technical requirements of RCRA.

The construction of a permanent administration building will provide adequate and safe working conditons for site employees and will be consistent with the State's long-term commitment at the Canal.

Cost:

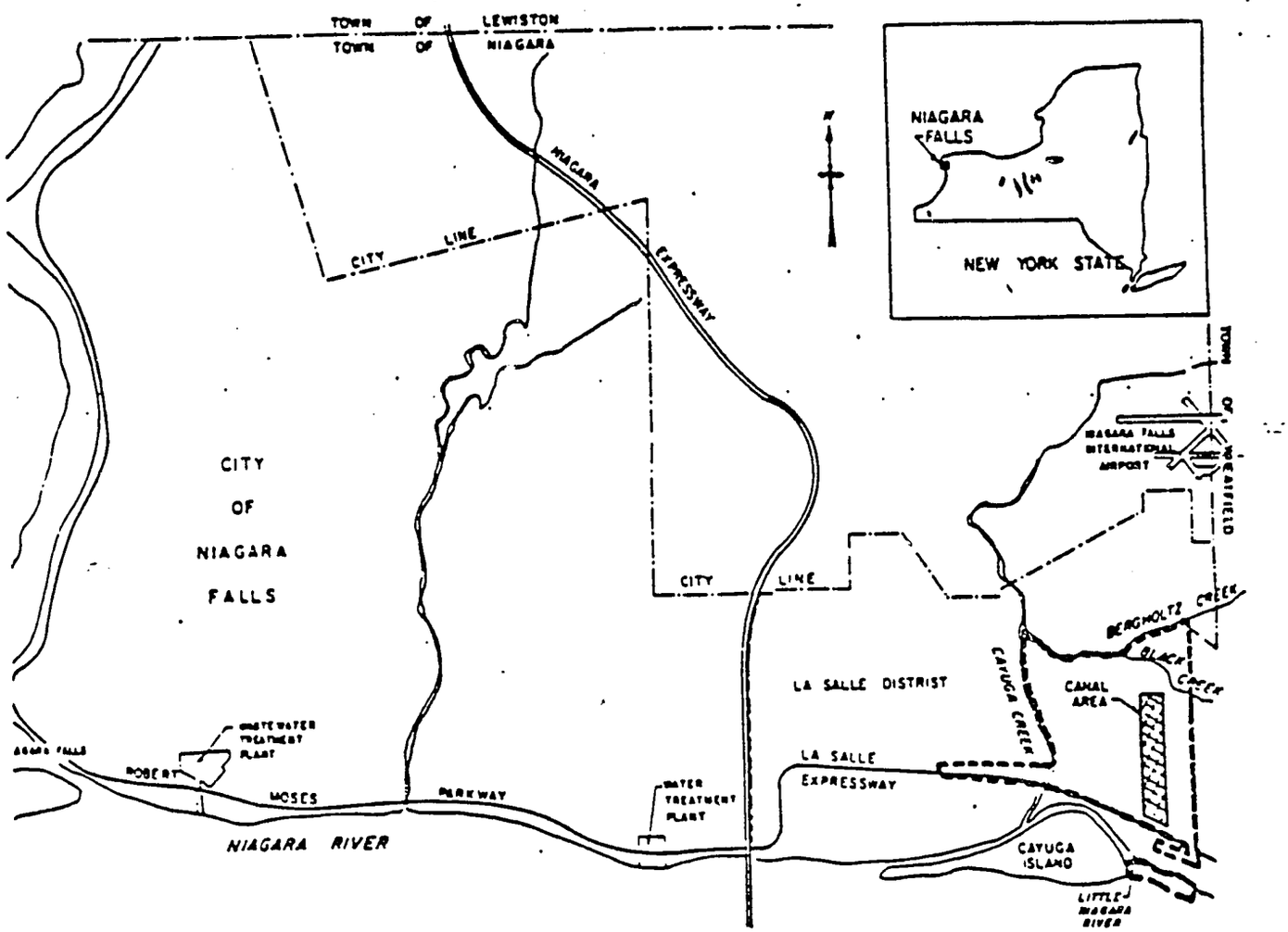
Table 2 shows the costs associated with the feasible alternatives for remedial action as estimated by CH2M Hill. These costs are order of magnitude estimates and are expected to be accurate within a range of +50 and -30 percent. Table 3 shows costs originally projected for 2nd and 3rd quarters of FY85 and for proposed revisions to the FY 85 SCAP.

The DEC will continue the lead on the project. Therefore, costs for DEC's administration management activities have also been estimated. The site has been classified as a 90 percent Federal and 10 percent State cost-sharing site. The State has a credit of $72,000 remaining from an original total of over $800,000 which will be used to cover part of their share. It should also be noted that EPA Headquarters will have to provide additional funding ($1,290,00) for these expenditures. Current Regional contingency funds will not be able to cover these costs.

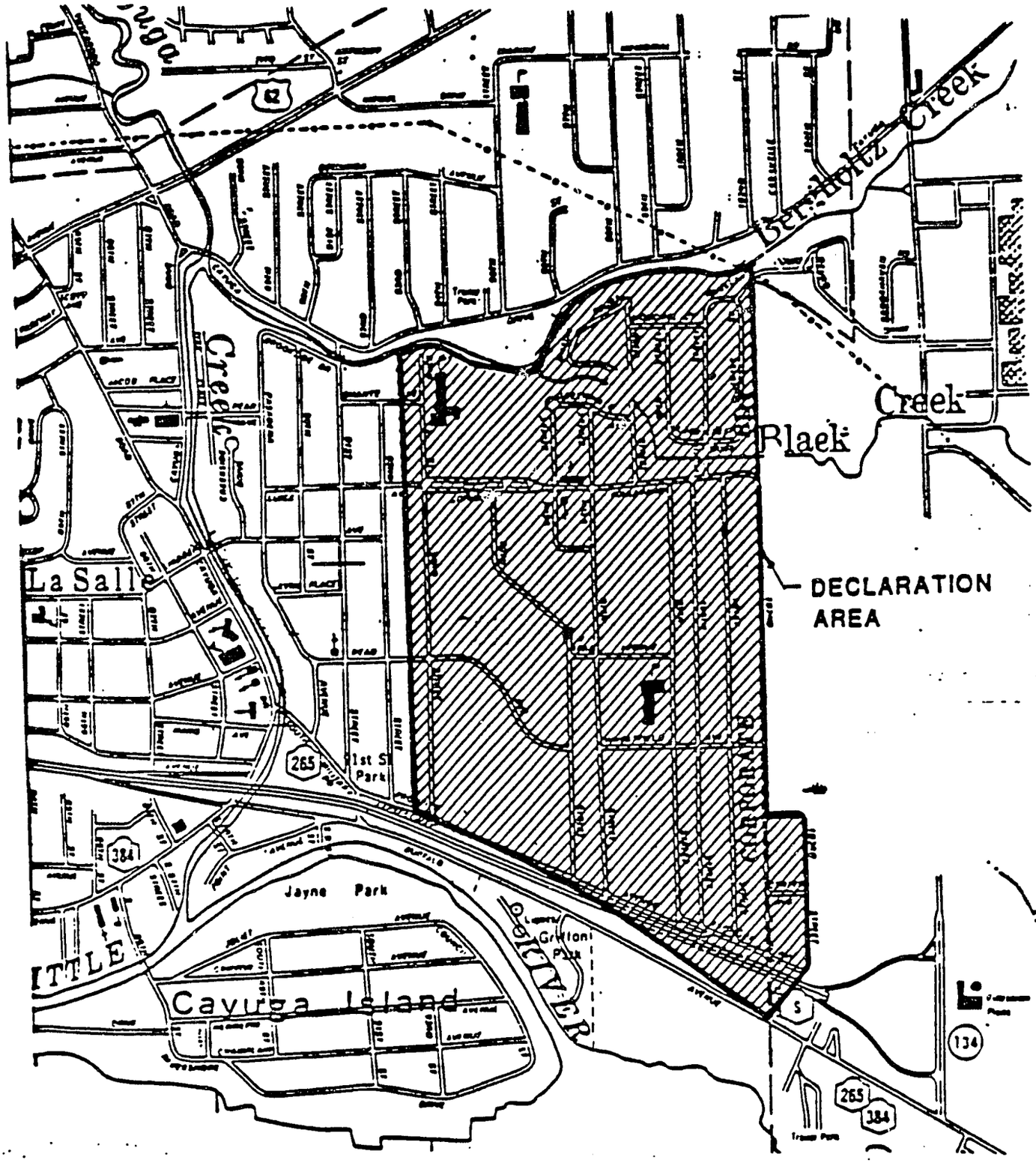
Schedule

Construction of sewer sediment dewatering facility	Fall 85
Sewers cleaned	Fall 85
Sampling of Cayuga Creek and the banks of Bergholtz and Black creeks	Fall 85
Construction of interim storage facility	Summer 86
Creeks cleaned	Spring/Summer 1987
93rd Street investigations	Fall 85-Spring 86
Administration building	Summer 85
Drum storage facility	Fall 85

FIGURE 1



LOVE CANAL
SITE INVESTIGATIONS AND REMEDIAL ACTION ALTERNATIVES
REGIONAL MAP



LOVE CANAL
FIVE ENGINEERING STUDIES

DECLARATION AREA MAP

FIGURE 2

FIGURE 3

DIOXIN: LOVE CANAL SAMPLES

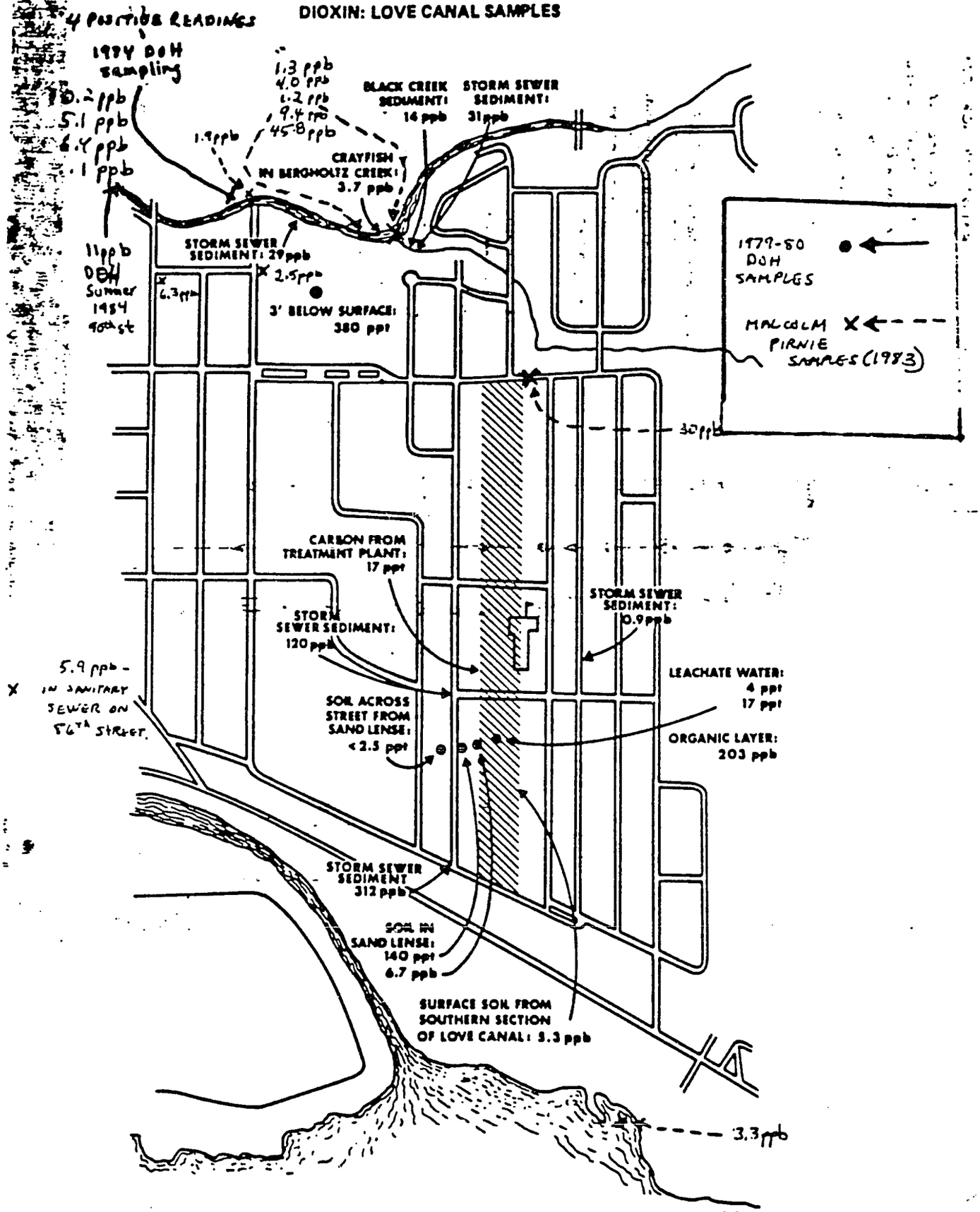
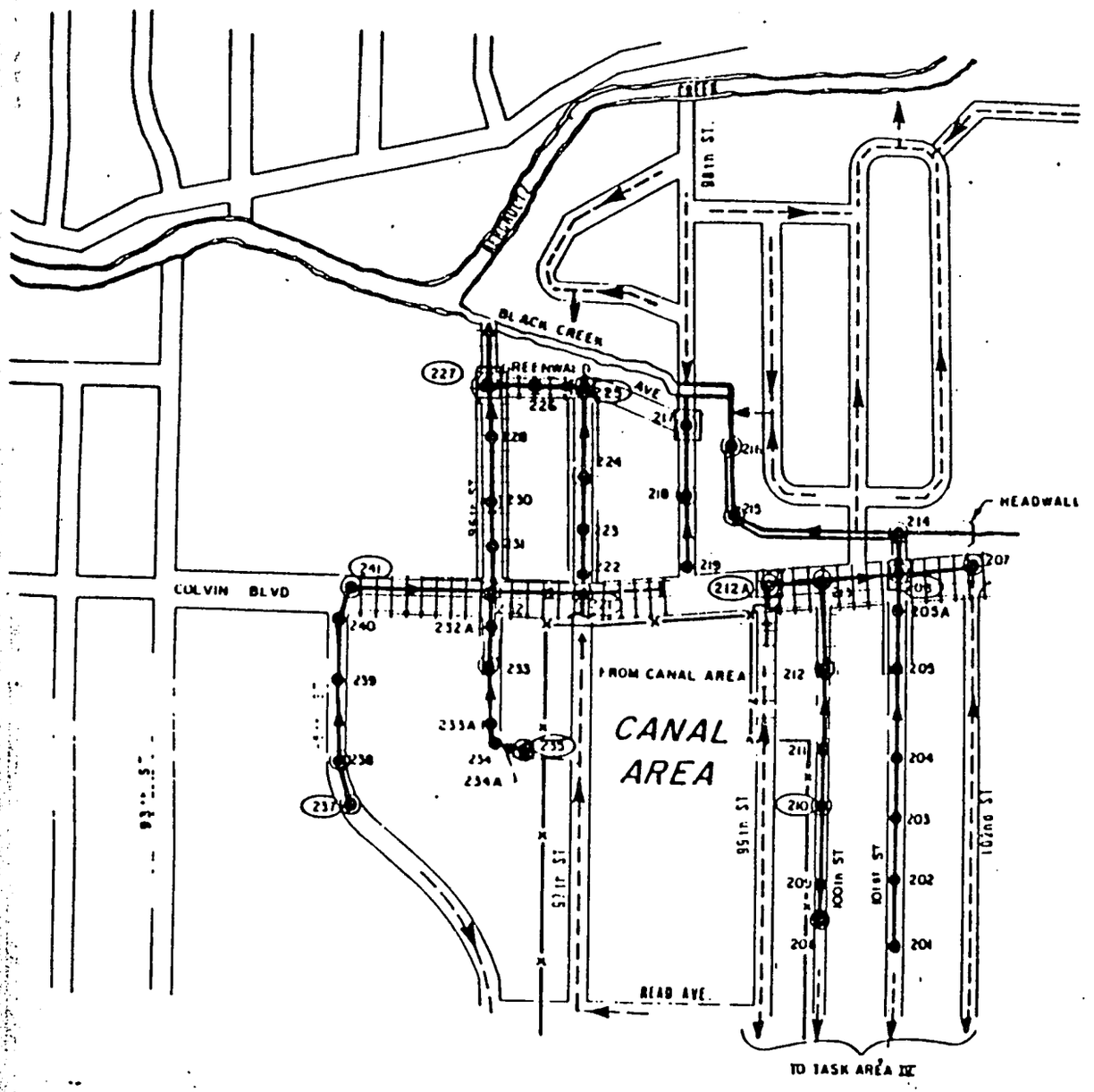


FIGURE 4



LEGEND

DRY WEATHER SAMPLING

- INSPECTED MANHOLE (NO SAMPLES TAKEN)
- LIQUID AND SEDIMENT SAMPLES
- SEDIMENT SAMPLE
- LIQUID SAMPLE
- (111) SEDIMENT MATERIAL

STORM WEATHER SAMPLING

- LIQUID SAMPLE

LEGEND

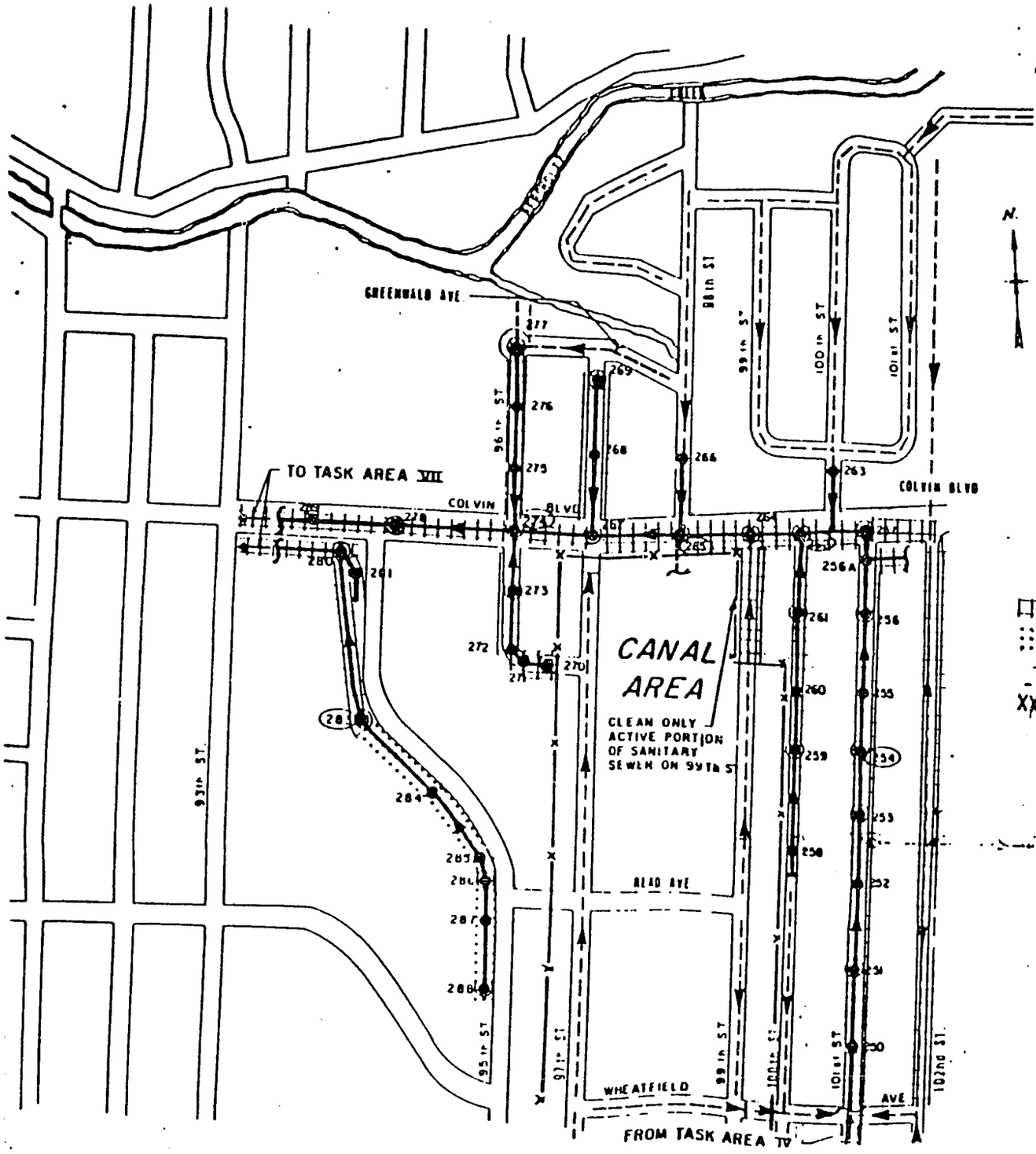
- HYDRAULICALLY CLEAN
- TELEVISION INSPECTION AND HYDRAULIC CLEANING
- SMOKE OR DYE TEST
- XXXXXXX REMOVE AND REPLACE

SCALE: 1" = 400'

LOVE CANAL
FIVE ENGINEERING STUDIES
NORTH STORM SEWERS
TASK AREA II

REMEDIAL ACTION PLAN

FIGURE 5



N.

LEGEND

DRY WEATHER SAMPLING

- INSPECTED MANHOLE (NO SAMPLES TAKEN)
- LIQUID AND SEDIMENT SAMPLES
- SEDIMENT SAMPLE
- LIQUID SAMPLE
- BEDDING MATERIAL

STORM WEATHER SAMPLING

- LIQUID SAMPLE

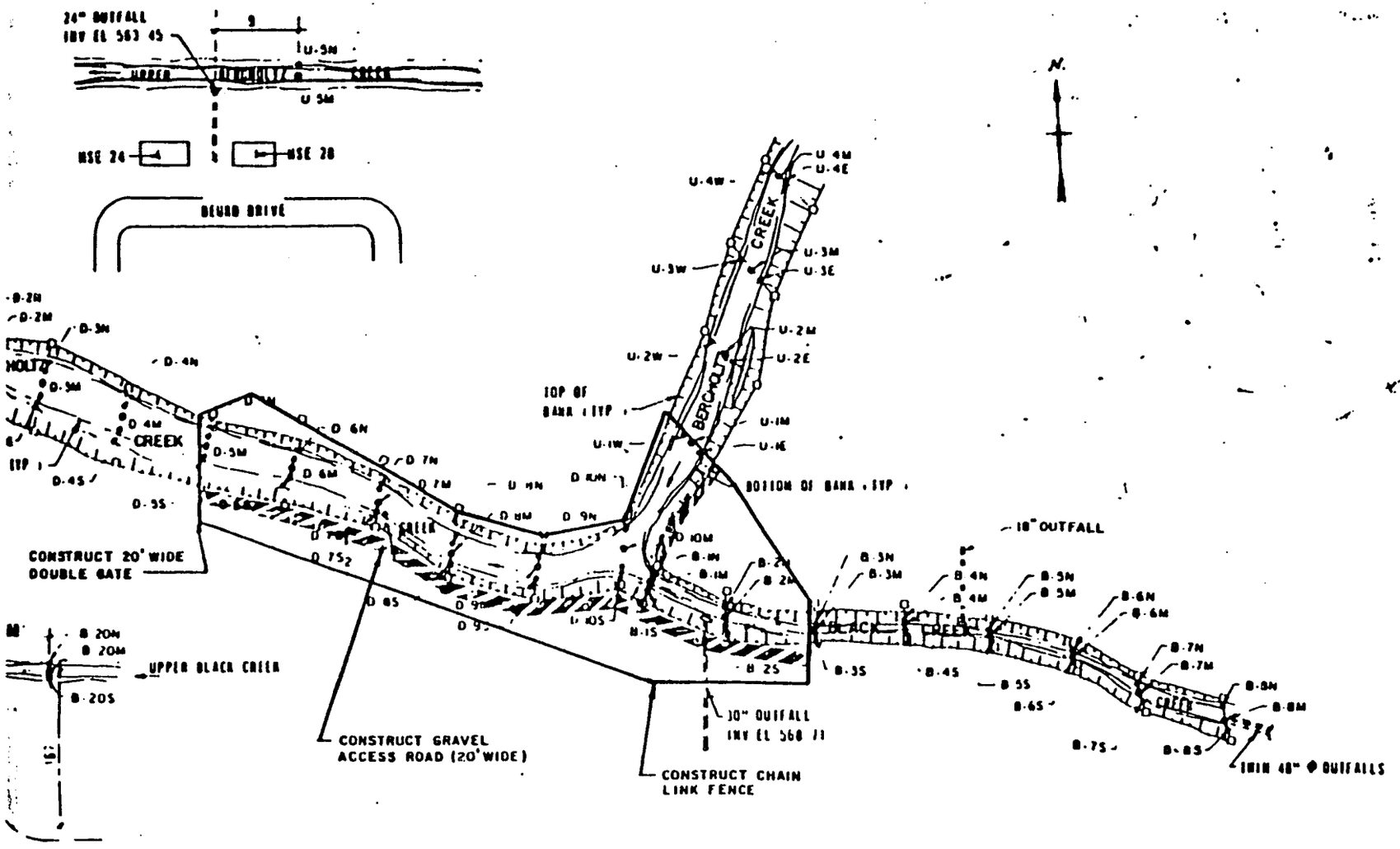
LEGEND

- HYDRAULICALLY CLEAN
- TELEVISION INSPECTION AND HYDRAULIC CLEANING
- SMOKE OR DYE TEST
- XXXXXX REMOVE AND REPLACE

SCALE: 1" = 400'

LOVE CANAL
FIVE ENGINEERING STUDIES
NORTH SANITARY SEWERS
TASK AREA II
REMEDIAL ACTION PLAN

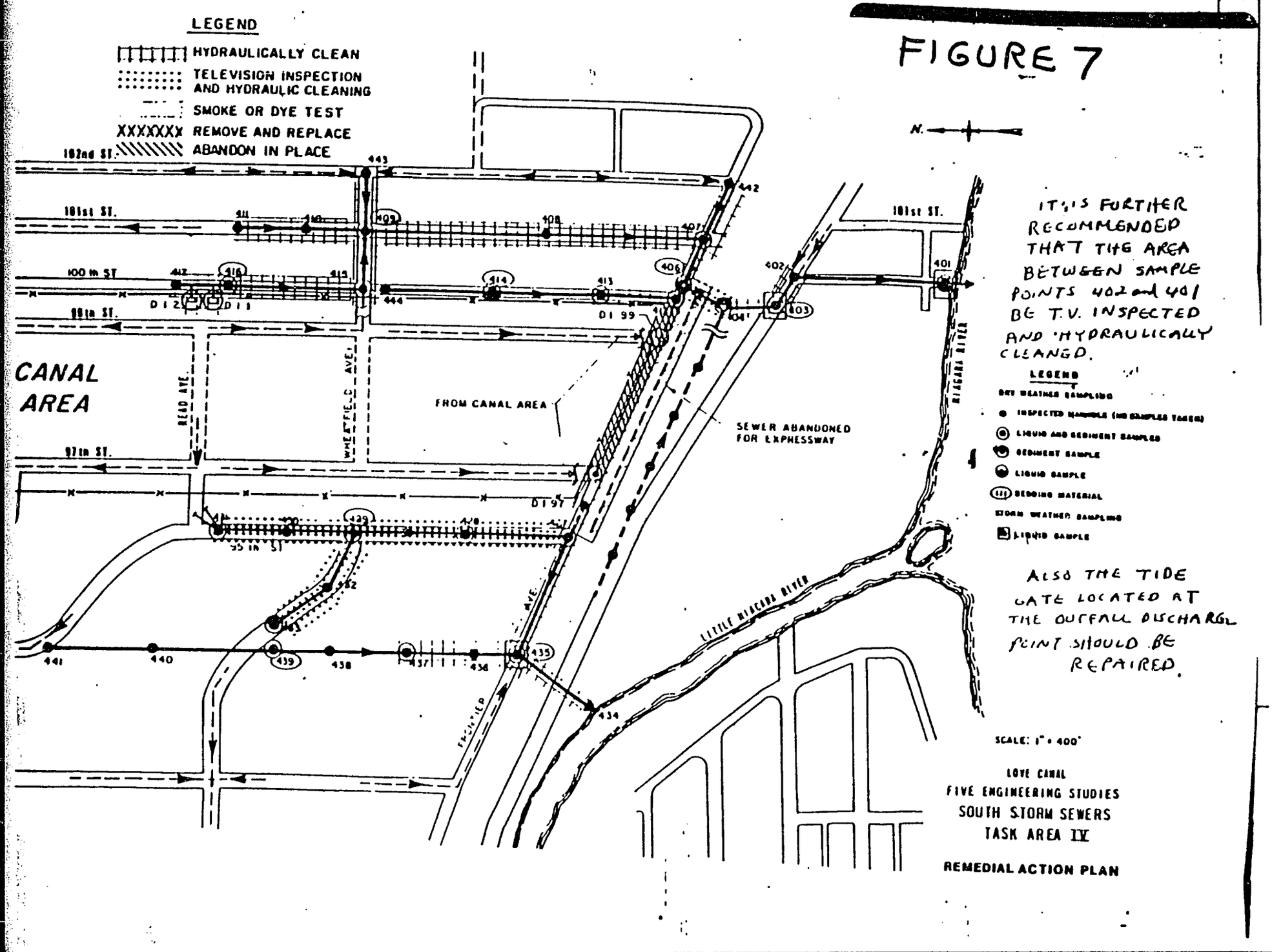
FIGURE 6



SCALE: 1" = 75'

LOVE CANAL
FIVE ENGINEERING STUDIES
BERGHOLTZ & BLACK CREEK
MECHANICAL EXCAVATION
TASK III

FIGURE 7



IT IS FURTHER RECOMMENDED THAT THE AREA BETWEEN SAMPLE POINTS 402 and 401 BE T.V. INSPECTED AND HYDRAULICALLY CLEANED.

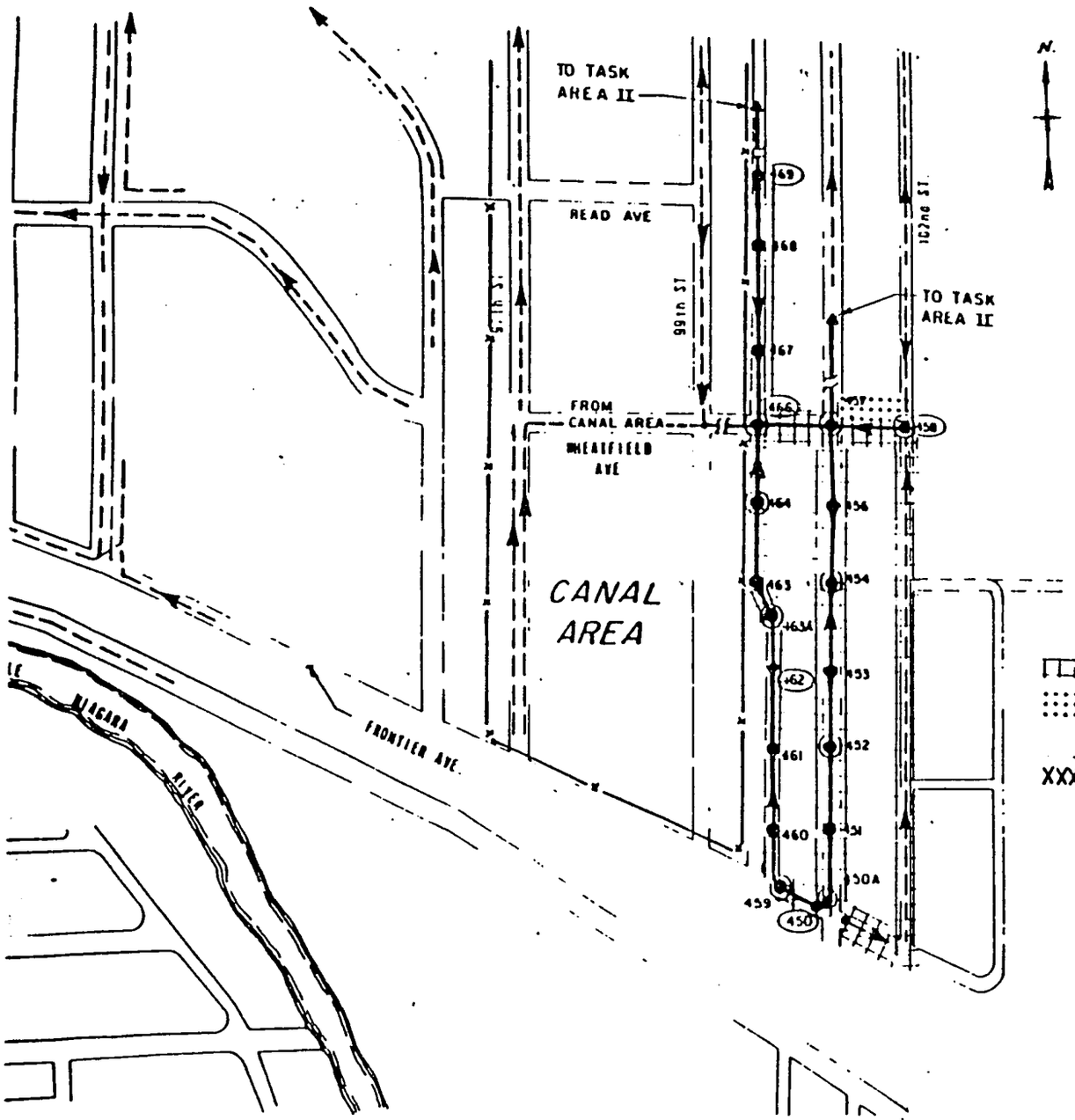
ALSO THE TIDE GATE LOCATED AT THE OUTFALL DISCHARGE POINT SHOULD BE REPAIRED.

SCALE: 1" = 400'

LOVE CANAL
FIVE ENGINEERING STUDIES
SOUTH STORM SEWERS
TASK AREA IV

REMEDIAL ACTION PLAN

FIGURE 8



N.

LEGEND

DRY WEATHER SAMPLING

- INSPECTED MANHOLE (NO SAMPLES TAKEN)
- LIQUID AND SEDIMENT SAMPLED
- SEDIMENT SAMPLE
- LIQUID SAMPLE
- (111) BEDDING MATERIAL

STORM WEATHER SAMPLING

- LIQUID SAMPLE

LEGEND

- HYDRAULICALLY CLEAN
- TELEVISION INSPECTION AND HYDRAULIC CLEANING
- SMOKE OR DYE TEST
- XXXXXX REMOVE AND REPLACE

SCALE: 1" = 400'

LOVE CANAL
FIVE ENGINEERING STUDIES
SOUTH SANITARY SEWERS
TASK AREA IV

REMEDIAL ACTION PLAN

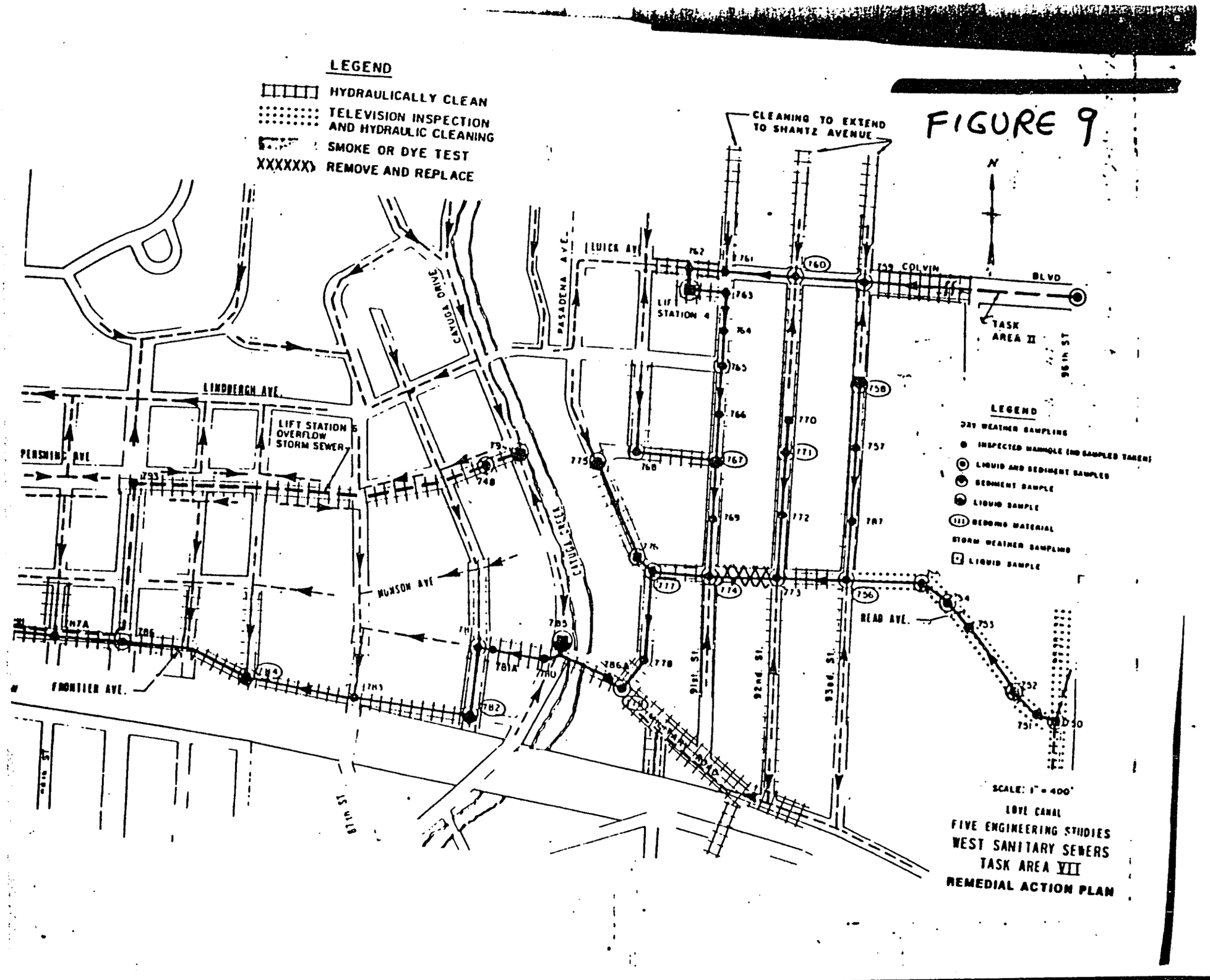
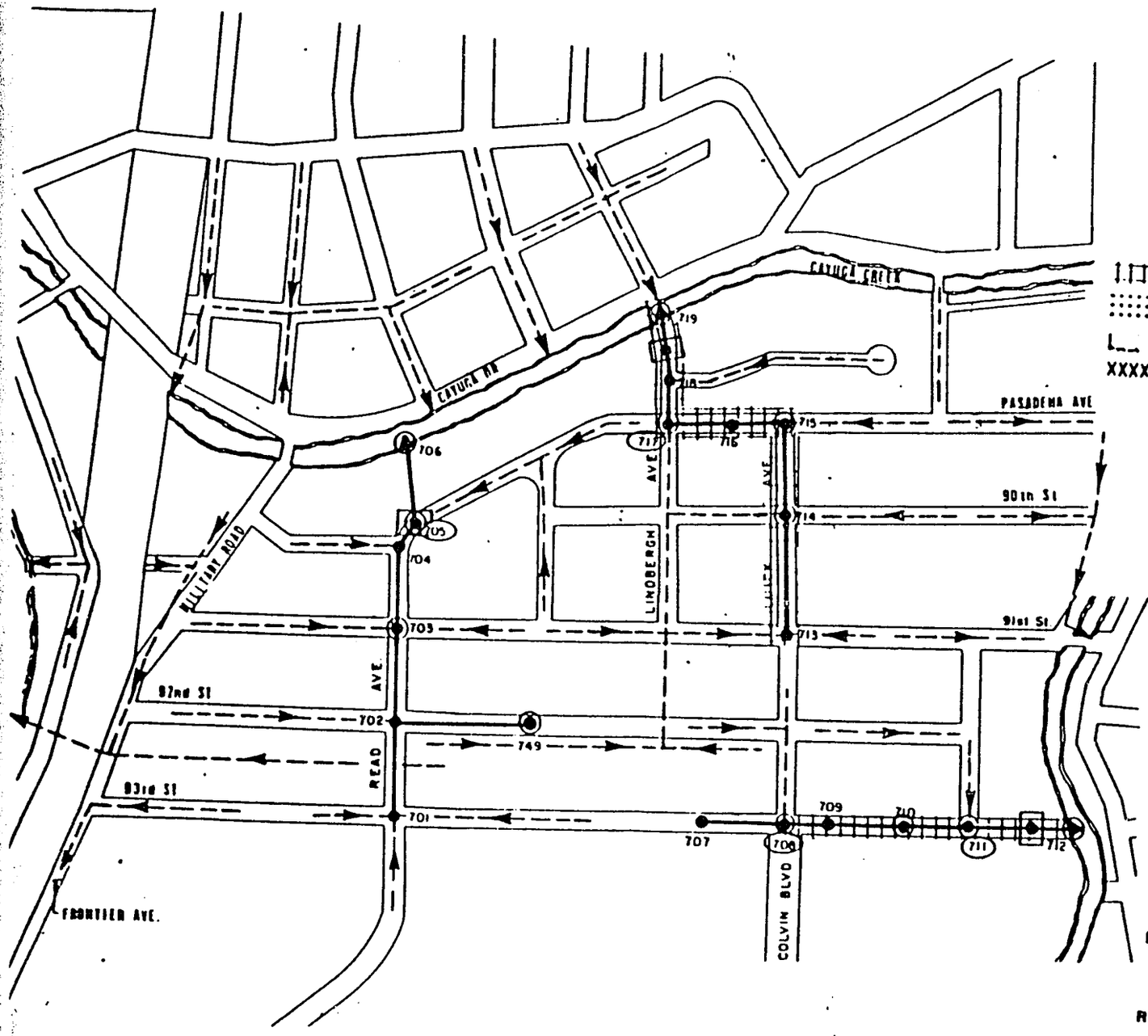

LEGEND
HYDRAULICALLY CLEAN
TELEVISION INSPECTION AND HYDRAULIC CLEANING
SMOKE OR DYE TEST
REMOVE AND REPLACE
CLEANING TO EXTEND TO SHANTZ AVENUE
FIGURE 9
N
LINDBERGH AVE.
PERSHING AVE
LIFT STATION 5 OVERFLOW STORM SEWER
HUNSON AVE
FRONTIER AVE.
BUICK AVE.
COLVIN BLVD
LIFT STATION 4
TASK AREA II
96th ST
READ AVE.
91st. St.
92nd. St.
93rd. St.
CAYUGA DRIVE
PASADENA AVE.
CAYUGA CREEK
LEGEND
DRY WEATHER SAMPLING
INSPECTED MANHOLE (NO SAMPLES TAKEN)
LIQUID AND SEDIMENT SAMPLES
SEDIMENT SAMPLE
LIQUID SAMPLE
BEDDING MATERIAL
STORM WEATHER SAMPLING
LIQUID SAMPLE
SCALE: 1" = 400'
LOVE CANAL
FIVE ENGINEERING STUDIES
WEST SANITARY SEWERS
TASK AREA VII
REMEDIAL ACTION PLAN

FIGURE 10



LEGEND

- HYDRAULICALLY CLEAN
- TELEVISION INSPECTION AND HYDRAULIC CLEANING
- SMOKE OR DYE TEST
- XXXXXX REMOVE AND REPLACE

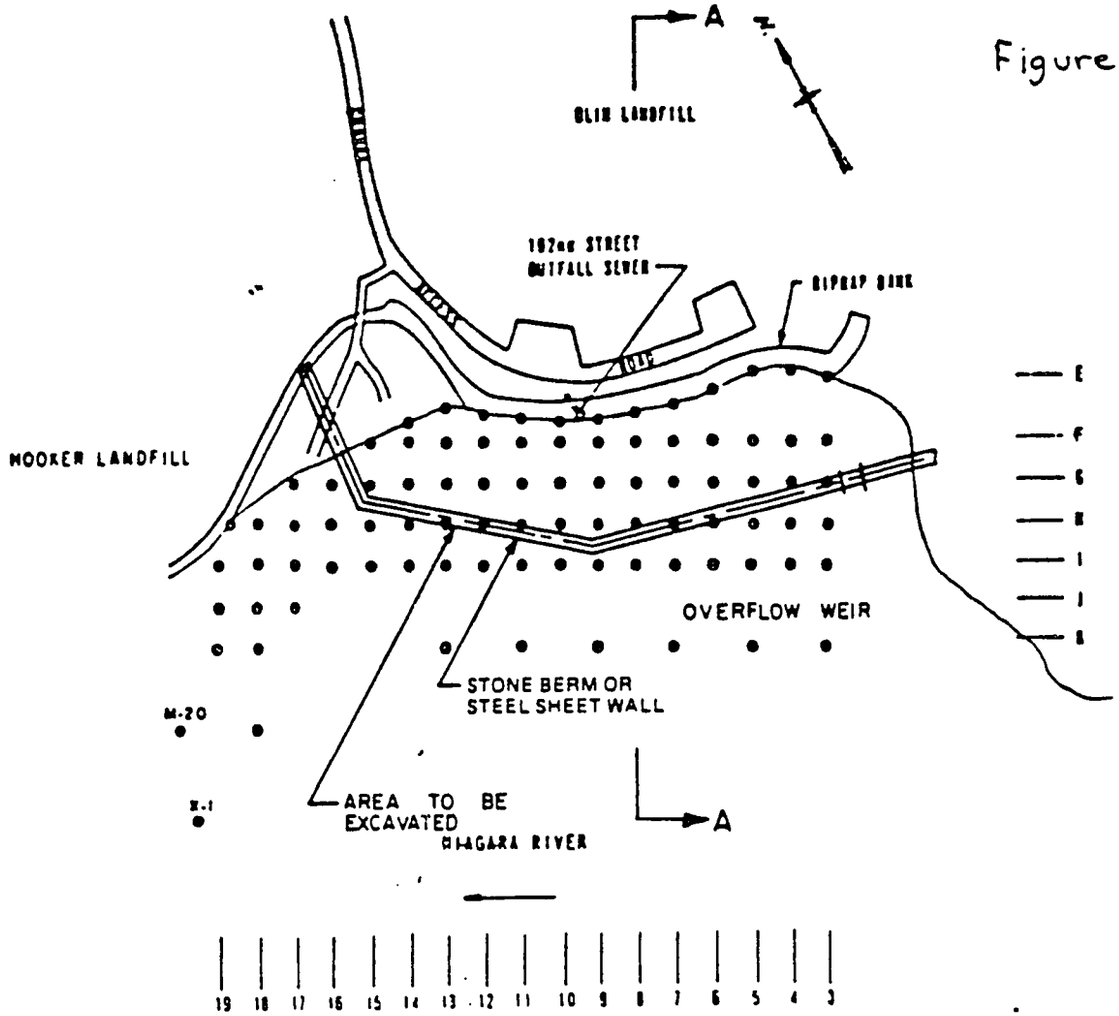
LEGEND

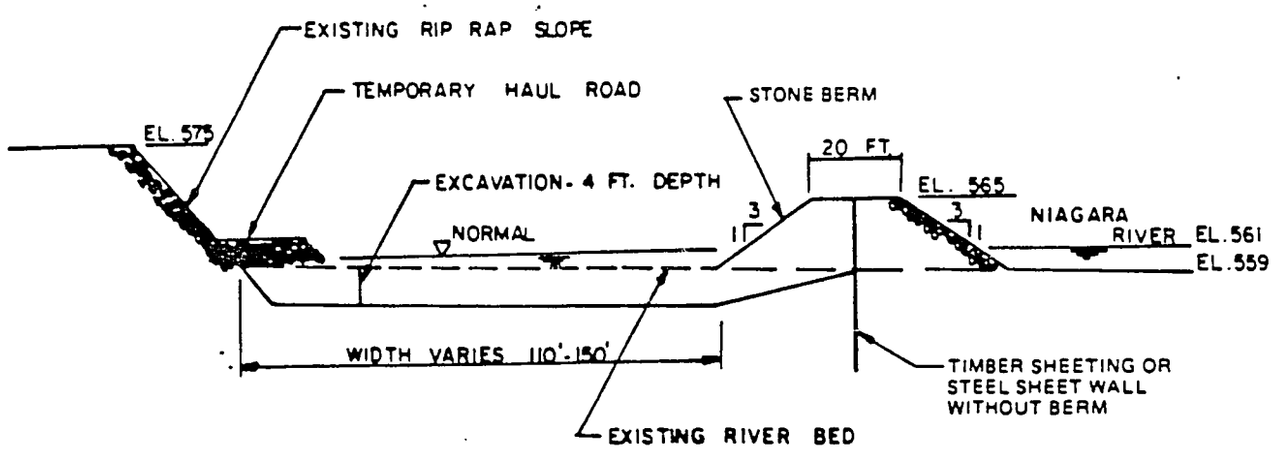
- DRY WEATHER SAMPLING
- INSPECTED MANHOLE (NO SAMPLES TAKEN)
- LIQUID AND SEDIMENT SAMPLES
- SEDIMENT SAMPLE
- LIQUID SAMPLE
- (SS) SEDIMENT MATERIAL
- STORM WEATHER SAMPLING
- LIQUID SAMPLE

SCALE: 1" = 400'

LOVE CANAL
FIVE ENGINEERING STUDIES
WEST STORM SEWERS -
TASK AREA VII
REMEDIAL ACTION PLAN

Figure 11

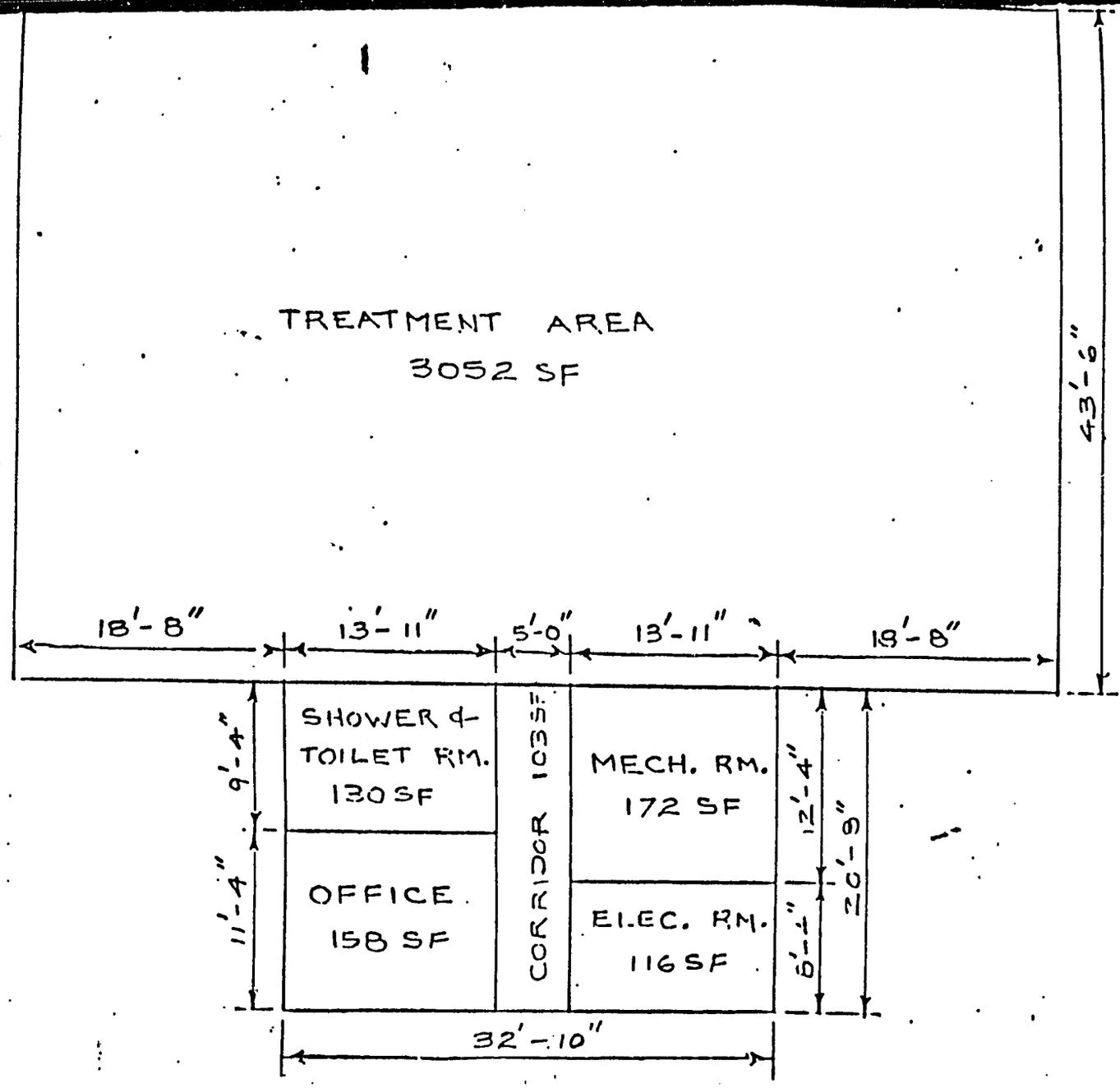




CROSS SECTION A-A

102nd STREET OUTFALL
EXCAVATION

Figure 12



LOVE CANAL TREATMENT PLANT

Table 1

IMPACTS ASSOCIATED WITH
LOVE CANAL REMEDIAL ALTERNATIVES

Alternative	Steps in Operation	IMPACTS	
		Remedial Action Phase	Long-Term
1. Sewers			
a. No action	None	None	Continued sediment migration to creeks and sewage treatment facility. Continued potential public exposure to contaminants.
b. Hydraulically clean and repair.	1. Run blower and plug sewer section.	Public contact minimized.	Potential for small amount of material to remain; minimized by TV inspection
	2. Set up cleaning jet at downstream, collection manhole.	Notice to residents of activity startup.	
	3. Perform cleaning operation (cleaning jet propels itself upstream and is then reeled back to collection manhole	Immediate cleanup if backup reported in house.	
		Backflow to cleaned sewer. Immediate cleanup if backup segments blocked.	
	4. Manually or mechanically remove large debris (using shovels and buckets).	Sewer demand decreased by performing action during dry season.	
	5. Use suction equipment (submersible pump and vacuum nozzle or vacuum truck) to remove sediments.	Volatiles inside house minimized by opening windows.	
	6. Transport sediment/water to treatment/disposal facility.	Dust emissions minimal because of sediment water content.	
	7. Remove plugs from cleaned sewer section.	Machinery noise during daylight work hours.	
	8. Decon blower, jet cleaning equipment and truck, and tank truck.	Truck Traffic to dewatering facility.	
	9. Collect and treat decon wash water.		
	10. TV inspection of cleaned segment.		
2. 102nd Street Outfall			
a. No action.	None.	None.	Continued sediment migration. Continued aquatic life exposure. Continued potential public exposure to sediments and contaminated fish.

Table 1
IMPACTS ASSOCIATED WITH
LOVE CANAL REMEDIAL ALTERNATIVES
(Continued)

Alternative	Steps in Operation	IMPACTS	
		Remedial Action Phase	Long-Term
b. Mitigate backflow to sewer by repair to tidal gate.	1. Remove rocks and debris from in front of headwall.	One day of activity.	Mitigates potential backflow from outfall to storm sewer.
	2. Mobilize backhoe and portable generator to top of headwall.	Small disturbance of outfall sediment because any actions are at outfall.	Continued sediment migration in river.
	3. Lower tidal gate into position on face of headwall.	Negligible public exposure.	Continued aquatic life exposure.
	4. Bolt tidal gate flange to headwall.	Machinery noise at outfall during daylight work hours.	Continued potential public exposure to to sediments and contaminated fish. (See Chapter 3).
c. Immediate Stabilization			
1) Construct stone berm with timber sheeting.	1. Inspect intended berm location for large debris and remove debris as necessary (drill several borings along alignment).	Little or no worker or equipment contact with sediment, unless when driving wall, debris or rocks are hit. Then the wall will be pulled out, repositioned (or obstacle will be moved), and replaced. Some worker contact possible while repositioning sheeting.	Berm/sheeting will need to be maintained to insure continued effectiveness.
	2. Beginning at shore line, use front end loader and bulldozer to transport and place stone.		
	3. Use barge mounted pile driver to place timber sheeting (second barge may be necessary to guide sheeting).		
2) Construct steel pile wall.	1. Inspect wall location for debris, remove debris as necessary.	See 2(c)1.	See 2(c)1.
	2. Use barge-mounted drill rig to drill borings along wall alignment to determine depth of river bed and identify locations of any buried debris.		
	3. Use barge-mounted pile driver to construct wall starting at shoreline (2nd barge will need to be used to guide sheet piling).		

Table 1
IMPACTS ASSOCIATED WITH
LOVE CANAL REMEDIAL ALTERNATIVES
(Continued)

Alternative	Steps in Operation	IMPACTS: Remedial Action Phase	IMPACTS: Long-Term
d. Long-term remediation			
1) In-place containment (with 2(c)1 or 2.	1. Construct stone berm or wall (See 2(c) 1 or 2 above).	See 2(c)1.	See 2(c)1.
	2. Dewater, backfill contained area and cap it.	Haul trucks with fill.	None.
2) 2(c) 1 or 2 followed by removal using land based equipment	1. Construct stone berm or wall (See 2(c) 1 or 2 above).	Potential for splashing workers as sediments are transferred from clamshell to truck.	None.
	2. Remove rip-rap along shore line and build berms or mud mats as necessary.	Biota will be lost.	
	3. Use shore-based drag line or clamshell on crawler crane to excavate sediments.	Truck traffic to dewatering facility.	
	4. Load excavated sediments into truck and transport sediments to dewatering/disposal facility.		
	5. Excavate stone berm placing stone in trucks--transport to disposal facility. Rebuild shore rip-rap to depth of excavation.		
	6. Decon dragline/clamshell, trucks, and/or other equipment.		
3. Black Creek			
a. No action.	None.	None.	Continued sediment migration. Continued potential public exposure.

Table 1
IMPACTS ASSOCIATED WITH
LOVE CANAL REMEDIAL ALTERNATIVES
(Continued)

Alternative	Steps in Operation	IMPACTS: Remedial Action Phase	IMPACTS: Long-Term
b. Mechanically excavate	1. Construct access road along creek bank, clear, and grub. 2. Construct berms up and downstream and dewater between using pumps. 3. Use backhoe to excavate sediments and place them in a watertight truck. 4. Transport sediments to dewatering/disposal facilities. 5. Remove earth berms and dispose of at hazardous waste facility. 6. Decon excavating equipment and truck, etc.	Public contact minimized o Restricted access during activities. o Volatile emissions negligible because no volatiles detected in sediment. o Dust emissions minimal - Wet state of sediment - Cleanup of spills on banks o Sediment transport will be in leakproof trucks operating over short distance. Temporary haul roads. Machinery noise during daytime work hours. Creek biota will be lost.	Potential for small fraction of contaminated sediment to remain. Creek biota community expected to renew.
c. Construct tidal gate or sediment trap at confluence conjunction with 3.b. above.	1. Excavate approximately 18 inches in Black Creek (at confluence with Bergholtz Creek). 2. Mix and pour concrete to form tidal gate/sediment trap. 3. Continue with steps 6 and 7 above.	Negligible addition to 3.b.	Prevents backflow of Bergholtz Creek sediments to Black Creek if two creeks not cleaned concurrently or are cleaned by different methods.
4. Bergholtz Creek & Beyond			
a. No action.	None.	None.	Continued sediment migration. Continued aquatic life exposure. Continued potential public exposure to sediment and contaminated fish.
b. Mechanically excavate.	1. Construct temporary berm at mouth of Black Creek to use as stream crossing. 2. Follow steps 1-6 under 3.b. above, except use frontend loader and clamshells.	See 3.b. Numerous trips (more than 1,400) by haul truck to deposit sediments. Would block some streets at times. Noise and possible dust emissions.	Potential for small residential fraction of contaminated sediment to remain.

Table 1
IMPACTS ASSOCIATED WITH
LOVE CANAL REMEDIAL ALTERNATIVES
(Continued)

Alternative	Steps in Operation	IMPACTS: Remedial Action Phase	IMPACTS: Long-Term
c. Hydraulically excavate.	1. Construct temporary berm at mouth of Black Creek to use as stream crossing.	Potential contact reduced because of closed transport in pipes.	Creek biota community expected to renew.
	2. Construct berms up and downstream and dewater between.	Potential pipeline leaks minimized by double walls.	Potential residual contamination; banks cannot be remedied using hydraulic dredge.
	3. Construct access road, clear, and grub.	Volatile emissions minimal because no volatiles detected in sediments. (91st Street and Colvin Boulevard)	Dewatering facility may be open for year(s) to allow sediments to dewater and stabilize.
	4. Manually remove large debris; reflood.	Bridges required where pipe crosses road.	
	5. Use mud cat to dredge sediments.	Machinery noise during work hours.	
	6. Dewater and inspect; reflood and redredge if necessary.		
	7. Remove earth berms and dispose of at hazardous waste facility.	Creek biota will be lost.	
	8. Transport sediment to disposal facility.	Pipelines (two; each is one mile long) must be in place throughout; pumps will run continually. Haul trucks will carry debris through streets.	
	9. Dewater dredge spoils and treat filtrate.		
	10. Decon mud cat, truck, dewatering pump, piping, etc.		
6. Sediment Dewatering			
a. Mechanically dewater.	1. Transport sediment in water tight truck or pipe sediment to dewatering facility.	Sediment compression may emit volatiles. Minimal dust emission because sediment still wet and is dropped into covered container.	Action is an intermediate stage of remedial action. Sediments are removed to Interim Storage (See #7). No long term impacts from action.
	2. Feed sediment onto vacuum filter and air press.		
	3. Remove filter cake and transport to disposal facility.		

Table 1

IMPACTS ASSOCIATED WITH
LOVE CANAL REMEDIAL ALTERNATIVES
(Continued)

Alternative	Steps in Operation	IMPACTS	
		Remedial Action Phase	Long-Term
	4. Transport and treat filtrate, at LCTF, release to sewer system and NFWTP.		
b. Use interim storage	1. Construct temporary system for sewer sediment dewatering.	Splashing from hydraulically dredged sediments. Emissions possible.	Hydraulically dredged sediments may not solidify for over a year; cannot cap facility until then.
	2. Construct interim storage facility (48,000 cubic yards capacity for hydraulic dredge water recirculation) with major design modifications for hydraulic dredged sediments.		
	3. Pipe water/sediments by pipeline (3,000,000 gallons) or haul sediments to facility (1,400 truck trips).		Continual feed (3,000,000 gallons) to Love Canal leachate treatment facility from hydraulically dredged sediments.
	4. Collect liquid drained into underdrain/leachate collection system or taken off top. Recycle to creek in hydraulic dredging. Treat and dispose of water eventually.		Temporary feed (600,000 gallons) to Love Canal leachate treatment facility from mechanically excavated sediments; cap facility immediately.
	5. Choose disposal/treatment option from 8.		
7. Interim Storage			
a. Construct an earthen bermed facility.	1. Excavate soils and construct berms. If facility is to be within the cap, cut hole in existing HDPE liner.	Placement of material in the the facility could result in the release of contaminated materials that must be contained. Machinery would be involved, causing noise and dust. Haul trucks would bring material into area. Essentially same impacts as activities associated with capping Love Canal.	Aesthetics; if hydraulic dredging used, facility may not be capped for over a a year. Operation/maintenance needed for as long as 30 years. Can be capped immediately if mechanically excavated sediments disposed of.
	2. Fine grade base and install bottom liner. If facility is in cap, weld bottom liner to existing liner.		
	3. Compact clay layer and install leak detection system. Compact additional clay.		
	4. Fine grade and install second synthetic liner.		

Table 1
IMPACTS ASSOCIATED WITH
LOVE CANAL REMEDIAL ALTERNATIVES
(Continued)

Alternative	Steps in Operation	IMPACTS	
		Remedial Action Phase	Long-Term
	5. Place granular material and piping for leachate collection system.		
	6. Deposit sediments and decon all contacted equipment.		
	7. Construct cover including installation of a synthetic liner. (May be some delay in covering if facility is used for dewatering).		
	8. Topsoil and seed cover.		
b. Construct a concrete structure (Times Beach vault)	1. Excavate soils and install synthetic membrane.	See 7a.	See 7a. Aesthetic impact different than 7a. since vault would be taller, but Only one-fifth as long. Vault can be capped sooner than 7a.
	2. Place drainage gravel and geotextile layers.		
	3. Pour 8" reinforced concrete and coat with polymeric asphalt.		
	4. Place drainage gravel and geotextiles to act as leachate collection system.		
	5. Similarly construct concrete sidewalls.		
	6. Follow steps 6-8 in 7.a., except no delay in covering.		
8. Offsite Disposal			
	1. Open storage facility, remove sediment.	Opening of storage facility and removal of sediments could generate dust, release volatiles. Will take several openings to remove material. Many trucks required to make 1,500 mile trip; possible accidents/incidents. Treatment/ disposal should have no more than "normal" impacts at disposal sites.	Facility must be maintained or demolished once empty.

Table 1

IMPACTS ASSOCIATED WITH
LOVE CANAL REMEDIAL ALTERNATIVES
(Continued)

Alternative	Steps in Operation	IMPACTS	
		Remedial Action Phase	Long-Term
	2. Load sediment on truck.		
	3. Transport to site & unload.		
	4. Treat or dispose.		
	5. Decon all equipment.		
9. Incineration			
a. Construct facility onsite.	1. Construct incinerator.	If operated within the regulations, emissions and incinerator operations should not pose a risk to workers or residents. Materials must be prepared (ground up, dried). Handling and transport of sediment will release dust, volatiles, and will generate noise. Incinerator will generate noise, ash, and steam. Must have building to house it. Transport of ash could result in spills. May require additional area to accommodate all of equipment. Cooling water must be treated.	Several years to build; at least one year of operation necessary; storage facility would essentially remain open entire period. Landfilling of residual may necessitate construction of new facility at Love Canal, or transport to offsite facility (See 8).
	2. Open storage facility.		
	3. Transport dewatered sediment to incinerator.		
	4. Incinerate sediment.		
	5. Transport ash to secure landfill for disposal.		
	6. Decon equipment.		
b. Use mobile incinerator	Same as 9.a. except step 6 would involve demobilization of incinerator equipment.	See 9.a.	Same as 9.a., except incinerator would be onsite from 1 to 29 years and mobilization would be much shorter.

Table 2

SUMMARY OF ESTIMATED COSTS FOR FEASIBLE ALTERNATIVES

Alternative	Total Present[1] Worth ($)
Sewer Remediation and Repair	
1. No Action	--
2. Cleaning	1,348,000
3. Abandon in-place and replace with new line	7,080,000
102nd Street Outfall Remediation	
1. Immediate Stabilization	
- No Action	--
- Filter Fabric and Stone	207,000
- Berm with Timber Sheeting	509,000
- Steel Pile Wall	636,000
2. Long Term Remediation	
- No Action Subsequent to Berm	--
- In-Place Containment	598,000
- Removal	
Shore Based Equipment	350,000
Creek Remediation	
1. No Action	--
2. Hydraulic Dredging of Bergholtz Creek	
- 1983 EID limits only	700,000
- 1983 EID limits plus 1st incremental reach	798,000
- Above Plus 2nd Incremental Reach	1,026,000
3. Mechanical Excavation--Land-Based Clamshell	
- 1983 EID limits	165,000
- 1983 EID limits plus 1st incremental reach	225,000
4. Mechanical Excavation--Tracked Front End Loader (and Clamshell as needed)	
- 1983 EID limits	184,000
- 1983 EID limits plus 1st incremental reach	248,000
- Above, Plus 2nd Incremental Reach	1,178,000
- Black Creek only	120,000
5. Additional Sampling Bergholtz and Cayuga Creeks and Banks	169,000
6. Fence Downstream Section of Bergholtz and Cayuga Creeks	161,000
On-Site Storage	
1. Above-Cap	
- Mechanical Excavation/5,000 cy	803,000
- Hydraulic Dredging/5,000 cy	829,000
- Hydraulic Dredging; 21,000 cy (Probable Volume)	1,131,000
- Hydraulic Dredging/135,000 cy	4,924,000

Table 2

SUMMARY OF ESTIMATED COSTS FOR FEASIBLE ALTERNATIVES
(Continued)

Alternative	Total Present[1] Worth ($)
2. Concrete Vault	
- Minimum Volume, 5,000 cy w/Berms	509,000
- Probable Volume, 21,000 cy, With Berms	1,135,350
- Maximum Volume, 135,000 cy w/Berms	7,298,000
Transport of Sediment, Dewatering and Leachate Water Treatment	
1. Sewer Sediments Dewatering/Love Canal Leachate Treatment Plant	
- Mechanical Dewatering	391,000
- Clarification/Filtration/Mechanical Dewatering	683,000
- Passive Dewatering	280,000
2. Transport and Dewatering of Mechanically Excavated or Hydrulically Dredged Creek Sediments contained in Creek Remediation and Interim Storage Costs.	
Off-Site Incineration	
1. Rollins, 5,000 cy	7,900,000-9,400,000
2. Rollins, 21,000 cy	18,000,000-31,500,000
3. Rollins, 135,000 cy	206,900,000-247,400,000
On-Site Incineration	
1. EPA Mobile Incinerator 5,000 cy	4,800,000-7,100,000
2. EPA Mobile Incinerator 21,000 cy	15,600,000-42,000,000
3. EPA Mobile Incinerator 135,000 cy	86,800,000-147,500,000
4. Huber AER, 5,000 cy	6,700,000-8,100,000
5. Huber AER, 21,000 cy	12,900,000-18,060,000
6. Huber AER, 135,000 cy	111,200,000-148,300,000
7. ENSCO Mobile Incinerator 5,000 cy	5,400,000
8. ENSCO Mobile Incinerator 21,000 cy	16,800,000
9. ENSCO Mobile Incinerator 135,000 cy	91,300,000

[1] In 1984 dollars.

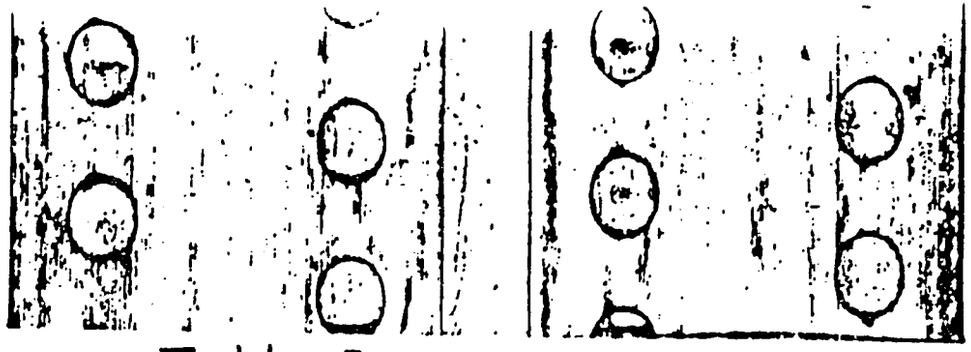


Table 3

FY85 Love Canal Remedial Activity Reclassification

	FY 85 SCAP PROJECTIONS		PROPOSED REVISIONS TO FY 85 SCAP						
Quarter	ACTIVITY	AMOUNT	ACTIVITY	EXPENDITURES CONTRACTURAL	ADMN.	TOTAL	FEDERAL	STATE	FUNDING TIME FRAME
Thru 2nd	RD-Sewers/Creeks	400,000	CH_2M-Hill Services on Sewer/Creek Alternatiye Assessment	135,000	0	135,000	135,000	-	Immediate Processing
	RA-Admin Bldg	415,000							
	TOTAL	815,000							
	Contingency*	345,000	RI/FS - DEC/DOH						
			DEC/DOH Habitation	380,000	40,000	420,000	420,000	-	C.A. Amendment #3 (FY85)(Late March)
			Habitation MOU						
			RD-Sewers	60,000	-	60,000	60,000		
			RD-Admin Bldg	40,000	5,000	45,000	45,000		
			RA-Admin Bldg	455,000	45,000	500,000	450,000	50,000	
	REVISED TOTAL	1,160,000	SUBTOTAL	1070,000	90,000	1,160,000	1,110,000	50,000	
			STATE CREDIT **				+50,000	-50,000	
			TOTAL			1,160,000	1,160,000	0	
3rd	RA-Sewers/Creeks	3,300,000	RD-Creeks	400,000	30,000	430,000	430,000		
	Contingency	945,000	RA-Monitoring Program	700,000	70,000	770,000	693,000	77,000	C.A. Amendment #4 (FY85)(early April)
	TOTAL	4,245,000	RI/FS - Expand Perimeter Study To Include 93rd Street School	350,000	50,000	400,000	400,000	-	
			RA-Sewers	2,400,000	260,000	2,660,000	2,394,000	266,000	
			RA-Air Monitoring	310,000	30,000	340,000	306,000	34,000	
			SUBTOTAL	4,160,000	440,000	4,600,000	4,223,000	377,000	
			STATE CREDIT **				+ 22,000	-22,000	
			TOTAL			4,600,000	4,245,000	355,000	
FY 85		5,405,000		5,230,000	530,000	5,760,000	5,405,000	355,000	

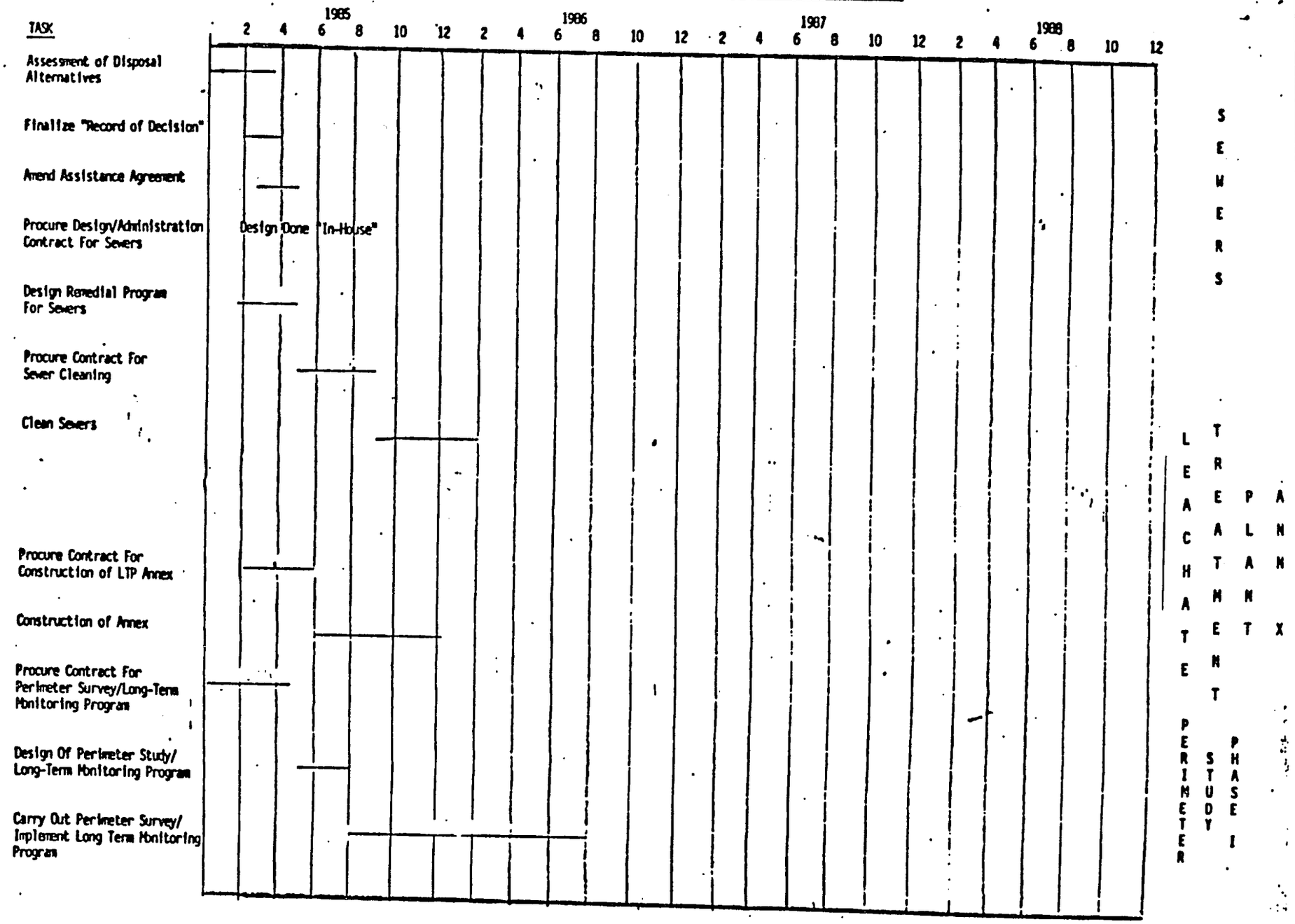
* $345,000 (2nd Q) and $945,000 (3rd Q) or a total of $1,290,000 will be required from Regional remedial contingency funds.

** Approx. $72,000 remains of State approved credit of $800,000

New York State Department of Environmental Conservation
Division of Solid and Hazardous Waste

Table 4

PROPOSED SCHEDULE OF REMEDIAL ACTIVITIES - LOVE CANAL SUPERFUND REMEDIAL PROGRAM



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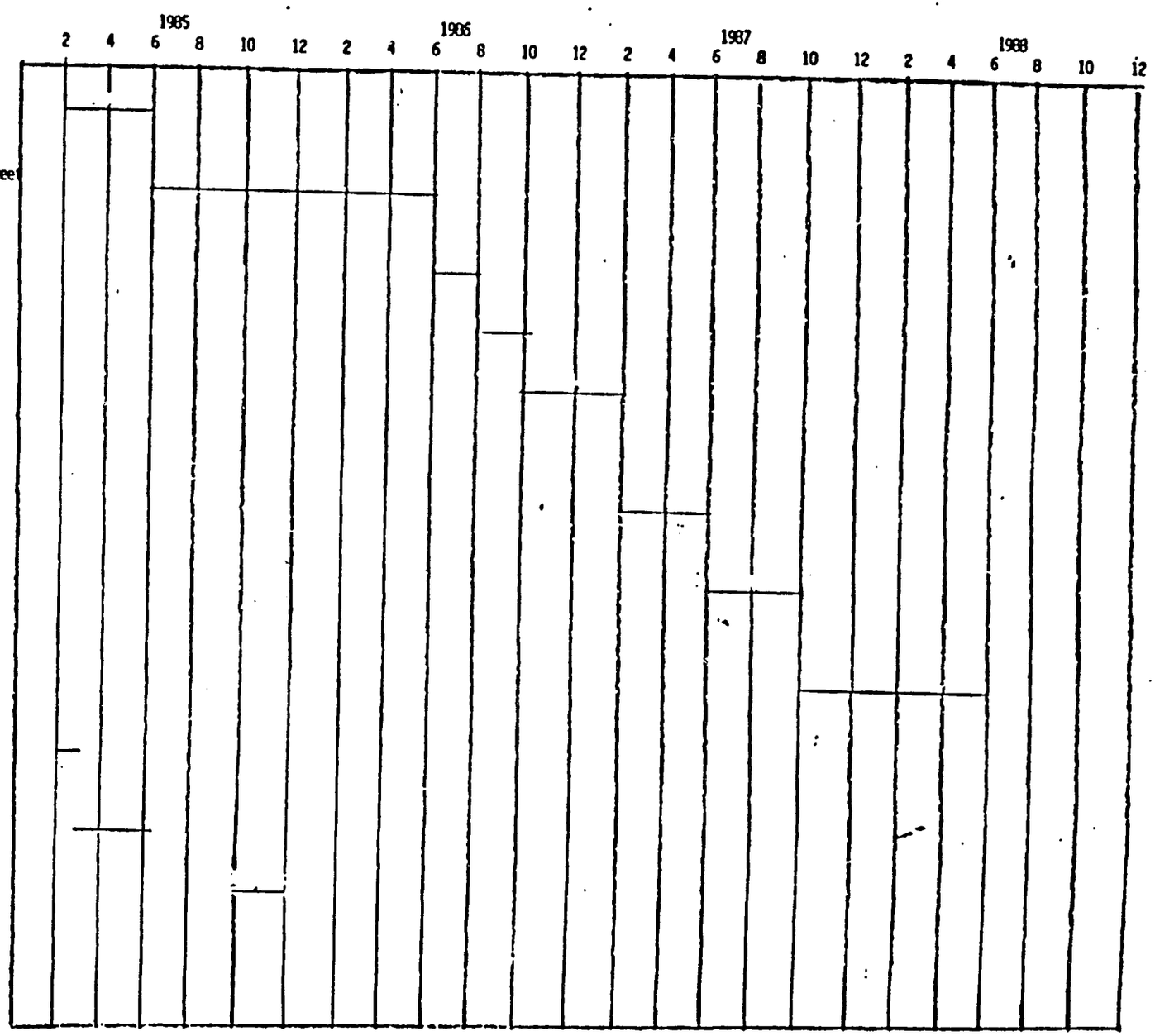

93rd ST SCHOOL PHASE II PERIMETER STUDY

I. R. M. 93rd ST SCHOOL

Table 4

New York State Department of Environmental Conservation
Division of Solid and Hazardous Waste

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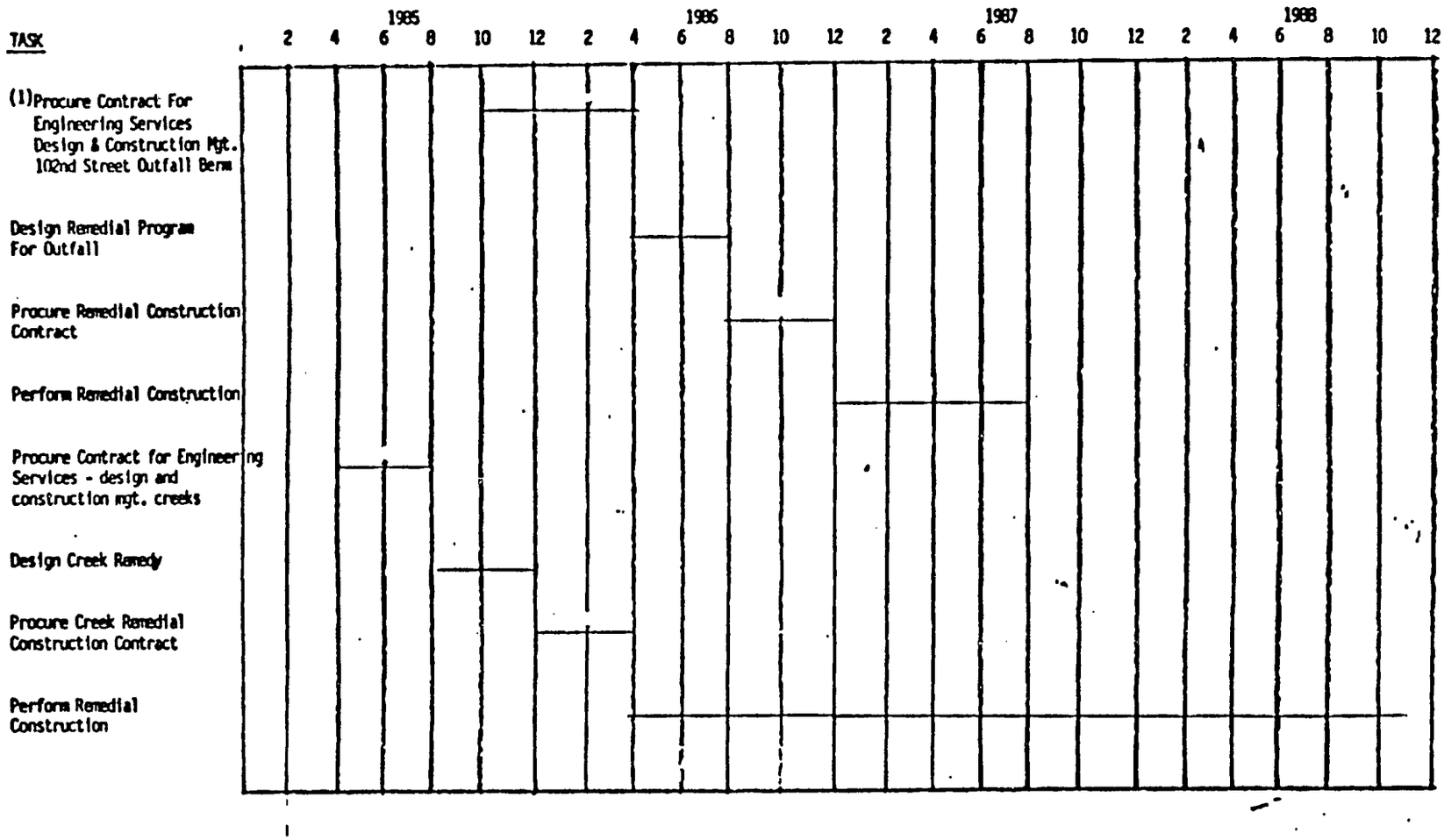

(1) This work only to be done if ongoing CERCLA Enforcement Actions at the 102nd St. Landfills do not address the problem of contaminated sediments. This decision must be made no later than June, 1985.

ATTACHMENT 1

STATE OF NEW YORK
DEPARTMENT OF HEALTH — OFFICE OF PUBLIC HEALTH

CORNING TOWER • THE GOVERNOR NELSON A. ROCKEFELLER EMPIRE STATE PLAZA • ALBANY, N.Y. 12237

DAVID AXELROD, M.D.
Commissioner

LINDA A. RANDOLPH, M.D. M.P.H.
Director

WILLIAM F. LEAVY
Executive Deputy Director

February 22, 1984

Norman H. Nosenchuck, P.E.
Director
Division of Solid and Hazardous Waste
Department of Environmental Conservation
50 Wolf Road
Albany, New York 12233-0001

Dear Mr. Nosenchuck:

Re: Malcolm Pirnie Report: "Site Investigation and Remedial Action Alternatives - Love Canal

You asked if the subject report provides sufficient information for us to make an assessment of public health risk; whether we will make such an assessment that may be useful in determining the appropriateness of the remedial programs proposed for streams and sewers in the area; and how much time we would need to do the job.

The assessment of potential public health risk was made by the US Department of Health and Human Services when they declared the EDA to be habitable subject to clean up of contaminated sewers and their drainage tracts (see attached). The Malcolm Pirnie investigation was directed at locating the contaminated areas of the sewers and their drainage tracts - the areas where cleaning was needed and these areas are identified in their report.

The Health and Human Services report did not make a "numerical risk-assessment" to estimate the increased morbidity and mortality that would result if the sewers and creeks were not cleaned. However, the report is direct and unambiguous in making the clean-up of the sewers and creeks a condition of habitation. It is clear that the presence of Love Canal associated chemicals, especially dioxin, in the sewers and creeks does pose a direct threat to children playing in the creeks, persons using yards subject to flooding from the creeks, and persons exposed to biota downstream subject to exposure to chemicals being washed down to them.

Sincerely,

Robert H. Huffaker

Robert H. Huffaker, DVM, MPH
Associate Director
Office of Public Health

Attachment