

## 2021 Hazardous Waste Scanning Project

### File Form Naming Convention.

*(File\_Type).(Program).(Site\_Number).(YYYY-MM-DD).(File\_Name).pdf*

*Note 1: Each category is separated by a period "."*

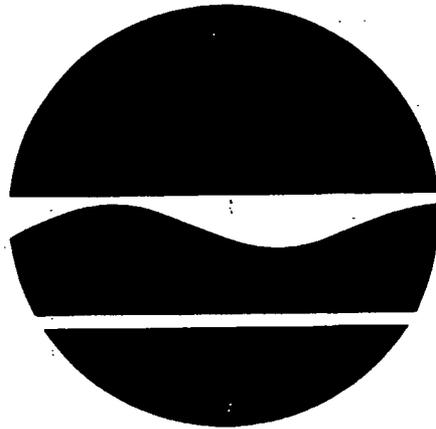
*Note 2: Each word within category is separated by an underscore "\_"*

Specific File Naming Convention Label:

*Report\_HW\_932020\_1994-07-01\_Remedial\_Chronology.pdf*

**NEW YORK STATE  
DEPARTMENT OF ENVIRONMENTAL CONSERVATION**

**REMEDIAL CHRONOLOGY**



**THE LOVE CANAL  
HAZARDOUS WASTE SITE**

**SITE NUMBER 9-32-020**

**NIAGARA COUNTY**

**JULY 1994**

**LANGDON MARSH, COMMISSIONER  
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION**

**MICHAEL J. O'TOOLE, DIRECTOR  
DIVISION OF HAZARDOUS WASTE REMEDIATION**

New York State Department of Environmental Conservation



**Division of Environmental Remediation**



**A SHORT OUTLINE  
OF THE HISTORY AND REMEDIATION  
OF THE LOVE CANAL**

**SITE NUMBER 9-32-020**

# CHAPTER I HISTORY - 1894 TO 1977

What started as a dream for William T. Love in the late 1800's became a national nightmare of improper management of hazardous waste in 1978. Mr. Love's plan was to construct a canal connecting the upper Niagara River to the lower Niagara River to create a source of cheap hydroelectric power for what would become a model industrial city. In May 1892 he began excavating the channel in the southeast corner of the City of Niagara Falls, New York. Unfortunately, the model city project and the partially dug canal were abandoned before the turn of the century.

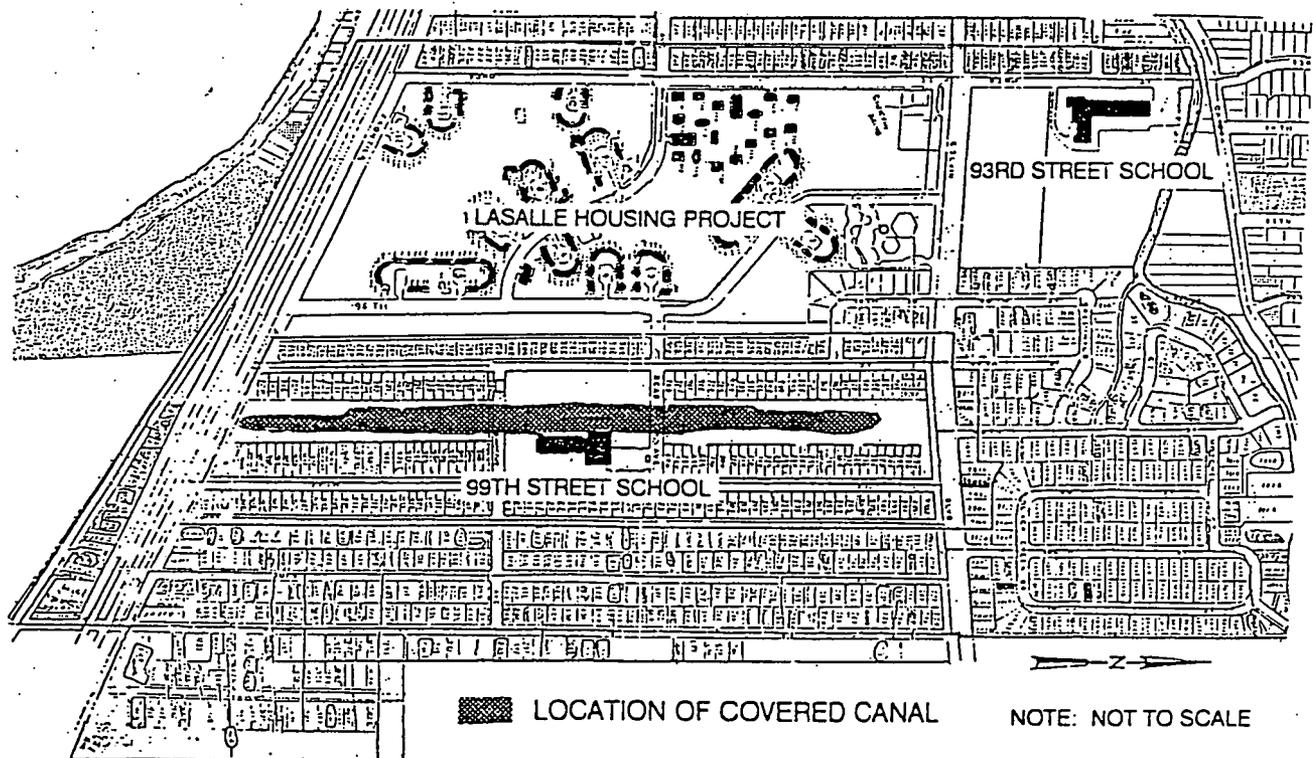
The excavation remained relatively untouched through the early 20th century. Aerial photography from 1938 depicts the canal as being about 3,000 feet long and almost 100 feet wide, extending in a north-south axis, with the southern end approximately 1500 feet from the Niagara River. The canal was estimated to be between 10 to 15 feet below the original grade.

In 1942, the Hooker Electrochemical Company began to dump chemical wastes from nearby plants,

which produced pesticides and plasticizers, into the abandoned canal. Portions of the canal were also used by the City of Niagara Falls for disposal of municipal refuse. In 1953, dumping by the company ceased; however, it has been estimated that approximately 21,800 tons of chemical waste were placed in the canal. The Niagara Falls Board of Education purchased the property from the company and in 1954 built an elementary school on 99th Street, adjacent to the canal. Later, Read Avenue and Wheatfield Avenue were constructed, along with their utilities, across the canal.

By the mid-1970's, about 100 homes had been built on lots adjacent to the abandoned hazardous waste dump. Over the years infiltrating precipitation mixed with the buried wastes. Contaminated water and liquid wastes pooled at the surface, and runoff carried contaminants into sewers and yards of some of these homes. Groundwater containing chemicals migrated through the more permeable upper layers of the ground, reaching the basements of some homes built directly adjacent to the canal.

## THE LOVE CANAL AREA AS IT WAS ABOUT 1978



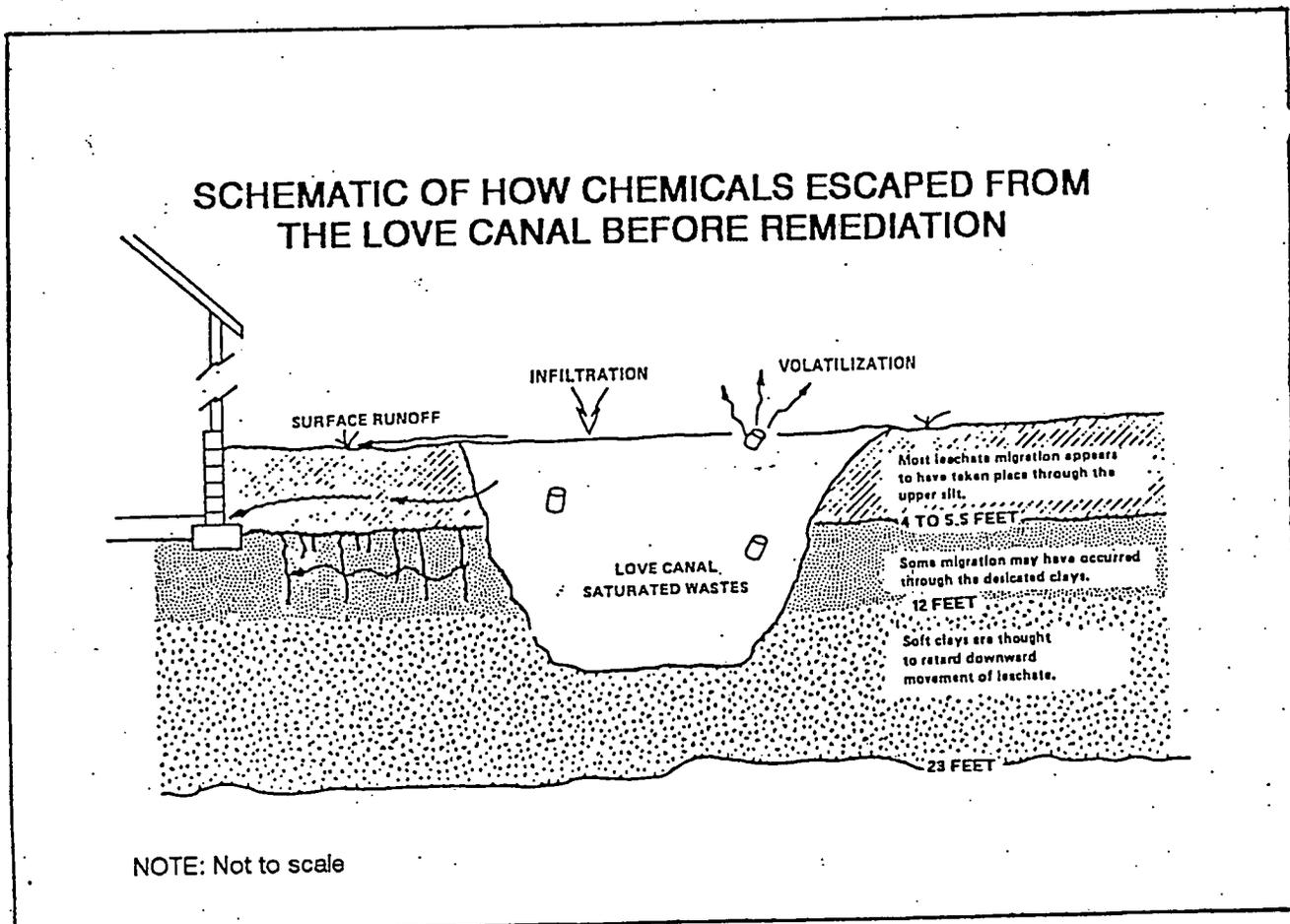
## GOVERNMENT RESPONDS

In response to complaints from residents of homes abutting the canal, the New York State Department of Environmental Conservation (NYSDEC) and the New York State Department of Health (NYSDOH), together with United States Environmental Protection Agency (USEPA), conducted studies on groundwater pollution, basement air and sump water contamination in 1977. In April 1978, on the basis of this initial data, Commissioner Robert D. Whalen of the NYSDOH, 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 and studies by NYSDEC, NYSDOH and USEPA were conducted in the summer of 1978. After reviewing the findings of these additional studies Commissioner Whalen declared, on August 2, 1978, that a health emergency existed

at Love Canal; and on August 7, 1978, President Carter issued a declaration of emergency making Federal disaster assistance available to begin remedial work. At the same time the 99th Street School was closed and the area was fenced off.

The state purchased homes located along 97th and 99th Streets at 1978 "pre-disaster" fair market value. 239 families were permanently relocated from the first two "rings" of houses around the Canal. Later, in May 1980, President Carter issued a second emergency declaration for Love Canal. This extended the boundaries adding a horseshoe-shaped Emergency Declaration Area (EDA) around the previously identified area. This new area affected 550 additional families. Federal funding was provided to supplement the State's resources affording those living in this new area the opportunity to sell their homes to the government, at 1980 assessed value, and relocate else where.



# CHAPTER II REMEDIAL EFFORTS - 1978 TO 1992

The remediation of the Love Canal Hazardous Waste Site began on August 22, 1978 with the State installing an eight-foot high chain link fence around the former canal and the first two rings of houses. At the same time, design work was completed on systems to halt the outward migration of chemicals from the landfill.

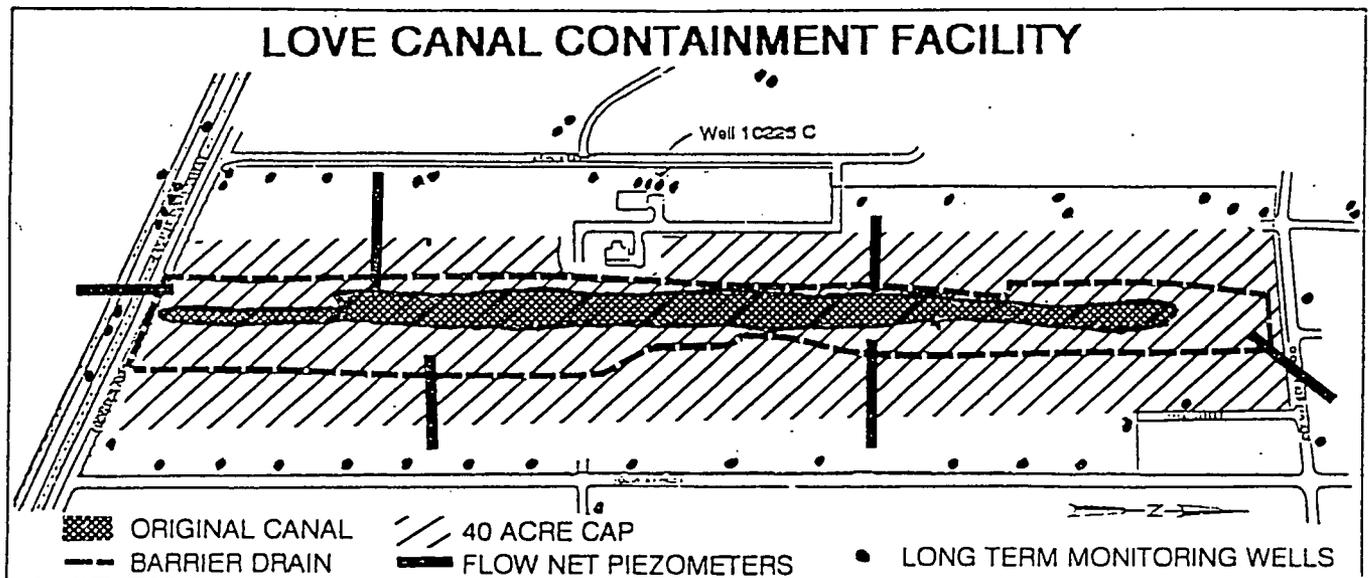
## CONTAINING THE CHEMICALS

### Leachate Collection System/Barrier Drain

On October 10, 1978, work began on the Love Canal Leachate Collection System which consisted of about 7,130 ft. of leachate collection pipe and

The NYSDEC completed placement of a 22-acre, three-foot thick clay cap over the landfill in July 1980.

In October 1981, design work began on a program to improve the efficiency of the Containment System. These plans included: repairs to Leachate Collection System, upgrading the cap to include a synthetic membrane and expanding the cap to over 40 acres, installation of a below-grade concrete groundwater cutoff wall (which was later deleted), improved surface drainage near the canal, and the cleaning, plugging and abandonment of storm and sanitary sewers within Rings I and II. Work on these improvements started in June 1982 with the demolition of the homes in Rings I and II. By



about 860 feet of gravity drain pipe around the canal. The collection pipe is made of extra strength perforated vitrified clay tile and was installed using conventional construction techniques. The tiles were placed in a three foot wide trench ranging in depth from 11 to 21 feet below original grade. They are bedded in and covered with a minimum of one foot of crushed stone, with the remainder filled with concrete sand. This collection system was substantially complete by November of that year.

### Containment Facilities

The entire landfill was covered with a 22 acre cap which consisted of a minimum of three feet of well-compacted clay. The cap prevented human contact with the wastes as well as migration of volatiles and fugitive dust from the landfill's surface.

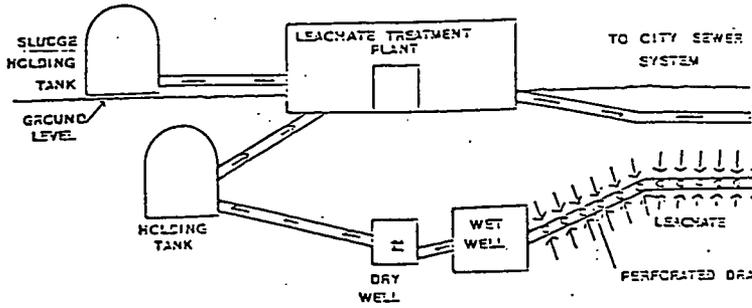
November 9, 1984 the work was complete, the plastic liner was in place, covered with 18 inches of fill and seeded to provide a healthy vegetative cover.

### Monitoring Well Installation

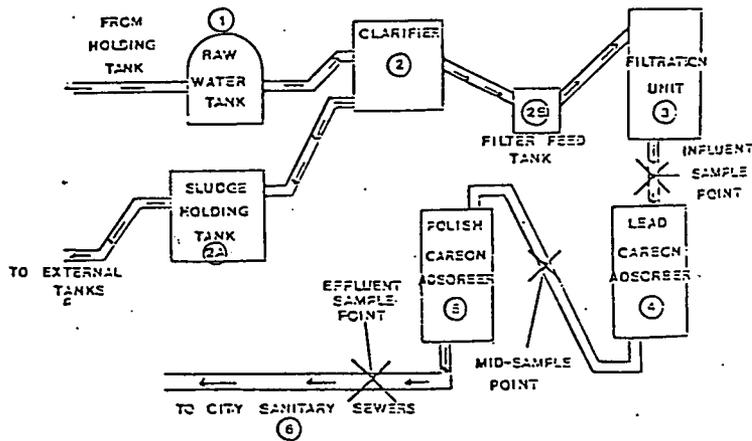
In the fall of 1985, the NYSDEC began installing approximately 100 monitoring wells around the Love Canal site. Soil samples were analyzed during the boring of 38 shallow groundwater wells to determine the areal extent of the contamination. A number of wells were installed directly into the canal in order to monitor liquid elevations within the waste and to better monitor the effectiveness of the leachate collection system. Thirteen bedrock wells were installed near the canal site to evaluate the potential for contamination of the bedrock groundwater system and provide insight into the need for additional

## HOW THE LEACHATE IS TREATED

### THE LEACHATE COLLECTION SYSTEM



### THE LEACHATE TREATMENT PROCESS



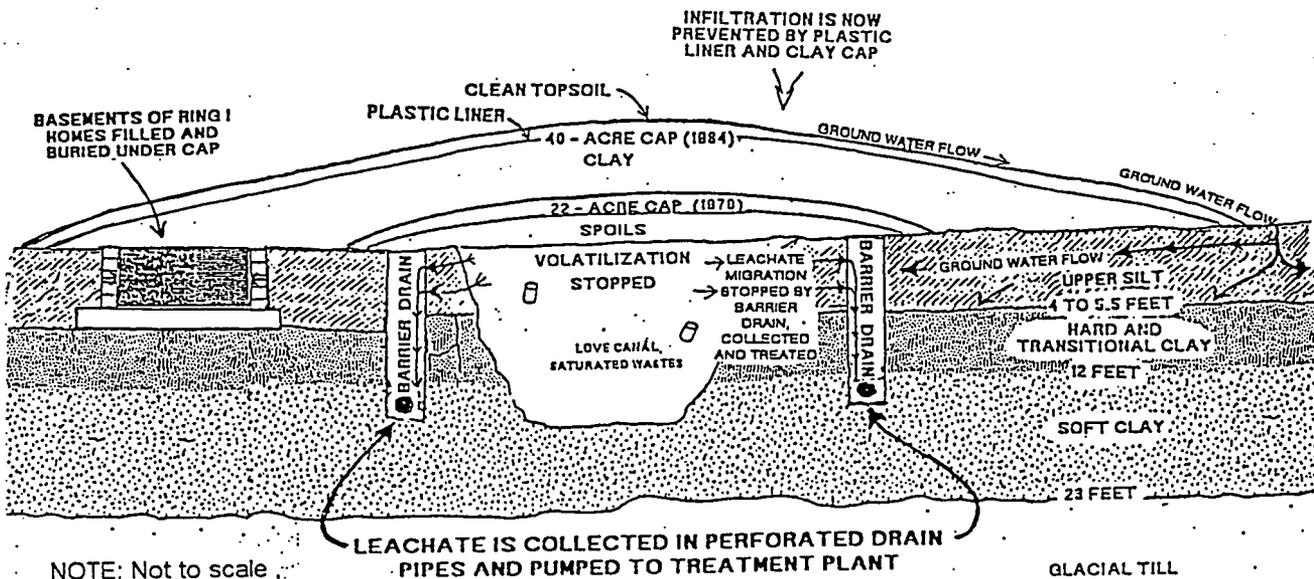
dewatering efforts. In addition, five sets of nested piezometers were installed to determine the influence of the collection system on the groundwater system.

### Plant Facilities

To process the collected leachate, an on site treatment facility was built. This facility receives leachate pumped from the collection system through two holding tanks with a combined storage capacity of 52,000 gallons. The raw leachate is then transferred to a clarifier where settleable solids, if any, and immiscible organic liquids are separated from the contaminated groundwater. The settleable materials are drawn off into four above ground storage tanks while the clarified leachate is passed through a bag filter which removes suspended solids.

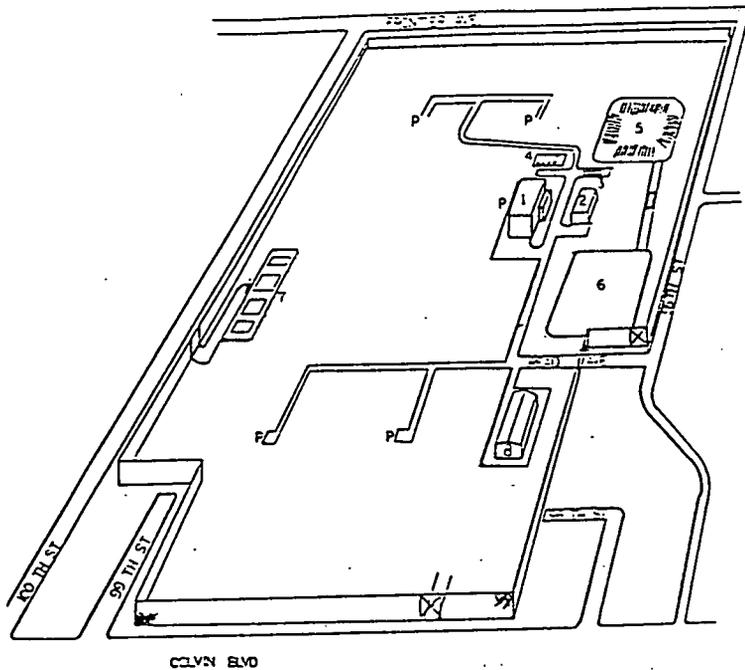
The clarified and filtered leachate is passed through three beds of granular activated carbon. The beds are linked in series and as the leachate passes through them, organic pollutants dissolved in the groundwater are effectively removed by adhering to the carbon. Hydrogen peroxide is injected into the effluent to oxidize the hydrogen sulfide generated by anaerobic bacteria which grow in the carbon beds. Finally, the is discharged to the City of Niagara Falls sewerage system in compliance with the sewer use ordinance. Construction of the facility started on September 10, 1979 and it entered operations on December 7, 1979.

## SCHEMATIC OF HOW THE CHEMICALS ARE CONTAINED BY THE REMEDIATION



NOTE: Not to scale

## THE LOVE CANAL SITE TODAY



- PUBLIC INFORMATION OFFICE
- 1 LEACHATE TREATMENT FACILITY
  - 2 ADMINISTRATION BUILDING
  - 3 PLASMA ARC UNIT TRAILER
  - 4 SLUDGE STORAGE TANKS
  - 5 DEWATERING CONTAINMENT FACIL.
  - 6 STAGING AREA
  - 7 SEWER SEDIMENT FACILITY
  - 8 DECONTAMINATION/DRUM STORAGE
- NOTE: NOT TO SCALE

### Recent Improvements and Maintenance

Over the past five years substantial improvements have been made to both the containment system and various plant facilities. Primary among them is the construction of a 2,900 square foot Administration Building which provides office, storage and laboratory facilities for the treatment plant staff. To improve long term reliability a rotating preventive maintenance schedule has been implemented for all field pumps; an extensive renovation of the collection systems electrical wiring and control systems is nearing completion which will allow for computer automation, monitoring and control of the pumping stations; and, access manholes were installed in the six leachate holding tanks and the tanks were cleaned. In addition, in 1991 the cap was surveyed to detect any settlement and the Department inspected and cleaned over 8,000 feet of leachate collection pipe to insure the integrity of the system and to provide for timely repairs, if needed.

## REMEDIATION OF THE LOVE CANAL EMERGENCY DECLARATION AREA

### Sewers

The USEPA released its Love Canal Environmental Monitoring Report in May 1982 and the U.S. Department of Health and Human Services advised that the EDA would be as habitable as the control comparison area once the contaminated storm sewers were cleaned. NYSDEC collected over 1,000 samples from the storm and sanitary sewers and, in October 1983, a final report recommended cleaning over 60,000 linear feet of storm and sanitary sewers. Cleaning began in April 1986 using both mechanical and hydraulic techniques, followed by a television inspection. Work continued through summer with 300 cubic yards of sediments removed and stored at the Sediment Dewatering Facility.

Confirmatory testing done in October 1986 indicated additional contaminated sanitary sewers along Frontier Avenue, between 76th and 81st Streets. An analysis of sediment samples indicated concentrations of dioxin in excess of 600 parts per billion (ppb). On October 5, 1987 the additional sanitary sewer cleaning began.

Another area of substantial activity has been the Frontier Avenue storm and sanitary sewer systems. Various projects involved:

The realignment of the storm sewer between its former intersections with 97th and 99th Streets. Drainage was rerouted through shallow piping to the LaSalle Expressway drainage system or to two new catch basins which were connected to the existing storm sewer beyond the abandoned section.

Additional sanitary sewer cleaning between 76th and 81st Streets, along Frontier Avenue. Sediment sample analytical results indicate concentrations of dioxin in excess of 600 parts per billion (ppb). The work consisted of cleaning and inspecting a total of approximately 3400 linear feet of sewer line, with about 15 cubic yards of material being removed. It also included cleaning of the storm sewer on Frontier Avenue downstream of 100th Street to the north boundary of the 102nd Street Inactive Hazardous Waste Site.

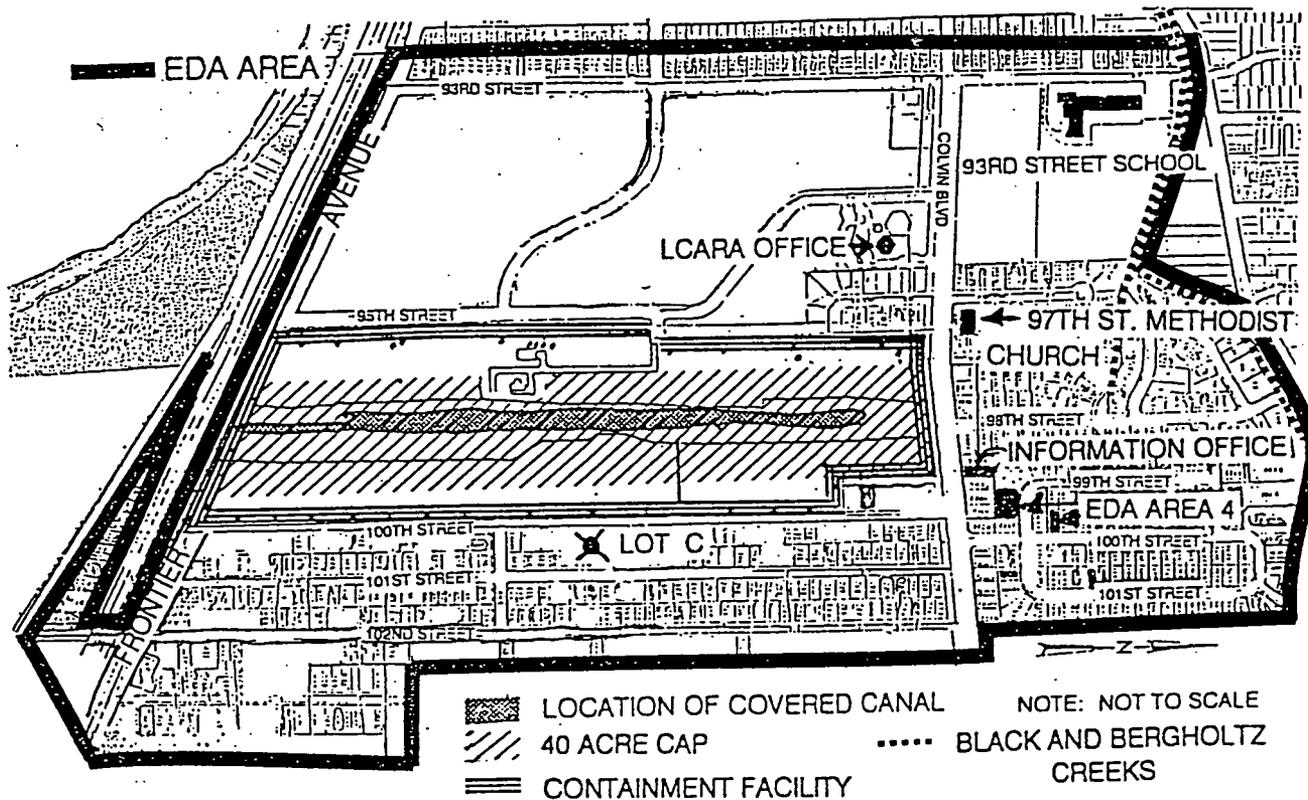
In August 1990, during the installation of an additional cutoff wall, unexpected contamination was discovered in the storm sewer pipe bedding near 100th Street. This previously undetected contamination was due to the migration of wastes from the Love Canal site prior to the initial remediation. After further investigation it was determined the Department would excavate the contaminated bedding between 100th Street and 101st Street and possibly line the section of sewer under the LaSalle Expressway.

The 102nd Street Storm Sewer Outfall, which is located outside the EDA, has been impacted by Love Canal contamination. Recognizing this, the USEPA identified an interim remedy for this area in its May 6, 1985 ROD. It is now NYSDEC's recommendation that this problem be addressed as part of the remedial program for the 102nd Street Landfill Site.

creeks. The NYSDEC collected numerous samples from the Black and Bergholtz Creeks. These studies identified dioxin contaminated sections of Bergholtz Creek from 150 feet upstream of its confluence with Black Creek to the 93rd Street footbridge. To remove the contamination, the creek bed was excavated to a depth of 18 inches and the creek bank to a minimum depth of 6 inches.

This was a major project which included: the excavation of over 3,300 feet of creek bank and bottom; cleaning of storm sewers with outfalls leading into the creeks within the area to be remediated; rehabilitation of the 93rd Street Sanitary Sewer and the replacement of the existing footbridge at 93rd Street. Plans also involved: the construction of a dewatering containment facility (DCF); construction of a decontamination - drum storage facility (DDSF); and the construction and

### LOVE CANAL AREA AS IT IS TODAY



#### Creeks

As early as 1979 dioxin contamination was known to exist in Black Creek. In response, the USEPA announced, in February 1980, that it would federally fund cleanup of these dioxin-contaminated

removal of haul roads. Design work began in July, 1985 for the remediation of the creeks with construction starting on May 2, 1988. The contract was declared substantially complete as of December 16, 1989.

## 93rd Street School

In March 1988, the NYSDEC issued a report for the 93rd Street School site which found the soils at the site were contaminated. As a result of the report the USEPA, in September 1988, issued a Record Of Decision (ROD) providing for the excavation of 7,500 cubic yards of soils, treatment of these soils by a solidification and stabilization technology, on-site placement of the treated soils and construction of a low permeability cover over both the treated soils and adjacent area. However, responding to concerns of the Niagara Falls Board of Education and the Love Canal Revitalization Agency, the USEPA issued a Record of Decision Amendment on May 15, 1991. The amended ROD included excavation and off-site disposal of approximately 11,000 cubic yards of the contaminated soil. Remedial work started in December 1991 and is expected to be completed by June of 1992.

## Other Remediation and Testing

### *Lot C*

During testing for the Love Canal EDA Habitability Study, dioxin was found at concentrations above 1 ppb at only one location, Lot C, 100th Street. Subsequent testing revealed dioxin at levels of concern to a depth of 12 inches. In early November 1988, a 10 by 17 foot area totaling about 10 cubic yards of soil was excavated to a maximum depth of 18 inches, which removed the contamination.

### *EDA Area 4*

In April 1990 and September 1990, NYSDEC and NYSDOH conducted an investigation of previously found elevated levels of B-BHC contamination in EDA Area 4. These investigations indicated that the higher levels of B-BHC was contained in fill used on three lots; 9909 and 9903 Black Creek Drive, and 1044 100th Street. In 1992 the Department will remove 900 - 1,000 cu. yds. of contaminated soil and the excavated areas will be backfilled with clean soils, graded and seeded.

## *97th Street Methodist Church*

An extensive investigation of the 97th Street Methodist Church site found no evidence of hazardous waste disposal. As a result, it recommended no further action and the site was removed from the State's Registry of Inactive Hazardous Waste Disposal Sites on January 9, 1991.

## *Home Maintenance Program*

The Home Maintenance Program was started by the NYSDEC in June 1988. The work included repairing roofs as necessary, boarding up windows and removing interior damaged material both north and south of Colvin Boulevard. In response to residents concerns the program was reassessed and it revealed that more roofs needed replacement than original planned. Therefore it was decided to fund ongoing work north of Colvin Boulevard and on 93rd and 96th Streets. Plans called for the homes south of Colvin Boulevard to be repaired the following spring. The Habitability Decision was issued on September 27, 1988. This decision prompted LCARA and the USEPA to agree that the maintenance of homes would become the responsibility of LCARA and the NYSDEC Home Maintenance Program was discontinued.

## *Cayuga Creek Fish Study*

In October 1987 the Division of Hazardous Waste Remediation entered into a Memorandum of Understanding with the Division of Fish and Wildlife to perform a study of fish in the Cayuga Creek system in order to assess the impacts of the sewer cleaning and the Black and Bergholtz Creek remediation projects. The second interim report concluded that the dioxin concentration in Young-of-the-Year fish from the creek's drainage basin continues to decline since the 1982 and 1987 sampling events.

# CHAPTER III REMEDIAL RESULTS

## LONG TERM MONITORING PROGRAM

In order to evaluate the effectiveness of the remedial work performed at the Love Canal, a number of monitoring activities have been undertaken. Primary among these is a system of overburden and bedrock monitoring wells ringing the Canal. One subset of these wells is designed to evaluate the effectiveness of the collector drain system as a hydraulic barrier, while a second subset is designed to evaluate its effectiveness as a barrier to the movement of chemistry. Wells in the second subset have been installed at a distance which appears to be beyond significant migration of Love Canal related compounds. Spacing of these wells was chosen to maximize the likelihood of detecting a point failure in the barrier drain system.

The Long Term Monitoring Program is designed to furnish hard evidence that the containment system is working and to provide early warning if undetected problems develop with the containment system. To accomplish this the program examines both hydrological and chemical data from the Love Canal area in order to evaluate the overall effectiveness of the containment system. These results are reported to the public yearly in an Annual Report.

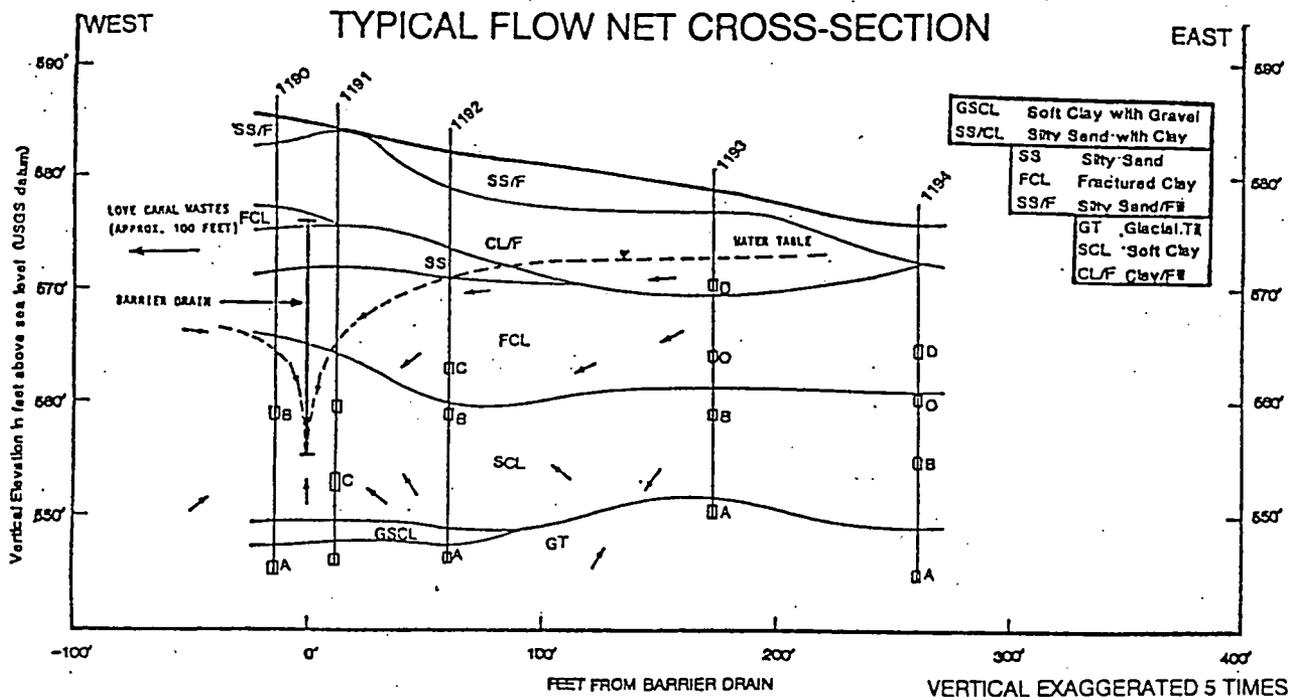
## Groundwater Monitoring - Hydrology

The hydrological data comes from six sets of piezometers located perpendicular to the drain. Readings are taken a number of times a year, and six flow net cross-sections are prepared. Evaluation of the six cross-sections leads to the conclusion that *the barrier drain is capturing all leachate migrating horizontally outward from the Canal, as well as pulling groundwater, which is outside the barrier drain, back toward the drain.*

## Groundwater Monitoring - Chemistry

The chemical data comes from analysis of groundwater samples from a system of over 50 overburden and bedrock wells located near the site perimeter. These wells are designed primarily for monitoring the chemical quality of groundwater at the Love Canal site and their location was carefully chosen to maximize the likelihood of detecting any failure that might occur in the barrier drain system. *To date the analytical results are characterized by a predominance of non-detectable levels of contamination.*

**NOTE:** For locations of monitoring wells and piezometers see drawing on page 3.



## Other Monitoring Developments

### *Canal Hydrology Studied*

In a further investigation of the hydrology underlying Love Canal, a special pump test study of the bedrock in the southwest area of the site was undertaken by NYSDEC staff in the spring of 1990. The study consisted of removing several well volumes of groundwater while simultaneously and continuously measuring water levels in the pumped well and several observation wells. The following conclusions can be drawn from the investigation:

1 In the Southwest area of the site, the bedrock aquifer is isolated from the overburden aquifer and means that there is very little likelihood for migration of groundwater from the overburden into the bedrock, or vice versa.

2 Within the bedrock aquifer are interconnections which extend over a large area which means that a hydrologic effect introduced into the bedrock at one point will be experienced at many other bedrock localities throughout the vicinity and in the unlikely event that a trace amount of contamination reaches the bedrock, it would rapidly be detectable over a large area.

### *Monitoring Wells Inventoried*

An inventory of groundwater monitoring wells in the EDA was conducted in the summer of 1990. A total of 327 wells, including USEPA wells, were inventoried. This is part of a selection process to determine which wells will remain part of the Long Term Monitoring Program.

## SIGNIFICANT DEVELOPMENTS IMPACTING AREA

### **Decision of Habitability**

A major milestone in the remediation efforts for Love Canal was passed on September 27, 1988 when Dr. David Axelrod, Commissioner of the New York State Department of Health, issued his "Decision of Habitability" for the Emergency Declaration Area (EDA). This report marked a turning point in the effort to remediate the area and is a step toward resettling neighborhoods around the Love Canal.

In making his decision, Dr. Axelrod followed criteria which were first developed in conjunction with a panel of independent scientists and the public. These criteria were pilot tested in the winter of 1986-87 and further modified on the basis of public and peer review, and a critique by the Technical Review Committee (TRC).

### *Well #10225C Investigation*

A new well installed in 1989 to replace an earlier well eliminated by construction activity, Well #10225C, continues to be closely monitored. Low levels of contaminants were found in the well during the 1989 Long Term Monitoring program. As a result the well was resampled several times. The data from these samplings is consistent with the previous analyses. The low levels of contamination in this well do not indicate the need for action or further study at this time. However, future results from this well will be tracked with special attention to any evidence of a change in groundwater conditions.

In addition, prior to the 1990 sampling, the NYSDEC requested that a consulting firm which is familiar with the Love Canal site and monitoring well program review the data from Well #10225C and provide an independent assessment. The Department was particularly interested in the question of whether the data suggested any trend in levels of contamination. The firm responded that:

1 It is early to draw final conclusions about the presence of a trend.

2 The data should be used as a basis for comparing future data from these wells to determine whether there is a trend.

The results from the Long Term Monitoring Program will continue to be made public. Should a trend occur for any of the parameters monitored, the situation will be immediately evaluated and appropriate action taken.

This process resulted in the TRC developing a definition of HABITABLE as: "Suitable for normal residential use without any restrictions." This meant that individuals could live in the EDA and feel comfortable about raising their families there, with children living and playing in the area.

The ruler that was used to measure whether an area met this definition focused on applicable known guidelines and on a comparison of environmental data from the EDA with data from three similar neighborhoods within Western New York. All comparison areas were required to be at least one half mile from any known landfill and were chosen by the TRC, with the assistance of the public.

This comparative approach was necessary because there were no standards for exposure to

many of the chemicals found in the canal and most of the experts felt that a qualitative risk assessment for all these chemicals was not feasible.

To compare the different neighborhoods, all were tested for evidence of particular Love Canal Indicator Chemicals (LCIC). These chemicals were selected because they are known to be present in the Love Canal, they are long-lasting, and they move easily through the soil or water and would indicate chemical migration from the Love Canal.

The testing process itself involved collecting over 2,500 soil and air samples from the EDA and the comparison areas. These samples were tested for three air LCICs and eight soil LCICs. In addition, because a federal guideline exists for dioxin, this compound was specifically tested for within the EDA.

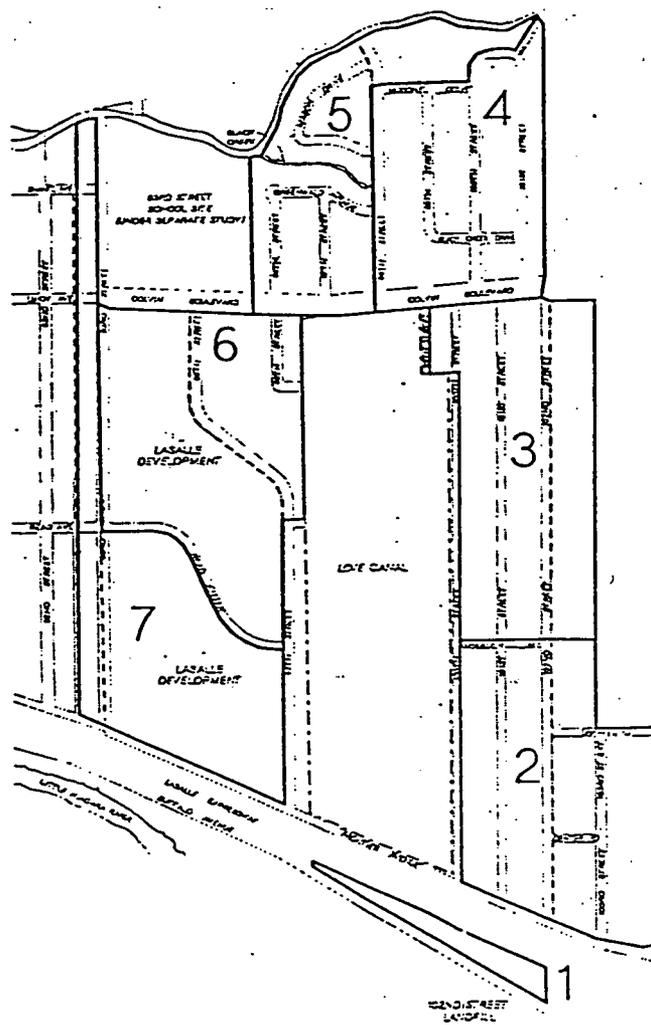
Results based on these tests which were conducted as part of the Habitability Study indicate:

- No enduring levels of air contamination were detected.
- Statistically, the soil from EDA 1 had significantly higher levels of all LCICs than soil from all the other parts of the EDA and from the comparison neighborhoods.
- Soil from EDA 2 and 3 had higher LCIC levels than soil from the comparison areas and EDA 4 - 7.
- Soil from EDA 4 - 7 did not have consistently elevated levels compared to soil from the comparison areas in Niagara Falls. However, soils from EDA 4 - 7 and Niagara Falls comparison neighborhoods were significantly more con-

taminated with LCICs than soil from the Erie County comparison area.

Applying the results of this study against the agreed upon habitability criteria, Dr. Axelrod determined that:

- EDA areas 4 - 7 met all of the habitability criteria and was suitable for unrestricted residential use or other purposes.
- EDA area 1 - 3 do not meet the criteria for habitability. Thus, these areas are not suitable for normal residential use without remediation.



- EDA areas 2 and 3 do not meet the criteria for habitability, although to a lesser extent than EDA 1. Remediation may make these areas as habitable as other neighborhoods in Niagara Falls, but they cannot, at the present time, be considered appropriate for unrestricted residential use.

- EDA 1 - 3 are deemed suitable for other purposes such as commercial or industrial use without remediation.

This decision enabled the Love Canal Area Revitalization Agency to develop a Master Plan, with input from a Land Use Advisory Committee, and prepare a Generic Environmental Impact Statement for the Plan.

### Love Canal Area Revitalization Agency Master Plan

The Love Canal Area Revitalization Agency met on September 13, 1989 and approved a Master Plan for the 350 acre EDA. The most significant decision

was to change the land use for EDA Areas 2 and 3, declared non-habitable by NYSDOH Commissioner Axelrod, to an industrial-commercial classification. The short term impact of the decision will be to start the demolition of the 149 houses which the Agency owns in this area. Because they have been vacant for as long as 10 years, most of these homes are in poor condition. The 26 families who still live in this area will have the option of remaining although the Agency will continue to offer to purchase these homes.

For planning purposes the Agency also enlarged EDA Areas 2 and 3 to include about 50 acres outside the EDA, extending eastward to Williams Road. This was done to enable planning to incorporate a 36 acre state designated wetland. The possibility that the wetland could be reconfigured and improved to provide a better wildlife habitat and a site amenity for future development will be studied at a future date.

Of equal significance is the decision to rehabilitate and resettle the area north of Colvin Boulevard and the west side of 93rd Street. This area contains 262 homes including 30 which are still occupied by residents who chose never to move from the EDA. These homes are generally in better condition than those located south of Colvin Boulevard and west of the Containment Facility. The homes are being improved and sold to home buyers as quickly as market conditions will allow. To date approximately 35 of these homes have been sold.

Between the canal and 93rd Street, on land largely owned by the Niagara Falls Municipal Housing Authority, the Agency has planned for a mixture of residential and other land uses. Open space and park land would be included and would add interest and sales appeal to the area. EDA Area 1, located south of the LaSalle Expressway, is designated as a "Gateway Area". This would be developed as green space to provide a scenic approach to the city.

### **Love Canal EDA Areas 2 and 3**

Pursuant to the State Environmental Quality Review Act, the New York State Disaster Preparedness Commission (DPC), as an involved agency, issued a Findings Statement for the Love Canal Master Plan. In the Findings Statement, the DPC declined to approve the expenditures of funds by LCARA necessary to promote commercial development of EDA 2 and 3. In part, the DPC found that LCARA's Master Plan did not adequately address the economic feasibility of remediating EDA 2 and 3

to allow for residential development.

Remediation of EDA 2 and 3 to permit residential use required that the concentration of LCICs in the top 12 inches of soil be reduced to conform with the habitability criteria. To explore this possibility, three alternative approaches were considered. One approach, soil treatment, was rejected because the concentration of contaminants in the soil are too low for effective treatment. Another approach, that of placing 12 inches of soil over the entire surface of the area was rejected because of difficulties in grading the soil near roads, sidewalks, houses and large trees. As a result, excavation and replacement of soil remained the only feasible alternative.

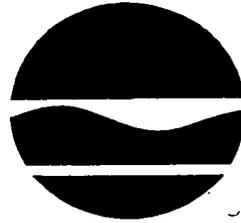
In December 1989, the NYSDEC and NYSDOH initiated a sampling program in EDA Areas 2 and 3 to better define the degree of remediation necessary to comply with the criteria of the Habitability Decision. The sampling program consisted of the collection of some 82 soil borings and the analysis of 246 samples in December 1989. Considering the available data, the report determined that the removal of six inches of soil would satisfy the habitability criteria and render EDA 2 and 3 suitable for unrestricted residential use. This eventually resulted in a document entitled "Love Canal EDA 2 and 3 Cost Analysis Report". This report provided LCARA and the DPC with the necessary information regarding the cost to remediate these areas for residential use.

The DPC, in May 1991, requested LCARA utilize this report, other available information and experience gained in the sale of homes, etc., to address the issues raised by the DPC's Findings and modify the GEIS and LCAMP, if appropriate. LCARA, after reviewing the points raised by the DPC, found that residential use of EDA Areas 2 and 3 was not economically feasible based upon the cost of remediation, the expense of rehabilitation of the homes and the difficulties currently being faced in marketing homes in the habitable areas. Therefore, LCARA concluded that revisions to the master plan and environmental impact statement were not necessary and the recommendation for commercial or light industrial development remains unchanged.

The DPC is reviewing LCARA's response, along with other supporting documents and will prepare a Draft Supplemental Findings Statement. A public hearing is to be held in order to gather public comment on this draft statement. After review of the public comments, the DPC will issue a final Supplemental Findings Statement.

**NEW YORK STATE  
DEPARTMENT OF ENVIRONMENTAL CONSERVATION**

**1993 ANNUAL REPORT**



**THE LOVE CANAL  
HAZARDOUS WASTE SITE**

**SITE NUMBER 9-32-020**

**NIAGARA COUNTY**

**SUMMARY**

1993 marked another year of progress in the efforts and commitment of the Department of Environmental Conservation to operate and maintain the Love Canal Inactive Hazardous Waste Site. The Annual Report covers only those developments which actually occurred in the 1993 calendar year. Major highlights of the past year included:

**LOVE CANAL CONTAINMENT FACILITY**

Operations and maintenance in 1993 at the Love Canal Containment Facility can best be characterized as routine. The Love Canal Leachate Treatment Facility's discharges met all discharge permit requirements of the Sewer Use Ordinance during the year. The leachate collection system continued to function as designed drawing ground water toward the underground drain system from both the landfill and the surrounding area beyond the cap. The Long Term Monitoring Program supports the conclusion, through both hydrological and chemical evidence, that the barrier drain system is functioning as designed.

**EMERGENCY DECLARATION AREA**

In the surrounding Emergency Declaration Area (EDA) remediation is complete. The Cayuga Creek fish study was completed and a report was issued. The remediation of the back yard of 9903 Black Creek Drive, and the remediation of the Frontier Avenue and the 100th Street Storm Sewers were also completed in 1993.

## EMERGENCY DECLARATION AREA PROJECTS

### Cayuga Creek Fish Study

The study, conducted by the Division of Fish and Wildlife, was completed and a final report was issued in August 1993. The final report concluded that the dioxin concentrations in young-of-the-year fish have declined in two stages. The first stage decline (between 1982 and 1987) of approximately 70 percent is associated with the completion of the containment of the Love Canal landfill site and the cleaning of the storm sewers in the area. The second decline (between 1987 and 1992) of an additional 46 to 86 percent is dependent on location and is due to removal of highly contaminated sediments from Black and Bergholtz Creeks. However, the Department of Health maintains an advisory against eating fish caught in the creeks.

### 93rd. Street School Site

The remediation of the site was completed and the construction contract has been closed out. The site is expected to be delisted in 1994.

### Frontier Avenue Project

In January of 1993, work began for the excavation, disposal and replacement of contaminated storm sewer pipe and bedding along Frontier Avenue and 100th. Street. Excavation, removal and replacement extended 96 feet north on 100th. Street from Frontier Avenue, and about 165 feet east on Frontier Avenue. Two manholes in the work area were removed and replaced with new manholes, and a new concrete cut-off wall was constructed. The pipe trenches were backfilled and compacted in accordance with the project specifications, and the concrete and asphalt roadways were replaced to meet the requirements of the City of Niagara Falls.

Test pits were dug to determine if contamination existed in the pipe bedding of the 42-inch storm sewer under the LaSalle Expressway downstream of Frontier Avenue excavation. Observations and analytical results of test pit samples indicated that contamination was not present, so no remedial action was taken. Remedial work on the Frontier Avenue project was completed in July 1993.

### EDA Area 4 Remediation

During excavation of soils in #9903 Black Creek Drive as part of the 1992 soil remediation at EDA Area 4, a black ash-like material was encountered throughout the backyard of the property. In early 1993, NYSDEC conducted a subsurface investigation to identify the limits of the material and collected samples for analysis. The results of the investigation indicated that some of the samples of black ash contained elevated concentrations of mercury, but were not hazardous according to the Toxicity Characteristic Leaching Procedure (TCLP).

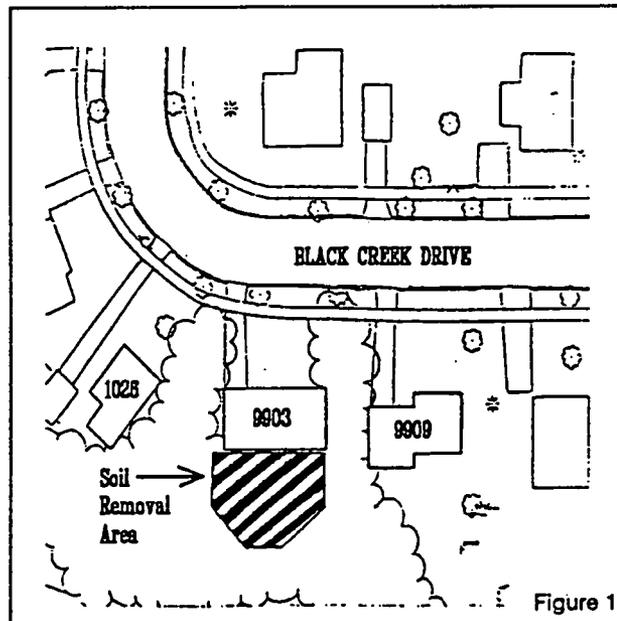
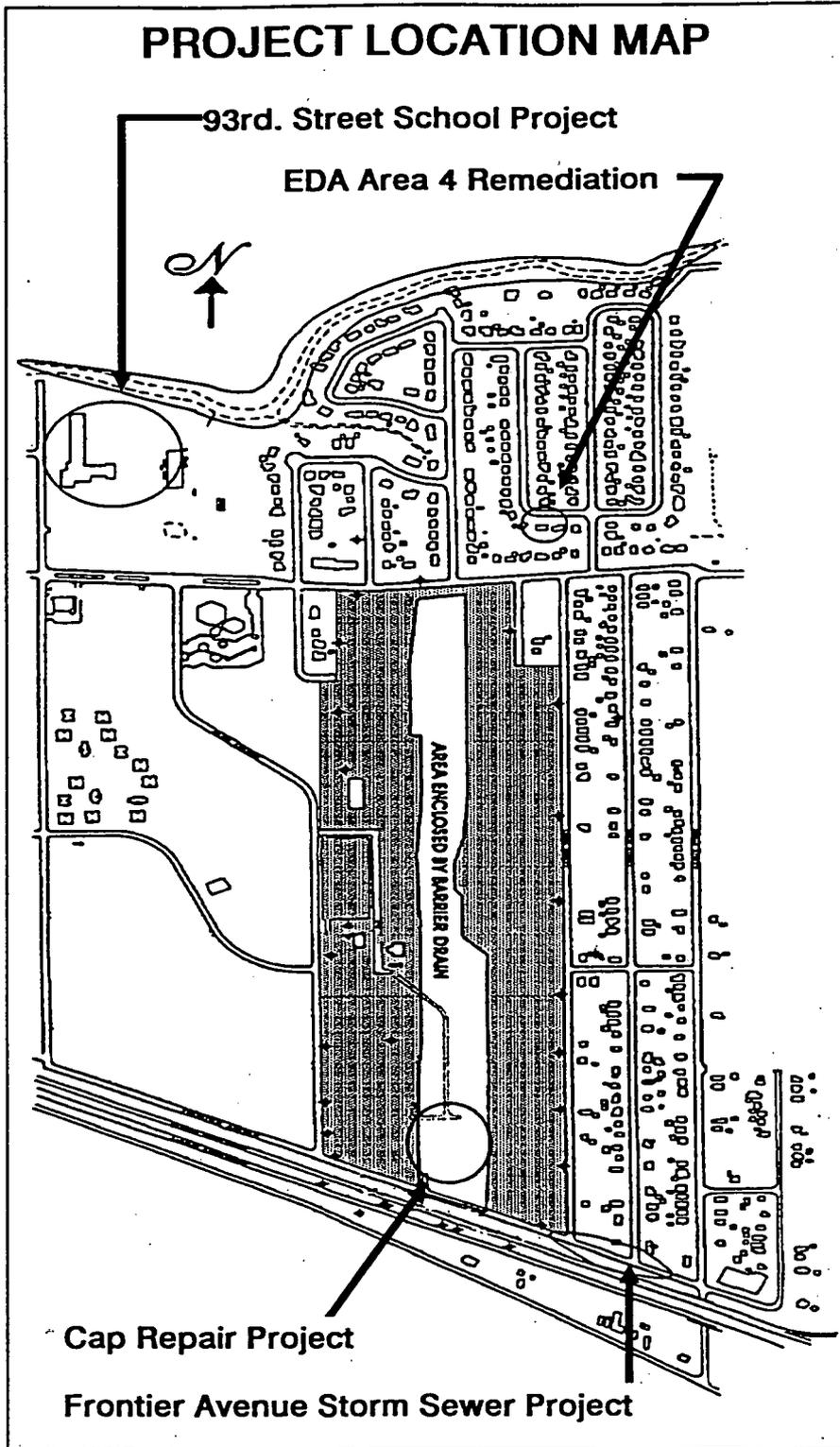


Figure 1

To determine the horizontal and vertical extent of the contamination, soil samples were collected in June 1993. The analytical results were used to decide how much soil needed to be removed.

Excavation of contaminated soils began on August 9, 1993 and was completed on August 11, 1993. About 24 truck loads (238 cubic yards) of contaminated soils were removed from the property and disposed of at the 102nd. Street landfill. The area was backfilled with clean soil and compacted to grade (see Figure 1 for area excavated). This remediation has removed all areas of significant mercury contamination. Because of this, the site will not require continued monitoring or maintenance.



## OPERATION & MAINTENANCE ACTIVITIES

The Leachate Treatment Facility continued to comply with all the requirements of its discharge permit in 1993. The permit is in effect until July 1995.

In the Fall of 1992, a 40 foot by 100 foot area of the cap's soil cover and liner had been excavated and removed. However, due to seasonal restrictions, the installation of the new High Density Polyethylene liner was delayed until warmer weather. Replacement of the new liner started in May 1993 and was completed in June 1993. Test results from seam weld samples indicated that the new materials met specifications. With the installation of the new liner, the area was filled with a mixture of cap soils excavated during the project and clean stockpile soil from the northeast corner of the Containment Facility, loamed and seeded. Restoration work was completed in July 1993.

## THE LONG-TERM MONITORING PROGRAM

The Long Term Monitoring Program (LTM) examines hydrological and chemical data from the Love Canal area in order to evaluate the overall effectiveness of the containment system. In 1993, one round of samples was collected from 36 long term monitoring wells that surround the site. Included in this sampling program were selected wells on the west side of the Dewatering Containment Facility (DCF). Approximately bi-monthly groundwater elevations were taken in six groups of piezometers located around the site.

- *The basic conclusion from the 1993 data is that they are essentially similar to 1989's, 1990's 1991's and 1992's, and that the barrier drain is functioning as designed.*
- *This conclusion is supported by both the hydrological and chemical evidence.*

## FOR MORE INFORMATION

For a more complete discussion of these topics and activities, or other information regarding the investigation, remediation, operations, maintenance and monitoring of the site, please contact:

Michael Podd

N.Y.S.D.E.C.

270 Michigan Avenue

Buffalo, N.Y. 14203

or by calling:

(716) 851-7220

Bureau of Community Affairs

N.Y.S.D.E.C.

50 Wolf Road, Room 208

Albany, N.Y. 142233

or by calling:

1 (800) 342-9296



JANUARY 1995

# UPDATE

## LOVE CANAL TRANSFERRED TO OCCIDENTAL CHEMICAL CORPORATION

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Dear Interested Citizen:

The New York State Department of Environmental Conservation would like to update you on the transfer of the operations and maintenance of the Love Canal site by Occidental Chemical Corporation (OCC). OCC will assume this responsibility on January 5, 1995, under a Consent Judgment which settled New York State's case against the company.

The Department is pleased to inform you that all remedial activities at the Love Canal site have been completed. As a result, the site will be reclassified from Class 2 (A site posing a significant threat to the public health or environment and action is required) to a Class 4 (A site which has been properly closed and requires continued management).

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*Some of the common questions or concerns about the transfer are answered below:*

**QUESTION: When will the transfer actually occur?**

This will occur on January 5, 1995. The Consent Judgment, which became effective in October 1994, called for OCC to undertake and assume responsibility for all operations and maintenance activities at the site 90 days after the judgment became effective.

**QUESTION: What will be done to train OCC's staff?**

So that an effective transfer of responsibility for the operation, maintenance and long term monitoring of the Love Canal takes place, transition teams were established by OCC and the Department to oversee the takeover. Formal training of OCC's technical staff started on November 14, 1994. The training, as planned, will be completed by January 5, 1995, when OCC is scheduled to take full responsibility for the operation and maintenance of Love Canal.

**QUESTION: How will the Department know if OCC's staff can actually operate the site?**

To ensure that OCC's staff can run the plant safely and effectively a second 90-day evaluation period, starting January 5, 1995 and ending April 5, 1995, will take place. During this time the Department will oversee and assess OCC's staff to ensure that the containment and monitoring systems are maintained and operated under effective, continuous, and clearly accountable management. To accomplish this, the state will assign three trainers/inspectors to the site. In addition, the Department will retain the option, at its sole discretion, to assign one trainer/inspector for an additional three month period at any time within the first two years after OCC's transfer.

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NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

270 Michigan Avenue  
Buffalo, N.Y. 14203

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**QUESTION: Will the Department perform long term oversight of OCC's activities at the site?**

Yes. After the end of the evaluation period (April, 1995) the Department will conduct inspections quarterly for the first year and annually thereafter. At that time the state will also collect separate samples of the plant's treated sewer discharge and between five and ten monitoring wells to check the accuracy of OCC's sampling and testing methods. In addition, OCC is required to submit an annual report to the Department. The report will outline activities performed at the site, including the monitoring program, and evaluate the performance and effectiveness of the remedial program. The report is to:

- b evaluate the performance of the collection system in maintaining inward gradients;
- b describe the operation of the plant and any modifications made;
- b evaluate the treatment plant in meeting the sewer use discharge permit; and,
- b evaluate the overall effectiveness of the remedy in preventing chemical migration.

Other separate annual report requirements applicable to hazardous waste generation, storage and transportation are required. Any spills are to be reported according to the appropriate regulations. The Consent Judgment also provides that OCC must obtain written approval from the Department when major modifications to the plant are proposed. The City of Niagara Falls also requires a quarterly report of sewer discharges and performs inspections semi-annually, which includes a sample and analysis of the plant's sewer discharges. Other inspections will periodically be made by other agencies, including OSHA and, local building and fire departments.

**QUESTION: Will the public notice any changes in the way the site looks?**

The Department does not believe the public will notice any significant changes to the appearance of the site. Under the Consent Judgement OCC will assume complete responsibility for all upkeep activities at the site. This includes such things as cutting the grass, keeping the fence in good repair, maintaining security, painting and repairing of all building and structures.

**FOR MORE INFORMATION**

If you have any questions regarding the Consent Judgment, the transfer of the operations and maintenance of the Love Canal site to Occidental Chemical Company, or the reclassification of the site to a Class 4, please feel free to call Michael Podd, at (716) 851-7220; or by calling, toll free, 1-800-342-9296 and leaving your name, address and request. Written comments or questions should be directed to Mr. Podd at NYSDEC's Region 9 Office, 270 Michigan Avenue, Buffalo, N.Y. 14203. For health related concerns regarding this site please contact Ms. Charlene Thiemann, New York State Department of Health, Health Liaison Program at, 1 800-458-1158, Ext. 402.

Sincerely,



Michael R. Podd  
Citizen Participation Specialist

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**NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION**

270 Michigan Avenue  
Buffalo, N.Y. 14203

# LOVE CANAL 1995 ANNUAL OPERATION AND MAINTENANCE REPORT

Occidental Chemical Corporation  
Niagara Falls, New York

## FORWARD

The 1995 Love Canal Annual Operation and Maintenance Report is submitted pursuant to Section 2.C. of Appendix B of the Consent Judgment between Occidental Chemical Corporation (OCC) and the State of New York effective October 7, 1994. It covers those developments and activities which occurred in the 1995 calendar year. This is the first Annual Report issued by OCC. Previous Annual Reports were issued by the New York State Department of Environmental Conservation (NYDEC). For further information regarding the developments and activities at Love Canal, please contact:

James Green  
360 Rainbow Blvd. S.  
Niagara Falls, New York, 14302  
Phone: (716) 286-3067

## SUMMARY

This year was a period of transition as the responsibility for site operations and control passed from NYDEC to OCC on January 5, 1995. Shortly thereafter on January 12, 1995, the NYDEC reclassified the site to a Class 4 site. This is a site which has been properly closed and requires continued management. NYDEC remained at the site for a short period following the change in site responsibility to monitor OCC performance. The transition in site control and continued operation in 1995 proceeded smoothly with no incidents out of the ordinary.

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## **LOVE CANAL LEACHATE COLLECTION AND TREATMENT**

A new City wastewater discharge permit was issued to OCC on January 5, 1995. The Love Canal Leachate Treatment Facility's discharges met all discharge requirements of City permit during the year. The leachate collection system continued to function as designed drawing ground water toward the underground drain system from both the landfill and the surrounding area beyond the cap.

### **OPERATION AND MAINTENANCE ACTIVITIES**

- No carbon changes occurred at the Leachate Treatment Facility this year. No spent carbon or other solid waste was transported from the site.
- Approximately 4000 ft. of deteriorated fencing was replaced at the site perimeter.
- Major repairs at Leachate Treatment Building and Administration Building were undertaken and included new roofs, wall repair, caulking and painting.
- In October, the NYDEC commenced closure of 134 wells no longer required for data collection.
- OCC received NYDEC approval to move the unused dewatering facility and clay inventory at the site to the 102nd St. site for use as contouring and cap material. Movement will start in the summer of 1996.

### **THE LONG-TERM MONITORING PROGRAM**

The Long-Term Monitoring Program examines hydrological and chemical data from the Love Canal area in order to evaluate the overall effectiveness of the containment system. In 1995, one round of samples was collected from 38 long-term monitoring wells that surround the site. Approximately quarterly groundwater elevations are taken in six groups of piezometers located around the site.

The basic conclusion from the 1995 data is that it is similar to previous data gathered from 1989 to 1994, and that the barrier drain is functioning as designed. This conclusion is supported by both the hydrological and chemical evidence.



**LOVE CANAL  
1996 ANNUAL OPERATION AND  
MAINTENANCE REPORT**

**Occidental Chemical Corporation  
Niagara Falls, New York**

**FOREWORD**

The 1996 Love Canal Annual Operation and Maintenance Report is submitted pursuant to Section 2.C. of Appendix B of the Consent Judgment between Occidental Chemical Corporation (OCC) and the State of New York effective October 7, 1994. It covers those developments and activities which occurred in the 1996 calendar year. This is the second Annual Report issued by OCC. Annual Reports prior to the 1995 calendar year were issued by the New York State Department of Environmental Conservation (NYSDEC). For further information regarding the developments and activities at Love Canal, please contact:

Dennis M. O'Neil  
Human Resources Manager  
Occidental Chemical Corporation  
2801 Long Road  
Grand Island, NY 14072  
Phone: (716) 773-8525

**SUMMARY**

Responsibility for site operations and control passed from NYSDEC to OCC on January 5, 1995. Shortly thereafter, on January 12, 1995, the NYSDEC reclassified the site to a Class 4 site. This is a site which has been properly closed and requires continued management. Operation in 1996 proceeded smoothly with no incidents out of the ordinary.

## LOVE CANAL LEACHATE COLLECTION AND TREATMENT

A new City wastewater discharge permit was issued to OCC on January 5, 1995. The Love Canal Leachate Treatment Facility's discharges met all discharge requirements of City permit during the year. The leachate collection system continued to function as designed drawing groundwater toward the underground drain system from both the landfill and the surrounding area beyond the cap.

### OPERATION AND MAINTENANCE ACTIVITIES

- No carbon changes occurred at the Leachate Treatment Facility this year.
- Nineteen rollofs were sent to the Buffalo Avenue Plant for temporary storage pending appropriate disposal.
- The NYSDEC completed closure of 115 wells no longer required for data collection. The well parts were drummed and transported to the OCC Buffalo Avenue Plant for temporary storage pending appropriate disposal.
- Monitoring well 8135 was installed May 8, 1996 to replace monitoring well 4108 which had been closed by the NYSDEC.
- The unused dewatering containment facility and clay inventory was moved from the site to the 102nd Street site for use as contouring and cap material.

### THE LONG-TERM MONITORING PROGRAM

The Long-Term Monitoring Program examines hydrogeologic and chemical data from the Love Canal area in order to evaluate the overall effectiveness of the containment system. In 1996, one round of samples was collected from 35 long-term monitoring wells that surround the site. Approximately quarterly groundwater elevations are taken in six groups of piezometers located around the site.

The basic conclusion from the 1996 data is that it is similar to previous data gathered from 1989 to 1995, and that the barrier drain is functioning as designed. This conclusion is supported by both the hydrological and chemical evidence.

# OCC and State of New York Settle Love Canal Claims

Following a 14-year legal battle, the state of New York and Occidental Chemical Corporation (OCC) have entered into a consent judgment in the Love Canal litigation. The June 21, 1994 judgment, which was approved by the U.S. District Court for the Western District of New York on July 1, 1994, requires that OCC pay the state \$98 million in exchange for a release of all state claims remaining against the company (*United States et al. v. Occidental Chemical Corporation et al.*, Docket Number: 79-CV-990C).

The settlement follows a March 17, 1994 court decision ruling that OCC was not liable for punitive damages associated with alleged activities of its predecessor, Hooker Chemicals & Plastics Corporation, at the Niagara Falls, New York site. However, it should be emphasized that the consent judgment does not affect the pending U.S. government claims against OCC (estimated at \$200 million) or the numerous personal injury claims asserted by private parties against the company.

## History of the Love Canal Litigation

Between 1942 and 1954, the Love Canal site, a 16-acre parcel of land located in Niagara Falls, New York, was used by Hooker Chemical (now OCC) as a landfill for wastes generated at its Niagara Falls chemical manufacturing plant. Approximately 25,000 tons of chemical wastes were allegedly disposed at the site.

In 1953, Hooker Chemical transferred the property to the City of Niagara Falls School Board, and an elementary school was built on the site the following year. Around 1971, chemical wastes began surfacing and seeping into neighboring homes, and in 1978, a state health emergency was declared. OCC acquired Hooker Chemical prior to the discovery of the contamination and the state health emergency.

On December 20, 1979, EPA filed a complaint against OCC (Hooker Chemical) asserting various federal statutory and common law claims arising from the disposal of hazardous wastes at the Love Canal site. Sub-

sequently, in 1980 the state of New York filed a complaint and joined the previous action filed by the federal government. The state asserted various claims of public and private nuisance and sought compensation for site cleanup costs. In addition, the state asserted punitive damages against OCC for the company's conduct in the disposal of hazardous wastes.

The court separated the case into two phases: Phase I, during which the liability of all parties would be determined, and Phase II, during which the nature and amount of the remedy would be decided. In its March 17, 1994 ruling on the state's claim for punitive damages, the court dismissed these claims due to lack of evidence that the company's activities exhibited the degree of recklessness that warranted assessment of such damages. That decision was partly based on the fact that Hooker Chemical's waste disposal activities at the Love Canal site complied with or exceeded industry practice at the time of disposal in the 1940s and 1950s. (A complete discussion on the March 17 ruling can be found in the July/August 1994 issue of *The Hazardous Waste Consultant*, page 3.6.)

The rest of the issues covered during Phase I and II litigation were left for future court orders. These remaining issues between the state and OCC included the state's reimbursement claims for cleanup costs and natural resource damages. The company's claims against the state included a claim for uncompensated appropriation of property under the deed of transfer of the Love Canal site from OCC to the city of Niagara Falls.

## Terms of Consent Judgment

The June 21 consent judgment sought to resolve all of the claims remaining between OCC and the state of New York. According to the terms of the consent judgment, the company has agreed to pay \$47.5 million into an escrow account within 14 days after entry of the judgment. In addition, OCC must make payments to the escrow account for three years according to the following schedule: \$15 million on June 1, 1995; \$15 million on June 1, 1996; and \$18 million on June 3, 1997. The company has also agreed to pay up to \$2.5 million for special projects to be designated later by the state. Other important

aspects of the consent judgment are summarized below.

### Assumption of O&M Duties

According to the consent judgment, the company has agreed to take over operation of the Love Canal containment facility. Accordingly, OCC is to maintain and repair the cap over the Love Canal site, the leachate collection system, the treatment plant, the monitoring system, and other related facilities. The company has also agreed to monitor the effectiveness of the remediation within the area. The court document stipulates that OCC must continue operation and maintenance (O&M) duties "as long as required to protect the public health or the environment"; O&M activities can be modified or terminated only upon court approval.

### Payment of Oversight Costs

In addition to its own financial commitment to O&M activities, the company has agreed to reimburse all costs incurred by the state for oversight of the O&M functions. The promised reimbursement includes direct costs for O&M obligations, as well as indirect costs and fringe benefits. OCC has also agreed to reimburse the state for attorneys' fees paid for any enforcement of O&M activities.

### Indemnification Provisions and Release of Claims

OCC has agreed to indemnify the state from all future claims resulting from the company's performance of its O&M obligations. In return, the state has agreed to indemnify the company from any claims resulting from the state's acquisition of property within the Love Canal area.

Finally, the consent judgment acts to release all claims by the state of New York against OCC arising out of past releases or threatened releases of hazardous substances from the Love Canal site. In turn, the company will drop its claim against the state for acquiring interest in property within the Love Canal area in violation of state acquisition law. As stated previously, litigation between the federal government and the company is still pending, as are the claims brought by private individuals against OCC.

**Love Canal Remedial Chronology**  
**January 1995**

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- 1890's ▶ William T. Love lays plans to dig a power canal between the upper and lower sections of the Niagara River to provide cheap hydroelectric power for a proposed model industrial city. Excavation begins.
- Late 1890's ▶ Project abandoned due to the invention of alternating current. Industry no longer needs to locate near a source of power. The abandoned canal is approximately 16 acres in size, 3,000 feet long, 100 feet wide and approximately 1,500 feet away from the Niagara River.
- 1938 ▶ Aerial photo indicates canal containing impounded water. Local residents report Canal used for swimming, ice skating, and other recreational purposes.
- 1942 to 1953 ▶ Hooker Electrochemical Company deposits at least 21,800 tons of production process wastes in the canal. Wastes include chlorinated hydrocarbon residues, process sludges, fly ash and other materials. City of Niagara Falls also uses the site for disposal of municipal wastes.
- 1953 ▶ Canal site sold to Niagara Falls Board of Education.
- 1954 ▶ 99th Street Public Elementary School constructed. Home construction in areas surrounding the Canal accelerates.
- 1960's ▶ Residents complain of minor explosions and fumes at the site.
- mid-1970's ▶ Rain water and melting snow seeping into the canal apparently forces chemical wastes to the surface of the site. Contaminated groundwater spreads laterally through surface soils into yards and basements of adjoining homes.
- Sept. 1976 ▶ NYSDEC engineers visit Love Canal while investigating the suspected discharge of Mirex by Hooker Electrochemical Corporation.
- Fall 1976 ▶ NYSDEC collects basement sump and sewer samples for Mirex/PCB analysis. Based on test data, NYSDEC urges City of Niagara Falls to do a hydrogeological study and to develop a pollution abatement plan.
- Early 1978 ▶ NYSDOH and USEPA collect additional sump samples and air samples from homes nearest the Canal. Significant chemical contamination found in both.
- Apr. 1978 ▶ NYSDEC and NYSDOH meet in Albany with USEPA representatives to review Love Canal test data and develop a remedial action plan.
- ▶ New York State Commissioner of Health declares area a threat to human health and welfare and orders local health officials to restrict access to the landfill.
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**Love Canal Remedial Chronology**  
**January 1995**

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- Aug. 2, 1978** ▶ New York State Commissioner of Health, Robert P. Whalen, M.D., declares a State of Emergency and recommends relocation of pregnant women and children under age of two residing in homes adjacent to the Canal.
- Aug. 3, 1978** ▶ New York State Governor Hugh Carey establishes an interagency task force to help relocate affected families; to prevent further toxic migration from the site; and to continue environmental and health studies.
- Aug. 7, 1978** ▶ President Jimmy Carter declares an emergency authorizing actions necessary to save lives and property. Governor Carey expands State's relocation effort authorizing permanent evacuation of all persons from 239 in homes in the first two rings adjacent to the Canal.
- Aug. 22, 1978** ▶ State installs eight-foot high chain link fence around the Love Canal and first two rings of houses.
- Aug. 1978** ▶ NYSDEC works with City of Niagara Falls and its consultant, Conestoga-Rovers, to complete design of the drainage and containment system to halt outward chemical migration from landfill.
- Oct. 10, 1978** ▶ City of Niagara Falls begins remedial construction work installing barrier drains around the southern section of the canal.
- Feb. 8, 1979** ▶ Health Commissioner David Axelrod issues a supplemental health order recommending that all pregnant women and children under age of two residing between 97th and 103rd Streets and from Frontier Avenue north to Colvin Boulevard be temporarily relocated. Governor modifies order to include entire families with pregnant women or young children and to include residents of the LaSalle Development.
- Apr. 24, 1979** ▶ USEPA enters into a Cooperative Agreement with the NYSDEC awarding a \$4 million grant to the NYSDEC, matched by \$4 million from New York State, to demonstrate new technologies for remedial actions at the Love Canal.
- May 29, 1979** ▶ NYSDEC begins remedial construction on the central and northern sections of the Love Canal Leachate Collection System placed from 12 to 20 feet below the surface.
- Sept. 10, 1979** ▶ NYSDEC begins construction on the Love Canal Leachate Treatment Facility.
- Oct. 11, 1979** ▶ Remedial construction in southern sector of Love Canal complete.
- Nov. 1979** ▶ Love Canal Leachate Collection System substantially completed.
- Nov. 9, 1979** ▶ Dioxin contaminated fish and crayfish found in Black Creek.

**Love Canal Remedial Chronology**  
**January 1995**

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- Dec. 1979**           ▶ The U.S. Dept. of Justice filed a lawsuit against Hooker Chemical & Plastics Corporation for damage to the environment due to Love Canal as well as financial damages incurred by the United States for necessary emergency measures.
- Dec. 7, 1979**       ▶ The Leachate Treatment Facility at Love Canal begins operation to collect and treat leachate from the barrier drain collection system.
- Feb. 21, 1980**     ▶ USEPA announces that it will proceed with a federally funded cleanup of sewers and dioxin-contaminated creeks.
- May 17, 1980**     ▶ USEPA announces that a recent study showed evidence that some residents of the Love Canal area may have suffered chromosome damage from exposure to toxic chemicals buried at Love Canal.
- May 21, 1980**     ▶ President Carter declares a second federal emergency in the area offering federal funds for temporary relocation of families.
- June 1980**         ▶ Governor Carey requests federal funds for purchase of homes in the Love Canal area.
- June 18, 1980**   ▶ Governor Carey signs legislation creating the Love Canal Area Revitalization Agency (LCARA).
- July 1980**         ▶ NYSDEC completes placement of a 22-acre, three-foot thick clay cap over the landfill to prevent human contact with the waste, to reduce the amount of water entering the site, and to reduce air emissions.
- July 3, 1980**     ▶ Congress approves emergency appropriations allowing the President to spend up to \$20 million to relocate families in the Love Canal Emergency Declaration Area (EDA). Federal government agrees to provide a \$7.5 million grant and a \$7.5 million loan to New York State to purchase approximately 550 eligible homes in the EDA. Program to be administered by LCARA.
- Aug. 1980**         ▶ USEPA begins a study to determine extent of contamination of air, water and soil in the EDA as a basis for forming recommendations for the future use of the area.
- Nov. 19, 1980**   ▶ New Federal Resource Conservation and Recovery Act (RCRA) regulations take effect with "Cradle-to-Grave" concept to control toxic waste disposal.
- Dec. 12, 1980**   ▶ President Carter signs Superfund legislation creating a \$1.6 billion federal fund to aid in cleaning up chemical spills and toxic waste dumps the U.S.

**Love Canal Remedial Chronology  
January 1995**

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- May 1982** ▶ USEPA releases its Love Canal Environmental Monitoring Report. The U.S. Department of Health and Human Services (DHHS) provides a provisional decision that the EDA is as habitable as the control comparison area once the storm sewers and their drainage tracts are cleaned.
- June 1982** ▶ Abandoned homes in Rings I and II demolished on site.
- July 12, 1982** ▶ NYSDEC enters into a Cooperative Agreement with the USEPA to carry out and evaluate measures to control migration of chemical wastes from the Love Canal. The initial award is for \$6,995,000 funded by the federal government. Under the terms of the Agreement, the federal government will provide for 90% of the subsequent awards for construction activities, to be matched by a 10% award from New York State.
- Dec. 1982** ▶ NYSDEC amended a contract to Severson Construction Corporation to perform the Phase II remedial construction work including repairs to Leachate Collection System, expansion to the cap and upgrading of the cap, improved surface drainage in the vicinity of the Canal.
- Jan. 1983** ▶ NYSDEC consultant, Malcolm Pirnie, Inc., collects over 1,000 environmental samples from the storm and sanitary sewers, and Black and Bergholtz Creeks.
- Feb. 1983** ▶ Cleaning and repairing of the barrier drain completed by O.H. Materials, contractor to the NYSDEC.
- March 1983** ▶ NYSDEC opens a Public Information Office at 9820 Colvin Boulevard adjacent to the fenced area, staffed by a citizen participation specialist and a stenographer.
- Apr. 1983** ▶ E.C. Jordan, Inc. completes its collection of soil samples along the proposed alignment of the concrete groundwater cutoff wall. Final alignment of cutoff wall to be based on results of this study.
- June 8, 1983** ▶ 99th Street School demolished.
- June 1983** ▶ On-site water, gas, storm and sanitary sewer lines plugged and sections of concrete cutoff wall installed to prevent offsite movement of contaminants within utility lines and soil bedding. Sewers along 97th and 99th Street cleaned.
- ▶ Congressional Office of Technological Assessment (OTA) publishes a technical memorandum evaluating the validity of the DHHS habitability decision. OTA's principle finding is that it is not possible to conclude that the EDA is as habitable as the comparison areas based on the existing data. OTA report indicates that there remains a need to demonstrate unequivocally that the EDA is safe immediately and over the long term.
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**Love Canal Remedial Chronology**  
**January 1995**

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- Summer 1983** ▶ Trees, shrubs and topsoil cleared from the site and work begins to extend cap which includes placement of plastic liner. Other site preparations begin.
- July 28, 1983** ▶ NYSDEC announces plans to delete perimeter groundwater cutoff wall from its remedial plans. Computer model prepared for USEPA by Geotrans indicates that the groundwater cutoff wall would only decrease the inflow of water into the site by 10%, a minor reduction with only minimal effect.
- Aug. 15, 1983** ▶ Repair work on the leachate collection system along Frontier Avenue begins.
- Aug., 1983** ▶ USEPA establishes a Technical Review Committee (TRC) consisting of representatives of the USEPA, DHHS, NYSDEC and NYSDOH to provide coordination and oversight for all aspects of the remedial program at the Love Canal. As members of the TRC, DHHS and NYSDOH are requested to recommend criteria to be used to determine habitability of the EDA.
- Oct. 1983** ▶ NYSDEC consultant, Malcolm Pirnie, Inc., provides final report of detailed investigations of the storm and sanitary sewers, Black, Bergholtz and Cayuga Creeks, and the 102nd Street Outfall. Recommends cleaning over 60,000 linear feet of storm and sanitary sewers and sections of Black and Bergholtz Creeks.
- June 1984** ▶ Dioxin-contaminated sections of Bergholtz Creek from 150 feet upstream of its confluence with Black Creek to 93rd Street footbridge, fenced to limit public access to creek beds.
- Fall 1984** ▶ USEPA directs its consultant, CH2M Hill, to provide additional information on various alternatives for the Black and Bergholtz Creeks Remediation prior to signing a Record of Decision (ROD).
- Nov. 9, 1984** ▶ Placement of a 40 mil thick high density polyethylene liner over 40 acres of the Love Canal site and placement of 18 inches of compacted fill over the plastic liner complete. The fill is then seeded and fertilized to provide a healthy vegetative cover.
- Jan. 1985** ▶ NYSDEC releases Cayuga Creek fish and sediment dioxin sampling report.
- March 1985** ▶ Phase II Report on 93rd Street School site submitted to NYSDEC by RECRA Research, Inc., recommends conducting a Remedial Investigation and Feasibility Study.
- May 6, 1985** ▶ USEPA signs a ROD requiring the cleanup of the Black and Bergholtz Creeks and the storm and sanitary sewers. Collected sediments to be stored within the fenced area of the Love Canal. Also require in-site stabilization of contaminated sediments at the 102nd Street outfall.
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- Fall 1985 ▶ NYSDEC consultant, E.C. Jordan Co., installs approximately 100 monitoring wells around the Love Canal site.
- Jan., 1986 ▶ Phase I Investigation was completed and a Phase I report published for the 97th St. Methodist Church site. Site is classified 2a indicating further investigation is necessary.
- Apr. 1986 ▶ Cleaning activities begin for over 60,000 linear feet of storm and sanitary sewers. Work continues throughout the spring and summer. Sediments are stored at the on-site Sediment Dewatering Facility.
- ▶ Plasma Arc Unit arrives at the Love Canal site.
- May 3-4, 1986 ▶ NYSDEC holds an open house to display the Plasma Arc Unit, a high-temperature destruction system capable of destroying liquid hazardous wastes. Unit anticipated to be used to destroy accumulated Love Canal liquid wastes. Nearly 200 people attend.
- May-June 1986 ▶ Malcolm Pirnie, Inc., consultant to the NYSDEC, collects additional samples from Black, Bergholtz and Cayuga Creeks and inspects additional portions of sanitary sewers. Samples analyzed for dioxin.
- July 8, 1986 ▶ Construction of Love Canal Administration Building begins. Building to be used by NYSDEC staff who operate the Love Canal Leachate Treatment Facility.
- July 1986 ▶ Contract for the design of the Black and Bergholtz Creek Remediation Project awarded to TAMS Consultants, Inc. of New York, N.Y.
- July 1986 ▶ NYSDEC awards contract to Loureiro Engineering Associates for conducting the 93rd Street Remedial Investigation/Feasibility Study.
- Aug. 1986 ▶ Signs posted along contaminated section of Bergholtz Creek warning public against swimming, wading and fishing.
- Oct. 1986 ▶ NYSDEC receives analytical results of the Black, Bergholtz and Cayuga Creeks additional bank and bed sampling. Sanitary sewer from 81st Street to 75th Street sediment sample analytical results indicate concentrations of dioxin in excess of 600 parts per billion (ppb). begin
- Oct. 17, 1986 ▶ Superfund Amendments and Reauthorization Act (SARA) signed into legislation.
- Nov. 1986 ▶ 93rd Street School Remedial Investigation and Feasibility Study field work begins.

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- ▶ E.C. Jordan Co., consultant to the NYSDEC, completes installation of all required wells for the Long-Term Monitoring and Perimeter Survey Program. This includes canal nested piezometers, perimeter wells and bedrock wells.
- ▶ USEPA Consultants, Black & Veatch, Inc. and Ecology & Environment, Inc. began taking soil samples in the Love Canal Emergency Declaration Area (EDA) to determine the concentrations of 2,3,7,8-TCDD as part of the Love Canal EDA Habitability Study being put together by EPA Consultant, CH2M Hill. Over 2100 samples were taken during the study. Sampling was completed in July 1987.
- Dec. 1986 ▶ Final criteria document accepted by members of the TRC for Love Canal EDA Habitability Study.
- Apr. 21, 1987 ▶ Construction of the Frontier Avenue storm sewer south of the Love Canal begins. Work includes abandoning and plugging of the existing storm sewer to prevent migration of chemical wastes from the Love Canal site. New sewer line added to collect runoff from the area.
- July 1987 ▶ NYSDEC receives the Monitoring Well Reports from E.C. Jordan Co., Inc.
- Aug. 5, 1987 ▶ Contract awarded to Stuart Alexander and Associates, consultants to NYSDEC to begin preparations of plans and specifications for the maintenance of homes in the Love Canal EDA.  
▶ USEPA releases its Proposed Plan for the Destruction/Disposal of Love Canal Creek and Sewer Sediments.
- Oct. 5, 1987 ▶ Additional sanitary sewer cleaning begins along Frontier Avenue between 81st Street and 74th Street.
- Oct. 18, 1987 ▶ Cayuga Creek fish sampled by NYSDEC's Division of Fish and Wildlife.
- Oct. 23, 1987 ▶ Agreement between LCARA and NYSDEC for providing certain stabilizing maintenance activities within EDA.
- Oct. 26, 1987 ▶ USEPA signs ROD of Black and Bergholtz Creeks providing for the on-site thermal destruction of contaminated sediments using a transportable thermal destruction unit.
- Dec. 17, 1987 ▶ NYSDEC advertises for the Black and Bergholtz Creek Remediation Project.
- Jan. 22, 1988 ▶ NYSDEC notifies Pyrolysis Systems, Inc., contractor for the Plasma Arc project, that the contract is terminated.

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- Feb. 4, 1988 ▶ Approval received to delist the 99th St. Methodist Church site from the 1988 Registry of Inactive Hazardous Waste Disposal sites.
- Feb. 8, 1988 ▶ Occidental Chemical Corporation submits an informational "Proposal for Solid Waste Storage and Destruction" outlining a plan to store and destroy dioxin-contaminated Black and Bergholtz Creeks' sediments at its plant site on Buffalo Avenue.
- March 1, 1988 ▶ OCC officials brief NYSDEC regarding the company's proposal for remediation of the Black and Bergholtz Creeks.
- March 2, 1988 ▶ OCC officials brief USEPA regarding the company's proposal for remediation of the Black and Bergholtz Creeks.
- March 7, 1988 ▶ USEPA and NYSDEC send letters to OCC officials rejecting the company's proposal for the remediation of the Black and Bergholtz Creeks but encouraging the company to continue to pursue the concept by submitting applications for necessary approvals.
- March 16, 1988 ▶ Final draft of the 93rd Street School Remedial Investigation/Feasibility Study Report received by NYSDEC.
- Apr. 1, 1988 ▶ Contract with Severson Environmental Services, Inc., for the cleanup of the Black and Bergholtz Creeks awarded by NYSDEC.
- Apr. 11-12, 1988 ▶ USEPA Consultant, Ecology & Environment, Inc. collected 35 soil samples from Lot C on 100th Street where the soil sampling done for the Love Canal EDA Habitability Study had found dioxin contamination. Samples were analyzed for dioxin.
- March 7, 1988 ▶ USEPA and NYSDEC send letters to OCC officials rejecting the company's proposal for the remediation of the Black and Bergholtz Creeks but encouraging the company to continue to pursue the concept by submitting applications for necessary approvals.
- March 16, 1988 ▶ Final draft of the 93rd Street School Remedial Investigation/Feasibility Study Report received by NYSDEC.
- Apr. 1, 1988 ▶ Contract with Severson Environmental Services, Inc., for the cleanup of the Black and Bergholtz Creeks awarded by NYSDEC.
- Apr. 11-12, 1988 ▶ USEPA Consultant, Ecology & Environment, Inc. collected 35 soil samples from Lot C on 100th Street where the soil sampling done for the Love Canal EDA Habitability Study had found dioxin contamination. Samples were analyzed for dioxin.
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- Apr. 13, 1988**      ▶ USEPA and NYSDEC issue the Proposed Remedial Action Plan which outlines the alternatives for remediation that were evaluated and selects one for the 93rd Street School.
- May 2, 1988**      ▶ Black and Bergholtz Creeks cleanup project begins.
- June 29, 1988**    ▶ Home Maintenance Project to stabilize homes in the Love Canal EDA begins.
- July 28, 1988**    ▶ Final Habitability Study Report (Vol. I-V) submitted to the members of the TRC.
- July, 1988**        ▶ The results of the Apr. sampling show dioxin contamination in surface and subsurface samples (down to 12") in the same location where the original soil sample was taken.
- Aug. 24, 1988**    ▶ Amendment to TAMS Consultants, Inc. Contract for Design, Contractor Procurement Trial Burn Engineering.
- Sept. 1988**        ▶ Record of Decision (ROD) issued for 93rd Street School Remedial Program.
- Sept. 27, 1988**   ▶ Commissioner of Health announces a Habitability decision.
- Nov. 2-3, 1988**   ▶ Ten cubic yards of soil was excavated at Lot C to remove dioxin contaminated soil. Excavated soil was placed in drums and stored on the Love Canal Site.
- Nov. 10, 1988**    ▶ NYSDOH establishes a Land Use Advisory Committee consisting of representatives of the local citizens and community leaders.
- Nov. 18, 1988**    ▶ Lot C was sampled by Ecology and Environment to confirm that dioxin contamination had been removed.
- Feb. 27, 1989**    ▶ The general Construction Contract work for the Home Maintenance Project was substantially completed.
- March, 1989**       ▶ The results of the Nov. sampling show no dioxin contamination in surface soil samples above the Federal Action target level of 1 ppb. Remedial efforts were successful in the removal of dioxin from Lot C.
- Apr. 7, 1989**      ▶ The General Construction Contract work for Home Maintenance Project to stabilize homes in the EDA ends.
- May 22, 1989**     ▶ USEPA enters into a Cooperative Agreement with the LCARA to provide technical assistance for revitalization of EDA and providing stabilizing maintenance of homes and other properties within EDA. LCARA assumes responsibility of the future maintenance of homes.

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- June 1, 1989 ▶ OCC Consent Degree regarding responsibility for Love Canal Wastes was signed.
- June 19, 1989 ▶ Love Canal Land Use Advisory Committee completes its deliberations.
- July 11, 1989 ▶ Love Canal Land Use Advisory Committee submits its recommendations on future land use of the EDA to Commissioner of Health Dr. Axelrod.
- Aug. 3, 1989 ▶ Excavation of Black & Bergholtz Creeks sediments begin.
- Aug. 21, 1989 ▶ Contract with Anna Contractors for the installation of the railing and ladders at the roof of the Love Canal Treatment Facility awarded by NYSDEC.
- Sept. 1989 ▶ Contract for the 93rd Street School Remedial Design awarded to Loureiro Engineering Associates.
- Sept. 12, 1989 ▶ Commissioner Jorling announced that NYSDEC is committed to remediate Love Canal Areas 2 and 3 to make it suitable for residential use. These areas were declared non-habitable in Dr. Axelrod's habitability decision.
- Sept. 13, 1989 ▶ Contract with Ecology and Environment Inc. for the Phase II Investigation of the 97th Street Methodist Church awarded by NYSDEC.
- Sept. 13, 1989 ▶ LCARA adopted a Preferred Land Use Plan revitalization of the Love Canal EDA.
- Sept. 25, 1989 ▶ Contract with Firstrhyme Construction Corporation, Inc. for Leachate Holding Tank 3A (Central Tank) Access Modification at Love Canal Treatment Facility awarded by NYSDEC.
- Sept. 27, 1989 ▶ Contract with Loureiro Engineering Associates for remedial design of 94rd Street School site approved by the State Comptroller's Office.
- Oct. 11, 1989 ▶ Work on 97th Street Phase II Investigation started.
- Oct. 18, 1989 ▶ OCC begins removing approximately 3,500 waste drums from the Love Canal site for processing at OCC's staging facility at the 93rd Street School.
- Oct. 26, 1989 ▶ Creek remediation completed, water allowed back into creeks.
- Nov. 15, 1989 ▶ OCC completes removing 3164 drums from the site.
- Dec. 4, 1989 ▶ NYSDEC and NYSDOH begins additional Surface Soil Sampling of the Love Canal EDA Area's 2 and 3.

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- Dec. 4, 1989** ▶ Contract with Severson Environmental Services, Inc. for Pump and Electrical Renovations at Love Canal Leachate Treatment Facility was awarded by NYSDEC.
- Dec. 6, 1989** ▶ Draft Environmental Impact Statement (DEIS) for revitalization of Love Canal EDA was accepted by LCARA.
- Dec. 16, 1989** ▶ The Black & Bergholtz Creeks Remediation contract was substantially complete.
- Dec. 18, 1989** ▶ Field Investigation work completed at 97th Street Church site.
- Jan. 4, 1990** ▶ Public Hearing was conducted by LCARA on DEIS.
- Jan. 19, 1990** ▶ EPA Administrator Mr. William Reilly meets with Lois Gibbs regarding Revitalization of Love Canal EDA.
- Jan. 22, 1990** ▶ Contract with Ecology & Environment, Inc. for B-BHC investigation in EDA Area 4 is awarded.
- Feb. 27, 1990** ▶ Love Canal 1989 Annual Report is released.
- March 9, 1990** ▶ Maurice Hinchey conducts a Legislative Hearing at Niagara Falls.
- March 13, 1990** ▶ Love Canal Treatment Facility Contingency Plant revisions adopted and distributed to various concerned agencies and personnel.
- Apr. 17, 1990** ▶ Area residents advised of sampling program to be conducted in Area 4 to investigate elevated levels of BHC contamination previously reported in the Habitability Study.
- Apr. 30, 1990** ▶ Notice to proceed on Love Canal pump and electrical renovation work to include upgrading/renovating electrical distribution to cap pump station and installing computerized control system.
- Apr. 30, 1990** ▶ The DEC requests permission to access all the wells in the EDA in order to commence a 24 month evaluation of the wells to determine which additional wells will be included in the Long Term Monitoring program and which will be decommissioned.
- May 4, 1990** ▶ Aerial photographs are taken of the Containment Facility and the EDA under Task No. 6 of the Standby Consultant Contract with E.C. Jordan. The pictures were taken to produce topographic maps of the site and EDA Areas 2 & 3.

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- May 8, 1990** ▶ Notice to Proceed for the Love Canal Central Section Holding Tank Access Contract. Work includes installation of manholes to the in ground tanks. Also included are plans to relocate the storm sewer running along Frontier Avenue by tapping into the LaSalle Expressway storm sewer and then cleaning and plugging the abandoned sections; after which a cut-off wall is to be installed to isolate the unused section.
- May 14, 1990** ▶ The Administrator of the EPA, Mr. William K. Reilly, reply to Ms. Lois Gibbs, of the Citizens Clearinghouse for Hazardous Wastes, Inc. replying to her concerns regarding the Habitability Study. In this letter Reilly states that the study was conducted in conformance with CERCLA and does assess the risks associated with inhabiting the EDA; that the Habitability Study was scientifically sound; and that it was conducted with full public consultation.
- May 21, 1990** ▶ The 97th Street Methodist Church draft Phase II Investigation report is issued. It concludes that there is nothing above the level of concern on the site.
- May 30, 1990** ▶ The Final Generic Environmental Impact Statement for the Love Canal Area Master Plan is issued by LCARA. The Impact Statement assess the various accumulative environmental effects resulting from the development of the area.
- June 13, 1990** ▶ The Love Canal Area Master Plan is issued by LCARA. This plan explained the preferred development for the area. It calls for Area 1 to be a greenbelt entrance into the area and the city. Areas 2 and 3 are to be developed for commercial or light industrial use. Areas 4 through 7 are to be developed as residential neighborhoods.
- June 13, 1990** ▶ LCARA adopts the Love Canal Area Master Plan Findings Statement. This step officially implements the master plan.
- July 10, 1990** ▶ Notice to proceed was given to the mowing contractor, Ridge Maintenance, to cut the grass within the Containment Facility including the cap.
- Aug. 2, 1990** ▶ An inventory of all piezometers and monitoring wells in the EDA and the Containment Facility was completed by E.C. Jordan as Task No. 8 of the Standby Consultant Contract.
- Aug. 3, 1990** ▶ The DOH reports elevated levels of B-BHC contamination on two separate lots (1044 100th Street and 9909 Black Creek Drive) from sampling done in Area 4 during Apr.. Although the levels were not considered a health hazard and showed what appeared to be an isolated pocket of contamination; it was determined that additional sampling was needed to better define the exact extent of the area affected to develop a strategy for clean-up if necessary.

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- Aug. 6, 1990** ▶ During the excavation and installation of the storm sewer cutoff wall on Frontier Avenue near 100th Street, contamination is discovered in the stone bedding of the pipe.
- Aug. 6, 1990** ▶ The Love Canal Central Section Holding Tank Access Contract declared substantially complete.
- Aug. 7, 1990** ▶ With OCC completing the decontamination and decommissioning of the processing facility (Tricil Plant) used in the remediation of Black and Bergholtz Creeks, confirmatory sampling of the facility and surrounding areas is performed by OCC with DEC oversight.
- Aug. 7, 1990** ▶ The Disaster Preparedness Commission (DPC) adopts its Findings Statement which concurs with most of the Master Plan, except for Areas 2 and 3.
- Aug. 15, 1990** ▶ LCARA advertises 10 homes for sale.
- Aug. 21, 1990** ▶ As a result of the contamination discovered along the Frontier Avenue storm sewer on Aug. 6, 1990, four additional test pits are dug into the pipe bedding of the storm sewer. Three out of the four pits indicated the presence of contamination.
- Sept. 5, 1990** ▶ LCARA approves sales contracts for four houses.
- Sept. 10, 1990** ▶ State Supreme Court Justice Joseph D. Mintz lifts an injunction against the sale of homes by LCARA that he originally imposed four years ago.
- Sept. 14, 1990** ▶ Letter sent to area residents explaining the most recent data obtained from the testing of well 10225C, as part of the Long Term Monitoring Program. the letter stated that as yet there was not enough data to draw any conclusions and that the well would continue to be monitored for future trends.
- Sept. 14, 1990** ▶ A Fact Sheet was issued on the storm sewer cutoff wall installation and subsequent investigation of contamination found, in Aug., in the bedding of the pipe along Frontier Avenue near 100th Street. This contamination is believed to have come from historic migration from the Love Canal site prior to remediation.
- Sept. 21, 1990** ▶ The DEC starts collecting soil samples from 18 bore holes to better define the exact extent of BHC contamination on 9909 Black Creek Drive, 1044 100th Street and the two lots directly north of 1044 100th Street.
- Oct. 2, 1990** ▶ U.S. District Judge John T. Curtin denies motion by O.C.C. to have punitive damages removed as an issue from the upcoming trial which will determine the amount to be reimbursed for the cleanup costs.

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- Oct. 2-8, 1990 ▶ OCC, with DEC oversight, removes additional asphalt, gravel and soil from contaminated areas, found in the Aug. 7, 1990 sampling, of the former Tricil Plant which was used in the remediation of Black and Bergholtz Creeks. This debris was transported to their main plant for storage. The entire area was then resampled, at 21 locations, to ensure that it is free of contamination.
- Oct. 24, 1990 ▶ The trial, before U.S. District Court Judge John T. Curtin, to have \$610 million in remedial costs and punitive damages assessed against OCC begins.
- Oct. 29, 1990 ▶ Occidental Chemical Corp. submits their proposal describing removal of sludge from the Love Canal Leachate Treatment Facility above ground holding tanks.
- Oct. 29, 1990 ▶ The 97th Street Methodist Church final Investigation Report is received which recommends "No Further Action" and that the site should be delisted.
- Nov. 9, 1990 ▶ The EDA 2 and 3 Draft Study Report is released by DOH and DEC. This report contains the results of the 84 soil samples collected during Dec. 1989. The report concludes that removal of 6 inches of soil from EDA areas 2 and 3 would be sufficient to remediate the area to satisfy the conditions for habitability as established for the Love Canal EDA.
- Nov. 20, 1990 ▶ Under the Standby Consultant Contract with E.C. Jordan, work commences under Work Assignment No. 7 to address the contaminated storm sewer pipe bedding along Frontier Ave. and the B-BHC contaminated soil in EDA Area 4.
- Nov. 28, 1990 ▶ The first new family to re-occupy a home in the habitable area moves into 26 Mason Court.
- Dec. 18, 1990 ▶ EDA Area 4 draft B-BHC investigation report was issued. It indicates that elevated levels of contamination are limited to two separate lots, 1044 100th Street and 9909 Black Creek Drive. The NYSDOH is tasked with reviewing the report to determine if there is a need for remediation.
- Dec. 18, 1990 ▶ Work Assignment No. D002472-8 issued to E.C. Jordan to prepare a cost analysis report for the remediation of EDA Areas 2 and 3.
- Jan. 9, 1991 ▶ The 97th Street Methodist Church is removed from the Registry of Inactive Hazardous Waste Sites.
- Jan. 22, 1991 ▶ The Frontier Avenue Storm Sewer Test Pit investigation sub-contract was re-bid, with only three responsive bids being received. A request to waive the five bid requirement was pursued in order to complete the test pit work during the 1991 construction season. Work Assign. No. D002472-7.

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- Jan. 24, 1991 ▶ Meeting convened between NYSDOH and NYSDEC to review the data of Apr. and Sept. 1990 samplings done in EDA Area 4 for B-BHC contamination. The review indicated that the higher levels of B-BHC are confined mainly to two lots (9909 Black Creek and 1044 100th Street). Also, the data indicated the contaminated soils appear to have been used as a fill material on these lots.
- Jan. 31, 1991 ▶ A Factory Acceptance Test (FAT) was held at the Bristol Babcock headquarters in Watertown, Connecticut. After two days of simulated testing the FAT was conditionally approved with minor items remaining to be addressed.
- Feb. 4, 1991 ▶ The draft Work Plan was received which included costs for the apparent low bidder of the Test Pit sub-contract.
- Feb. 4, 1991 ▶ Additional samples collected in EDA Area 4 to possibly identify PRP's.
- Feb. 12, 1991 ▶ First round comments on the draft Work Plan were sent to E.C. Jordan. A meeting with Jordan was held on Feb. 21, 1991 to discuss the comments and negotiate the final work plan cost and schedule.
- Feb. 13, 1991 ▶ LCARA extends the buy out program for EDA Areas 1, 2 and 3 to May 31, 1992. However, the agency also voted to not extend the buy out program for the habitable portions of the EDA past its current March 27th deadline.
- Feb. 21, 1991 ▶ Pre-award meeting with Firstrhyme Construction, apparent low bidder for the Test Pit sub-contract.
- Feb. 22, 1991 ▶ Deputy Commissioner Sullivan met with EDA area residents to discuss their concerns and obtain their input regarding issues relating to Love Canal.
- Feb. 26, 1991 ▶ E.C. Jordan work plan for Work Assignment No. D002472-8 is approved for preparing a cost analysis report for the remediation of EDA Areas 2 and 3.
- Feb. 28, 1991 ▶ 1991 First Quarter Report of effluent data was submitted to the City of Niagara Falls.
- March 1, 1991 ▶ Amendment No. 1 was approved for the E.C. Jordan's Work Assignment D002472-5. Included in this amendment was design work for carbon ventsorb flame arresters and implementation of a corrosion monitoring study on the sludge storage tanks.
- March 8, 1991 ▶ Draft recommendations from NYSDOH describing appropriate remediation for EDA Area 4 contamination was received.
- March 8, 1991 ▶ Analytical results of the soil samples collected during the week of Feb. 4, 1991 have been received and are being reviewed to identify PRP(s).
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- March 15, 1991 ▶ Comments on above designs were made to E.C. Jordan.
- March 15, 1991 ▶ OSC approved Change Order No. 5 to the Pump and Electrical Renovations contract. With this change Severson's revised schedule has been approved for completion of the contract by the end of June 1991. However, the required time extension and additional insurance coverage included under Change Order No. 6 was delayed due to the delay in passing the NYS budget.
- March 29, 1991 ▶ Final EDA 4 Soil Investigation Report was received from Ecology and Environment (consultant). The review of soil sampling data collected in Apr., Sept. 1990 and Feb. 1991 indicates that the contaminated soils on these lots were placed as a fill material. Preliminary indications are that a viable PRP may be able to be approached to perform the work.
- March 29, 1991 ▶ The work plan was approved and Notice to Proceed with the Frontier Avenue Storm Sewer Test Pit investigation was granted (E.C. Jordan Work Assignment No. D002472-7).
- Apr. 8, 1991 ▶ E.C. Jordan and Firstrhyme Construction begin mobilizing for the Frontier Avenue test pit investigation.
- Apr. 15, 1991 ▶ Excavation of four "double wide" test pits begins, one pit south of the LaSalle Expressway, and one pit each on 100th Street, 101st Street and Frontier Avenue, between 100th and 101st Streets. In all four pits, the storm sewer pipe bedding was found to be still clay and there was no evidence of NAPL migration or contamination of any kind. Samples of the bedding were taken, concrete plugs were poured and the pit was backfilled with native material.
- Apr. 16, 1991 ▶ E.C. Jordan (Work Assignment D002472-5) took measurements for the installation of the Backflow Preventer (Task 2) and four electrical resistance probes for the Sludge Tank Corrosion Study (Task 4) were installed.
- Apr. 18, 1991 ▶ Permission to demobilize was granted. Firstrhyme will be completing restoration work including street patching curb replacement during the week of Apr. 22, 1991.
- Apr. 22, 1991 ▶ Conceptual approval for Amendment No. 1 was granted to perform a visual inspection of the 42" storm sewer under the LaSalle Expressway. The inspection, scheduled for May 30, 1991, will confirm the feasibility of slip-lining the sewer if it becomes necessary.
- Apr. 26, 1991 ▶ Hazardous Waste Treatment and Storage (TSD) Annual Report was submitted to Hazardous Substances Regulation.
- May 3, 1991 ▶ E.C. Jordan receives comments for Leachate Treatment Facility Staff on the Facility's As-Built drawings.
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- May 7, 1991 ▶ E.C. Jordan transmits Love Canal EDA 2 and 3 Cost Analysis Report (CAR) to the NYSDEC on the cost of remediating EDA Areas 2 and 3 (Work Assignment No. D002472-8).
- May 13, 1991 ▶ Disaster Preparedness Commission (DPC) forwards CAR to LCARA to help in evaluating the economic feasibility of remediation, to address issues raised by the DPC, and modify the EGIS and Land Use Master Plan, if appropriate.
- May 15, 1991 ▶ Technical Review Committee meets to discuss the remediation of the Love Canal and related issues.
- May 15, 1991 ▶ The NYSDEC releases the CAR to the general public.
- May 15, 1991 ▶ The 93rd Street School ROD Amendment signed.
- May 21, 1991 ▶ A meeting was convened between the Saratoga Associates (LCARA's consultant) and the NYSDEC, to brief NYSDEC on the proposed conceptual Landscape Plan for the containment area.
- May 30, 1991 ▶ Inspection of the 42" storm sewer revealed no significant problems with the pipe alignment. However, the discovery of potentially contaminated sediment inside the pipe resulted in the addition of a sewer cleaning task for the remedial contract (E.C. Jordan Work Assignment No. D002472-7).
- June 4, 1991 ▶ Program narratives and funding requests were submitted to the Bureau of Program Management for the fourth quarter Love Canal grant amendment application.
- June 12, 1991 ▶ The 1991 Second quarterly Report of effluent data was prepared and submitted to the City of Niagara Falls.
- June 17, 1991 ▶ Change over to the computerized telemetry system is scheduled during the weeks of June 17 and June 24. Bristol Babcock representatives, along with the Bureau of Electronics personnel will be present for the changeover work. This work represents the final major work task for this contract with the exception of the PC2 pump modification included in Change Order No. 6.
- June 17, 1991 ▶ The NYSDEC's comments on LCARA's proposed conceptual Landscape Plan for the containment area sent to Saratoga Associates.
- June 19, 1991 ▶ Proposed conceptual Landscape Plan for the containment area presented to LCARA by Saratoga Associates.
- June 19, 1991 ▶ Mandatory pre-bid site meeting held for the Love Canal Leachate Collection System Cleaning and Television Inspection Contract (Task 9, E.C. Jordan Work Assignment D002462-5).
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- June 26, 1991 ▶ Bid-opening for Leachate Collection System Cleaning and Television Inspection Contract (Task 9, E.C. Jordan Work Assignment D002462-5) is held.
- June 27, 1991 ▶ RCRA Inspection of the Love Canal Containment Facility conducted.
- July 11, 1991 ▶ First contact was made with the Occidental Chemical Corporation (OCC) regarding EDA Area 4 by the Department. OCC requested a copy of the NYSDOH report on the site.
- July 15, 1991 ▶ Re-activated Bulk Carbon Supply bid opening for this proposal was held at the Office of General Services (OGS).
- July 16, 1991 ▶ The stamped Backflow Preventer Installation drawings and specifications for the Love Canal Leachate Treatment Facility were submitted to the City of Niagara Falls and Niagara County Health Department.
- July 24, 1991 ▶ Niagara Falls Municipal Housing Authority began the demolition of the Senior Citizen's Housing Complex.
- July 31, 1991 ▶ Amendment No. 2 was approved for the E.C. Jordan Work Assignment D002472-5.1 and included the preparation of a RFP for Environmental Audit Items (Task 7).
- Aug. 2, 1991 ▶ Occidental Chemical Corporation (OCC) responded to the NYSDEC's request that: OCC will not perform the work of soil removal from three lots within ED-4, but will accept these soils as intermediate fill on their property at the 102nd Street Landfill site.
- Aug. 7, 1991 ▶ NYSDEC determined the soils from three lots within EDA-4 cannot be designated as hazardous waste as the contamination would not fail the TCLP test. Funding for the work is processed by USEPA in the existing Love Canal Cooperative Agreement. Negotiations begin on a work plan submittal.
- Aug. 26, 1991 ▶ An inspection and sample grab was conducted by the City of Niagara Falls. The inspection will satisfy the City's semi-annual requirement and satisfied the City's sample verification protocol.
- Aug. 28, 1991 ▶ The Niagara Falls Fire Department toured the Plant, Administration and D.D.S.F. buildings as part of the Joint Fire Prevention Program.
- Aug. 29, 1991 ▶ NYSDEC submitted a punch list of the Pump and Electrical Renovation project items to be completed to Severson.
- Sept. 30, 1991 ▶ The Long Term Monitoring 1991 groundwater sampling for chemical analysis is 100% complete. Work has been initiated on analysis of groundwater elevation data for the 1991 Love Canal Long Term Monitoring report.
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- Sept. 3, 1991** ▶ Mr. Robert Kelly, Associate Physicist of N.Y.S.D.O.L., visited the site and conducted a radiological survey of monitoring well 1160-C and the area around the sludge holding tank. The instruments used were a Geiger-Mueller and/or Scintillation Counter. No radioactive emitters were counted. Also, approximately six wipes were taken around the Sludge/NAPL Holding Tank area. Additionally, a NAPL/Sludge sample was grabbed from MW-1160-C. The sample jar was uncapped and the counter tube placed near the mouth. No radioactive emitters were detected. Two 20 ml. vials were filled for further analysis.
- Sept. 19, 1991** ▶ OCC sludge Removal Project sludge samples were taken by New York Central Services (subcontractor to Conestoga Rovers Associates [CRA]) and a series of filterability tests were performed. The tests were not successful.
- Sept. 25, 1991** ▶ Analytical results from samples taken on Aug. 26, 1991 were received from the Niagara Falls Waste Water Treatment Plant. The results verified that discharge from the Love Canal Treatment Plant were in compliance.
- Sept. 30, 1991** ▶ The necessary certification assuring that LCARA is in compliance with contract terms and conditions as received from LCARA.
- Oct. 8, 1991** ▶ Love Canal EDA 4 and Frontier Avenue Sewer Excavation revised work plan for development of soil removal bid documents was received from E.C. Jordan. The revised work plan is being reviewed by the Department and is expected to be approved by the end of the month. Survey work will begin shortly.
- Oct. 21, 1991** ▶ Amendment No. 3 was approved for the E.C. Jordan Work Assignment D002472-5.2 and included: the survey subcontracts, and the cleaning and inspection contract for the Love Canal Leachate Collection System.
- Oct. 24, 1991** ▶ NYSDEC and USEPA hold a Public Availability Session regarding the construction phase of the 93rd Street School remediation.
- Nov. 1991** ▶ All Pump and Electrical Renovation punch list items, including removal of trailers from previous construction activities, completed.
- Nov. 5, 1991** ▶ RCRA/OSHA items included in the Environmental Audit are put out to bid. A mandatory pre-bid meeting was held at the Love Canal site on Nov. 8, 1991. A drawing addendum was sent to the bidders on Nov. 12, 1991 and resulted in receipt of only one bid. This situation is being evaluated.
- Nov. 6, 1991** ▶ Field work begins on the survey work for Love Canal EDA 4, Frontier Avenue Sewer Excavation and the Love Canal Containment Facility. All work was performed under Work Assignment D002472-5.3.

**Love Canal Remedial Chronology**  
**January 1995**

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- Nov. 12, 1991 ▶ Decision tree for the determination of the Love Canal EDA 4 soils characteristic hazardous waste was submitted to USEPA. The NYSDEC and USEPA continue to evaluate the disposal options for these soils.
- Nov. 13, 1991 ▶ Work started on the Love Canal Leachate Collection System cleaning and television inspection by Allstate Power-Vac, Inc., Linden, J.J., under E.C. Jordan Work Assignment D0002472-5.3.
- Nov. 16, 1991 ▶ LCARA responds to the Disaster Preparedness Commission regarding EDA Areas 2 and 3 stating that modifying the EGIS and Land Use Master Plan is not warranted.
- Nov. 25, 1991 ▶ Mobilization begins for the remediation of the 93rd Street School site. Work will entail removing 11,000 cubic yards of contaminated soils, an in ground oil storage tank and cleaning of the exterior of the school. The excavated soils will be placed at the 102nd Street Site to be used as fill in preparation for the remediation of that site.
- Nov. 26, 1991 ▶ Work completed on the Love Canal Leachate Collection System cleaning and television inspection.
- Dec. 5, 1991 ▶ The NYSDEC confirmed with Occidental Chemical Corporation that the removal of sludge from the on site holding tanks would be rescheduled for the spring of 1992 due to the inability of OCC's subcontractor to mobilize earlier.
- Dec. 12, 1991 ▶ NYSDEC and USEPA reach verbal agreement on NYSDEC's proposal calling for the disposal of EDA 4 soils at the 102nd Street landfill as intermediate fill.
- Dec. 13, 1991 ▶ Excavation of the 93rd Street School contaminated soils begins.
- Dec. 13, 1991 ▶ The Love Canal Leachate Treatment Facility received delivery of one load reactivated bulk carbon.
- Jan. 2-10, 1992 ▶ Approximately 11,000 tons of contaminated soils have been excavated at the 93rd Street School site and transported to the 102nd Street Landfill.
- June 23, 1992 ▶ Bids were opened for the remediation of Frontier Avenue and EDA 4 lots.
- July 7, 1992 ▶ Annual sampling for the Long-Term Groundwater Monitoring Program began.
- July 13, 1992 ▶ Corrosion inspection of outside sludge tanks began.
- Aug. 3, 1992 ▶ OHM Corporation, subcontractor for Occidental Chemical Corp., completed the removal of sludge from the outside sludge storage tanks. The sludge was filtered, using a filter press, into two phases: a liquid phase (APL) and a NAPL (non-aqueous) phase.

**Love Canal Remedial Chronology**  
**January 1995**

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- Sept. 1, 1992 ▶ Annual Long-Term Groundwater Monitoring sampling program completed.
- Oct. 26-30, 1992 ▶ Integrated Waste Special Services (spent-carbon removal contractor) conducted a removal of spent carbon from the carbon adsorption units.
- Nov. 12, 1992 ▶ Remedial activities at Frontier Ave./100th Street, EDA 4 lots and Love Canal cap repair area began.
- Nov. 25, 1992 ▶ Filtered NAPL was removed by Occidental Chemical Corp. from sludge Tank #1 and stored on-site in three tanker trucks.
- Dec. 2, 1992 ▶ The State Disaster Preparedness Commission (DPC) issued the Supplemental Findings Statement for LCARA's Master Plan for the Love Canal Emergency Declaration Area (EDA). This Supplemental Finding Statement approved of the actions set forth in the Master Plan for commercial development of Areas 2 and 3.
- Dec. 9, 1992 ▶ Excavation of contaminated soils and backfill of EDA 4 lots was substantially completed. An unknown ash-like fill material was encountered in a portion of 9903 Black Creek Drive during excavation work. Some of the samples showed elevated levels of mercury, but subsequent chemical analysis revealed that the material was not TCLP characteristic for hazardous waste.
- Feb. 26, 1993 ▶ Removal of contaminated sewer pipe and bedding at Frontier Ave. was complete. A new concrete cut-off wall was installed west of manhole 412.
- March 8, 1993 ▶ The 42 inch storm sewer pipe under the LaSalle Expressway, downstream of Frontier Ave., was hydraulically cleaned. No contamination was found in the pipe's bedding.
- March 11, 1993 ▶ Sewer pipe replacement and trench backfill at Frontier Avenue was completed.
- March 23, 1993 ▶ The Love Canal's Public Information Office was officially closed.
- Apr. 19, 1993 ▶ Work on the interlocking of DCF cells A and B started. The project will allow storm water collected in Cell B to be diverted into the 95th Street storm sewer to diminish the amount of uncontaminated rainwater influent into the Treatment Facility's collection system.
- May 13-14, 1993 ▶ Final restoration, mulching and seeding has been completed at the DCF cells A and B. Interlocking project completed.
- June 7, 1993 ▶ Work for the Love Canal's sludge tank #4 upgrade and roof railing installation started.
-

**Love Canal Remedial Chronology**  
**January 1995**

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- June 9, 1993 ▶ Additional sampling and analysis was conducted by URS Consultants at 9903 Black Creek Drive (EDA 4 lot) to define the extent of the mercury-contaminated ash-like material.
- June 14, 1993 ▶ Replacement of the HDPE liner in the Love Canal cap repair area in the south sector was completed.
- June 15, 1993 ▶ Work on the upgrade of sludge tank #4 was completed.
- July 13, 1993 ▶ Work at Frontier Ave./100th Street and EDA 4 lots substantially completed.
- Aug. 9-11, 1993 ▶ Remediation of Lot 9903 Black Creek Drive at EDA 4 was completed. 238 cubic yards of contaminated soils were excavated and disposed of at 102nd Street Landfill.
- Sept. 30, 1993 ▶ The final Remedial Report for the Frontier Ave./100th Street and EDA 4 lots project was completed.
- Oct. 12, 1993 ▶ The third and final report on the Cayuga Creek dioxin study was released. This study focused on young-of-the-year fish to show the effectiveness of the remedial actions at the Love Canal site and its environs. Declines in 2, 3, 7, 8 - TCDD concentrations averaged 84 percent or more during the study period. With this study, the Cayuga Creek investigation was completed and no further remedial action was determined necessary.
- March 17, 1994 ▶ U.S. District Judge John Curtin announced that Occidental Chemical Corp. is not liable for punitive damages concerning the dumping of hazardous waste at the Love Canal site.
- May 9, 1994 ▶ Annual sampling for the Long-Term Monitoring program began.
- June 21, 1994 ▶ A Consent Decree was filed in Federal Court settling the New York State's case with Occidental Chemical Corp. The settlement was for \$98 million and OCC will take over the site's operation and maintenance.
- June 22, 1994 ▶ The 1994 Long Term Monitoring sampling program was completed.
- July 25-29, 1994 ▶ Cleaning of all Love Canal's collection system tanks and treatment facility tanks was completed.
- Nov. 14, 1994 ▶ Training of Occidental's technical staff for the operation and maintenance of the Love Canal began.
- Jan. 5, 1995 ▶ The New York State Department of Environmental Conservation officially transferred responsibility for the operation and maintenance of the Love Canal to Occidental Chemical Corporation.
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NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

TRANSMITTAL SLIP

TO MICHAEL Podd

FROM BEN LOREDO

RE: LOVE CANAL HISTORY

RECEIVED

APR 21 1994

DATE 4/20/94

N.Y.S. DEPT. OF ENVIRONMENTAL CONSERVATION REGION 9

HERE IS THE DOCUMENT WITH OUR COMMENTS MARKED IN RED. IF YOU HAVE ANY OTHER QUESTION, PLEASE CALL ME.

FOR ACTION AS INDICATED:

- Please Handle
- Prepare Reply
- Prepare Reply for \_\_\_\_\_ Signature
- Information
- Approval
- Prepare final/draft in \_\_\_\_\_ Copies

- Comments
- Signature
- File
- Return to me
- \_\_\_\_\_
- \_\_\_\_\_

THANKS

# MEMORANDUM

DATE: 3/9/94 RE: LOVE CANAL Success Story  
TO: [initials] EAP/ USE EPA FORMAT

With the emphasis on generating good publicity for the department's success we will generate a foldout flyer which can be used to show the successful completion of remediation at Love Canal.

cc Mike Podd  
cc BRUCE  
cc BEN

We should do this for each site as RA ends before the "trail" gets cold. Good long term public circulation document during omm.

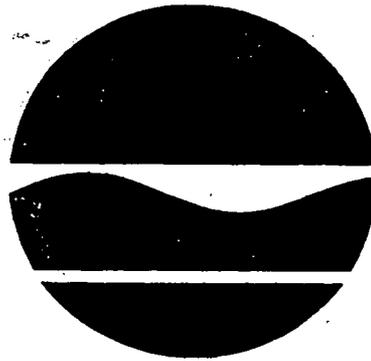
SIGNED:  
TOPS FORM NO. 4150

RECEIVED

MAR 11 1994

N.Y.S. DEPT. OF  
ENVIRONMENTAL CONSERVATION  
REGION 9

*Love Canal  
Inactive Hazardous Waste Site:  
A Remedial Chronology*



**NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION  
THOMAS C. JORLING, COMMISSIONER**

**DIVISION OF HAZARDOUS WASTE REMEDIATION  
MICHAEL J. O'TOOLE, JR., DIRECTOR**

**January 1992**

# CHAPTER / HISTORY - 1894 TO 1977

What started as a dream for William T. Love in the late 1800's became a national nightmare of improper management of hazardous waste in 1978. Mr. Love's plan was to construct a canal connecting the upper Niagara River to the lower Niagara River to create a source of cheap hydroelectric power for what would become a model industrial city. In May 1892 he began excavating the channel in the southeast corner of the City of Niagara Falls, New York. Unfortunately, the model city project and the partially dug canal were abandoned before the turn of the century.

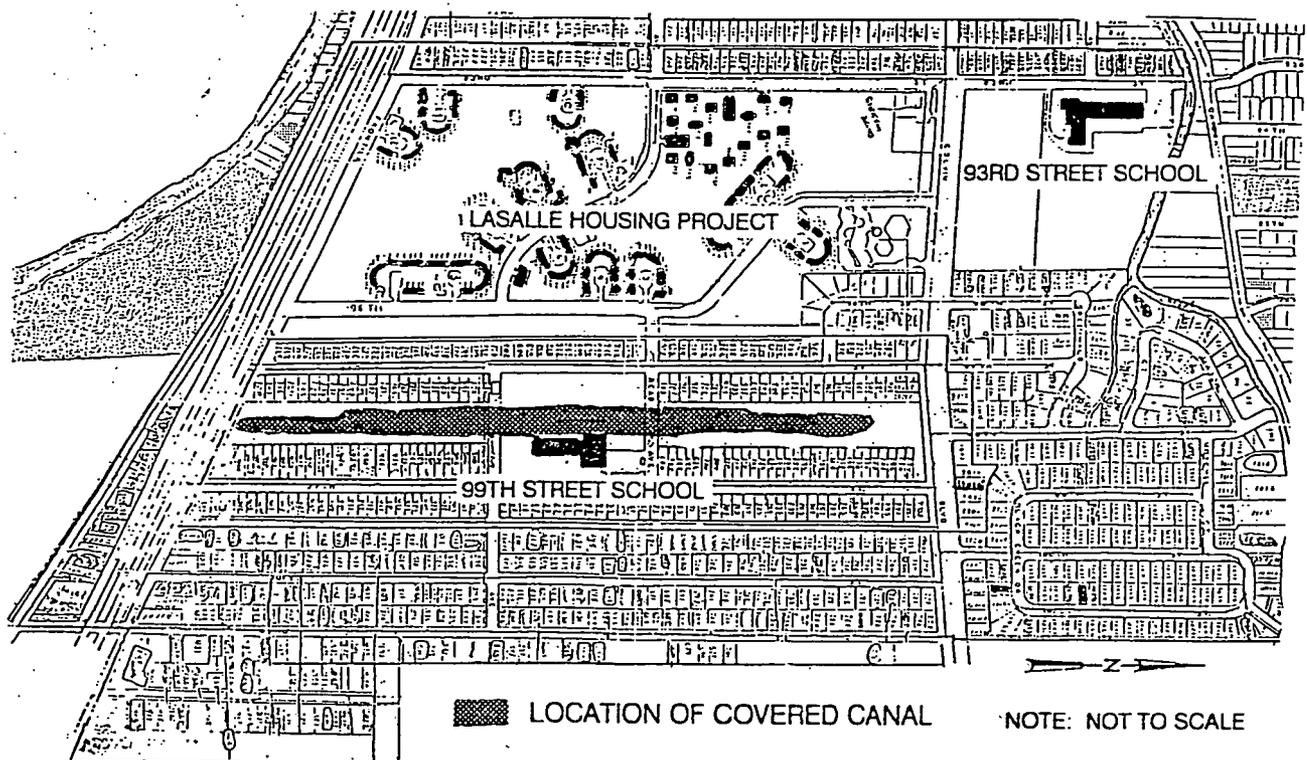
The excavation remained relatively untouched through the early 20th century. Aerial photography from 1938 depicts the canal as being about 3,000 feet long and almost 100 feet wide, extending in a north-south axis, with the southern end approximately 1500 feet from the Niagara River. The canal was estimated to be between 10 to 15 feet below the original grade.

In 1942, the Hooker Electrochemical Company began to dump chemical wastes from nearby plants,

which produced pesticides and plasticizers, into the abandoned canal. Portions of the canal were also used by the City of Niagara Falls for disposal of municipal refuse. In 1953, dumping by the company ceased; however, it has been estimated that approximately 21,800 tons of chemical waste were placed in the canal. The Niagara Falls Board of Education purchased the property from the company and in 1954 built an elementary school on 99th Street, adjacent to the canal. Later, Read Avenue and Wheatfield Avenue were constructed, along with their utilities, across the canal.

By the mid-1970's, about 100 homes had been built on lots adjacent to the abandoned hazardous waste dump. Over the years infiltrating precipitation mixed with the buried wastes. Contaminated water and liquid wastes pooled at the surface, and runoff carried contaminants into sewers and yards of some of these homes. Groundwater containing chemicals migrated through the more permeable upper layers of the ground, reaching the basements of some homes built directly adjacent to the canal.

## THE LOVE CANAL AREA AS IT WAS ABOUT 1978



## GOVERNMENT RESPONDS

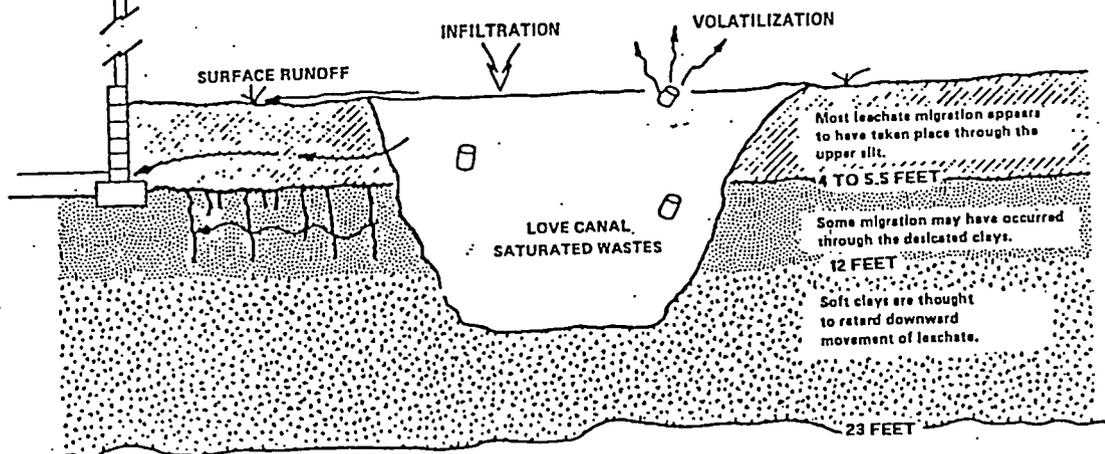
In response to complaints from residents of homes abutting the canal, the New York State Department of Environmental Conservation (NYSDEC) and the New York State Department of Health (NYSDOH), together with United States Environmental Protection Agency (USEPA), conducted studies on groundwater pollution, basement air and sump water contamination in 1977. In April 1978, on the basis of this initial data, Commissioner Robert D. Whalen of the NYSDOH, 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 and studies by NYSDEC, NYSDOH and USEPA were conducted in the summer of 1978. After reviewing the findings of these additional studies Commissioner Whalen declared, on August 2, 1978, that a health emergency existed

at Love Canal; and on August 7, 1978, President Carter issued a declaration of emergency making Federal disaster assistance available to begin remedial work. At the same time the 99th Street School was closed and the area was fenced off.

The state purchased homes located along 97th and 99th Streets at 1978 "pre-disaster" fair market value. 239 families were permanently relocated from the first two "rings" of houses around the Canal. Later, in May 1980, President Carter issued a second emergency declaration for Love Canal. This extended the boundaries adding a horseshoe-shaped Emergency Declaration Area (EDA) around the previously identified area. This new area affected 550 additional families. Federal funding was provided to supplement the State's resources affording those living in this new area the opportunity to sell their homes to the government, at 1980 assessed value, and relocate else where.

### SCHEMATIC OF HOW CHEMICALS ESCAPED FROM THE LOVE CANAL BEFORE REMEDIATION



NOTE: Not to scale

## CHAPTER II REMEDIAL EFFORTS - 1978 TO 1992

The remediation of the Love Canal Hazardous Waste Site began on August 22, 1978 with the State installing an eight-foot high chain link fence around the former canal and the first two rings of houses. At the same time, design work was completed on systems to halt the outward migration of chemicals from the landfill.

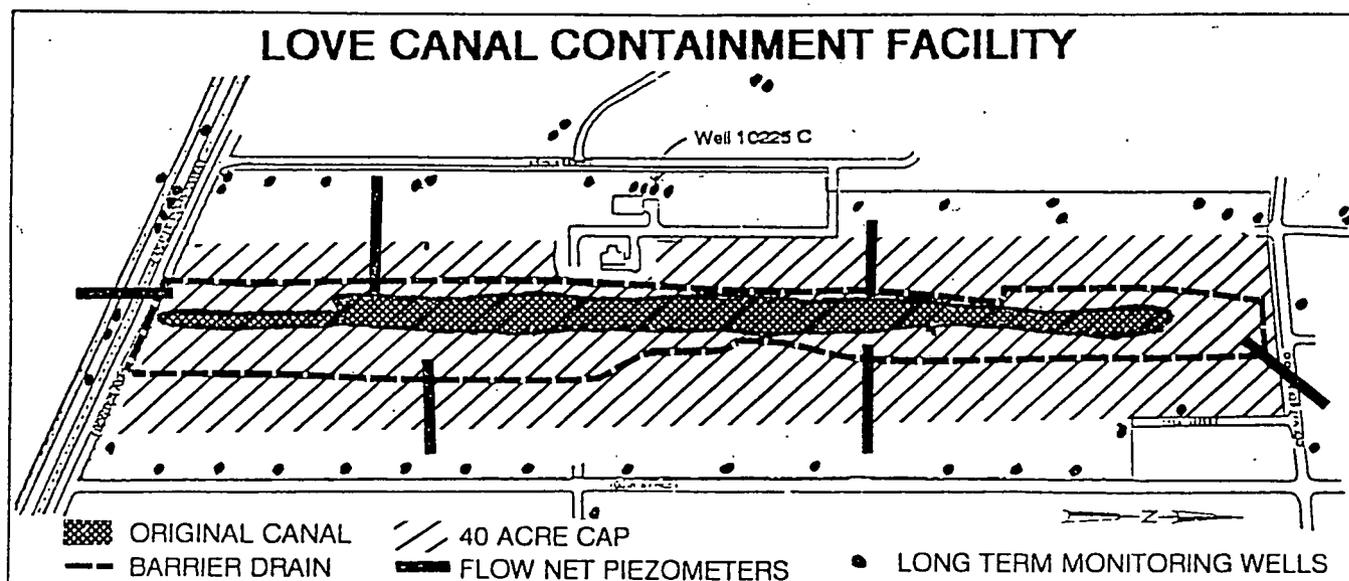
### CONTAINING THE CHEMICALS

#### Leachate Collection System/Barrier Drain

On October 10, 1978, work began on the Love Canal Leachate Collection System which consisted of about 7,130 ft. of leachate collection pipe and

The NYSDEC completed placement of a 22-acre, three-foot thick clay cap over the landfill in July 1980.

In October 1981, design work began on a program to improve the efficiency of the Containment System. These plans included: repairs to Leachate Collection System, upgrading the cap to include a synthetic membrane and expanding the cap to over 40 acres, installation of a below-grade concrete groundwater cutoff wall (which was later deleted), improved surface drainage near the canal, and the cleaning, plugging and abandonment of storm and sanitary sewers within Rings I and II. Work on these improvements started in June 1982 with the demolition of the homes in Rings I and II. By



about 860 feet of gravity drain pipe around the canal. The collection pipe is made of extra strength perforated vitrified clay tile and was installed using conventional construction techniques. The tiles were placed in a three foot wide trench ranging in depth from 11 to 21 feet below original grade. They are bedded in and covered with a minimum of one foot of crushed stone, with the remainder filled with concrete sand. This collection system was substantially complete by November of that year.

#### Containment Facilities

The entire landfill was covered with a 22 acre cap which consisted of a minimum of three feet of well-compacted clay. The cap prevented human contact with the wastes as well as migration of volatiles and fugitive dust from the landfill's surface.

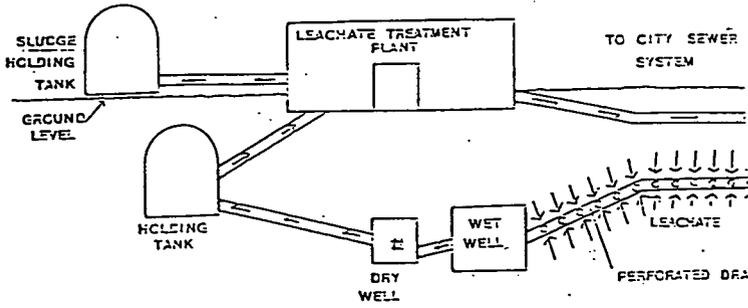
November 9, 1984 the work was complete, the plastic liner was in place, covered with 18 inches of fill and seeded to provide a healthy vegetative cover.

#### Monitoring Well Installation

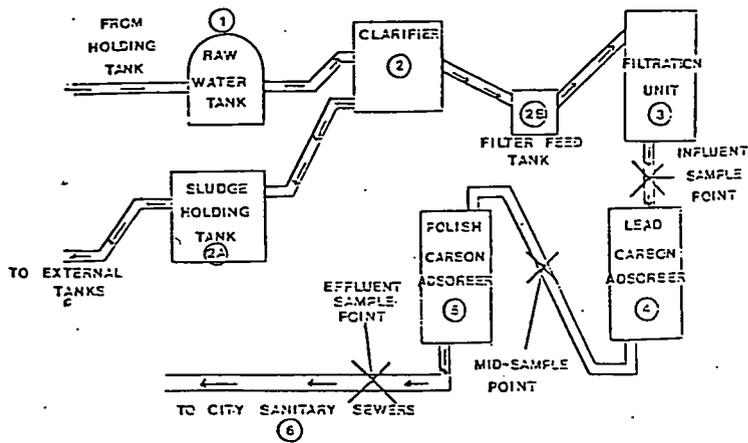
In the fall of 1985, the NYSDEC began installing approximately 100 monitoring wells around the Love Canal site. Soil samples were analyzed during the boring of 38 shallow groundwater wells to determine the areal extent of the contamination. A number of wells were installed directly into the canal in order to monitor liquid elevations within the waste and to better monitor the effectiveness of the leachate collection system. Thirteen bedrock wells were installed near the canal site to evaluate the potential for contamination of the bedrock groundwater system and provide insight into the need for additional

## HOW THE LEACHATE IS TREATED

### THE LEACHATE COLLECTION SYSTEM



### THE LEACHATE TREATMENT PROCESS



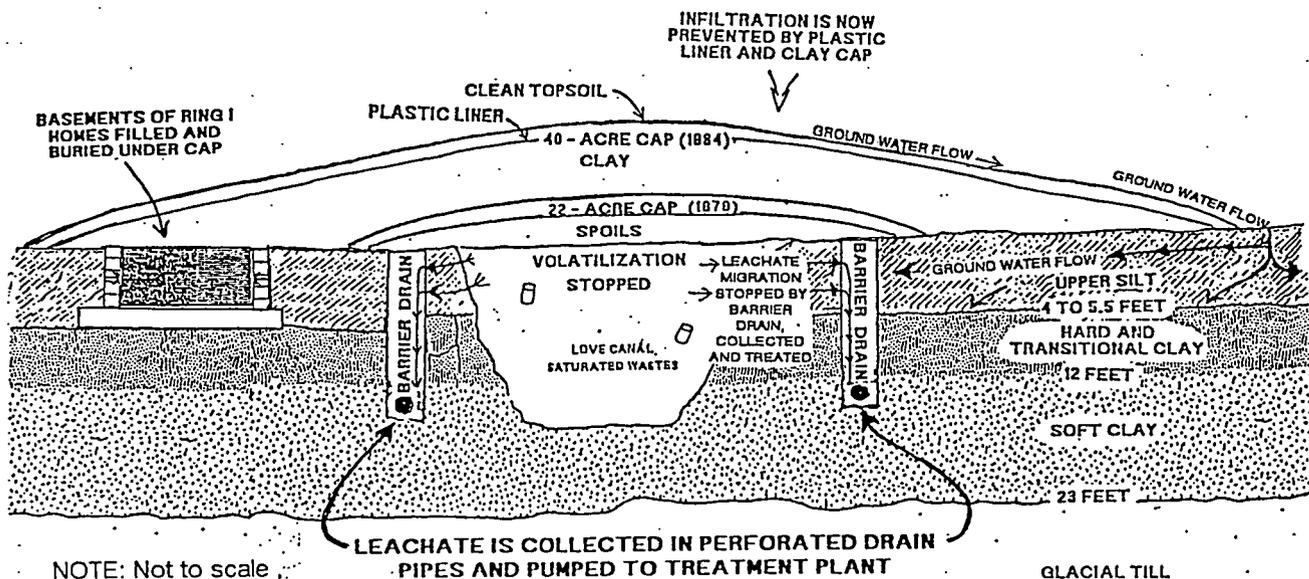
dewatering efforts. In addition, five sets of nested piezometers were installed to determine the influence of the collection system on the groundwater system.

### Plant Facilities

To process the collected leachate, an on site treatment facility was built. This facility receives leachate pumped from the collection system through two holding tanks with a combined storage capacity of 52,000 gallons. The raw leachate is then transferred to a clarifier where settleable solids, if any, and immiscible organic liquids are separated from the contaminated groundwater. The settleable materials are drawn off into four above ground storage tanks while the clarified leachate is passed through a bag filter which removes suspended solids.

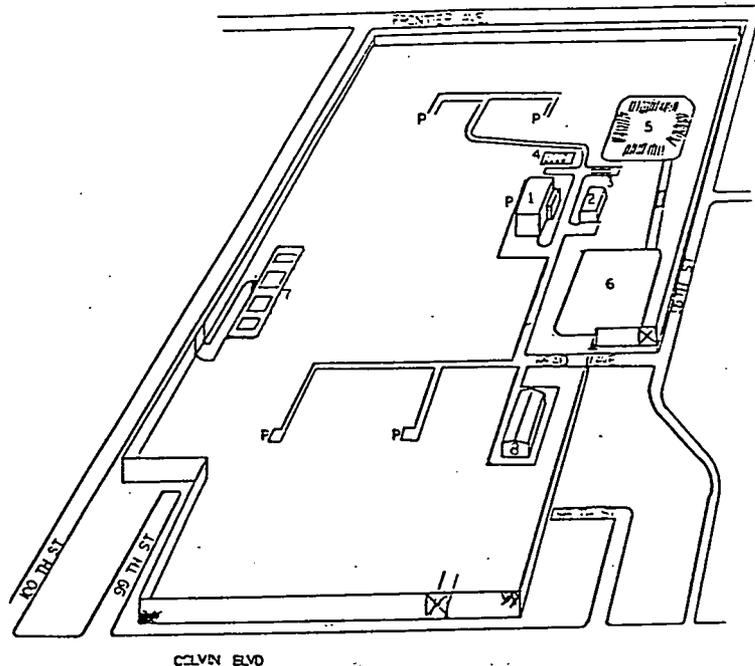
The clarified and filtered leachate is passed through three beds of granular activated carbon. The beds are linked in series and as the leachate passes through them, organic pollutants dissolved in the groundwater are effectively removed by adhering to the carbon. Hydrogen peroxide is injected into the effluent to oxidize the hydrogen sulfide generated by anaerobic bacteria which grow in the carbon beds. Finally, the is discharged to the City of Niagara Falls sewerage system in compliance with the sewer use ordinance. Construction of the facility started on September 10, 1979 and it entered operations on December 7, 1979.

## SCHEMATIC OF HOW THE CHEMICALS ARE CONTAINED BY THE REMEDIATION



NOTE: Not to scale

## THE LOVE CANAL SITE TODAY



- 1 LEACHATE TREATMENT FACILITY P. PUMP STATION  
 2 ADMINISTRATION BUILDING  
 3 PLASMA ARC UNIT-TRAILER NOTE: NOT TO SCALE  
 4 SLUDGE STORAGE TANKS  
 5 DEWATERING CONTAINMENT FACIL.  
 6 STAGING AREA  
 7 SEWER SEDIMENT FACILITY  
 8 DECONTAMINATION/DRUM STORAGE

### Recent Improvements and Maintenance

Over the past five years substantial improvements have been made to both the containment system and various plant facilities. Primary among them is the construction of a 2,900 square foot Administration Building which provides office, storage and laboratory facilities for the treatment plant staff. To improve long term reliability a rotating preventive maintenance schedule has been implemented for all field pumps; an extensive renovation of the collection systems electrical wiring and control systems is nearing completion which will allow for computer automation, monitoring and control of the pumping stations; and, access manholes were installed in the six leachate holding tanks and the tanks were cleaned. In addition, in 1991 the cap was surveyed to detect any settlement and the Department inspected and cleaned over 8,000 feet of leachate collection pipe to insure the integrity of the system and to provide for timely repairs, if needed.

## REMEDIATION OF THE LOVE CANAL EMERGENCY DECLARATION AREA

### Sewers

The USEPA released its Love Canal Environmental Monitoring Report in May 1982 and the U.S. Department of Health and Human Services advised that the EDA would be as habitable as the control comparison area once the contaminated storm sewers were cleaned. NYSDEC collected over 1,000 samples from the storm and sanitary sewers and, in October 1983, a final report recommended cleaning over 60,000 linear feet of storm and sanitary sewers. Cleaning began in April 1986 using both mechanical and hydraulic techniques, followed by a television inspection. Work continued through summer with 300 cubic yards of sediments removed and stored at the Sediment Dewatering Facility.

Confirmatory testing done in October 1986 indicated additional contaminated sanitary sewers along Frontier Avenue, between 76th and 81st Streets. An analysis of sediment samples indicated concentrations of dioxin in excess of 600 parts per billion (ppb). On October 5, 1987 the additional sanitary sewer cleaning began.

Another area of substantial activity has been the Frontier Avenue storm and sanitary sewer systems. Various projects involved:

The realignment of the storm sewer between its former intersections with 97th and 99th Streets. Drainage was rerouted through shallow piping to the LaSalle Expressway drainage system or to two new catch basins which were connected to the existing storm sewer beyond the abandoned section.

Additional sanitary sewer cleaning between 76th and 81st Streets, along Frontier Avenue. Sediment sample analytical results indicate concentrations of dioxin in excess of 600 parts per billion (ppb). The work consisted of cleaning and inspecting a total of approximately 3400 linear feet of sewer line, with about 15 cubic yards of material being removed. It also included cleaning of the storm sewer on Frontier Avenue downstream of 100th Street to the north boundary of the 102nd Street Inactive Hazardous Waste Site.

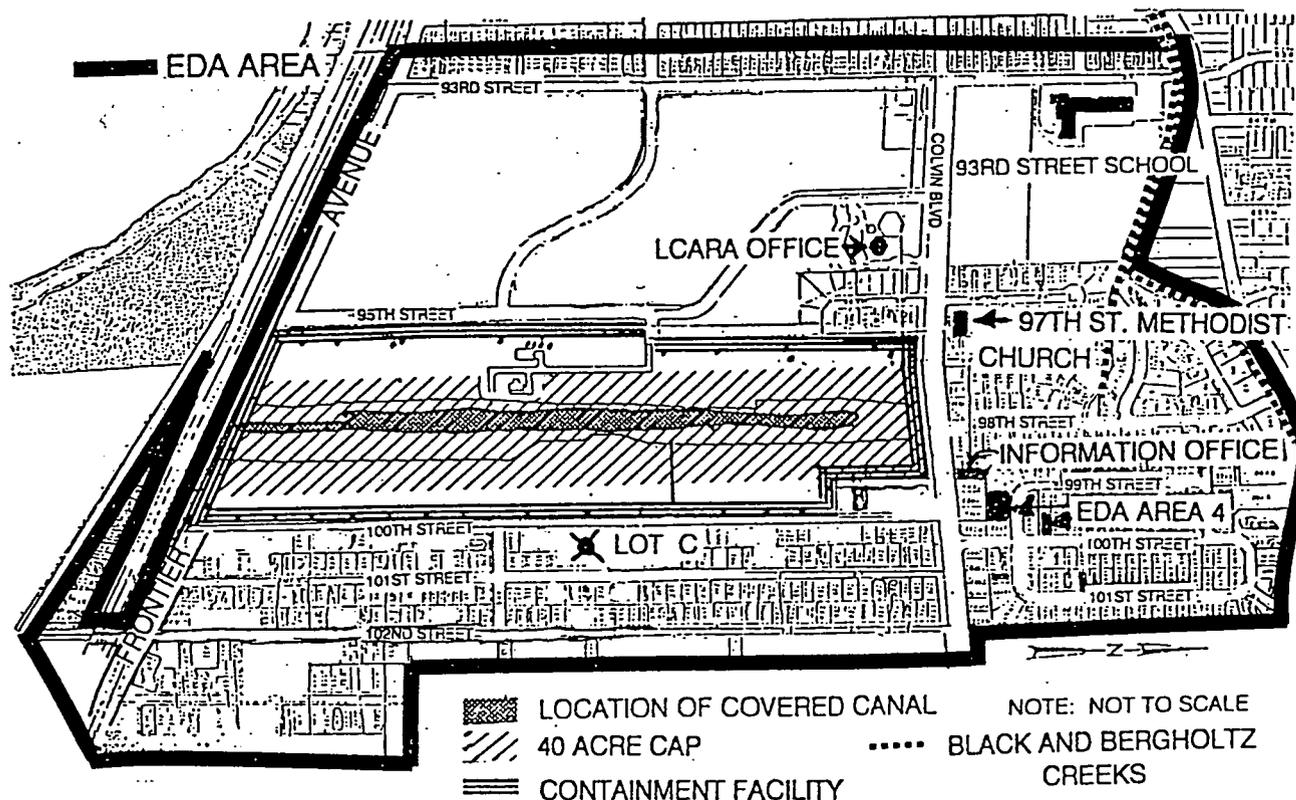
In August 1990, during the installation of an additional cutoff wall, unexpected contamination was discovered in the storm sewer pipe bedding near 100th Street. This previously undetected contamination was due to the migration of wastes from the Love Canal site prior to the initial remediation. After further investigation it was determined the Department would excavate the contaminated bedding between 100th Street and 101st Street and possibly line the section of sewer under the LaSalle Expressway.

The 102nd Street Storm Sewer Outfall, which is located outside the EDA, has been impacted by Love Canal contamination. Recognizing this, the USEPA identified an interim remedy for this area in its May 6, 1985 ROD. It is now NYSDEC's recommendation that this problem be addressed as part of the remedial program for the 102nd Street Landfill Site.

creeks. The NYSDEC collected numerous samples from the Black and Bergholtz Creeks. These studies identified dioxin contaminated sections of Bergholtz Creek from 150 feet upstream of its confluence with Black Creek to the 93rd Street footbridge. To remove the contamination, the creek bed was excavated to a depth of 18 inches and the creek bank to a minimum depth of 6 inches.

This was a major project which included: the excavation of over 3,300 feet of creek bank and bottom; cleaning of storm sewers with outfalls leading into the creeks within the area to be remediated; rehabilitation of the 93rd Street Sanitary Sewer and the replacement of the existing footbridge at 93rd Street. Plans also involved: the construction of a dewatering containment facility (DCF); construction of a decontamination - drum storage facility (DDSF); and the construction and

### LOVE CANAL AREA AS IT IS TODAY



#### Creeks

As early as 1979 dioxin contamination was known to exist in Black Creek. In response, the USEPA announced, in February 1980, that it would federally fund cleanup of these dioxin-contaminated

removal of haul roads. Design work began in July, 1985 for the remediation of the creeks with construction starting on May 2, 1988. The contract was declared substantially complete as of December 16, 1989.

## 93rd Street School

In March 1988, the NYSDEC issued a report for the 93rd Street School site which found the soils at the site were contaminated. As a result of the report the USEPA, in September 1988, issued a Record Of Decision (ROD) providing for the excavation of 7,500 cubic yards of soils, treatment of these soils by a solidification and stabilization technology, on-site placement of the treated soils and construction of a low permeability cover over both the treated soils and adjacent area. However, responding to concerns of the Niagara Falls Board of Education and the Love Canal Revitalization Agency, the USEPA issued a Record of Decision Amendment on May 15, 1991. The amended ROD included excavation and off-site disposal of approximately 11,000 cubic yards of the contaminated soil. Remedial work started in December 1991 and is expected to be completed by June of 1992.

## Other Remediation and Testing

### *Lot C*

During testing for the Love Canal EDA Habitability Study, dioxin was found at concentrations above 1 ppb at only one location, Lot C, 100th Street. Subsequent testing revealed dioxin at levels of concern to a depth of 12 inches. In early November 1988, a 10 by 17 foot area totaling about 10 cubic yards of soil was excavated to a maximum depth of 18 inches, which removed the contamination.

### *EDA Area 4*

In April 1990 and September 1990, NYSDEC and NYSDOH conducted an investigation of previously found elevated levels of B-BHC contamination in EDA Area 4. These investigations indicated that the higher levels of B-BHC was contained in fill used on three lots; 9909 and 9903 Black Creek Drive, and 1044 100th Street. In 1992 the Department will remove 900 - 1,000 cu. yds. of contaminated soil and the excavated areas will be backfilled with clean soils, graded and seeded.

## *97th Street Methodist Church*

An extensive investigation of the 97th Street Methodist Church site found no evidence of hazardous waste disposal. As a result, it recommended no further action and the site was removed from the State's Registry of Inactive Hazardous Waste Disposal Sites on January 9, 1991.

## *Home Maintenance Program*

The Home Maintenance Program was started by the NYSDEC in June 1988. The work included repairing roofs as necessary, boarding up windows and removing interior damaged material both north and south of Colvin Boulevard. In response to residents concerns the program was reassessed and it revealed that more roofs needed replacement than original planned. Therefore it was decided to fund ongoing work north of Colvin Boulevard and on 93rd and 96th Streets. Plans called for the homes south of Colvin Boulevard to be repaired the following spring. The Habitability Decision was issued on September 27, 1988. This decision prompted LCARA and the USEPA to agree that the maintenance of homes would become the responsibility of LCARA and the NYSDEC Home Maintenance Program was discontinued.

## *Cayuga Creek Fish Study*

In October 1987 the Division of Hazardous Waste Remediation entered into a Memorandum of Understanding with the Division of Fish and Wildlife to perform a study of fish in the Cayuga Creek system in order to assess the impacts of the sewer cleaning and the Black and Bergholtz Creek remediation projects. The second interim report concluded that the dioxin concentration in Young-of-the-Year fish from the creek's drainage basin continues to decline since the 1982 and 1987 sampling events.



## Other Monitoring Developments

### *Canal Hydrology Studied*

In a further investigation of the hydrology underlying Love Canal, a special pump test study of the bedrock in the southwest area of the site was undertaken by NYSDEC staff in the spring of 1990. The study consisted of removing several well volumes of groundwater while simultaneously and continuously measuring water levels in the pumped well and several observation wells. The following conclusions can be drawn from the investigation:

1 In the Southwest area of the site, the bedrock aquifer is isolated from the overburden aquifer and means that there is very little likelihood for migration of groundwater from the overburden into the bedrock, or vice versa.

2 Within the bedrock aquifer are interconnections which extend over a large area which means that a hydrologic effect introduced into the bedrock at one point will be experienced at many other bedrock localities throughout the vicinity and in the unlikely event that a trace amount of contamination reaches the bedrock, it would rapidly be detectable over a large area.

### *Monitoring Wells Inventoried*

An inventory of groundwater monitoring wells in the EDA was conducted in the summer of 1990. A total of 327 wells, including USEPA wells, were inventoried. This is part of a selection process to determine which wells will remain part of the Long Term Monitoring Program.

## SIGNIFICANT DEVELOPMENTS IMPACTING AREA

### **Decision of Habitability**

A major milestone in the remediation efforts for Love Canal was passed on September 27, 1988 when Dr. David Axelrod, Commissioner of the New York State Department of Health, issued his "Decision of Habitability" for the Emergency Declaration Area (EDA). This report marked a turning point in the effort to remediate the area and is a step toward resettling neighborhoods around the Love Canal.

In making his decision, Dr. Axelrod followed criteria which were first developed in conjunction with a panel of independent scientists and the public. These criteria were pilot tested in the winter of 1986-87 and further modified on the basis of public and peer review, and a critique by the Technical Review Committee (TRC).

### *Well #10225C Investigation*

A new well installed in 1989 to replace an earlier well eliminated by construction activity, Well #10225C, continues to be closely monitored. Low levels of contaminants were found in the well during the 1989 Long Term Monitoring program. As a result the well was resampled several times. The data from these samplings is consistent with the previous analyses. The low levels of contamination in this well do not indicate the need for action or further study at this time. However, future results from this well will be tracked with special attention to any evidence of a change in groundwater conditions.

In addition, prior to the 1990 sampling, the NYSDEC requested that a consulting firm which is familiar with the Love Canal site and monitoring well program review the data from Well #10225C and provide an independent assessment. The Department was particularly interested in the question of whether the data suggested any trend in levels of contamination. The firm responded that:

1 It is early to draw final conclusions about the presence of a trend.

2 The data should be used as a basis for comparing future data from these wells to determine whether there is a trend.

The results from the Long Term Monitoring Program will continue to be made public. Should a trend occur for any of the parameters monitored, the situation will be immediately evaluated and appropriate action taken.

This process resulted in the TRC developing a definition of HABITABLE as: "Suitable for normal residential use without any restrictions." This meant that individuals could live in the EDA and feel comfortable about raising their families there, with children living and playing in the area.

The ruler that was used to measure whether an area met this definition focused on applicable known guidelines and on a comparison of environmental data from the EDA with data from three similar neighborhoods within Western New York. All comparison areas were required to be at least one half mile from any known landfill and were chosen by the TRC, with the assistance of the public.

This comparative approach was necessary because there were no standards for exposure to



was to change the land use for EDA Areas 2 and 3, declared non-habitable by NYSDOH Commissioner Axelrod, to an industrial-commercial classification. The short term impact of the decision will be to start the demolition of the 149 houses which the Agency owns in this area. Because they have been vacant for as long as 10 years, most of these homes are in poor condition. The 26 families who still live in this area will have the option of remaining although the Agency will continue to offer to purchase these homes.

For planning purposes the Agency also enlarged EDA Areas 2 and 3 to include about 50 acres outside the EDA, extending eastward to Williams Road. This was done to enable planning to incorporate a 36 acre state designated wetland. The possibility that the wetland could be reconfigured and improved to provide a better wildlife habitat and a site amenity for future development will be studied at a future date.

Of equal significance is the decision to rehabilitate and resettle the area north of Colvin Boulevard and the west side of 93rd Street. This area contains 262 homes including 30 which are still occupied by residents who chose never to move from the EDA. These homes are generally in better condition than those located south of Colvin Boulevard and west of the Containment Facility. The homes are being improved and sold to home buyers as quickly as market conditions will allow. To date approximately 35 of these homes have been sold.

Between the canal and 93rd Street, on land largely owned by the Niagara Falls Municipal Housing Authority, the Agency has planned for a mixture of residential and other land uses. Open space and park land would be included and would add interest and sales appeal to the area. EDA Area 1, located south of the LaSalle Expressway, is designated as a "Gateway Area". This would be developed as green space to provide a scenic approach to the city.

### **Love Canal EDA Areas 2 and 3**

Pursuant to the State Environmental Quality Review Act, the New York State Disaster Preparedness Commission (DPC), as an involved agency, issued a Findings Statement for the Love Canal Master Plan. In the Findings Statement, the DPC declined to approve the expenditures of funds by LCARA necessary to promote commercial development of EDA 2 and 3. In part, the DPC found that LCARA's Master Plan did not adequately address the economic feasibility of remediating EDA 2 and 3

to allow for residential development.

Remediation of EDA 2 and 3 to permit residential use required that the concentration of LCICs in the top 12 inches of soil be reduced to conform with the habitability criteria. To explore this possibility, three alternative approaches were considered. One approach, soil treatment, was rejected because the concentration of contaminants in the soil are too low for effective treatment. Another approach, that of placing 12 inches of soil over the entire surface of the area was rejected because of difficulties in grading the soil near roads, sidewalks, houses and large trees. As a result, excavation and replacement of soil remained the only feasible alternative.

In December 1989, the NYSDEC and NYSDOH initiated a sampling program in EDA Areas 2 and 3 to better define the degree of remediation necessary to comply with the criteria of the Habitability Decision. The sampling program consisted of the collection of some 82 soil borings and the analysis of 246 samples in December 1989. Considering the available data, the report determined that the removal of six inches of soil would satisfy the habitability criteria and render EDA 2 and 3 suitable for unrestricted residential use. This eventually resulted in a document entitled "Love Canal EDA 2 and 3 Cost Analysis Report". This report provided LCARA and the DPC with the necessary information regarding the cost to remediate these areas for residential use.

The DPC, in May 1991, requested LCARA utilize this report, other available information and experience gained in the sale of homes, etc., to address the issues raised by the DPC's Findings and modify the GEIS and LCAMP, if appropriate. LCARA, after reviewing the points raised by the DPC, found that residential use of EDA Areas 2 and 3 was not economically feasible based upon the cost of remediation, the expense of rehabilitation of the homes and the difficulties currently being faced in marketing homes in the habitable areas. Therefore, LCARA concluded that revisions to the master plan and environmental impact statement were not necessary and the recommendation for commercial or light industrial development remains unchanged.

The DPC is reviewing LCARA's response, along with other supporting documents and will prepare a Draft Supplemental Findings Statement. A public hearing is to be held in order to gather public comment on this draft statement. After review of the public comments, the DPC will issue a final Supplemental Findings Statement.