NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
STATEMENT OF BASIS
FOR

Roth Bros. Smelting Corporation
6223 Thompson Road
East Syracuse, NY 13057
EPA I.D. No.: NYD006977006

Date: July 20,1994

I. ANNOUNCEMENT OF PROPOSED CORRECTIVE MEASURES

The Statement of Basis (S.B.) has been developed by the New York State Department of Environmental Conservation (NYSDEC) under the authority of the Solid Waste Disposal Act, as amended, and more commonly referred to as the Resource Conservation and Recovery Act or RCRA. This Statement of Basis was prepared in accordance with the requirements of 6 NYCRR 373-1.4(f).

The S.B. describes the preferred, proposed, final corrective measure alternative for remediating the soil contamination identified at the Roth Bros. Smelting Corporation in East Syracuse, New York (the "Facility"). This preferred, proposed, final corrective measure for the soils in the vicinity of Plant 2 is stabilization in the form of polysilicate fixation with institutional controls, which will require deed restrictions on future uses of the areas, including appropriate restrictions to reduce public access to the soils at the site. Details of the preferred, proposed, final corrective measure are discussed in the Proposed Final Corrective Measures and Cleanup Goals sections of this statement.

The S.B. provides background information on the Facility; outlines the alternatives considered to remediate the soil; presents the technical approach and rationale for the selection of the preferred remedy; and discusses the public's role in the decision process for selecting a final remedy for this Facility.

NYSDEC welcomes public comment on all the alternatives considered and any other comments pertinent to selecting a final corrective measure for this Facility. Public comments can influence NYSDEC's final selection of a corrective measure. If new substantive information and arguments are presented to NYSDEC through public comments, NYSDEC may integrate these comments and so modify the proposed final corrective measure. Therefore the public is encouraged to review and provide comment on this S.B..

The selection of the proposed, preferred remedy is supported by investigative data presented in the "Draft Phase II RCRA Facility Assessment (RFA) Report for the Roth Brothers Smelting Corp.", dated October, 1991; the "Environmental Investigation Roth Bros. Corp.- Plant 2", dated May, 1991; the "Results of Remaining RCRA Facility Investigations (RFI) Activities", dated March, 1993. The evaluation of alternative corrective measures is presented in the "Corrective Measures Study" dated July 1993, and "Roth Bros. CMS Report Addendum" dated March 1994.

II. Facility Background

A. Location and Operations

Roth Brothers is located in the north-central portion of Onondaga County, New York. The site is bordered to the south and west by the Penn Central railway system, to the east by Thompson Road, and to the north by the south Branch of Ley Creek. The facility is surrounded by industrial and residential areas. To the south, the site is bordered by Hoffman air and Filtration System company (fan and vacuum equipment assembly), and to the north the facility is bordered by the Oberdorfer Foundry (aluminum foundry). Along this northern property line, Oberdorfer stores large piles of foundry sands, which are referred to as the Oberdorfer fill area. To the east the adjacent property is occupied by a transmission shop, industrial park and residential areas about half a mile away.

Since 1927, Roth Brothers has reclaimed non-ferrous metals and alloys through secondary smelting and refining of purchased scrap, drosses, and by-products. In 1949 the company moved to its present location off Thompson Road in East Syracuse, New York.

The current facility covers approximately 32 acres which contain two principal operation areas, Plant Nos. 1 and 2 (with a combined area of 200,000 square feet), as well as surrounding storage areas. The original operations were conducted in Plant No. 1 and Plant No. 2 was added in the mid-1950's. Attachment 2 shows the L-shaped tract occupied by the facility and the two Plants.

Historically, facility operations have consisted of aluminum and zinc smelting, lead-tin solder operations, and copper insulation incineration. Aluminum and zinc operations are primarily conducted in Plant No. 1, although the Aluminum Crusher is located in Plant No. 2. Lead and copper processing operations, which were conducted in Plant No. 2, ceased in April and July 1991, respectively. On May 6, 1991 the company announced plans to add aluminum smelting capacity of 25,000 tons per year by closing and remodeling the lead-tin solder operations.

The aluminum, zinc, copper and lead solder processes produce large quantities of solid wastes. These wastes fall into seven main groups:

1. Scrap Iron - is accumulated in the northern storage area and then sold to a recycler;

2. Baghouse Dusts - all baghouse dusts are collected in polyethylene-lined cardboard boxes. Non-hazardous dusts are disposed of in a municipal landfill. Dusts that are hazardous are stored at the Aluminum Dust Storage Area or the Copper Dust Storage Area for dust generated from the related process. Before 1991, Roth Bros. made lead solder. The dusts from this process were reported to have been stored in the northern fill area and may account for the lead contaminated soil there. Baghouse dust from the Zinc/Zamac production process were disposed of in a municipal landfill with other non-hazardous facility wastes.

3. Aluminum Dross and Fines - Waste Aluminum Fines are stored in the Waste Aluminum Fines Storage Area. Aluminum dross has been stored in the Aluminum Turnings Storage Yard and other places throughout the facility. Both the fines and the dross are periodically sold to a recycler.

4. Lead Slag - As with the lead bearing baghouse dust this waste is no longer generated at this site. Before 1991, this waste was generated from the processing of lead dross which was returned to the furnace until the lead content was below the Extraction Procedure or Toxicity Characteristic regulatory levels. This waste was then disposed of in the DeWitt and Orleans County landfills. Lead slag was stored at the Copper Dust Storage Area and the Northern Waste Storage Area.

5. Acid fumes - Until the early 1980's acid fumes were produced by the processing of copper wire. These fumes were treated in an alkaline coated baghouse.

6. Cooling Water - The Aluminum, Zinc/Zamac and Lead processes used contact cooling water which was discharged to SPDES Outfall 002, 005 and 001 respectively. Non-contact cooling water from copper production and the lead furnace were discharged to SPDES Outfall 001.

7. Other Wastes - Waste oil from the facility's vehicles is burned on-site to provide the maintenance area with heat. This oil is stored in four (4) waste oil tanks near the maintenance area.

   Oily wastewaters from the facility's four (4) Oil/Water separators are stored in waste oil tanks to eventually be burned for heat in the winter.

   Burning of bags which contained lime used in the Baghouses are burned in metal hoppers and the ashes disposed of in a sanitary landfill.

   Metal scraps from quality assurance tests are stored at Laboratory Satellite Accumulation Areas and are returned to whatever smelting operations they originally were collected from.

B. <u>Regulatory and Investigation History</u>

On September 5, 1984, Roth Brothers notified NYSDEC that they had decided to formally close their hazardous waste storage facility and withdraw their Part A permit application. On April 30, 1985, the facility submitted a closure plan for their hazardous waste storage areas.

In October 1985, Roth Brothers requested the withdrawal of their reclassification request, citing that they were unable to meet state exemptions due to volume limitations on their 90-day storage and that they were no longer planning to close their hazardous waste storage areas. In addition, Roth Brothers stated that they intended to apply for both state and federal hazardous waste permits.

Roth Brothers submitted a 6NYCRR Part 373 Permit Application (the New York State equivalent to a RCRA Part B Application) to NYSDEC on April 16, 1986. The application was determined to be incomplete and a Notice of Incomplete Application was sent to the facility. Roth Brothers provided additional information on October 22 and November 24, 1986. On March 30, 1987, Roth Brothers was granted a Part 373 Permit by NYSDEC to operate a hazardous waste storage facility and carry out corrective action. Three container storage areas, the aluminum Dust Storage Area (SWMU 11), the Lead Dust storage Area (SWMU 35), and the Copper Dust Storage Area

(SWMU 36), with a total capacity of 290 containers were permitted. No EPA permit was issued to this Facility.

On September 30, 1993, the last of Roth's regulated waste storage units had its closure certification accepted by NYSDEC. This released the facility from having to have a 6NYCRR 373 Permit for the storage of hazardous waste, but the permit continues in effect for corrective action until an order is in place. Before any corrective measures are implemented, an Order on Consent will be in effect to address the implementation of the final corrective measure and post-remedial monitoring.

In October 1989, Roth hired Blasland and Bouck Engineers to conduct a preliminary soil investigation of the facility to answer some issues raised during an environmental audit by their insurance company. The results of the investigation indicated that the site was contaminated with oil and grease and possibly PCBs. This report is an appendix contained in the H&A document dated February 1992 titled "Response to Review by NYSDEC of Environmental Investigation".

A more conclusive investigation was performed by Galson Technical Services in April 1990. The results (Attachment 1) indicated that there was significant contamination in the Plant 2 area with heavy metals and PCBs.

Roth hired H & A of New York (H & A) in August of 1990 to perform a comprehensive investigation of the entire site.

H & A performed a two phase investigation equivalent to an RCRA Facility Investigation which was concluded in May of 1991 when they submitted a report to Roth detailing the areas of contamination (Attachment 2) and suggesting possible remedial strategies. (Attachment 3). The primary contaminants consisted of lead and PCBs. The other contaminants were other metals (e.g., Chromium, Cadmium and Barium) and some semivolities. These contaminants were present at lower concentrations and in the same area as the lead contamination which allowed for the use of lead as an indicator parameter. The presence of PCBs could not be correlated with the lead contamination and had to be handled separately.

III. RCRA Facility Investigations

A. Groundwater Contamination

Based on investigations of twelve (12) wells, a potentiometric surface map was developed, which is present in Attachment 2. Groundwater flow is generally to the northeast flowing toward the Oberdorfer Foundry.

Apparent discharge points exist along the east boundary of the facility to a ditch that is a tributary to the south branch of Ley Creek.

Three additional monitoring wells were installed, developed and sampled to provide additional groundwater analytical data. All monitoring wells installed at Roth Bros. are sampled according to the Groundwater Sampling and Analysis Plan, Quarterly Groundwater Monitoring Program (H&A, December 1992). Analysis of the samples include the Target Compound List, semi-volatiles, total metals, soluble metals, pH, conductivity and temperature.

There have been no detections of volatiles or pesticides in the groundwater samples. Minor levels of PCBs have been detected occasionally but not in a pattern that would define a plume of contamination. One sample was found to contain a detectable level of the semi volatile compound bis(2) ethyl hexyl phthalate, a common lab contaminant. There have been slight to moderate exceedances of the groundwater standards for Lead, Antimony, Arsenic Barium and Selenium. Groundwater monitoring will be required during and following the implementation of the Corrective Measures. It is believed that removal of the source of contamination may be adequate to address groundwater contamination. Follow up groundwater monitoring results will be evaluated to determine if additional corrective measures will be necessary to specifically adrss groundwater contamination.

B. Soil Contamination

Soil in the vicinity of Plant 2 was analyzed for a wide range of constituents. This work was carried out in three separate phases. The results of the first two phases of investigation are found in the report titled "Environmental Investigation Roth Bros. Plant 2", dated May, 1991. The third phase results are found in the report titled "Results of Remaining RCRA Facility Investigation Activities", dated March, 1993.

Phase III of the soil investigation was designed to answer the few remaining questions about contamination at Plant 2. Remaining activities associated with the RFI were performed in accordance with a NYSDEC approved Work Plan dated 6 November 1992. Previous environmental investigations performed for this site have been considered by NYSDEC as a partial RFI; activities conducted for this phase of work were performed to address concerns raised by the NYSDEC upon review of the earlier work performed.

The Phase I investigation of the Plant 2 area of the Roth facility was shown to have significant problems. Not only was total lead found in concentrations over 10,000 ppm, but several samples failed the TCLP test for a characteristic hazardous waste (i.e., samples leached lead in the TCLP test over 5 ppm). This is considered a potential threat to the groundwater. PCBs were also found at significant levels (up to 204 ppm).

The Phase II investigation consisted of an in depth examination of the soil of Plant 2.

The results of these soil investigations are provided below and boring locations are identified in Attachment 2:

1. Four test borings were made in the maintenance yard which contains the Former Underground Storage Tanks (USTs), the Diesel Pumping Station, and the Steam Cleaning Room; black staining was noted in two of the four borings, and two of the borings were converted to groundwater monitoring wells;

2. Fifty-three shallow borings were made in the paved portions of the Northern Waste Storage Area because analysis of aerial photographs had indicated that this area had also possibly received fill materials in the past. Fill materials were encountered to a depth of 0 to 6.5 feet, with an average fill thickness of 3.1 feet. The composition of this fill material varied, including silt, sand and gravel, cinders, wood fragments, glass, and ash. Fifteen out of 37 samples from these test borings exceeded 500 ppm lead, and 8 of the 37 samples exceeded the TC regulatory level for lead. PCBs were detected in 35 out of 37 samples, with three samples exceeding 25 ppm. The highest level of PCBs detected was 82.7 ppm;

3. An additional six test borings and two trenches were made in the unpaved area of the Northern Waste Storage Area. Three of these borings were made in areas where high PCB and TC lead values were encountered in the Phase I investigation, and three were made in native soil areas at the north end of this unit. These latter three borings were converted to groundwater monitoring wells to evaluate water quality north of this unit. Lead

was detected in the former three soil borings in excess of the TC regulatory level, and PCBs were identified in the range of 27.7 ppm to 164 ppm; and

4. Twenty-four shallow test borings were also made in the vicinity of the Lead Dross Shed Baghouse No. 4, the Lead Dust Storage Area and the Copper Dust Storage Area because aerial photographic analysis had determined that this area may also have received fill materials. The average fill thickness was 2.1 feet in these areas. Six out of 16 samples had total lead concentrations in excess of 500 ppm (in concentrations up to 23, 740 ppm), and 16 out of 18 samples contained PCBs (in concentrations up to 40.1 ppm). Only one of these samples exceeded 25 ppm for PCBs.

Four objectives for the remaining Phase III RFI activities were identified as:

1. Expand the site soils analytical database;

2. Expand the outfall soil (sediment) analytical database; and

3. Collect data to resolve waste handling concerns at selected solid waste management units (SWMUs).

A summary of the Phase III soil investigation results is provided below with data presented in Attachment 2.

1. Site Soil Database

   Selected locations on Plant 2 were sampled at the soil surface and shallow depths and analyzed for compounds of concern. Specific analytes were chosen based on site usage and previous site study results.

   Samples were collected from the Former Copper Wire Incinerator at Plant 2, the Former Substation, and a background location. The sample taken at the Copper Wire Incinerator shed was analyzed for PCBs; none were detected. The sample from the Former Substations was non-detect for semi-volatiles and total petroleum hydrocarbons.

2. Outfall Soil Database

   Outfall 001, and Outfall 002, also known as SWMU

#45 and #46, were sampled and analyzed to determine the extent of contamination in discharge soils in the ditches. The samples were analyzed for lead (total and TCLP), PCBs, semi-volatiles, total organic carbon, and dioxins and dibenzofurans. Outfall 001 had elevated total and TCLP lead that was evaluated for treatment in the CMS. Semi-volatile compounds were also detected but at levels below comparison criteria. Outfall 002 sample analysis indicated total lead levels of concern, but low levels of TCLP lead and non-detect for semi volatiles. Both samples indicated the presence of low levels of PCBs.

3. Solid Waste Management Units (SWMUs)

Sampling at selected SWMUs included surface shallow soil sampling, test borings, and outfall ditch sampling. The gathered samples were submitted to a laboratory for selected analysis. Samples were analyzed for total and TCLP lead, PCBs, semi-volatiles, oil and grease, and/or total petroleum hydrocarbons depending on particular SWMU historical usage. Detections were made that would subject the sampled units to CMS evaluation not already identified by past site investigations.

IV. Previous Corrective Measures through Closure

In 1992 three (3) Solid (Hazardous) Waste Management Units (SWMUs or HWMUs) were closed in accordance with NYSDEC approved closure plans. A summary of the closure activities for the Plant 1 HWMU Storage Area, the Plant 2 Copper Dust HWMU Storage Area, and the eastern portion of the Lead Dust HWMU Storage Area is provided in Attachment 4.

V. Potential Receptors and Risks

This section summarizes potential risks to possible human health and environmental receptors by releases of hazardous wastes, including hazardous constituents. Potential receptors are identified first and then possible exposure pathways are examined in terms of the fate and transport of the target constituents (i.e., total lead and PCBs) identified in soil contamination at this facility. Possible human health exposure routes that may exist now and in the foreseeable future are discussed in the context of how a human receptor may contact a hazardous constituent.

The risk evaluation considers that this facility is located in an industrial area with restricted public access, which will continue through deed restrictions. The primary potential risk to the environment is that leachate from contaminated soil may impact the groundwater. The primary potential risk to human health is from inhaling or ingesting contaminated air borne particles. Based on these results, it has been determined that contaminated soil at the Plant 2 site must be remediated.

Also, groundwater monitoring will continue on a quarterly basis during and following the soil remediation activities. This groundwater monitoring data will be reevaluated periodically to assess the need for its continuance and/or for requiring corrective action.

A. Potential Receptors

Roth Brothers is surrounded by other industrial facilities, but there are some residential areas located east of the site. Potential human health receptors exist in the Town of East Syracuse, with inhabitants of the nearby residential areas, and with workers on site and at the adjacent offsite facilities.

Groundwater could be considered a potential environmental receptor of contamination leaching out of the site's contaminated soils. Another potential environmental receptor of site contamination are the sediments in the ditches and tributary to Ley Creek located north of Roth Brothers. These ditches receive run off and treated process wastewater from the site.

B. Potential Exposure Pathways

A number of physical and chemical properties and site-specific conditions influence the fate and transport of chemicals in the environment. Ultimately these processes affect the potential exposure routes for human and environmental receptors. Expected transport and fate of lead and PCBs are discussed below.

Lead can be present in soil and sediment as a naturally occurring element or compound. Its presence may also be attributed to airborne lead which deposited out from an atmosphere once being contaminated by automobile exhausts containing this contaminant. Elemental lead is insoluble in water at pH levels associated with most natural waters, but not so for certain lead compounds which can exist naturally or be created by polluting sources. In natural waters lead from such compounds can be sparingly soluble resulting in trace background levels (i.e., very low parts per billion). Lead dissolution in water is enhanced by acidic conditions existing in atmospheric precipitation (i.e., rainwater). Acid rainwater has the potential to leach lead and the other heavy metals from the contaminated soils as it percolates through the soil column. This heavy metal transport process in strongly retarded by the soil particles sorbing the dissolved metals in the subsurface environment. Although the retardation process is a highly effective, it is reversible. Therefore, the potential fate of these metal contaminants through the leaching pathway, if left unremediated, could be mixing in with the groundwater flowing under the site.

At the surface, exposed contaminated soil containing heavy metals has the potential to be transported through erosion. Contaminated soil left uncovered or without vegetative growth can be eroded by runoff during precipitation events and by dusting during dry windy conditions. Through either pathway contaminants in surfacial soils have the potential to migrate when left exposed to rain and wind. The fate of contamination made mobile by eroding weather conditions will depend upon where the final deposition of the transported contamination occurs. The potential exists for such contamination to transport under dry dusting conditions as airborne contaminated particles. However, this airborne contamination, while occurring infrequently given the weather patterns at this facility, would become more dilute with increasing distance from the contaminated sources.

PCBs are a group of man-made chemicals composed of 209 individual compounds. PCBs have been used widely in coolants, lubricants, and dielectric materials in selected electrical equipment. Industrial manufacture of PCBs stopped in 1977. As a synthetic organic chemical, PCB fate and transport in the environment is dependent on its solubility in water, its ability to partition or migrate between water, air and soil and its chemical half-life or persistence. PCBs are persistent, having a long half-life. They have a very low vapor pressure, therefore, don't significantly volatilize. PCBs tend to sorb strongly onto the organic matter in soils and combined with their low water solubility, generally $<10^{-1}$ mg/l, precludes any significant transport through the leaching pathway. However, if left uncovered soil contaminated with PCBs has the potential to migrate by the same weather related events discussed for lead transport.

C. Potential Exposure Routes

Possible human exposure routes for lead and PCBs consist of ingestion, inhalation, and dermal contact. The dermal contact route for lead is only an exposure route insofar as it leads to ingestion or inhalation of lead. Lead is not typically absorbable through the skin. An ingestion route may occur through voluntary consumption (pica) or involuntary consumption of contaminants contained in soil or dust. Ingestion may also occur through consumption of water containing dissolved lead. Groundwater is not considered an ingestion exposure route at this time since groundwater has not been shown to be contaminated by lead at this facility (see RFI and prior investigations) and groundwater is not presently used as a drinking water source at or in the vicinity of the Roth facility.

D. Summary Risk Evaluation

The Roth Brothers Facility is an industrial site and the intention will be to maintain it as such into the foreseeable future. Public access to the site is restricted except for individuals working at the facility. Therefore, the most conservative exposure assumptions of a child digesting onsite contaminated soil or root crops being grown for human consumption onsite in contaminated soils are not plausible scenarios. If unrestricted use of site soil was to be considered, then PCB levels in surfacial soils must be less than one part per million and total lead levels in soils should not exceed 250 parts per million. These concentrations were established as target cleanup levels and considered goals for the remedy evaluation process during the preparation of the corrective measures study (CMS).

Results of the remedial investigation at the Roth Brothers Facility demonstrate that high concentrations of total lead and moderate levels of PCBs contaminate the soil at several locations. These results show some PCB concentrations exceeding 50 parts per million and that other soils when subjected to the toxicity characteristic leaching procedure (TCLP) yield total lead levels in leachate tests exceeding 5 parts per million. At either one of those concentrations levels the contaminated soil would be considered hazardous waste and represents a significant threat to human health and the environment.

Although there is no immediate contamination of groundwater occurring at this site, the potential for lead contamination exists through the leachate pathway: given the presence of high lead levels in the contaminated soil; the acid rain conditions that can occur at the site; and the propensity to leach lead as evidenced by TCLP tests results. Therefore, a potential risk exists for contaminating groundwater with lead and possibly other heavy metals from contaminated soil, if not appropriately remediated. These same contaminated soils also present a significant risk to human health through the air pathway when made mobile during dry, windy conditions. Inhalation of dust containing lead concentrations is a potential exposure route onsite and offsite since certain areas that contain lead concentrations (northern fill area) are unpaved and only partially vegetated. The human inhalation exposure routes considered for this facility included an onsite worst case evaluation in the area of exposed soil containing lead and at the downwind facility boundary, which would be the nearest offsite location for potential inhalation of lead containing dusts.

VI. Scope of Corrective Action and Remediation Goals

Based upon the summary risk evaluation proposed remedial alternatives should address the following:

- soil treatment to immobilize the lead and other heavy metal contaminants;
- soil remediation that will mitigate impacts on receptors from contaminated dust; and
- soil remediation that reduces the bioavailability of lead, and/or cuts off the ingestion/potential contact exposure route where exposed soil lead and PCB levels exceed the target cleanup levels.

Remedial actions should be designed to mitigate exposures to contaminants through direct contact with the contaminated soils, inhalation of contaminated fugitive dusts, and prevent generation of lead-contaminated leachate. In summary, in order to mitigate potential impacts on receptors, corrective measures should be directed at areas where total lead and PCB concentrations exceed the target cleanup levels. Based on the exposure routes which may cause health risk, the evaluation above indicates that preference should be given to corrective action technologies that immobilize lead (to prevent airborne exposure and future groundwater leaching), cut-off contact, and therefore inhalations/ingestion routes of lead-containing materials, and reduce the bioavailability of lead. This led to the following remediation goals:

1) Those areas of soil that failed the TCLP test for lead (that is, leached lead at 5ppm or more and is characteristic hazardous waste) must be treated, excavated or encapsulated to reduce its leaching potential.

2) Those soil areas that have tested over 825 ppm total lead must be addressed as in 1 above.

3) Confirmation soil sampling that tests over 825ppm total lead will be addressed in 1 above.

4) All areas that contain over 250 ppm total lead must be topped by an impermeable cover such as macadam.

5) If an area has over 50 ppm total PCBs, the soil must be removed to a suitable hazardous waste treatment facility.

6) Any area of soil that has been shown to be contaminated with PCBs but not metals, need only be covered.

7) Roth will incorporate a notice in its deed or in a similar instrument which is normally examined in a title search that will, in perpetuity, notify any potential purchaser of the property of the types, concentrations, and locations of such hazardous wastes or hazardous constituents present, that the use of the property must remain industrial in nature, and that access to the property must remain restricted. Any use of the property other than industrial, any removal of soil or any removal of access restrictions will require approval by the NYSDEC.

VII. CORRECTIVE MEASURES ALTERNATIVES

A. SCREENING CHARACTERISTICS

Characteristics used to screen applicable from inapplicable technologies, based on the USEPA RCRA Corrective Action Plan guidance include:

1. Site Characteristics - existing site conditions may limit or promote the use of certain remedial technologies. Where the site characteristics place such limitations, the technology is eliminated.

2. Waste Characteristics - identification of the waste characteristics which limit the technology's feasibility or effectiveness.

3. Technology Limitations - Limitations such as performance record, inherent construction, operation and maintenance problems, unreliability, poor performance, and methods which have not yet been fully demonstrated are characteristics considered during the technology screening process.

B. CORRECTIVE MEASURE ALTERNATIVES

The following corrective measure alternatives reviewed for this report have shown effectiveness in remediating lead and PCBs (with the exception of the No Action alternative which is included for baseline comparison). These technologies include:

Alternative	1	No Action
Alternative	2	Excavating and offsite disposal
Alternative	3	Cap/slurry walls
Alternative	4	Encapsulation
Alternative	5	Soil Washing
Alternative	6	Electrokinetic Leaching
Alternative	7	In-situ Vitrification
Alternative	8	Secondary Smelting
Alternative	9	In-situ solidification
Alternative	10	Ex-situ silicate solidification/stabilization
Alternative	11	Ex-situ polysilicate stabilization/mineralization

Roth Bros. has estimated the following costs for each of the alternatives listed above:

TABLE 1

Alternative	Total Cost (Millions Of Dollars)	Cost Per Ton	Total Waste (Tons)
1	0	0	19,036
2	8.02	421	"
3	.685 - .837	36-44	"
4	1.18	62	"
5	.95 - 2.86	50-150	"
6	1.066 - 1.68	56-88	"
7	5.9 - 6.85	310-360	"
8	2.85 - 5.71	150-300	"

9	3.71	195	"
10	1.43 - 1.99	75-105	"
11	.76 - 1.52	40-80	"

The costs listed in Table 1 do not include the off-site disposal of more than 2,000 tons of soil contaminated with over 50ppm of PCBs. This cost would add over $500,000 to the total cost of each alternative except number 2.

ALTERNATIVE 1 NO-ACTION

The no-action alternative would allow the lead/PCB contaminated materials to remain in place. No further steps would be taken to reduce the concentration of the components which render the material hazardous.

ALTERNATIVE 2- EXCAVATION

The excavation alternative consists of the removal, hauling and disposal of lead and PCB contaminated soil/fill material to a permitted hazardous waste storage, and disposal treatment facility. Sampling of remaining soil/fill would be conducted for confirmation that this alternative meets or exceeds appropriate target cleanup levels.

ALTERNATIVE 3 CAP/SLURRY WALLS

The capping in-place alternative involves capping the existing ground surface in the affected areas. The capping process would cover the lead and PCB contaminated soil/fill material with a low permeability barrier thereby reducing the likelihood of contact with the contaminated material, and reducing the likelihood of migration via infiltrating groundwater or erosion of lead and PCB containing soil/fill. The affected area would also be surrounded by a low permeability slurry or grout wall to reduce migration potential via groundwater underflow.

ALTERNATIVE 4 ENCAPSULATION

The encapsulation alternative involves excavation of the soil/fill material to a designated area on the site. The material would be placed over a bottom liner and sealed with a multi-layered cap. The excavated areas would require backfilling, compaction and grading.

ALTERNATIVE 5 Soil Washing

The soil washing alternative involves excavating the contaminated soil, separating the particles by size, and then applying a combination of physical (scrubbing, pressure, heat jets) and chemical (pH adjustment, oxidation) steps. Since inorganic contaminants tend to bind to clay- and silt-sized soil particles the physical and chemical separation accomplished by the washing concentrates the contaminants into a smaller volume of soil.

Mobile units for soil washing operations are available and could be set up on the Roth Bros. site. Contaminated materials would be excavated as described previously. Mixed waste, such as a combination of organics with metals (i.e. lead and PCBs), make the washing fluid formulation difficult. EPA has rated the applicability of this technology as moderate to marginal for PCB contamination and moderate to marginal on silty/clay soils with metal contamination. This alternative would reduce the volume of contamination by separating and concentrating the contaminants in a smaller volume. Toxicity would likely be reduced for the treated volume but would be higher for the high concentration smaller volume. Mobility is not necessarily addressed since the leachability and chemical state of the treated volume is not known. Technology studies predict a 80-90% reduction in waste volume, resulting in a lower volume (10 to 20% of original), higher concentration waste. Additional treatment (off-site treatment and/or destruction) would be required for the reduced waste volume. Thus this alternative must be considered in combination with off-site treatment and disposal. Further, washing is not applicable to the TCLP-lead material so additional measures would be required for site wastes with this characteristic.

ALTERNATIVE 6 ELECTROKINETIC LEACHING

The electrokinetic leaching alternative is an emerging technology for reduction of metal contamination in soil. Electrokinetic soil processing is an in-situ, semi-continuous technology that electrically induces migration of heavy-metal ions. A low intensity direct current is applied across the contaminated soil. This is a cyclic application that takes two to three months per cycle, based on treatment of homogeneous material.

ALTERNATIVE 7 In-Situ Vitrification

In-situ vitrification alternative involves the use of electrical networks to melt soil or sludge at temperatures ranging from 1600^0 to 2000°C. The process results in immobilization of inorganic pollutants (metals) and PCBs. The soil volume is typically reduced by 20-40% by elimination of void space and ignition/oxidation through low temperature burns. A silicate glass and microcrystalline structure remains as the vitrified soil waste material. Backfill is placed over the vitrified material.

ALTERNATIVE 8 Secondary Smelting

The secondary smelting alternative is otherwise known as slagging with off-gas treatment. During this process waste is injected into a hot (2,200 - 2,500°C) reducing flame in the reactor section of the burner. The control of operating parameters allows extraction of valuable metals and destruction of hazardous organics. Metals such as lead are vaporized from the waste along with volatile compounds. The reactor feeds into a slag separator where process gases are separated from molten materials. The slag is continuously solidified and removed. Off-gas vapors are post-combusted with ambient air and condensed as metal oxides. The mixed metal oxide particulate is collected in a baghouse.

ALTERNATIVE 9 In-Situ Solidification

The in-situ solidification method involves treating the soil/fill material in-place using a large diameter (3 to 12 ft.) single mixing auger. A solidification product, consisting of a cement-organic clay mix, is injected and mixed with the soils. The procedure continues in an overlapping circular pattern over the affected areas. The overall bulk density of treated soil/fill is increased by approximately 21%, and the end product is a low porosity, dense, homogeneous mass of soil/fill. This method is reported to be effective in stabilizing the leachable lead and PCBs without having to excavate the soil.

ALTERNATIVE 10 Ex-Situ Silicate Solidification/Stabilization

The silicate solidification/stabilization alternative involves the solidification and stabilization of excavated soil/fill materials. The affected material is excavated, mixed with silicates and a cementatious material on-site and then cast into molds for on-site or off-site disposal.

This method is applicable to soils and sludges with heavy metals and high molecular weight organics (i.e. PCBs). The wastes are immobilized and bound into a hardened, concrete-like solidified mass. The volume of the treated material will be approximately 50% greater than the original contaminated soil.

ALTERNATIVE 11 Ex-Situ Polysilicate Stabilization/Mineralization

The polysilicate stabilization/or an equivalent mineralization alternative is similar to the silicate solidification/stabilization, but the technology does not form a solidified monolith. Contaminated materials are excavated and processed on site. Heavy-metals contaminated soils are wetted with a polysilicate water mixture and/or other proprietary reagents that convert metal oxides to metal metasilicate or lead phosphate (apatite crystal) mineral structure. Small amounts of a cementatious material are added and the resulting material is cured for a period of time determined from treatability testing. The treated material is friable and may be backfilled and recompacted with conventional earthmoving equipment, and remains workable over the long term.

VIII. EVALUATION OF THE PROPOSED CORRECTIVE MEASURE ALTERNATIVES

This section evaluates the proposed remedies against five remedy decision factors and eliminates those that do not measure up to anyone of the factors.

A. Implimentablity - This means that a particular alternative is practical, it can be constructed and operated, it is a reliable technology, it can be monitored for effectiveness, and the technology is available.

The alternative technologies that do not meet this decision and the reasons are as follows:

Alternative 5 Soil Washing - The lead contaminants at this site have a very small grain size, as does the soil. Separating the contaminated soil by grain size will only remove the small percentage of the soil that has a larger grain size. The reduction in volume of contaminated soil would be correspondingly small.

Alternative 6 Electrokinetic Leaching - This technology exists only at the pilot study stage and has not yet been proven to be reliable in full scale field operations.

Alternative 7 In-Situ Vitrification - This technology is not currently available for full scale field implementation.

Alternative 8 Secondary Smelting - This alternative requires that the soil have enough lead in it to recover are cyclable grade of metal. Since most of the Roth Site soils have less than 5% lead by weight this option is not viable.

Alternative 9 In-Situ Solidification - While this option is implementable, it is not as practical as Ex-Situ Solidification/Stabilization) (ESSS) or Ex-Situ Polysilicate Stabilization/Mineralization (ESPSM). Mixing additives and cement to soil while it is still in the ground makes it difficult to get a uniform mixture and increases the likelihood of having "hot spot" areas that will not pass the remedial standards set for this project. Also, it is also more difficult to maintain quality control over the end product.

Alternative 10 Ex-Situ Solidification/Stabilization - This method is also implementable but considerably less so than ESPSM. ESSS will increase the volume of contaminated soil by 50% (Compared to only 10-15% for ESPSM) and the end product will be monolithic chunks of soil which make handling or building on material much more difficult while providing no additional benefits that ESPSM does not provide.

None of the above alternatives that were not implementable will be considered further in the selection process.

The following alternatives are considered to be implementable: Cap/Slurry Walls, Encapsulation, No Action, Excavation and Off-Site Disposal, Ex-Situ Polysilicate Stabilization Mineralization (ESPSM).

ESPSM has been used at many other sites contaminated with metals and found to be a practical solution for this type of problem. This process typically increases the volume of the treated material by only about 10%.

B. Long Term Reliability and Effectiveness - The magnitude of residual risk must be acceptable and the related controls for the technology must be reliable.

The alternative technologies that do not meet this decision and the reasons are as follows:

Alternative 3 Cap/Slurry Walls - This would isolate the contaminated soil from potential receptors, however the soil itself would not be any less toxic. This site would have to be monitored to ensure the cap/slurry walls were maintaining their integrity for the foreseeable future.

Alternative 4 Encapsulation- As noted above, this option would reduce contact between the contaminated soil and potential receptors, while not reducing the toxicity of the soil. This alternative would require some form of care or maintenance for the foreseeable future, which increases the risk of human error allowing a release to occur.

The above alternatives will not be considered further in this selection process.

The following alternatives are considered to be reliable and effective in the long term: Excavation and Off-Site Disposal and ESPSM. ESPSM would require a minimum of human intervention in order to keep the treated soil covered. The advantage of this alternative is that the cover is only an extra precaution as the treated soil will not leach lead even if the cover was not in place and the increased particle size of the soil will greatly reduce airborne dust from leaving the site.

C. Reduction of Toxicity, Mobility or Volume of Wastes

Alternative 1 No Action - TCLP lead has been detected at levels in limited areas exceeding the 5 ppm level used to define hazardous waste and PCBs exceed 50 ppm in limited areas. This alternative clearly does not achieve any of these objectives and will not be considered further.

Both of the remaining alternatives meet this criterion by reducing the mobility of the contaminants in the soil by stabilizing them with concrete or other materials and then providing some form of cover.

D. Cost - This includes current capital expenditures and future operation and maintenance costs.

Alternative 2 Excavation and Off-Site Disposal- This option is by far the most expensive alternative. Even though this is the most expensive option, it does not , over all, solve any problems. It simply trucks the contaminated soil someplace else where it would then have to be treated anyway.

ESPSM is not extremely expensive and provides a reasonable value to the environment and human health for the cost of this alternative.

IX. PROPOSED CORRECTIVE MEASURES

This section further details the evaluation of the ex-situ polysilicate stabilization technology for application at the Roth Bros site. Initial detailed evaluation is against technical criteria described by USEPA Corrective Action Plan guidance. Additionally, the technology is evaluated relative to satisfying the goals of creating a Corrective Action Management Unit (CAMU) on the site, as described by the 2/16/93 Federal Register CAMU listing.

A. TECHNICAL CRITERIA

The selected technology alternative was reviewed against four technical criteria; performance, reliability, implementability and safety.

1. Performance

Performance of the evaluated technology is measured by the degree to which the technology reduces the possibility of lead and PCBs leaching to the groundwater, reduces exposure of on-site and off-site receptors via airborne dust particles containing lead, and reduces exposure via ingestion.

An ex-situ polysilicate stabilization process is available from Greenfield Environmental/Solid Treatment Systems (STS) Division. STS has performed a treatability study on samples taken from the Roth Bros site.

Treatability studies are performed to develop the appropriate method to eliminate or minimize the concentrations of hazardous materials. The treatability study establishes such factors as appropriate polysilicate mixture for the wastes, the applicability to the site specific soils, and cost information. Two five-gallon buckets of soil were collected from the northern fill area. The sample locations were identified as B-1 and B-2 for analyses were selected from locations of B250 and TP202, respectively. Each sample was obtained by lining a pail with a clean polyethylene soil sample bag. The upper 3 in. of soil was scraped from each location, and soil from 3 to 18 in. depth was excavated with a clean shovel, piled adjacent to the hole and blended before placement into the bag. The bags were then sealed, labeled and stored in the H&A of New York rock and soil laboratory until shipment to STS, Inc.

Prior to submitting the samples to STS, Inc. for the treatability study, H&A mixed a predetermined amount of the lead flue dust with sample B-2 to provide a spiked sample representation of high TCLP conditions. A split (labeled as B-2S) was collected and submitted to an independent laboratory (General Testing Corporation) for TCLP lead analyses. Samples B-1 and B-2 were then shipped on to STS, Inc. in California for the treatability study.

The results of the treatability study indicate the soil/fill material can be stabilized with the STS proprietary reagents at a cost within the range presented for the technology. TCLP tests were used as a measure of the potential of toxic constituents to leach from a waste to contaminate the groundwater. The initial concentration for sample B-2 was 50.15 ppm by a TCLP test. The post-treatment sample was analyzed and found to contain 0.06 ppm of TCLP lead. This indicates a 99% reduction in leachable lead content.

The ex-situ polysilicate stabilization process also increases the average size of soil particles by a minimum a factor of 10. This increase in average particle size decreases the number of particles subject to air entrainment as respirable dust, thereby significantly reducing the inhalation exposure route. Encapsulation of lead compounds in the final metal metasilicate makes the final product less toxic (by ingestion) by limiting the bioavailability of the lead. Total lead concentrations are not reduced, therefore even though the stabilized lead is less bioavailable, an ingestion route would not be eliminated unless the treated area received a minimal cap.

Further bench scale tests were performed by IT Corporation in May and June of 1994. The data from the studies showed the results of TCLP tests on lead contaminated soil treated with five different stabilization formulations. The soil from each formulation was tested by TCLP for lead and other metals at a 3,6, and 13 day cure period. The results of formulations 1 and 2 were as low as non-detect for lead. This data is available in Attachment 4.

2. <u>Reliability</u>

The reliability of the chosen corrective measure is judged by evaluating the operating and maintenance requirements of the process. The ex-situ polysilicate stabilization process does not require any on-going maintenance activities to be reliable. Once the material has been stabilized it is cured in small piles on-site. The cured material is analyzed and used to backfill the formerly contaminated soil excavations. When this operation is complete at all site areas requiring remediation, the process unit is broken down and removed from the site. The only periodic monitoring anticipated would be that required to support closure of the CAMU(s) necessary to perform this on site (see below). This and similar mineralization processes have been performed at several sites to date and have demonstrated reliability of implementation and performance.

3. <u>Implementability</u>

The selected corrective measure should be relatively easy to construct and implement, reducing the contamination in a timely manner.

The polysilicate stabilization and mineralization technologies have been successfully applied to a number of sites. We anticipate the operation of the Roth corrective measure would cycle through the excavation, sorting, treatment (stabilization), curing and backfilling steps in an efficient manner. By selecting the polysilicate stabilization technology, the site avoids continuing operations and maintenance costs that may be associated with other technologies.

In summary, the STS polysilicate stabilization (or equivalent by other vendors) meets these criteria. STS has developed a mobile self contained system for applying the technology that is anticipated would be used at Roth Bros. if STS is the selected vendor.

4. <u>Safety</u>

The selected corrective measure must satisfy the criteria of maintaining the safety of on-site and off-site persons. Equipment for the stabilization/mineralization methods involve conventional earth moving and handling machinery (wet screens, blenders, pugmill, etc.) thus safety measures are relatively easily defined and implemented. Since the treatment is wet, dust control measures are limited to those needed for initial excavation. The Corrective Measures Implementation Report will include measures to monitor lead contaminated dust in the air during these activities.

Site excavation requirements have been reviewed with Roth, and their representatives indicate excavation can be sequenced to allow safe conduct of ongoing site operations.

5. <u>HUMAN HEALTH</u>

The corrective measure selected for the Roth Bros site must satisfy the criteria of being protective of human health.

On site lead contamination has been detected in soils, but not in groundwater. The lead on site has also been shown to have the potential of leaching to groundwater (via TCLP analysis). Although groundwater is not presently and not anticipated to be used for a drinking water source, the polysilicate stabilization/mineralization processes protect human health in this respect by reducing the leachability of lead, thereby protecting the groundwater resource.

As described in the USEPA Uptake/Biokinetic Model, lead impacts are best determined by evaluating effects on blood lead levels. The model shows that many different lead sources (i.e. drinking water, paint) contribute to the total body burden. The site-specific evaluation performed for this CMS determined that lead containing dust particles transported by air movement across the Roth site potentially can contribute to human lead body burdens, if the site was not remediated. The STS stabilization technology increases the size of the treated particles by a minimum 10X making them significantly less mobile, and decreasing their ability to become airborne particles transported off-site. The particle size increase will also restrict the availability of dust particles of a respirable size to on-site personnel.

Toxicity of the treated material is reduced by the decrease in bioavailability of the treated material. However, once treated and replaced on site the ingestion route of exposure would not be eliminated by the STS method. To do this contact with the treated material need only be eliminated. A minimal cap (pavement, building, or minimal soil cover and vegetation) or limited administrative controls to control access would satisfy this criteria. This would be implemented best by consolidating the treated material to allow controlled final placement, grading for drainage to controlled run-off points (such as existing SPDES outfalls), and control of future access.

6. ENVIRONMENTAL

Satisfaction of the environmental criteria is measured by the corrective measures ability to cause the least adverse impact or greatest improvement over the shortest period of time. The polysilicate stabilization or equivalent mineralization meets these environmental goals.

Application of the process is not anticipated to cause adverse effects on environmental receptors. The area of operation for the treatment unit would be industrial. Activities associated with the treatment unit would not be significantly different than those already conducted on site.

Removal of the contaminated sediments from outfall areas for treatment and backfill on-site would limit any further transfer of contamination toward off-site locations from the outfalls. This would be a net positive environmental benefit. Similar to the benefit expected for human health, a decrease in lead containing dust transported off-site will benefit potential environmental receptors.

The polysilicate stabilization or equivalent mineralization will prevent the leaching of lead into groundwater; protecting those resources, and preventing migration of contaminants off-site.

X. Procedure For Reaching A Final Decision

Section 7004(b) of the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. Section of 6974 and 40 C.F.R. § 124.10, as well as Article 27 of the ECL and 6 NYCRR Part 621 require that the public be given forty-five (45) days to comment on a proposed remedy. The comment period will begin on July 20, 1994 and will end on August 18, 1994. Any person interested in commenting on this proposed remedy must do so within the forty-five (45) days comment period.

All persons wishing to comment on this proposed remedy should provide comments in writing to mr. Edwin Dassatti, Chief, Eastern Bureau Hazardous Waste, 50 Wolf Road, Albany, New York 12233-7252 no later than August 18, 1994. comments should include all reasonably available references, factual grounds and supporting material.

NYSDEC will consider all written comments received during the public comment period in making the final remedy decision. Any determination to conduct a public hearing on the proposed remedy based upon written comments will be made in accordance with the EPA requirements in 40 C.F.R. Part 124 and the NYSDEC Uniform Procedures regulations in 6 NYCRR Part 621.

When NYSDEC makes a final determination regarding this proposed remedy, notice will be given to each person who has provided written comments or requested notice of the final decision. The final remedy decision shall become effective thirty (30) after the service of notice of the decision, unless a later date is specified. If no comments request a change in the proposed final remedy, the final remedy decision shall become effective immediately upon issuance.

XI. Tentative Determination

Since the proposed final corrective measure will prevent the contamination from migrating off-site by air or groundwater by reducing the mobility of wastes, complying with applicable environmental requirements (e.g. SPDES, air emissions), and is protective of human health and the environment, the NYSDEC has made a tentative determination that this proposed final corrective measure will be appropriate.