CORRECTIVE MEASURES IMPLEMENTATION PLAN
ROTH BROS. SMELTING CORPORATION
EAST SYRACUSE, NEW YORK

by:

H&A of New York
Rochester, New York

and

IT Corporation
Rochester, New York

For

Roth Bros. Smelting Corp.
East Syracuse, New York

File No. 70185-043
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Geotechnical Engineers &
Environmental Consultants

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New York State Department of
Environmental Conservation
50 Wolf Road
Albany, New York 12233

Attention: Mr. Paul Counterman

Subject: Corrective Measures Implementation Plan
Roth Bros. Smelting Corporation
East Syracuse, New York

Ladies and Gentlemen:

On behalf of Roth Bros. Smelting Corporation, H&A of New York (H&A) and IT Corporation (IT) are pleased to submit this Corrective Measures Implementation Plan (CMI) for the Roth Bros site. The CMI plan has been prepared in accordance with the guidance provided in the EPA document "Interim Final Corrective Action Plan", dated November 1986.

The CMI plan documents the design, operating procedures and performance criteria for the implementation of the polysilicate and cement stabilization of the toxic characteristic lead soils and stabilization and removal of PCB contaminated soils. Details of the CMI have been developed through review of previous site investigations and treatability tests conducted in the lab and field. The design and performance criteria are consistent with the Statement of Basis written by the NYSDEC, and released for public comment during a period ending 18 August 1994.

We look forward to NYSDEC's review and approval of this plan at your earliest opportunity. Please do not hesitate to contact us if you have any questions.

Sincerely yours,
H&A OF NEW YORK

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I. INTRODUCTION

This document shall serve as the Corrective Measures Implementation (CMI) Plan for the Roth Bros Smelting Corporation (Roth Bros.) in East Syracuse, New York, as shown in Figure 1. The purpose of the CMI Plan is to describe the final design and implementation procedure for the preferred corrective action alternative identified in the Corrective Measures Study (CMS) (H&A, July 1993), and the Statement of Basis (NYSDEC, July 1994). This document will be the work plan for the polysilicate and cement stabilization of soils identified as containing total lead at concentrations greater than 825 ppm, TCLP lead at concentrations exceeding 5 ppm, and the removal of soils containing greater than 50 ppm PCBs. Additionally, information is provided in this document concerning the placement of the treated materials in a Corrective Action Management Unit (CAMU), and the construction of cover over the CAMU and already sampled areas of the site containing PCBs greater than 25 ppm. Statistical sampling procedures recognized by the EPA are proposed here for the evaluation of compliance with the performance criteria established for this treatment.

Guidance for developing this CMI was obtained from the USEPA document entitled "Interim Final Corrective Action Plan", November 1986. Other reference texts used during the development of this plan are noted in the text. The document is structured as follows:

- Section I puts forth the purpose and structure of the CMI Plan.
- Section II provides a description of the responsibility and authority of organizations and key personnel involved in the implementation of the chosen remedial solution for the site.
- Section III provides the design basis and strategy based on current understanding of the contamination recognized in the CMS, the applicable environmental and public health standards, and the minimization of environmental and public impacts. This section includes a discussion of the lab and field pilot treatability tests.
- Section IV provides the performance goals and treatment acceptance criteria to be applied to the corrective measures. The applicable sampling plans and analysis quality control/quality assurance procedures are found in this section of the report. This section also includes a discussion of the geotechnical specifications for the treated material and the cover to be placed over the CAMU.
- Section V provides the operating plan to be followed in the field during the full implementation of the selected remedial solution. This section includes a discussion of site controls and contingency plans to protect the health of the public and employees of Roth Bros.
- Section VI provides a discussion of quality assurance documentation and procedures to be followed during the full implementation of the corrective measures.
- Section VII provides a discussion of the project implementation schedule and the proposed content of site coordination meetings and periodic progress report submissions to the NYSDEC.

- Appendices are included in this Plan and include the Community Relations Plan, the results of the lab treatability testing, and a site-specific Health and Safety Plan as required by OSHA for hazardous waste activities.

These sections are supported by figures and data tables where appropriate.

II. PROGRAM MANAGEMENT PLAN

The CMI plan will be implemented by a team of qualified contractors and consultants under contract to Roth Bros. H&A will team with the selected remedial contractor, IT Corporation to conduct the remedial operation. Both parties will share in the responsibility for the quality control of the application of the selected remedy. H&A has had involvement with the Roth Bros. site since the initial RCRA Facility Investigations (RFI), and has produced the RFI reports and the CMS for the Roth Bros. site. IT Corp, the remedial contractor, conducted treatability tests and a field pilot test to refine the design of the selected site remedy and has participated in the development of the CMI plan.

During the implementation of the CMI Plan, IT Corp. will have primary responsibility for the excavation and treatment of contaminated soils identified in the CMS, and construction and closure of the CAMU. IT Corp will employ their experience in the stabilization of soils to the application of the remedy. IT Corp will have responsibility for site control and air monitoring for the protection of the site employees and potential off-site receptors. H&A will assist in the plan implementation by confirming the extent of required excavations, observe quality control functions and obtain and transmit to a lab samples of treated material for confirmation of acceptable treatment. H&A will continue in the role of primary contact with the Roth Bros. plant personnel and the NYSDEC personnel from the Region and the Division of Hazardous Substance Regulation. Roth Bros. will contract independently with Upstate Laboratories in Syracuse for the analysis of the treated samples to confirm the success of the treatment. H&A will produce the progress reports, and final engineering report, including record drawings with assistance from IT Corp. The Operations and Maintenance Plan for the continued monitoring of the corrective measure will be prepared and submitted by H&A after submission of the final engineering report.

IT's and H&A's project organizations are shown on Figure 2. H&A has selected experienced personnel who have worked on earlier investigations and reports prepared for the Roth Bros. site. IT Corp has selected experienced personnel who have worked together on similar projects. The structure of this project is well defined with each individual having a specific task to accomplish. Lines of communication between the parties have been established and tested during the treatability study and pilot study phases of the project.

The personnel involved in the project for H&A include:

Vince Dick-Project Director. Mr. Dick will provide senior management on this project maintaining close communications with field operations, Roth Bros personnel and regulatory agencies with interest in this project. Mr. Dick has been involved with the Roth Bros. project from the beginning of site investigations. He has directed the project through the investigation phase to the remedial selection and implementation.

Margaret Bonn-Project Manager. Ms. Bonn will be responsible for the coordination of H&A field activities during the project, and the approval of field change orders or the implementation of contingency plans at the Roth Bros site. Ms. Bonn has been involved with the Roth project for H&A during the completion of the RFI activities, the preparation of the CMS and continuing groundwater monitoring program. She will also be responsible for producing progress reporting on the remedial process. Ms. Bonn is the branch health and safety manager for the Rochester office, and will provide health and safety input to the project implementation.

Margaret Corrigan - Site Field Coordinator. Ms. Corrigan will provide onsite monitoring of the construction project for H&A. She will obtain and analyze soil samples according to statistical methods for determination of the boundaries of excavation. She will also monitor the collection of samples of treated materials for confirmation analysis. Ms. Corrigan will direct the health and safety monitoring for H&A employee exposure and personnel protective equipment upgrades. Ms Corrigan has been involved with the Roth Bros project for H&A for several years and has conducted field investigations, quarterly groundwater monitoring, and assisted in the production of required reporting.

Stanley Walker P.E.. Technical Support. Mr. Walker will assess the quality control and quality assurance aspects of the CMI project. Mr. Walker will be the certifying engineer for the final engineering report and O&M plan to be implemented at the site. As a vice president with H&A, Mr. Walker has overseen numerous NYSDEC regulated construction projects.

Ray Teeter Ph.D; P.E.- Technical Support. Dr. Teeter will oversee the geotechnical aspects of the soil stabilization project. He will provide guidance to the field personnel, review final grading plans, and specify the design of required CAMU and PCB soil capping. Dr. Teeter has assisted the Roth Bros project during the lab and field pilot treatability tests.

Denis Conley - Technical Support. Mr. Conley will provide assistance to the project in maintaining quality control during the XRF and immunoassay testing to confirm the extent of required excavation for treatment. Mr. Conley is an approved data validator by NYSDEC, and will provide this service during the preparation of the final engineering report.

The personnel involved in the project for IT Corporation include:

Doug Frick - Project Director. Mr. Frick will provide senior management on this project and ensure client satisfaction and technical and financial performance. He will review project progress and results during project execution.

Don Schriber - Project Manager. Mr. Schriber will be responsible for all phases of the stabilization operations performed by IT at the Roth Bros. site. He will serve as IT's field contact with Roth Bros. and H&A of New York personnel. He serves as IT's primary contact in the New York region for remediation and decontamination projects and is located in the Rochester, New York office.

Jeff Korb - Health and Safety Manager. Mr. Korb will be responsible for the development and implementation of the site-specific H&S Plan which will be utilized for the full-scale operations at the Roth Bros. site. He will supervise health and safety technicians utilized on the site and ensure proper monitoring and documentation occurs. Mr. Korb is located in the Rochester, New York office.

Jeff Calarie - Operations Supervisor. Mr. Calarie will be responsible for all daily site activities including supervision of field labor, planning of daily activities, procurement of materials and equipment, and documentation of project progress.

Dr. Ernie Stine - Technical Support. Dr. Stine has been involved in the development of bench-scale testing of the formulation for the stabilization of contaminated soil at the Roth Bros. site. He will continue to provide technical support to the project team. Dr. Stine is a chemist with 7 years of experience in the development of inorganic treatment processes focusing on solidification technology. Dr. Stine is located at IT's treatability laboratory in Knoxville, Tennessee.

John McGahan - Technical Support. Mr. McGahan has been involved in the bench-scale testing of contaminated soil at the Roth Bros. site and will continue to provide technical and field support as needed to the IT project team. Mr. McGahan, a chemist with 36 years of experience, has served as a senior staff consultant to IT's Process Development Group. He has recently retired from IT and is retained as a consultant for this project. He is located in Buffalo, New York.

John Gauthier, P.E. - Technical Support. Mr. Gauthier will provide, as needed, engineering and regulatory support for design and construction issues for the project team. Mr. Gauthier is located in the Rochester, New York office.

The above listed personnel from H&A and IT Corp. will be assisted and supported in this project by technical staff and equipment operators as required.

III. REMEDIAL DESIGN BASIS

The remedial design to be implemented at the Roth Bros. site is based on information collected during previous site investigations, the applicable regulatory guidance on clean-up criteria, the definition of hazardous waste subject to the RCRA program in New York, and the results of proposed technology bench and field scale treatability tests.

3-01. CORRECTIVE MEASURES STUDY/STATEMENT OF BASIS

A Corrective Measures Study for the Roth Bros site was prepared by H&A and submitted to the NYSDEC in June 1993, and an addendum to that report was prepared by H&A and submitted in March 1994. Subsequent to these submissions the NYSDEC approved the CMS and prepared the Statement of Basis in July 1994. The Statement of Basis was made available to the public during a 30 day comment period that closed on 18 August 1994. With the exception of a submittal by H&A on behalf of Roth Bros. to clarify historical or factual statements in the Statement of Basis no public comment was received by the NYSDEC regarding the proposed remediation of the Roth Bros Site

The CMS summarized the information regarding the nature and extent of site contamination and applied recognized regulatory criteria to determine the areas requiring corrective measures. The criteria for TCLP lead and PCBs are relatively clear in USEPA regulation and guidance. The criteria for total lead concentrations triggering corrective measures is not as clearly defined. The CMS prepared by H&A and approved by the NYSDEC employs the USEPA's Uptake Biokinetic model to assess the total lead criteria. In summary, soils and sediments considered subject to corrective measures include those with:

- TCLP lead concentrations above the regulatory threshold of 5 ppm.
- Total lead concentrations greater than 825 ppm, a value determined by the Uptake Biokinetic Model.
- PCB concentrations greater than 50 ppm, the hazardous waste definition

Areas at the Roth Bros. plant site subject to corrective measures for total and TCLP lead are shown on Figure 3. The plant areas recognized as having PCB concentrations requiring corrective measures are shown on Figure 4. The Statement of Basis prepared by the NYSDEC recognized the areas for remediation as those shown on Figures 3 and 4. Additionally the following criteria were established by the NYSDEC:

- Areas that contain over 250 ppm total lead must be topped by an impermeable cover such as macadam (asphalt pavement).
- Soils containing PCBs greater than 50 ppm must be removed for disposal at an off-site facility. Remaining areas contaminated with PCBs must be covered.
- Roth must incorporate a notice in its deed restricting future use of the site to industrial activities.

The clean-up criteria were used to evaluate possible remedial technologies for the site in the CMS. The selected corrective measure includes polysilicate/portland cement stabilization of TCLP and total lead soils and sediments and excavation of PCB soils, treatment to stabilize leachable lead then disposal off-site at a properly permitted facility. This selected treatment satisfies the criteria listed in the Statement of Basis:

- soil treatment to immobilize the lead and other heavy metal contaminants;
- soil remediation that will mitigate impacts on receptors from contaminated dusts; 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 clean-up levels.

The selected corrective measure satisfies the technical, environmental, human health, and institutional concerns as described in the CMS.

3-02. DESIGN APPROACH

A qualitative flow chart (Figure 5) has been prepared to illustrate the approach to implementing the selected remedial design at the Roth Bros site for PCB soils greater than 50 ppm. Figure 6 is the qualitative flow chart for implementing the selected remedial design for TCLP lead contaminated soils and sediments. Details of the equipment set-up and soil treatment plan are described in Section IV. Soils recognized as containing PCB contamination greater than 50 ppm will be handled in a different manner than those soils recognized as containing TCLP or total lead over the criteria.

The boundaries of areas marked for remediation on Figures 3 and 4 are estimates of the areas that may actually require remediation and represent half the distance to the next available clean (below criteria) boring result. To establish the actual boundary of the excavation H&A will undertake a program of field sampling and confirmation analysis. This program will only be applied at critical sides of the excavation. For instance, if the grid being excavated is surrounded by other areas located within the areas marked for remediation, no confirmation sampling will be completed. The field analysis will consist of colormetric testing (chlor-n-oil test kit) for the detection of PCBs greater than 50 ppm, and X-Ray fluorescence (XRF) for detection of total lead at levels greater than 825 ppm. Details of the analytical Standard Operating Procedures and reliability can be found in Appendix B.

A 25 x 25 foot grid based on recent survey results will be set-up over the recognized PCB contaminated locations (refer to Figure 4). Excavation of fill materials from the location will be initiated by the construction contractor. The material will be processed for stabilization of leachable lead then containerized for off-site disposal at a properly permitted treatment, storage, disposal facility.

Samples will be obtained to determine the extent of the excavation for PCB > 50 ppm. One sample will be obtained from each critical side at a distance of 2.5 feet from the 25 foot grid. Samples will be obtained from a depth of 1 foot. A minimum of 3 samples will be collected from random locations at the bottom of the 25 x 25 foot excavation. Should analysis of these samples indicate PCB content below 50 ppm, the initial grid will represent the extent of the excavation. If the samples indicate the presence of PCBs > 50 ppm, more samples will be obtained from locations that represent another 2.5 ft increase in the length of a side of the excavation. This process will continue until the extent of

critical sides of the excavation are determined. The chlor-n-oil test kits will allow rapid availability of results.

A similar approach will be used to confirm the extent of excavation at the areas marked for TCLP and total lead corrective actions (refer to Figure 3). Samples will be analyzed in the field by XRF for determination of the total lead content. Samples indicating concentrations less than 825 ppm will be considered confirmation of the extent of excavation on critical sides. Samples with total lead concentrations greater than 825 ppm will indicate the need for further sampling and an extended excavation. Records of all extent of excavation confirmation sampling will be maintained by H&A and reported in the periodic progress reports and the final engineering report.

The stabilization formulation has been derived by IT Corporation, and a quantitative flow chart has been provided as Figure 7. The formulation considers the previous site investigation results, non-homogenous nature of the fill at the site, and IT's previous experience in soil stabilization projects. To refine the formulation, IT undertook lab and field pilot treatability tests. These tests and their results are described in the following section.

3-03. PROOF OF DESIGN

As the remedial contractor, IT Corp conducted two lab treatability tests on Roth site materials. Letter reports detailing the results of the treatability tests are included in this report as Appendix C. The lab treatability test results were applied to the design of a field pilot test that was conducted during the week of 29 August 1994. The results of the field pilot test were used to establish the performance goals for the technology (refer to Section IV).

3.3.1 Lab Treatability Testing

For the initial lab treatability tests, samples were collected from the site by H&A personnel, targeting areas recognized as having elevated levels of TCLP and total lead. These samples were sent to the IT treatability lab in Knoxville, TN. The lab spiked the samples with lead acetate such that the samples had a total lead of 5560 ppm and a TCLP lead of 4.7 ppm. Several formulations were examined in the first round of treatability testing. The formulations included 10% portland cement, 0.2 % polysilicate, and various amounts of water. The test also investigated the possibility of using lime, a quantity of which was available on the Roth, site as an additive. The lime was found to have no positive effect. During the bench testing, it was discovered that available aluminum in the samples generated hydrogen gas during the stabilization process. A formulation including 0.2% polysilicate in water solution, 10% portland cement and water as needed was determined to be successful for stabilizing the leachable lead in the samples treated. For this formulation, the three day cure TCLP for lead was 0.07 ppm, the six day cure was non-detect, the thirteen day cure result was also non-detect.

An additional set of lab treatability tests were run to more fully study the impact of hydrogen gas production, and to investigate adding the cement as a slurry to control time of set. The formulations tested in the second treatability test included variations in the amount of portland cement to 15% and the polysilicate to 0.4%. Various methods of moisture addition and mixing period were investigated in order to design the field pilot test. This treatability test also studied the stabilization reaction out to the 28 day cure period. It was determined that

the formulations containing 10% portland cement did not pass the 28 day TCLP test. It was also determined that adding the cement in a slurry improved the time of set for the treated material. The final formulation was selected to be 15% portland cement, 0.2% polysilicate diluted one-to-one, and a target moisture content range of 20-25% in the final soil-cement mixture. Based on further hydrogen gas generation evaluation, it was concluded that phosphoric acid or other phosphate compound could be added to soils that contain visual evidence of aluminum to lengthen the time of set and lower the concentrations of TCLP lead.

3.3.2. Field Pilot Testing

The field pilot treatability test was designed to evaluate the selected formulation of polysilicate and Portland on several areas of the contaminated soil at the Roth Bros. site. The selected areas for testing included one area that had been identified as having elevated levels of PCB's, areas that had high levels of total lead, and areas with TCLP lead above and below the 5 ppm criteria. The areas selected also exhibited the different physical characteristics of the site including high moisture content outfall sediments, various fill materials, and soils under pavement. A total of seven areas were excavated and treated. Pilot studies were performed during the week of August 29, 1994 by IT. H&A provided oversight during the week. Representatives of NYSDEC visited the site during the week to observe the pilot treatment operations.

Samples of untreated and treated soils and sediments were analyzed for total and TCLP lead with a cure time of treated samples ranging from 3 to 5 days. The analytical lab used the ICP TCLP method with detection limits as low as 3 ppb. The results of all treated batches ranged from non-detect to 1.9 ppm. Table 1 summarizes the analytical results. Further analysis of these results is included in the Section IV, Performance Goals and Specifications. Table 2 illustrates the quantities of soil, water, polysilicate, and Portland which were mixed for each batch.

The constituents of each batch were weighed on site and mixed. Soil was excavated in the selected area and homogenized with the backhoe bucket. Soil was transported to the pilot treatment area which was set up at the northern pavement edge. Soils immediately adjacent to the pavement edge (area D) were chosen for the first pilot test. The required amount of cement was hydrated in a cement truck, soil and additional water was added and the material mixed. The Type N polysilicate (PQ N) was added and final mixing using the cement truck occurred. The treated material was then poured into the bucket of a backhoe where samples were collected. Treated material was placed on 4 mil poly in the contaminated area covered and marked. Treatment of material from Area D resulted in a lumpy, thick paste with negligible slump.

Mixing using the cement truck created several problems. The treated material did not want to flow from the truck drum and it took large quantities of water to decontaminate the truck for the next test. IT and H&A personnel determined that pilot studies goals could be accomplished using a 6 cubic foot cement mixer which was procured and utilized for all subsequent tests. Weighing, mixing, and sampling procedures were the same as used in the Area D test.

Soil was collected from Area G and treatment performed using proportions described in Table 2. The mixture resulted in a lumpy, thick paste. Soil from Area E was collected and treatment operations performed. The hydrogen head space test for area E revealed the presence of hydrogen and 1% trisodium phosphate (TSP) was added after initial treated samples were collected. Initial samples without the addition of TSP hardened rapidly while the TSP treated sample remained soft. The remaining areas (F, H, A, and B) were treated in the same manner as Area D and G. The head-space test for Area H also revealed the presence of hydrogen formation; TSP was not added to the batch. Mixes resulted in loose to stiff, lumpy pastes with negligible slump except for Area A.

Area A resulted in a two phase mixture consisting of a very liquid phase and a clumpy aggregate phase. Samples of each phase were collected and analyzed for TCLP. IT believes that too much water was added too quickly to this batch. This batch contained a large percentage of rock and gravel. IT decided to treat another portion of Area A soils and add less water. The second blend from Area A was treated, sampled, and analyzed. The results of both batches are included in the analytical data.

Based upon the analytical results in Table 1, the bench scale formulation was successfully applied to various soil types and contamination levels during the field pilot studies. Soils of different physical characteristics and moisture content were successfully treated using moderate mixing methods. Experience was gained in the handling of untreated soils and treated material under field conditions. The following summarizes the results of the field pilot studies:

- The bench scale developed formulations successfully treat all known soil and sediment types and characteristics to TCLP lead below 5 ppm.

- The formulation is tolerant of various moisture content soils and sediments and water addition may be regulated to build a thick paste which will be ideal for handling and placement in the CAMU.

- Although hydrogen gas generation was detected in two areas, this did not appear to interrupt the fixation reaction. Based upon the field pilot test results, IT believes that the presence of aluminum in screened soils will not effect treatment on the larger batches.

- The formulation appears to be successful over a broad range of processing parameters based upon Area A's good treatability results despite poor mix quality, and the fact that the cement truck and portable mixers are not rigorous mixing methods compared to a pugmill.

IV. PERFORMANCE GOALS AND SPECIFICATIONS

4-01. MATERIAL CHEMISTRY PERFORMANCE CRITERIA

Several analyses were performed during the field pilot test to determine predictable chemical criteria for performance of the full scale corrective measures implementation. The testing included analysis of untreated contaminated soil samples for total lead concentrations and analysis of splits of those samples via XRF. Results of these analyses were used to establish a correlation between a field operable instrument (the XRF) and laboratory analytical data (total lead concentrations in soil). The second type analyses consisted of lead TCLP analysis for concentrations of untreated and treated samples. Results of these analyses were used to determine the average and range of percent leachable lead reduction resulting from the polysilicate stabilization procedure.

4.1.1 Pilot Test Total Lead/XRF Results

Total lead concentrations of untreated (raw) contaminated soil samples were performed for each of the Areas A through H treated in the field pilot test. Total lead concentrations are shown on Table 1 and range from a low of 667 ppm to a high of 30,000 ppm total lead. Splits of these same samples were also analyzed by XRF using the same procedure intended for full CMI implementation field use. Resulting XRF intensities were plotted relative to the total lead concentrations and subjected to regression analysis. Regression analysis showed a strong correlation (correlation coefficient $R^2 = 0.86$).

4.1.2 XRF/Total Lead Criterion to Guide Excavation

Only two of the samples collected during the field pilot test had total lead concentrations below the site criteria of 825 ppm. To provide more data towards the lower lead concentrations and the y-intercept shown on figure contained in Appendix D, several lab blanks will be run on the XRF. These results will be added to the correlation line and the revised graph will become the tool for field conversion of XRF intensity readings to total lead concentrations. The total lead analysis by means of XRF analysis will be used during the full implementation to determine and confirm the extent of excavation at the areas designated on Figure 3.

4.1.3 Pilot Test TCLP Statistics - Pass/Fail and Target Criteria

TCLP values of untreated and treated samples in the field pilot test were used to estimate the average and range of percent reduction created by the polysilicate stabilization process. TCLP values for both the untreated and treated field pilot test samples are shown on Table 1.

First the data set comprising the eight initially available untreated sample TCLP results was compared to the overall data set to statistically evaluate the similarity of the two data sets (see Appendix D). Overall, our goal was to determine that the mean of TCLP values of the field pilot tested materials was the same as or higher than the overall site TCLP values, in order to be confident that TCLP results of the field pilot test would represent an average or worst case set of samples. A chi-square ranking of the untreated pilot test TCLP values indicated it to be log normally distributed, as was the initial data set of 83 samples for the entire site. Variances of the two data sets were first analyzed by an F-test and were shown to be different

at a 95% confidence level. A modified student T-test was then used to compare the means of the two data sets. The students T-test was then performed and confirmed that the means of the two data sets are significantly different, however the mean of the untreated 8-sample set was determined to be greater than the mean of the original 83 site-wide untreated samples. In other words, the treatment used in the field pilot test and the resulting TCLP values represent treatment of an average population worse than is expected for the overall site corrective measures implementation.

Percent reduction values were then calculated from the field pilot test results (see Appendix D). To determine the average percent reduction resulting from the polysilicate stabilization the mean TCLP value of untreated soil was determined from the pilot test samples. This value is 7.17 ppm. The average TCLP value of pilot test treated soil was also determined; this value is 0.288 ppm. For this analysis, all non-detect values were included at the detection limit of 0.003 ppm. The average percent reduction of TCLP value calculated based on these two population means is 96.0%.

A range of percent reduction of TCLP values was also determined by looking at the extreme ends of TCLP value reduction by area batch treatment. Area A samples showed the least amount of TCLP value reduction resulting from treatment; Area F showed the greatest amount of TCLP reduction.

Comparing the untreated TCLP values to treated TCLP values for Area A resulted in an estimated 76% reduction. Comparing the untreated TCLP values to treated TCLP values for Area F resulted in 99.99% reduction. The average percent reduction (96.0%) and range of percent reduction (76% to 99.99%) was then applied to the whole site untreated sample TCLP data set. The predicted mean of the untreated whole site sample population is 45.23 ppm. Using the average percent reduction (96.0%) a new treated TCLP average value of 1.81 ppm is predicted (see Appendix D). Applying the same average percent reduction to the predicted high value of the untreated site sample population (671 ppm TCLP lead) results in a predicted treated high TCLP value of 26.84 ppm. This clearly exceeds the RCRA regulatory threshold of 5 ppm, therefore the RCRA regulatory threshold must serve as the past/fail criterion for treatment in the full scale stabilization process. Insofar as the average TCLP value for the pilot test was significantly different and higher than the average for the whole site data set, it is anticipated that the full scale stabilization should be capable of achieving 5 ppm as a pass/fail criterion.

In summary, the RCRA regulatory threshold of 5 ppm will be used as a pass/fail criterion to determine successful treatment of individual batches of lead contaminated material at the Roth Bros. site. TCLP values of treated material will be tracked continuously during full scale implementation to attempt obtaining a mean treated TCLP value approximating or below 1.81 ppm.

4.1.4 Confirmation Sampling/Analyses of Treated Material

Frequency of Sampling: The frequency of obtaining samples during the stabilization process is dependent on the required statistical sample size to achieve the target criteria. The method used to establish the statistical sample size is demonstrated in the USEPA Guidance Document; "Methods for Evaluating the Attainment of Cleanup Standards, Volume 1: Soils

and Solid Media"(February 1989). Specifically, we have employed the method for determining sample size for systematic samples. The methods described in this guidance document are designed to err on the conservative side, with a lower probability that a soil area will mistakenly be designated clean rather than dirty.

We have assumed a 95 % confidence level (the probability that the sample area will be declared clean when it is actually dirty), and a 20% false negative rate (the probability that the sample area will be declared dirty when it is actually clean). The standard deviation used in the calculation was obtained from the evaluation of the data generated during the field pilot test. The clean up standard was set at 5 ppm, and the true mean contaminant concentration was set at 1.8 ppm. The calculation indicates that the appropriate sample size for statistical analysis will be 80 samples. This number was divided by .95 to indicate that 95% of the samples obtained would be successfully analyzed by the laboratory. The number of sample to be collected for TCLP analysis is 84.

Sample Collection/Handling: If we use the assumption that 20,000 tons of material will be treated on the site, and our required sample population of 84; a sample must be obtained every 238 tons of processed material. During the treatment in the pugmill a sample will be collected after every approximately 100 tons of throughput. Dependant on that particular day's production, we will have collected between 6 and 8 samples during the day. Three to four of these samples will be selected for submission to the lab. The samples will be selected to represent the throughput of the process at times approximately evenly spaced out through the day's production. These samples will be logged and set aside for a 3-day cure period, then submitted to the lab. The other collected samples will be discarded in the CAMU area.

During the time when the samples are collected for the 3-day cure samples another sample will be collected which will be analyzed for the 28-day cure results. This sample will be composited off the pugmill during the day's production, with a quantity of sample being collected approximately every 100 tons of throughput. All sample collection and transfer to the lab will be done by H&A personnel.

Selected Lab/Quality Assurance: Roth Bros will contract independently with Upstate Laboratories in Syracuse, New York to provide timely analysis of the samples collected during the full project implementation. The proximity of the lab to the site will provide the ability for quick response times. Upstate Laboratories is a New York certified lab.

The TCLP lead samples submitted to the laboratory will be analyzed according to SW-846 Method 1311, with strict adherence to the matrix spiking frequency required by the method. All TCLP samples will be submitted after their appropriate cure time. The lab will provide 2-day turnaround on the TCLP samples submitted during the active phase of construction. Normal turnaround times will be applied to the 28-day cure samples.

Samples will also be submitted to the lab for confirmation of the total lead and PCB field testing to determine the extent of excavation. Once the extent of excavation has been determined according to the procedure set out in Section 3-02, a composite confirmation sample will be collected from the critical sides of the excavation for analysis at the lab.

Samples generated in confirming the extent of PCB excavations will be analyzed by USEPA Method 8080 for PCBs with one sample in every twenty being subject to MS/MSD analysis. The total lead confirmation samples will be analyzed by USEPA Method 7421. A duplicate sample will be run for every twenty samples submitted. The samples obtained for confirmation of field testing methods (XRF and Chlor-n-oil) will be subjected to the normal lab turn around time for analysis.

4.1.5 Evaluation of Treated TCLP Data

Two criterion will apply to determining success of the full scale polysilicate stabilization: a pass/fail criterion and new target mean value for TCLP after treatment.

As described in Section 4.1.3, the pass/fail criterion will be based on the RCRA regulatory threshold of 5 ppm. Any confirmation sample of treated material that is above 5 ppm will cause retreatment of that batch until such time as the batch passes the 5 ppm pass/fail TCLP criterion. The contingency for retreatment is described in Section 5-04.

TCLP values of treated materials will be collected and statistically analyzed as soon as a sufficiently large population of treated samples is available (approximately 15 to 20 sample results which should be available by the end of the second week of full scale treatment). This sample set will be analyzed to determine a treated lead TCLP mean value and then this value will be compared to the target of 1.8 ppm. As additional results become available over and above the base population the mean will be recalculated on a daily basis to determine proximity with the target TCLP value.

4-02. GEOTECHNICAL PERFORMANCE CRITERIA

The following geotechnical criteria will apply to performance of the full scale CMI.

4.2.1 Treated Material Placement

Prior to placing this treated material in a cell, the subgrade soils beneath the CAMU shall be examined. The soils will be tamped using a plate tamper on a backhoe. Loose, soft, saturated, frozen, or organic materials shall be removed or improved to provide an adequate bearing surface prior to placement.

The treated mixture shall be placed in a fully-saturated condition that should preclude air voids.

4.2.2. Material Strength

The cured treated mixture shall from a sample obtained at mixing, demonstrate an unconfined compressive strength of at least 2 tons per sq. foot, as determined by pocket penetrometer testing; at 3 days of cure.

Each batch or lift of the treated mixture shall demonstrate unconfined compressive strength of at least 2 tons per sq. foot, before being covered by any additional materials.

4.2.3 Cover Materials and Placement

The asphalt pavement for CAMU cover has been designed in consideration of periodic 18-wheeler truck traffic and trailer storage which may be required by Roth Bros. At a minimum, the pavement shall include a minimum 6-inch base/subbase coarse of compacted select granular fill. The base/subgrade shall be graded such that surface water will be conducted away from the CAMU and drained as shown on Figure 10. A drained condition shall be maintained within the base/subbase course during placement; pavement shall not be placed over free standing water on the subbase or under frozen conditions. Pavement covering the subbase shall at a minimum consist of a 2-inch asphaltic wearing course overlying a 3-inch asphaltic binder coarse.

V. OPERATING PLAN

5-01. SITE SETUP

IT will mobilize all equipment and personnel necessary to the site to perform the lead-contaminated soil fixation project at Roth Bros. in East Syracuse, New York. A list of the equipment to be used can be found in Appendix E of this report. Figure 8 shows the site process and CAMU layout.

Once on site, IT will set up the site trailer, pugmill equipment, and install erosion control. Erosion control will consist of silt fence or hay bales located downstream from the work area.

Exclusion zones will be designated with hazard tape and snow fence.

Decontamination areas will be set up for decontamination of personnel and equipment. Decontamination areas will consist of boot wash, hand wash, personnel protective equipment (PPE) donning and doffing area, and exclusion zone sign-in/sign-out log. The equipment decontamination area will consist of a lined area for washing equipment with a berm for collecting water. Decontamination water will be collected and used in the treatment process. Final decontamination water will be collected, sampled, and properly disposed as determined necessary by the results of the lead and PCB analyses.

5-02. EXCAVATION PLAN

Figure 9 shows the construction sequence for the excavation and placement of impacted materials.

Initial operations will consist of excavation of cells to place treated material and excavation of impacted soils from the designated outlying areas targeted for remediation. Asphalt and concrete removed will be staged in an area designated by Roth Bros. Impacted soil removed from outlying areas will be placed in a staging area within the limits of the CAMU, on the south side. This material will be screened and processed first. CAMU cells will be developed as necessary to receive processed material. Individual cells, approximately 4 feet deep by 30 feet wide by 200 feet long (equivalent to approximately one day's production) will be excavated, excavation will begin at the cell labelled Number 1 and proceed with alternating cells from north to south. The alternating of cell development will allow for an undeveloped cell between developed cells until the material placed in the developed cells has cured.

After approximately one day of curing time for the developed cell, the undeveloped cell will be excavated. As an example, cell #1 and #3 will be developed and filled first, then #2 and #4 will be developed after #1 and #3 have cured.

The uncontaminated material excavated from the cells of the CAMU will be staged in the clean soil stockpile area northwest of the CAMU. This material can be used for backfilling the outlying excavated areas.

To minimize the size of the CAMU area, cells numbered R1, R2, 19 and 20 will be developed last. These cells will be developed only if required.

The treated material will be placed into the poly-lined cells with a rubber tired loader being careful to eliminate voids and air pockets. Vibrator equipment will be available if needed to reduce the likelihood of void space.

5-03. SOIL TREATMENT PLAN

Contaminated soils will be treated by fixating the leachable lead with a combination of Portland cement, sodium polysilicate, and water. Trisodium phosphate may be added to increase the time of set and treat hydrogen gas generation problems if encountered.

5.3.1 Pretreatment

Soil will be excavated from the identified contaminated outlying areas and staged as described in Section 5-02. Some natural dewatering will take place while the soils are staged. Soils will be screened through a Kolberg Model 271 screening plant or equivalent to remove particles that are over 1-1/2 inches in size. Some soils may be screened more than once to assure a soil consistency that will readily pass through the pugmill feed hopper and mixer.

A qualitative hydrogen concentration headspace test will be conducted on an hourly basis from the screened soil stockpile of more frequently if visual examination reveals the presence of aluminum. IT believes the screening process will remove most of the aluminum which is large enough in size to effect the treatment process.

The headspace test will be performed by collecting sample of the soil in a plastic bag and adding reagents and mixing thoroughly. After 30 to 90 minutes a PID detector will measure LEL for hydrogen gas generation. TSP would then be added to the mixing operation based on these results.

Soils from some of the designated outlying areas consist of large amounts of organic materials. These soils will be mixed with drier granular soils to assist in the feeding and mixing through the pugmill. Care will be taken to segregate previously identified PCB soils from non-PCB soil.

5.3.2 Mixing Operation

Actual soil mixing will be performed with a Kolberg Model 53 portable pugmill plant or equivalent.

Soil will be placed in the feed hopper from the pretreatment area using a loader. Soil weight will be measured with a calibrated bucket scale on the loader. Portland cement will be added to attain the 15 percent mixture via a hopper over the feed belt. Water will be added at the mixing chamber. The water source will be an on-site fire hydrant and 2-inch hose. Water will be regulated with a flow meter and valve arrangement.

Mixing in the pugmill is performed by paddles on twin counter-rotating shafts in the 8-foot mixing chamber. The arrangement of the mixing paddles and exit chute determine mixing energy and retention time. Initial operations will include mixing chamber adjustments to

maximize energy, retention time, and productivity to assure complete mixing. Sodium polysilicate will be added using a spray bar in the mixing chamber. Trisodium phosphate will be added in liquid form using a hand-held sprayer or by addition to the polysilicate mixture, if necessary.

After leaving the mixing chamber, the treated material will be discharged by the discharge conveyor into a pile.

During treatment operations, all ingredients will be weighed or metered to assure proper proportioning. Visual observations of the feed material, mixing chamber, and discharge will be constantly noted to assure proper mixing.

5.3.3 Post-treatment

Mixed material will be segregated into daily batches. A daily batch will vary in size depending on production for the day. Estimated productivity is 700 tons per 10-hour crew workday. During the 10-hour crew workday, it is anticipated that pugmill production will be 8 hours, the remaining time being for startup, cleanup, and maintenance.

The sampling plan for confirmation analysis for TCLP is described in Section 4.1.4. Samples will be delivered to a local lab. The results will be faxed from the laboratory to the site to allow timely assessment of compliance with the treatment acceptance criteria as confirmation the treatment was successful.

After treatment, the material will be placed with a loader into the appropriate cell of the CAMU as described in Section 5.0. Final curing will take place in the CAMU cell. All batches placed in the cells will be labeled with a flag or paint depicting batch date. A diagram of batch placement locations will be kept.

Equipment will be decontaminated prior to demobilization. This will be accomplished by scraping and high-pressure washing. Decontamination waters will be stored on site. After decontamination procedures are completed, demobilization of equipment will commence.

5.3.4 CAMU Closure/Cover

The treated material will be smoothed and graded as much as practical during placement into the CAMU. After all the treated material has been placed and passed the required TCLP analysis the final grade will be effected by the selected fill material. An asphalt cap will be installed as per Figure 10. The cover will be sloped towards Roth's SPDES outfall 002. The asphalt will be feathered to match existing asphalt and a ramp will be installed to facilitate access to the top of the CAMU for future use by Roth Bros.

an impermeable liner geomembrane may be needed if DEC needs.

5.3.5 Restoration of Outlying Areas

Outlying areas will be restored using compacted clean fill. Unpaved areas will be seeded to match existing vegetation. Paved areas will have asphalt or concrete installed based upon the repavement of Roth Bros.

5.3.6 Affected Monitoring Well Closure and Replacement

During CMI remedial construction activities at least three groundwater monitoring wells will require abandonment and replacement. Monitoring wells B290-OW, B278-OW, B279-OW, and B273-OW are located within targeted remediation areas, and/or the area designated for CAMU excavation.

Monitoring well B290-OW located on the east side of the storage shed will remain in its current location. Because fill depth in the area is only 2.0 ft., excavation around the well may be completed without significant damage, to the well casing or backfill around the screen.

Monitoring well B273-OW located north-east of the Lead Dross Shed will require abandonment since fill is as deep as 5.0 ft. in that area. A replacement monitoring well will not be installed in this area because groundwater quality is currently not monitored at this well and also because following completion of the CMI all contaminated soils from this area will be stabilized and relocated to the assigned CAMU.

Both monitoring wells B278-OW and B279-OW located in the northern fill area will require abandonment and replacement. The replacement wells will be relocated outside and downgradient of the completed CAMU. These monitoring wells will be installed at completion of the CAMU and will be part of the proposed site groundwater monitoring in the Operations and Maintenance Plan (O&M). The O&M Plan will be submitted following final grading and closure of the CAMU.

5-04. CONTINGENCY PLANS

5.4.1 Production Run Fails TCLP Standard

In the unlikely event that QA/QC sampling reveals a production run failing TCLP acceptance criteria, IT will retreat the material failing the analysis. Once the area of material is located it will be retreated. The retreatment process will be done in-situ in the cell. Retreatment will consist of loosening the material with the excavator bucket; adding Portland cement, PQ N, and necessary water; and mixing. Additional treated material will not be placed over the retreated area until the material passes TCLP.

5.4.2 Weather Issues

Precipitation. To limit moisture content variability, excavated untreated soil will be covered during periods of precipitation. Treated material which has been placed in the cell and not yet cured will also be covered to avoid interruption of curing process.

The formulations developed for the treatment process allow a wide range of moisture content and the treatment process may be continued during precipitation, as long as the untreated soil stockpile is covered and treated material is protected from accumulated water. The material will be exposed to precipitation during processing; however, water addition may be adjusted during processing.

During periods of heavy rain, it may be necessary to cease process operations.

Temperature. The cooler fall temperature will affect the time of set. The rate of curing is slowed by lower temperatures. The polysilicate material is especially sensitive to temperatures below 40 degrees Fahrenheit (°F). At this temperature, it becomes extremely viscous. However, once combined with the soil-Portland matrix, the polysilicate remains effective and reacts, but at a slower rate. The curing will continue. The slower time of set will facilitate placement of the treated material.

The project is scheduled for the fall of 1994 and ambient temperatures of 40°F are expected. The polysilicate material may be heated and utilized in soils which are below 40°F. Ambient air temperatures at or below 32°F on a continuous basis are likely to significantly impair the hydration process.

The treatment process will be completed on site prior to the normal ground freezing in the Syracuse, New York area.

5.4.3 Dust Control

Based upon real time dust monitoring described in section 5-05 Health and Safety and visual observation the need for dust suppression procedures will be constantly evaluated. The document which will serve as guidance for the implementation of dust control procedures is the TAGM issued October 1989 by NYSDEC.

The critical dust generating areas will be at the excavation faces, the contaminated soil stockpile, loading and discharge of the screening equipment, and the loading and mixing areas of the pugmill. In addition, the potential of dust generation exists during transportation of the contaminated soil in the rubber tired loaders from the excavation faces to the treatment area. Since the processed soil is a wet paste no dust control problems are expected in the placement of treated material in the CAMU.

Water is one of the basic additives of the polysilicate cement treatment process and will be utilized to control the generation and migration of dust. If dust control measures are needed water can be sprayed using garden hoses on excavation faces, hauling equipment, stockpiles, screening plant, and pugmill. Other controls shall be utilized such as covering stockpiles and excavation faces when not in use.

5-05. HEALTH AND SAFETY

A site-specific H&S Plan (SSHSP) will be developed to comply with OSHA CFR 1910.120 regulations for work to be performed on a RCRA hazardous waste site. The H&A Health and Safety Plan prepared for Roth Bros. activities is included as Appendix F. The plan has been tailored to meet the

what

level

requirements of working with the lead- and PCB-contaminated soils, equipment involved in excavation and treatment of materials, and air monitoring to prevent exposure to personnel at the site and the surrounding community. IT will prepare a HSP that includes procedures to be implemented by their personnel during remedial operation.

5.5.1 Air Monitoring

An important aspect of the Health and Safety plan is an air monitoring program to determine and control local and offsite impacts of the stabilization activities. The plan addresses exposures to operations personnel, Roth Bros. employees and the surrounding community. A personnel sampling program to determine exposures to field personnel will be instituted using personal sampling methods. Three ambient monitoring stations will be utilized to collect data on fugitive dust generated by site operations. Stations will be set up upwind and downwind of the operations. In addition a third station will be deployed at a point on the site nearest the neighborhood next to the site.

IT will also use real time dust monitoring equipment and log results on a daily basis. Results will be utilized to determine and implement dust control procedures described in Section 5.4.3. Fugitive dust suppression particulate monitoring will be performed in accordance with the NYSDEC TAGM issued in October 1989. Action levels in this document will be followed as well as suggested dust suppression methods.

VI. QUALITY ASSURANCE

6-01. DOCUMENTATION

During the performance of the selected remedial design, documentation for purposes of quality assurance will be maintained by H&A and IT personnel. H&A field personnel will record site observations, field test results and excavation dimensions in a daily field report (DFR). IT personnel will record other project data including weights of soil and additives used in each batch of the stabilization, records of batch placement in the CAMU, visual observations of untreated and treated materials, results of hydrogen screening testing, and results of the site air monitoring program. IT will document this information in a Field Activities Daily Log (FADL). Both parties will record any other information that they deem significant to the operation.

Should a modification in the operating plan be required by observations made during the full implementation, a field modification form will be completed by the party initiating the change. This field modification will be approved by the other site party. Completed field modification forms will be forwarded to the representatives of Roth Bros and the NYSDEC. Such documentation will be prepared for all procedures that differ from those outlined in this CMI.

The DFRs, FADLs and field modifications will become part of the record of the corrective measures implementation. These documents will be used to produce the final engineering report for the corrective measures.

6-02. CORRECTIVE ACTION

If deviations from the operating plan contained in this document are noted by site personnel the matter will immediately be brought to the attention of the Project Directors for H&A and IT. The Project Directors will inform the NYSDEC of any discovered discrepancies. Dependant on the seriousness of the deviation a meeting may be held between representatives of IT, H&A, Roth Bros and the NYSDEC to resolve the matter and formulate a solution. Either Project Director, the NYSDEC, or Roth Bros may shut down the operation if serious deviations from the CMI plan are discovered.

All employees of IT and H&A are expected to comply with the site specific health and safety plan prepared for the site. Any employee refusing to comply with this plan or causing other unsafe situations will be immediately removed from the project.

VII. SCHEDULE

This section discusses the proposed project implementation schedule for the soil stabilization and construction of the CAMU. Also included in this section are details of the proposed content of site coordination meetings and periodic progress reports to be produced for the NYSDEC.

7-01. PROJECT SCHEDULE

The proposed schedule for the corrective measures implementation is shown on Figure 11. This schedule includes tasks to be undertaken by Roth Bros, H&A, IT, and the NYSDEC. It includes tasks from the initiation of remediation to those expected to be required by the NYSDEC following the remedy implementation. The scheduling of these items is tentative and may be weather dependent as described in Section 4.4.2. The time of construction is based on a average daily treatment rate of 700 tons. At an average prediction of 20,000 tons for treatment, approximately 28 days of treatment operations will be required. Operations are currently planned for 10 hours per day and six days per week. The submittal dates for the final engineering report and Operations and Maintenance Plan will be dependant on the date of final grading for CAMU closure.

7-02. PROGRESS MEETINGS AND REPORTS

It is anticipated that weekly site meetings will be held that will summarize the operations slated for that week, update participants on the activities completed during the previous week and address any health and safety concerns. These meetings will be open to interested parties from H&A, Roth Bros, and the NYSDEC. The meetings will be conducted by IT personnel. Minutes of the topics of discussion will be produced and copied to the interested parties. Additionally, a thorough health and safety briefing meeting will be held at a site location prior to the construction implementation.

Monthly progress reports will be produced during the construction and final grading operations at the site. The contents of these reports will include the following items:

- A summary of materials excavated, treated and placed in the CAMU during the period.
- A summary of the analytical data generated during the period, including XRF and chlor-n-soil results from the determination of the extent of excavation, and any available confirmation TCLP results from previous month's batches.
- A summary of any changes anticipated in the operational plan.
- A summary of the air monitoring program results, and details of any contingency actions initiated.
- General report on health and safety activities, including any accident or incident reports.
- List of PCB waste generated or shipped from the site during the period.
- Discussion of any planned changes in the project approach, schedule or other relevant information.

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TABLE I

ROTH BROS. SMELTING CORP.

FIELD PILOT TEST LABORATORY RESULTS

LOCATION	SAMPLE I.D.	TOTAL LEAD (PPM)	TCLP LEAD (PPM)	EXTRACTION Ph
AREA A	1–RAW	667	1.08	6.19
	2–RAW	1720	1.64	6.20
	3–RAW	1340	1.58	6.22
	4–TREATED	––	0.25	12.48
	5–TREATED	––	ND	11.23
AREA A (RETEST)	1R–RAW	1080	1.22	6.25
	2R–RAW	1660	1.76	6.23
	3R–TREATED	––	ND	10.81
	4R–TREATED	––	0.008	8.61
AREA B	1–RAW	983	1.57	5.36
	2–RAW	2390	1.6	5.76
	3–TREATED	––	0.054	12.17
	4–TREATED	––	0.08	12.25
AREA D	1–RAW	4000	2.05	6.40
	2–RAW	29400	3.68	6.26
	3–TREATED	––	ND	11.40
	4–TREATED	––	ND	11.32
AREA E	1–RAW	4670	3.09	6.27
	2–RAW	5960	4.86	6.24
	3–TREATED	––	0.53	12.31
	4–TREATED	––	ND	10.74
	5–TREATED	––	ND *	10.08
AREA F	1–RAW	1380	19.7	5.28
	2–RAW	2780	36.5	5.63
	3–TREATED	––	ND	10.82
	4–TREATED	––	0.24	12.34
AREA G	1–RAW	877	1.61	6.01
	2–RAW	772	2.03	5.97
	3–TREATED	––	ND	10.66
	4–TREATED	––	0.013	12.20
AREA H	1–RAW	8720	21.5	5.81
	2–RAW	30000	16.5	5.83
	3–TREATED	––	1.8	12.19
	4–TREATED	––	1.9	12.21

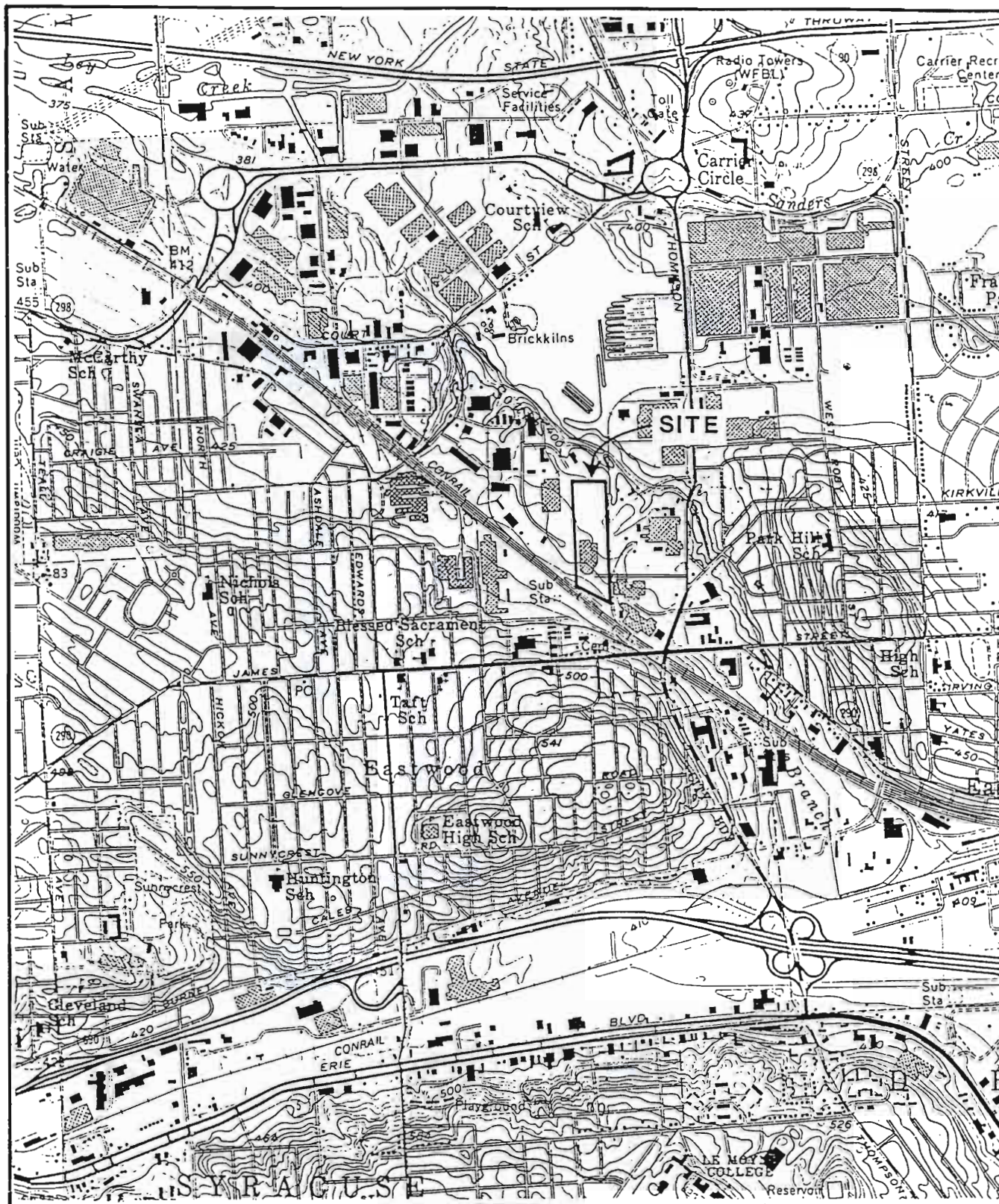
NOTES:

1. " * " Indicates trisodium phosphate was added to treated batch.
2. ND = Not detected above laboratory detection limits (detection limit = 0.003 ppm)
3. " –– " Indicates sample was not analyzed for that parameter.

TABLE 2

PILOT STUDIES MIXTURES

Area	LEL H_2 Test	Pounds of Soil	Percent of H_2O	Pounds of Cement	Pounds of Hydration H_2O	Pounds of PQ N	Pounds of Additional Water	Comments
A	ND	406	7.4	60.9	30.5	0.81	88.5	Visually Poor Mix Quality
A Retest	ND	353	7.4	52.3	26.2	0.70	75	Stiff, Pasty Material
B	ND	332	27	49.8	24.9	0.66	0.00	Stiff Paste
D	ND	3,130	12	564	235	6.25	167	Quick Set, Stiff, All water not added
E	220	352	16	2.8	27	0.70	29.6	Stiff Paste
F	ND	510	18	76.5	38.3	1.02	0.00	Stiff Paste
G	ND	332	14	49.8	24.9	0.66	40.1	Stiff Paste
H	780	290	52	43.5	21.8	0.41	0.00	Stiff Paste



H & A of New York

Consulting Geotechnical Engineers, Geologists and Hydrogeologists

ROTH BROS. SMELTING CORP.
SYRACUSE, NEW YORK

PROJECT LOCUS

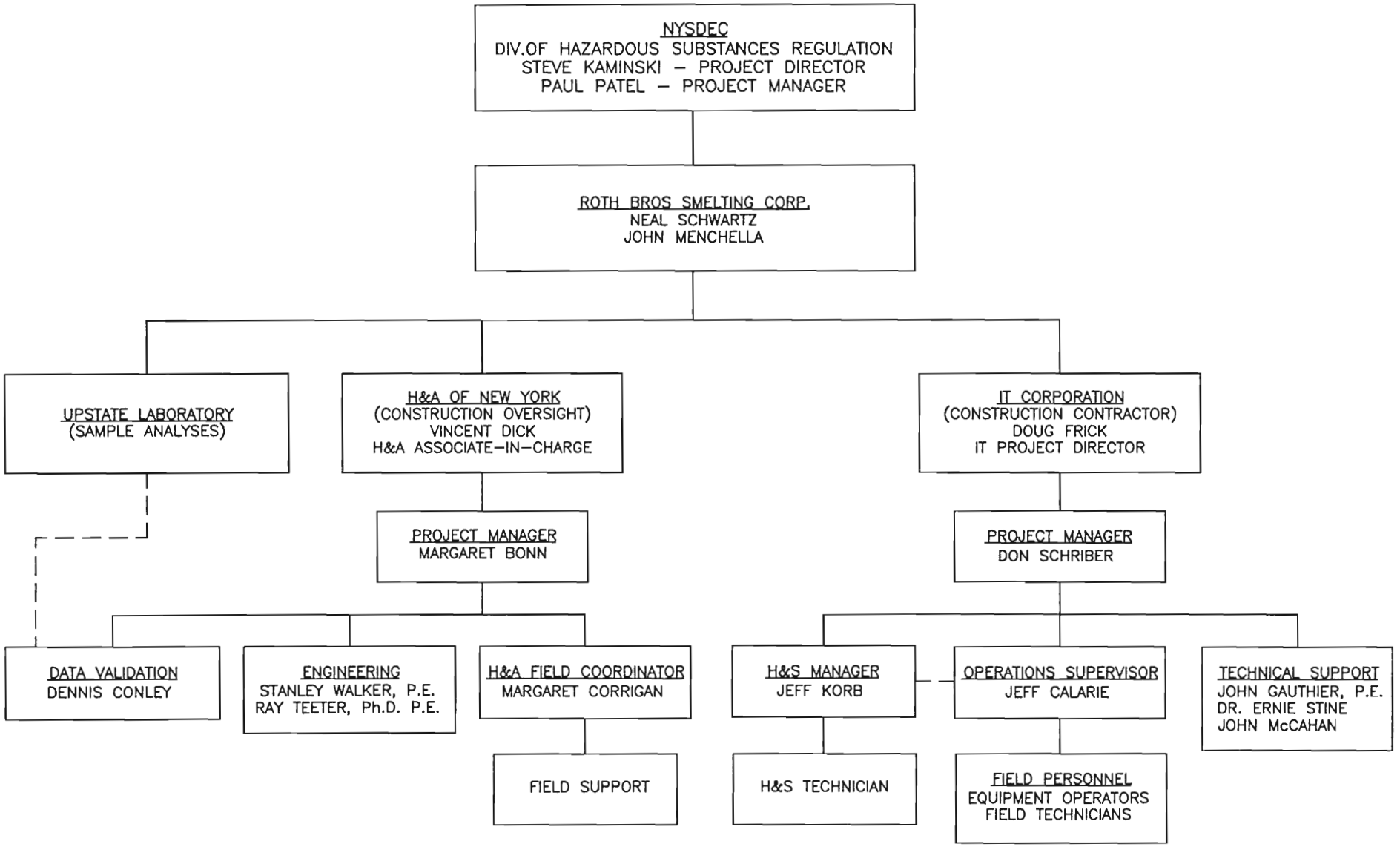
SCALE: 1 IN. = 2000 FT.

SEPTEMBER 1994

FILE NO. 70185-43

FILE NO. 70185-43

PROJECT ORGANIZATION CHART
ROTH BROS SMELTING CORP.
CORRECTIVE MEASURES IMPLEMENTATION



SEPTEMBER 1994

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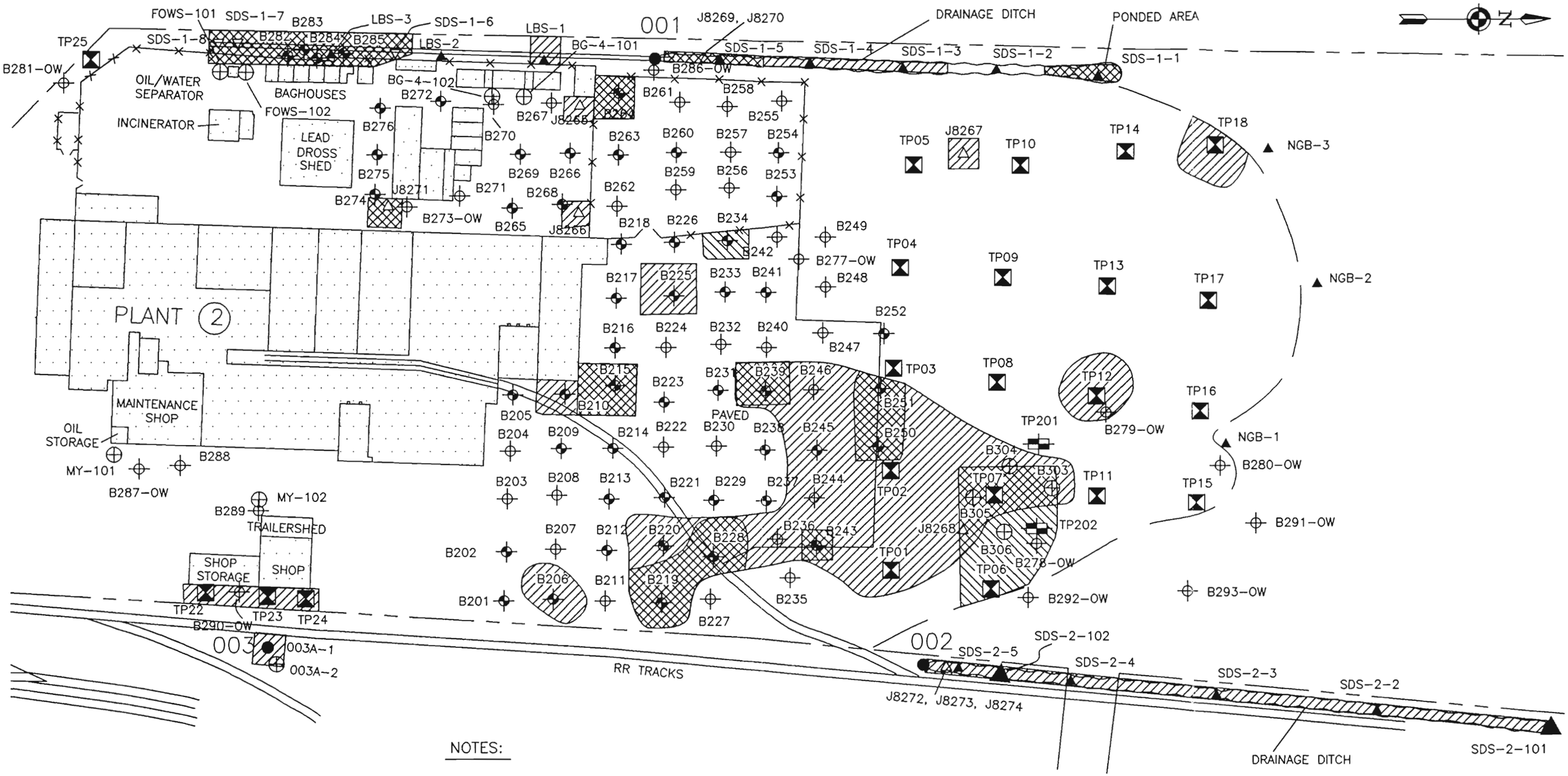
FIGURE 2



NOTES:

AREA WITHIN HATCHURED MARKS INCLUDES SOIL WITH TOTAL LEAD CONCENTRATIONS > 825 PPM. AREA IS ESTIMATE ONLY BASED ON SAMPLING AND ANALYSIS PERFORMED TO DATE.

AREA WITHIN HATCHURED MARKS INCLUDES SOIL WITH TCLP LEAD CONCENTRATIONS > 5 PPM. AREA IS ESTIMATE ONLY BASED ON SAMPLING AND ANALYSIS PERFORMED TO DATE.

ACTUAL EXTENT OF COMPOUND PRESENCE MAY DIFFER.

H&A OF NEW YORK
Geotechnical Engineers & Environmental Consultants

ROTH BROS. SMELTING CORPORATION
EAST SYRACUSE, NEW YORK

TARGETED TOTAL LEAD AND TCLP LEAD REMEDIATION AREAS

SCALE: 1 IN. = 100 FT. SEPTEMBER 1994

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FIGURE 3

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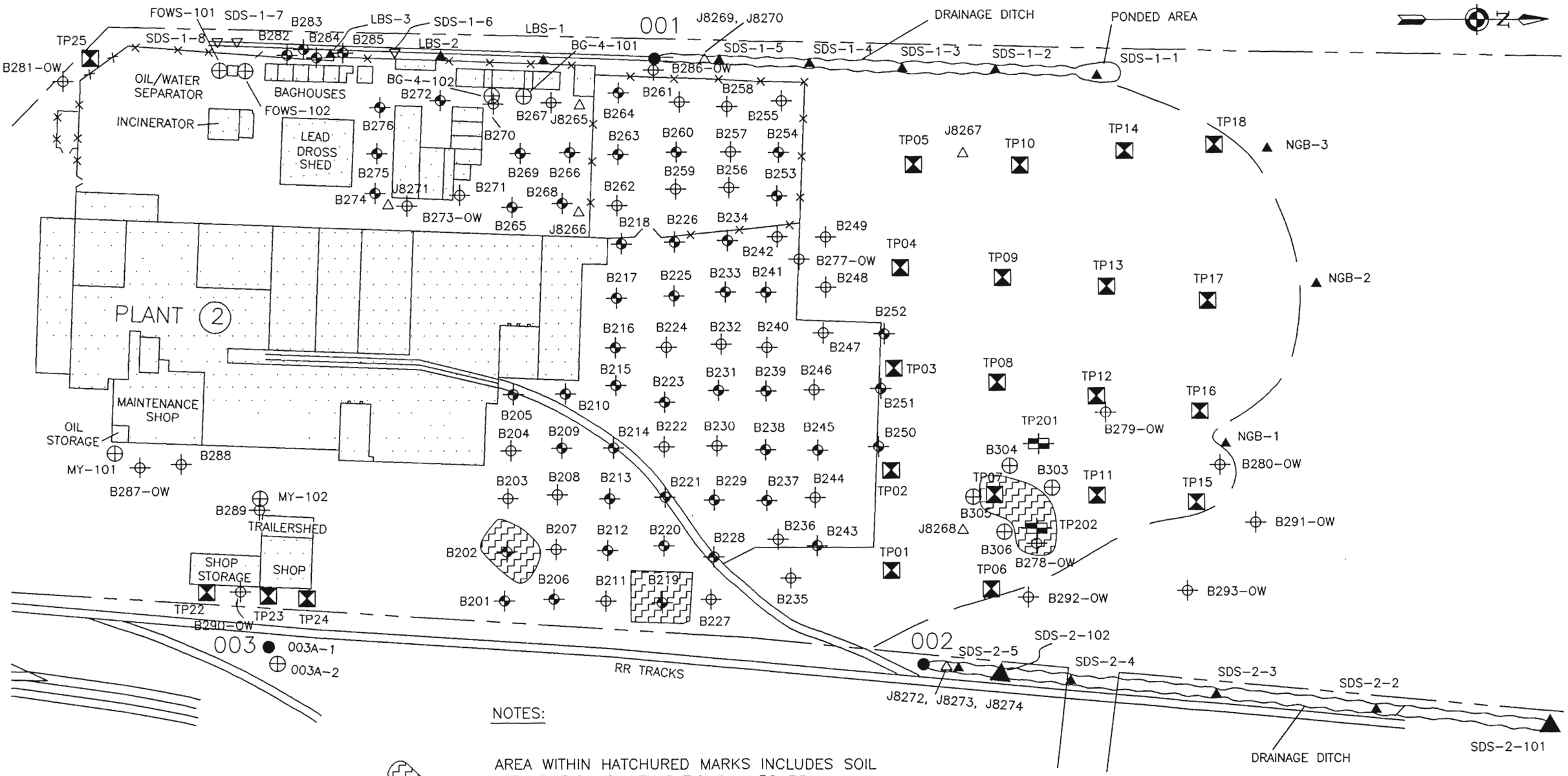


NOTES:

AREA WITHIN HATCHURED MARKS INCLUDES SOIL WITH PCB'S CONCENTRATIONS > 50 PPM. AREA IS ESTIMATE ONLY BASED ON SAMPLING AND ANALYSIS PERFORMED TO DATE.

ACTUAL EXTENT OF COMPOUND PRESENCE MAY DIFFER.

H&A OF NEW YORK
Geotechnical Engineers & Environmental Consultants

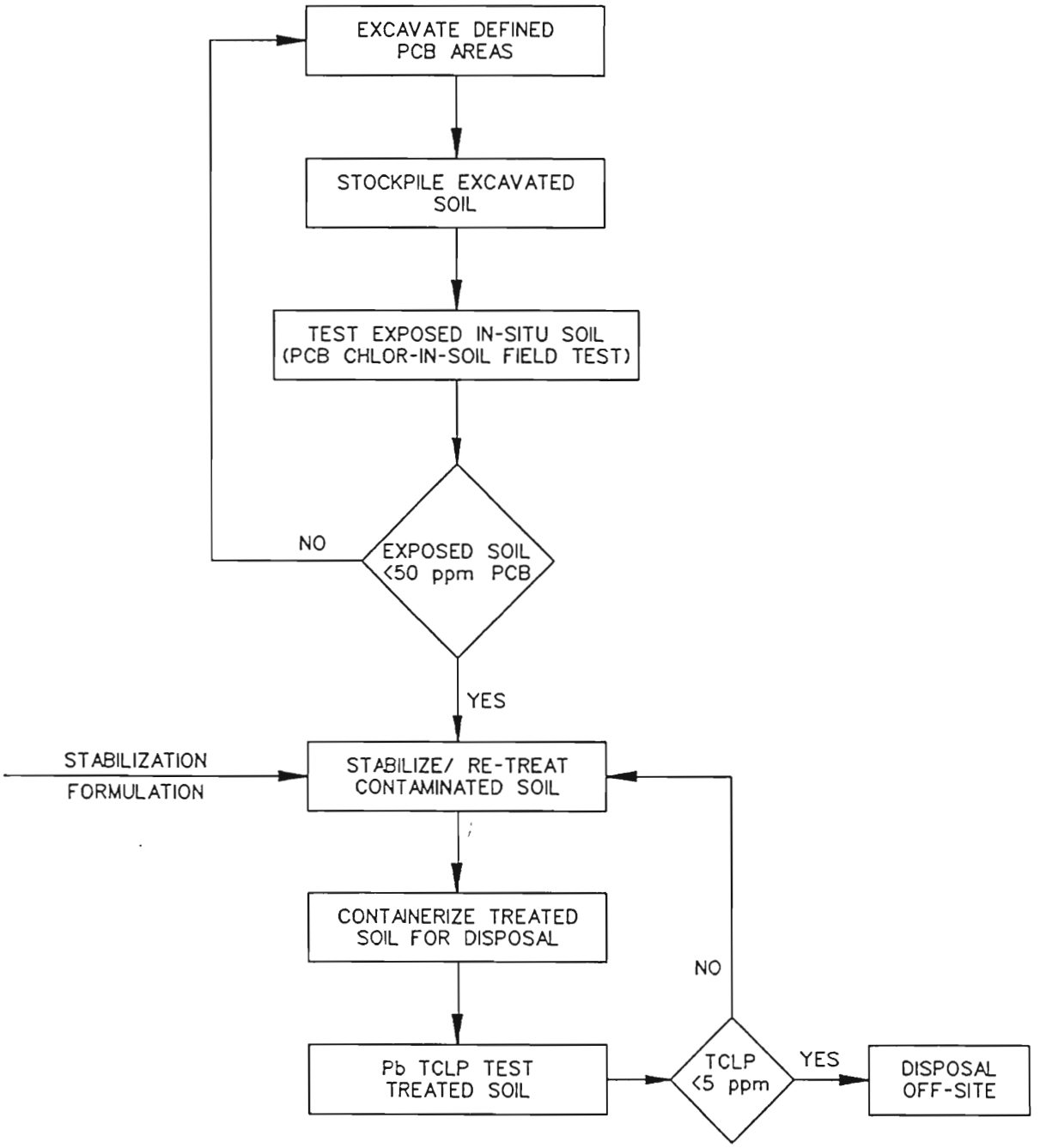
ROTH BROS. SMELTING CORPORATION
EAST SYRACUSE, NEW YORK

PCB EXCAVATION AREAS

SCALE: 1 IN. = 100 FT. SEPTEMBER 1994

FILE NO. 70185-43

QUALITATIVE FLOW CHART
ROTH BROS CORRECTIVE MEASURES IMPLEMENTATION
PCB > 50 ppm SOILS



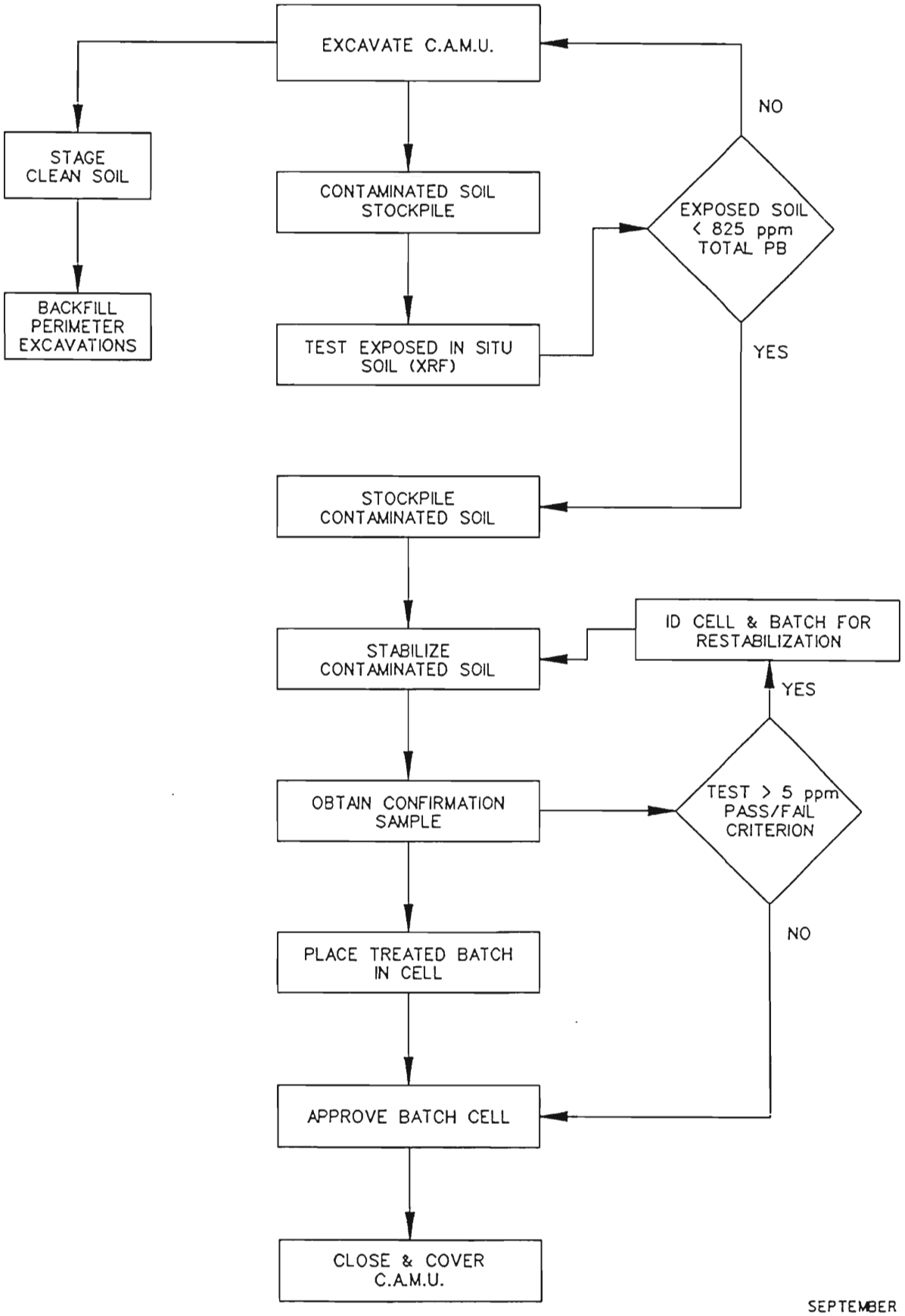
FILE No. 70185-43

SEPTEMBER 1994

FILENAME: FIG5.DGN

FIGURE 5

QUALITATIVE FLOW CHART
ROTH BROS CORRECTIVE MEASURES IMPLEMENTATION
LEAD REMEDIATION



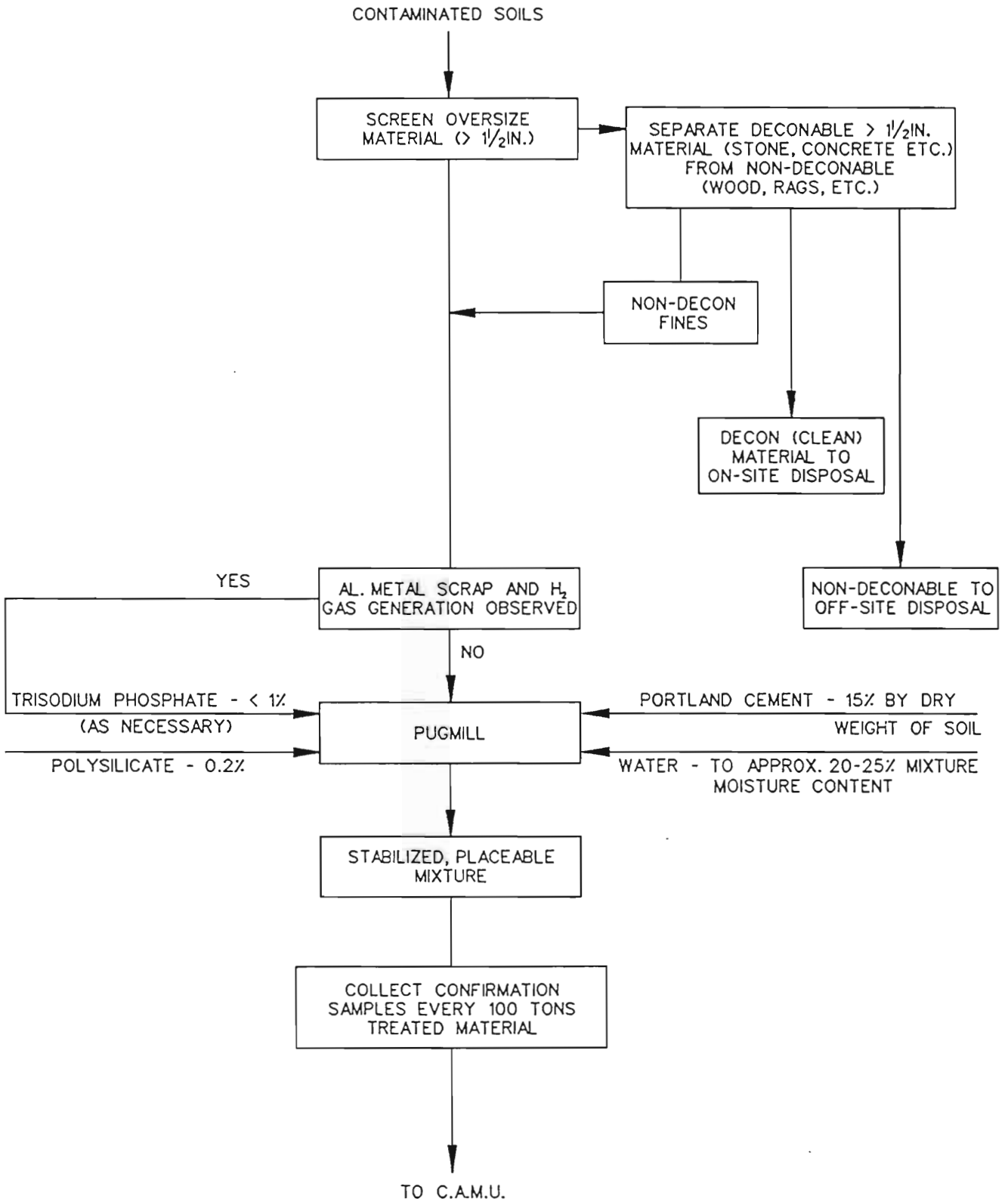
FILE No. 70185-43

SEPTEMBER 1994

FILENAME: FIG6.DGN

FIGURE 6

QUANTITATIVE FLOW CHART – POLYSILICATE STABILIZATION



FILE No. 70185-43

SEPTEMBER 1994

FILENAME: FIG7.DGN

FIGURE 7

DRAWN BY	C.J.B.	CHECKED BY	
	09-09-94	APPROVED BY	

DRAWING NUMBER 515579-B1

OIL/WATER SEPARATOR
BAGHOUSES
INCINERATOR
LEAD DROSS SHED
PLANT ②
MAINTENANCE SHOP
OIL STORAGE
TRAILERSHED
CONSTRUCTION OFFICE TRAILER
SITE SUPPORT ZONE
SHOP STORAGE
SHOP
PARKING AREA
R.R. TRACKS
APPROXIMATE LIMITS OF EXCAVATED CONTAMINATED SOIL STAGING AREA (150'x150')
DECON. PAD
PS TANK
SODIUM POLYSILICATE MIXING TANK
PUG MILL
SILO (CEMENT)
SCREEN
EXISTING EDGE OF ASPHALT
CLEAN SOIL STAGING AREA (60'x60') FOR BACKFILL OF EXCAVATED AREAS
APPROXIMATE LIMITS OF C.A.M.U.
APPROXIMATE LIMITS OF EXCLUSION ZONE
R.R. TRACKS
EXISTING DRAINAGE DITCH

LEGEND:

AREA WITHIN HATCH MARKS INCLUDES SOIL WITH TOTAL LEAD CONCENTRATIONS > 825 PPM. AREA IS ESTIMATE ONLY BASED ON SAMPLING AND ANALYSIS PERFORMED TO DATE

AREA WITHIN HATCH MARKS INCLUDES SOIL WITH TCLP LEAD CONCENTRATIONS > 5 PPM. AREA IS ESTIMATE ONLY BASED ON SAMPLING AND ANALYSIS PERFORMED TO DATE.

AREA WITHIN HATCH MARKS INCLUDES SOIL WITH PCB'S CONCENTRATIONS > 50 PPM. AREA IS ESTIMATE ONLY BASED ON SAMPLING AND ANALYSIS PERFORMED TO DATE.

SCALE
0 100 200 FEET

REFERENCE:

H & A OF NEW YORK DWG. NO. 70185-43: NO TITLE, PREPARED FOR ROTH BROS. SMELTING CORPORATION, SCALE: 1"=100', DATED: JULY 1993.

FIGURE 8

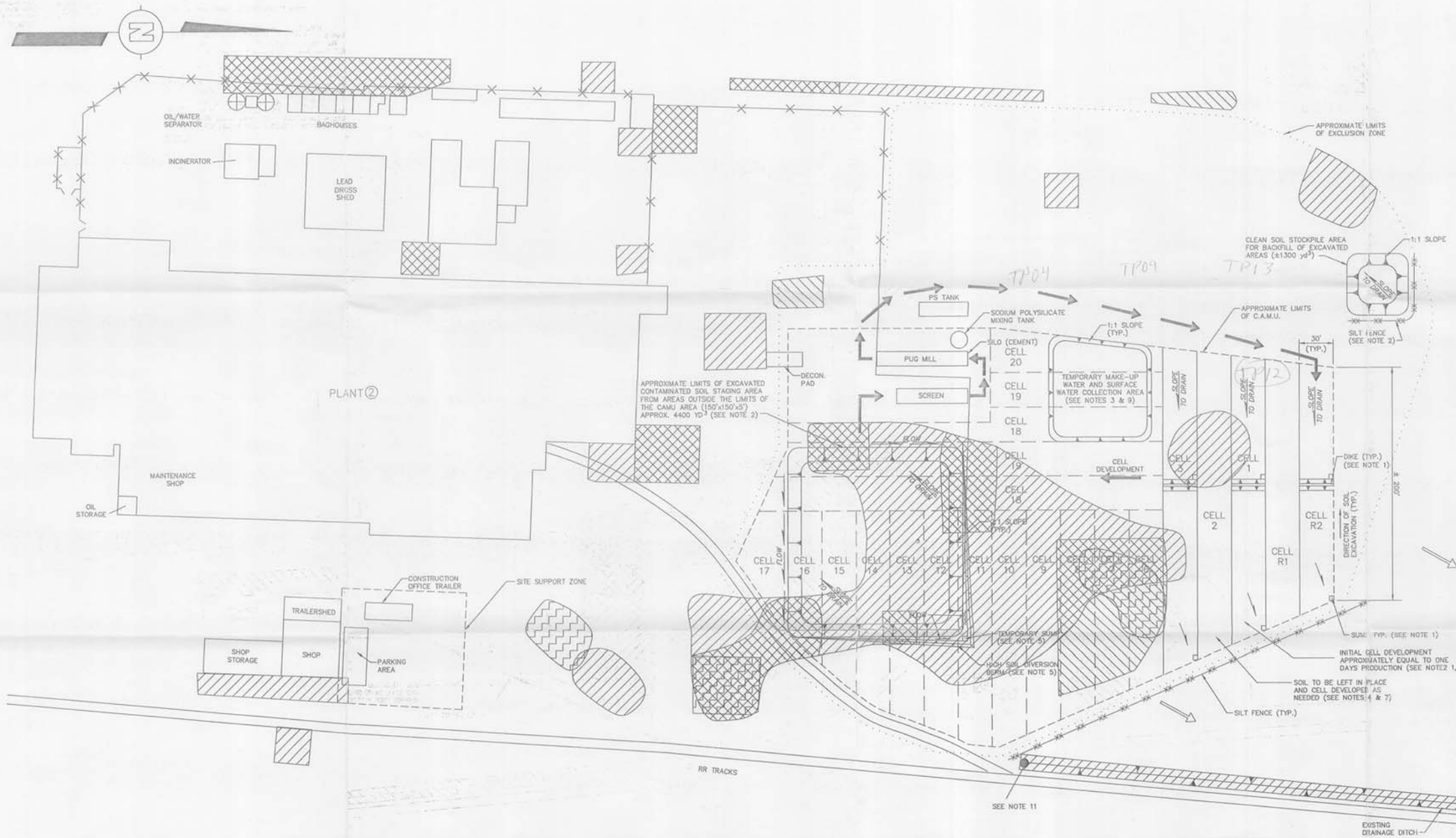
PROCESS/CAMU LAYOUT

PREPARED FOR

ROTH BROS. SMELTING CORPORATION
EAST SYRACUSE, NEW YORK

INTERNATIONAL TECHNOLOGY CORPORATION

DRAWN BY | C.J.B. | CHECKED BY | | DRAWING NUMBER 515579-E7
09-12-94 | APPROVED BY



CONSTRUCTION SEQUENCE FOR EXCAVATION/PLACEMENT

NOTES:

1. EXCAVATE CELL #1 APPROXIMATELY 30'x230'x4.5' DEEP. THE SIDE SLOPES WILL BE VERTICAL. THE BOTTOM OF EACH EXCAVATED CELL WILL BE SLOPED TO A SUMP LOCATED ON THE NORTHEAST CORNER OF EACH CELL. A SOIL DIKE WILL BE LEFT IN PLACE APPROXIMATELY 2' WIDE WITH 1:1 SLOPES. THIS DIKE WILL BE USED TO SEGREGATE THE MORNING AND AFTERNOONS STABILIZED AND PLACED MATERIAL, INITALLY UNTIL TCLP RESULTS HAVE BEEN VERIFIED. ONCE THEY HAVE PASSED THE DIKES WILL NOT BE NEEDED FOR REMAINING CELL DEVELOPMENT.
2. CLEAN SOILS WILL BE STOCKPILED WEST OF THE EXCAVATED CELLS. THE TEMPORARY STOCKPILE MATERIAL WILL BE PLACED IN AREA APPROXIMATELY 60'x60' TO A MAXIMUM HEIGHT OF 10'. THE SIDE SLOPES WILL BE 1:1. THE TEMPORARY STOCKPILE WILL BE COVERED WITH POLY. A SILT FENCE WILL BE PROVIDED AS SHOWN TO PREVENT RUNOFF AND SOIL EROSION IN THE STOCKPILE AREA.
3. EXCAVATE TEMPORARY MAKE-UP WATER AND SURFACE WATER COLLECTION AREA. THE COLLECTION AREA WILL BE EXCAVATED APPROXIMATELY 90'x90'x4.5' DEEP. THE SIDE SLOPES WILL BE 1:1. EXCAVATED CLEAN SOIL WILL BE STOCKPILED IN THE CLEAN SOIL STOCKPILE. DURING CONSTRUCTION RAINWATER THAT ACCUMULATES IN THE EXCAVATED CELLS WILL BE PUMPED TO THE COLLECTION AREA AND USED AS MAKE-UP WATER IN THE STABILIZATION PROCESS.
4. CELL DEVELOPMENT WILL BEGIN AT THE NORTH END OF THE CAMU WORKING SOUTH AS SHOWN. EVERY OTHER CELL WILL BE DEVELOPED TO PROVIDE AT LEAST 1 DAY CURING PRIOR TO EXCAVATION OF A NEW CELL. (ALTERNATING CELL DEVELOPMENT #1, 3, 5, 7, 9, ETC.).
5. BEGIN STOCKPILING OF EXCAVATED CONTAMINATED SOILS AND PLACE WITHIN THE CAMU AREAS AS SHOWN. THE TEMPORARY STOCKPILE WILL BE APPROXIMATELY 150'x150'x5' AS INDICATED. A TEMPORARY (1 FOOT BERM WILL BE PROVIDED AS SHOWN TO INTERCEPT SURFACE WATER RUNOFF TO A SUMP AS INDICATED. WATER THAT ACCUMULATES WILL BE COLLECTED AND PUMPED TO THE COLLECTION AREA FOR MAKEUP WATER IN THE STABILIZATION PROCESS. THE STOCKPILE WILL BE COVERED WITH POLY TO PREVENT RUNOFF OF EXCAVATED CONTAMINATED SOILS.
6. CONTAMINATED SOILS REMOVAL SHOULD START WITH THE AREAS OF CELLS 3 & 5. EXCAVATED SOIL WILL GO TO THE CONTAMINATED STOCKPILE LOCATION. CONTAMINATED SOILS EXCAVATION SHOULD THEN CONTINUE IN THE AREAS OUTSIDE OF THE CAMU AREA. AS EACH AREA HAS BEEN EXCAVATED, CLEAN SOIL FROM THE CELL DEVELOP--MENT STOCKPILES WILL BE USED IN THE BACKFILL FOR EACH AREA. BACKFILL MATERIAL WILL BE PLACED IN LOOSE 1 FOOT LIFTS AND THEN COMPACTED WITH A BACKHOE BUCKET OR RUBBER TIRE FRONT LOADER. THIS WILL BE TYPICAL FOR MOST AREAS WITH THE EXCEPTION OF AREA ADJACENT TO STRUCTURES, WHERE A WALK BEHIND VIBRATORY ROLLER WILL BE USED. THE BACKFILL WILL BE PLACED IN 9" LOOSE LIFTS AND COMPACTED.
7. ONCE THE EXCAVATED SOILS FROM OUTSIDE OF THE CAMU HAVE BEEN REMEDIATED. THE PUG MILL WILL BEGIN TREATMENT OF EXCAVATED CONTAMINATED SOIL STOCKPILE PLACING THE STABILIZED MATERIAL INTO EXCAVATED CELLS 1, 3 & 5. AT LEAST 1 DAYS CURING WILL BE NEEDED BEFORE STARTING CELLS 2 & 4 EXCAVATION AND CONTINUED PLACEMENT OF STABILIZED MATERIAL
8. AFTER THE REMOVAL OF THE CONTAMINATED/STABILIZED SOIL STOCKPILE, EXCAVATION OF CELLS WILL CONTINUE SOUTH ALTERNATING AS SHOWN AND AS DESCRIBED IN (NOTE 7).
9. AS CELL #18, 19, & 20 ARE TO BE DEVELOPED THE COLLECTION AREA WILL BE REDUCED IN SIZE UNTIL THE LAST CELL HAS BEEN BACKFILLED WITH STABILIZED MATERIAL.
10. CELLS R1 AND R2 ARE RESERVED FOR PLACEMENT OF TREATED CONTAMINATED MATERIAL IN EXCESS OF 20,000 TONS.
11. OUTFALL 002 TO BE MOVED MINIMUM OF 400 FT. DOWNSTREAM (TO NORTH). FINAL LOCATION AND DATE OF MOVEMENT TO BE DETERMINED BY ROTH BROS. AND NYSDEC REGION 7 DIV. OF WATER.

LEGEND:

- AREA WITHIN HATCH MARKS INCLUDES SOIL WITH TOTAL LEAD CONCENTRATIONS > 825 PPM. AREA IS ESTIMATE ONLY BASED ON SAMPLING AND ANALYSIS PERFORMED TO DATE.
- AREA WITHIN HATCH MARKS INCLUDES SOIL WITH TCLP LEAD CONCENTRATIONS > 5 PPM. AREA IS ESTIMATE ONLY BASED ON SAMPLING AND ANALYSIS PERFORMED TO DATE.
- AREA WITHIN HATCH MARKS INCLUDES SOIL WITH PCB'S CONCENTRATIONS > 50 PPM. AREA IS ESTIMATE ONLY BASED ON SAMPLING AND ANALYSIS PERFORMED TO DATE.
- APPARENT GROUNDWATER FLOW
- STABILIZED SOIL EXCAVATION/PLACEMENT

REFERENCE:
H & A OF NEW YORK DWG. NO. 70185-43; NO TITLE, PREPARED FOR ROTH BROS. SMELTING CORPORATION, SCALE:1"=100', DATED: JULY 1993.

REVISION	DATE	BY	CHK'D	APR'VD	DESCRIPTION

FIGURE 9

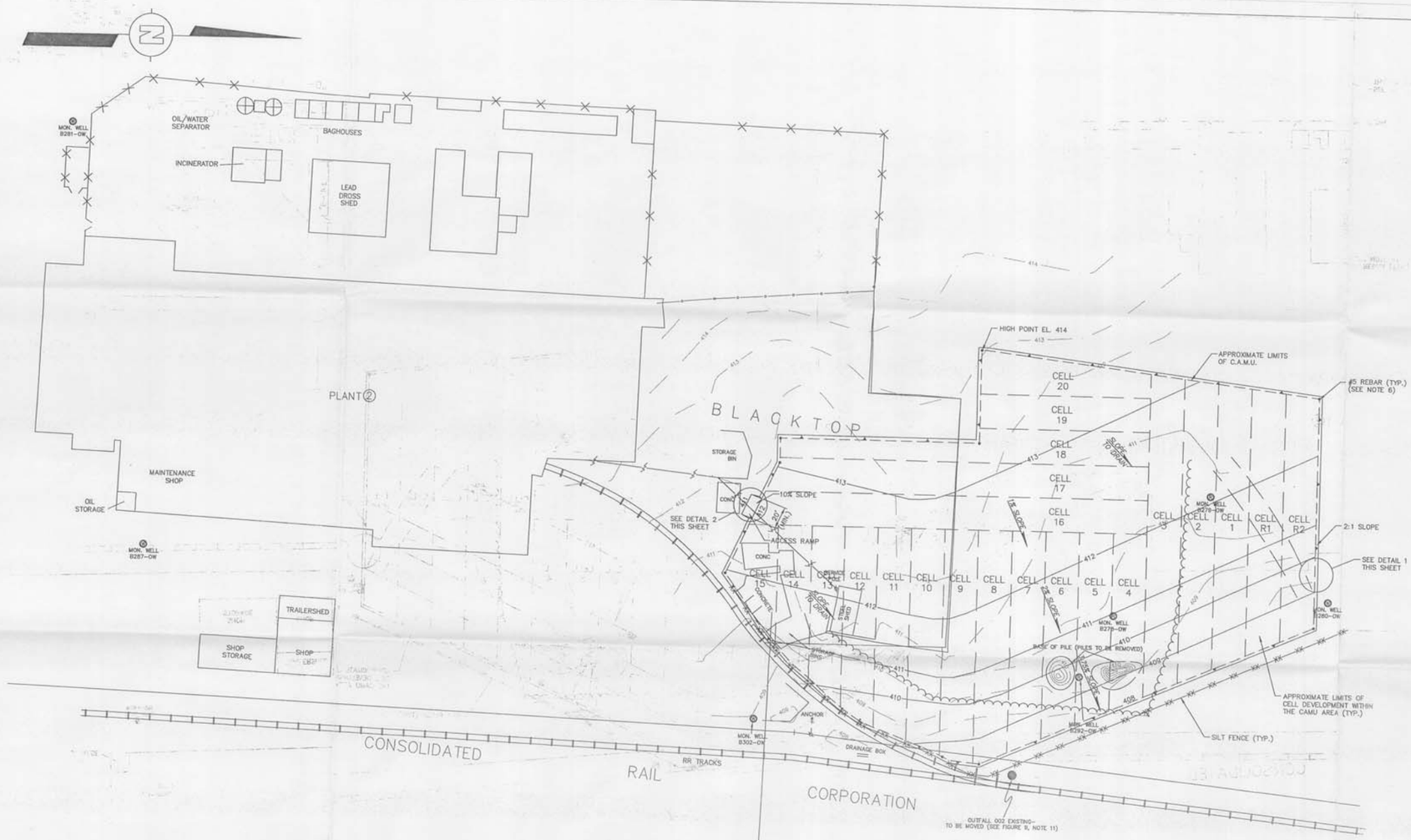
ROTH BROS. SMELTING CORPORATION
EAST SYRACUSE, NEW YORK

TITLE
PLAN – PROPOSED EXCAVATION/ PLACEMENT OF STABILIZED MATERIAL

INTERNATIONAL TECHNOLOGY CORPORATION

DESIGNED BY	D.W.	CHECKED BY		SHEET
DRAWN BY	C.J.B.	APPROVED BY		X
DATE	09/14/94	DRAWING NO.	515579-E7	

DRAWING NUMBER 515579-E8

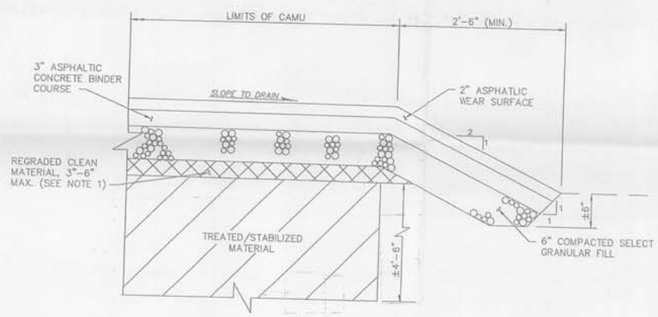


NOTES:

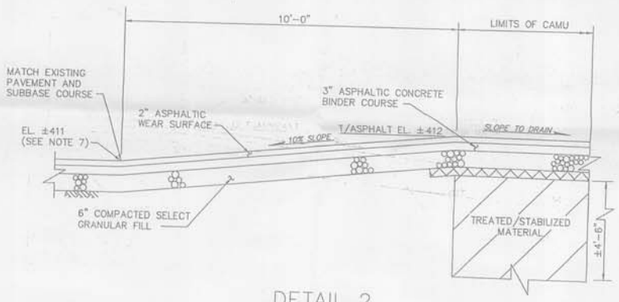
1. STOCKPILED CLEAN SOILS REMOVED FROM CAMU PLACED OUTSIDE OF CAMU AREA FOR OUTLYING AREA RESTORATION AS NEEDED.
2. FOR PLAN OF PROPOSED EXCAVATION/PLACEMENT OF STABILIZED MATERIAL SEE FIGURE 9.
3. EXISTING MONITORING WELLS LOCATED WITHIN THE CAMU BOUNDARIES WILL BE REMOVED AND GROUTED IN PLACE.
4. AREA ALONG THE SOUTH AND WEST SIDES OF THE EXISTING ASPHALT AREA WILL BE SAW CUT TO PROVIDE A NEAT LINE FOR NEW ASPHALT COVER AT COMPLETION. ASPHALT AND CONCRETE REMOVED FROM THE AREAS WITHIN THE CAMU BOUNDARY WILL BE PLACED IN A LOCATION DESIGNATED BY THE OWNER OR HIS REPRESENTATIVE.
5. ASPHALT WEAR SURFACE AND BINDER COURSE WILL BE PER NEW YORK DEPARTMENT OF TRANSPORTATION (NYSDOT) SPECIFICATIONS FOR PLACEMENT.
6. AT THE COMPLETION OF ASPHALT COVER A TEMPORARY STEEL REBAR WILL BE USED TO IDENTIFY THE LIMITS OF THE CAMU FOR SURVEY PUPROSES. REBAR WILL BE APPROXIMATELY 5' LONG DRIVEN TO APPROXIMATELY 8" ABOVE THE GROUND. THE TOP WILL BE PAINTED FLOURESCENT ORANGE AND FLAGGED. ASPHALTIC CONCRETE CONCRETE CAN BE POURED AROUND EACH REBAR LOCATION FOR PERMANENT MARKING AT A LATER DATE OF AS DIRECTED BY THE OWNER.
7. ELEVATIONS SHOWN ARE EXISTING, SURVEYED BY ALFRED N. IANUZI AUGUST 31, 1994. ELEVATIONS TO BE VERIFIED AT TIME OF CONSTRUCTION AND FOR FINAL ASPHALT COVER PLACEMENT.
8. FINAL EXCAVATIONS TO BE APPROX. 12+ IN. ABOVE EXISTING ELEVATIONS SHOWN, MAINTAINING SLOPE AND SURFACE WATER FLOW TO OUTFALL 002 DRAINAGE.

LEGEND:

- MONITORING WELLS TO BE REMOVED
- MONITORING WELLS TO REMAIN
- EXISTING SURFACE CONTOURS
- PROPOSED NEW CAMU CONTOURS



DETAIL 1
TYPICAL ASPHALT COVER INSTALLATION
SCALE 1"=1'-0"



DETAIL 2
ASPHALT COVER/ACCESS RAMP
SOUTHSIDE OF CAMU
SCALE 1"=2'-0"

REFERENCES:
1. H. & A. OF NEW YORK DWG. NO. 70185-43; NO TITLE, PREPARED FOR ROTH BROS. SMELTING CORPORATION, SCALE: 1"=100', DATED: JULY 1993.
2. TOPOGRAPHIC MAP, TITLED: "PART OF LANDS OF ROTH BROS. SMELTING CORP., PART OF LOT NO. 30 TOWN OF DEWITT, PREPARED BY ALFRED N. IANUZI JR., LAND SURVEYOR, DATED: AUG 31, 1994 SCALE: 1"=40', FILE NO. 2223.002

SCALE
0 50 100 150 FEET

FIGURE 10

ROTH BROS. SMELTING CORPORATION
EAST SYRACUSE, NEW YORK

TITLE
PLAN – PROPOSED CAMU ASPHALT COVER GRADING

INTERNATIONAL TECHNOLOGY CORPORATION

REVISION	DATE	BY	CHK'D	APR'VD	DESCRIPTION

DESIGNED BY	D.W.	CHECKED BY			SHEET X
DRAWN BY	C.J.S.	APPROVED BY			
DATE	09/14/94	DRAWING NO.	515579-E8		