Report

Preliminary Hydrogeologic Site Assessment

Syracuse China Co.
Syracuse, New York

April 1990

OBRIEN & GERE

REPORT

PRELIMINARY HYDROGEOLOGIC SITE ASSESSMENT

SYRACUSE CHINA CORPORATION
SYRACUSE, NEW YORK

APRIL 1990

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SECTION 1 - INTRODUCTION

1.01 Purpose

This Report was prepared for Syracuse China Corporation. It presents the findings of the Preliminary Hydrogeologic Site Assessment performed at the company's industrial landfill, located immediately north of its 2900 Court Street facility in Syracuse, New York (Figure 1). The data obtained from the Preliminary Hydrogeologic Site assessment have been used to:

1. Provide a preliminary characterization of the landfill and the quality of the ground water and the surface water associated with the landfill.

2. Evaluate the horizontal and vertical extent and chemical characteristics of the waste water treatment sludge disposed at the landfill.

3. Evaluate the presence of polychlorinated biphenyls (PCBs) in soils used to construct a berm around the western perimeter of the landfill.

The results of this assessment will provide a basis to evaluate whether Syracuse China will close the landfill or apply for a landfill permit.

1.02 Background

The site has been used by Syracuse China Corporation as an industrial landfill since approximately 1940. The public had open access to the landfill until it was fenced in the late 1960s or early 1970s. Although no records exist, the public occasionally left some refuse materials in the landfill over the years. In addition, contractors for the City of Syracuse, Town of Salina, and Town of Dewitt were allowed to deposit road fill and materials cleared from storm sewer catch basins in the landfill.

The landfill can be divided into two separate areas; the upper portion or western half of the landfill and the lower portion or the eastern half of landfill (Figure 2). The

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upper portion of the landfill represents the oldest area of the landfill and reportedly contains mostly bisque, gypsum molds, broken china, waste water treatment sludge, cement, and construction debris. The lower portion of the landfill contains mostly bisque, gypsum molds, broken china, refractory material, and waste water treatment sludge.

The landfill has two principal settling ponds and two secondary settling ponds (Figure 2). Plant effluent water is discharged to the principal Settling Ponds 1 and 2. Amerfloc 482 manufactured by Drew Chemical Corporation is continuously added to the waste stream prior to discharge to Settling Pond 1. Amerfloc acts as a flocculant which causes the suspended solids to settle. Secondary Settling Ponds 3 and 4 are used for approximately 1 week in the spring of the year when Settling Ponds 1 and 2 become filled with waste water treatment sludge and are excavated (Figure 2). Adjacent to Settling Pond 1 is a Sludge Pond where the sludge from Settling Pond 1 and Settling Pond 2 is placed. The material in the Sludge Pond is allowed to dry and is then disposed of on the landfill. The solids in the effluent are primarily clay, glass, and glaze process waste which accumulates at a rate of approximately five tons/day.

Syracuse China holds a SPDES permit (NY 010-0137) to discharge the water to Ley Creek. Samples of the treated plant effluent have been collected on a regular basis by Syracuse China and analyzed by Upstate Laboratories Inc. as required by Syracuse China's SPDES permit.

Table 1 presents an analytical summary of samples collected from treated waste water, untreated waste water, and sludge and sediment since February 1986. Analytical results of samples collected in 1986 had shown levels of arsenic, barium, and lead above detection limits (Table 1). Analytical results collected in 1988 showed concentrations of arsenic, barium, lead and mercury above detection limits (Table 1). In June 1989, there was a finding of 5.5 ppm of lead (EP Toxicity Method) in a sediment sample taken at a point prior to entry to Settling Pond 1.

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In September 1989, Upstate Laboratories analyzed samples of untreated plant effluent, waste water treatment sludge, and treated plant effluent to further evaluate the presence of lead. Some of these samples were also analyzed for EP toxicity metals. Results of the EP toxicity tests conducted on sludge samples collected from the sludge pond (Figure 2), in September 1989 indicated that three of the four sludge samples had EP toxicity values in excess of 5 ppm for lead (Table 1). The two samples from the north end of the sludge pond had EP Toxicity lead values of 7.0 ppm and 3.7 ppm, while the two samples from the south end of the sludge pond had EP toxicity lead values of 6.4 ppm and 9.0 ppm (Table 1).

In addition, a recent review of plant records indicated that materials used to construct a berm around the western perimeter of the landfill were reportedly obtained from Ley Creek dredged soils (Figure 2). Some of the soil in Ley Creek is known to be contaminated with PCBs (EDI, 1985).

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SECTION 2 - FIELD INVESTIGATION METHODS

In November 1988, a magnetometer survey was conducted on the older portion of the landfill to evaluate the presence and extent of ferrous objects in the area. Based upon the results of the magnetometer survey Syracuse China submitted a Work Plan to the New York State Department of Environmental Conservation (NYSDEC) in July 1989, to conduct a Preliminary Hydrogeologic Assessment of the landfill. As part of the Preliminary Hydrogeologic Site Assessment the effects that the landfill may have had on the ground water and surface water were evaluated by completing the following work tasks:

1.) Ground water monitoring well installation

2.) In-situ hydraulic conductivity testing

3.) Ground water and surface water sampling.

Surface and subsurface soil samples were also collected to evaluate the chemical characteristics of the waste water treatment sludge previously disposed in the landfill. Additionally, surface soil samples were collected and analyzed to assess whether PCBs are present in the soils used to construct the berm around the western perimeter of the landfill.

2.01 Magnetometer Survey

A magnetometer survey was completed on the Syracuse China Landfill to evaluate the presence and extent of ferrous metal debris, including steel drums, within the older portion of the landfill.

An area of concern of approximately 300 ft by 300 ft, located immediately north of the landfill access road was identified by Syracuse China representatives (Figure 2). A grid system was laid out which measured 400 ft by 550 ft over the area of concern (Figure 2).

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A flux gate proton magnetometer (EG&G model 8645) was then used to measure the earth's magnetic field.

Magnetometer readings were taken at 50 foot intervals along the grid. At each location three readings were obtained, averaged, and recorded. The average readings were contoured using a computer program. A base station was set up to monitor magnetic drift during the survey.

A contour map of the magnetometer survey data presented as Figure 3, indicates the presence of several small magnetic anomalies. It was not possible to determine the source of the magnetic anomalies. The anomalies could be due to barrels, steel rebar, or other ferrous objects. The magnetic anomalies along the southern perimeter of the survey are likely caused by power lines and railroad tracks. Magnetometer readings are presented in Appendix A.

2.02 Ground Water Monitoring Well Installation

Five ground water monitoring wells (MW-1, MW-2, MW-3, MW-4, and MW-5) were installed around the perimeter of the landfill between October 9 and 11, 1989 to evaluate the geology, hydrogeology, and ground water chemistry of the area (Figure 2). The wells were completed in accordance with the protocols presented in Appendix B. Parratt-Wolff Inc., of Syracuse, New York installed the ground water monitoring wells under the supervision of an O'Brien & Gere Engineers, Inc. hydrogeologist.

The soil borings, in which the ground water monitoring wells were installed, were advanced using a Mobil b-61 drilling rig equipped with 4 1/4-inch I.D. hollow stem augers. Split-spoon samples were collected continuously from each boring according to ASTM Method D1586-84. Each split spoon sample was classified, described, and placed in an 8 oz. glass jar for storage. The lithologic classifications are presented on the soil boring logs in Appendix C.

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At MW-2, MW-3, MW-4, and MW-5, glacial till was encountered several feet below the ground surface. To avoid penetrating the till layer, 5 ft of 2-inch inside diameter, 0.010-inch slot size, flush-jointed, PVC well screen was installed. At MW-1, 10 ft of well screen was installed as saturated till was not encountered. The well screen at each location was attached to an appropriate length of 2-inch diameter PVC riser pipe and placed inside the hollow stem augers. A washed quartz sand (grade 0) was then installed around the well screen and extended 2 ft above the top of the screened interval. As required by 6 NYCRR Part 360, six inches of fine sand (grade 00) was then installed atop the sand pack. A 3 ft bentonite pellet seal was then placed atop the fine sand layer. A locking steel protective casing was then cemented in place. Specific well construction details and lithologic classifications are presented on the soil boring logs in Appendix C.

Drilling equipment that contacted soil or water was decontaminated using a steam cleaner. The rinse water was allow to drain onto the landfill surface. Additionally, the split spoon was cleaned between samples using an Alconox wash followed with a potable water rinse.

The completed monitoring wells were developed according to the protocols provided in Appendix B. Well development removes fine grained materials that may have settled in or around the well during installation and promotes hydraulic connection between the well and the aquifer. Development was accomplished by surging the well screen with a decontaminated stainless steel bailer. The bailer was cleaned between each well using an Alconox wash, clean water rinse, methyl alcohol rinse, and a final distilled water rinse. New polypropylene rope was attached to the bailer at each well location. The water evacuated from the well was allowed to drain onto the ground surface.

The newly installed monitoring wells were surveyed using traditional field survey methods by a licensed New York State surveyor. All elevations were surveyed to nearest 0.01 ft from an assumed datum of 200 ft, the top of the steel casing at well MW-1 (Table 2).

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2.03 In-Situ Hydraulic Conductivity Testing

In-situ hydraulic conductivity testing was conducted on monitoring wells MW-1, MW-2, MW-3 and MW-5 per the protocols presented in Appendix B. To complete the test, water was removed from the well and the rate of ground water recovery was recorded. These data were interpreted using Hvorslev's method. The results are presented in Appendix E. Since no drawdown was observed at MW-4, an estimated permeability of greater then 1×10^{-3} cm/sec is probable.

2.04 Ground Water Sampling and Analyses

Ground water samples were collected on October 26, 1989 from the five newly installed monitoring wells per the field protocols presented in Appendix B . Samples were analyzed by OBG Laboratories Inc. for volatile organic compounds (VOCs) using USEPA Methods 601 and 602, and for dissolved metals (USEPA series 6000-7000) which include: arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver. The analytical results are presented in Table 3.

Prior to collecting the ground water samples, each well was evacuated using a decontaminated bottom-loading stainless steel bailer attached to a new polypropylene rope. Bailing was continued until a minimum of three well volumes were removed from the well or until the well went dry. The water evacuated from the wells was allowed to drain onto the ground surface. Well sampling details are presented on the ground water sampling logs included in Appendix D.

Samples collected for VOCs were transferred to two 40-ml glass vials and preserved with hydrochloric acid. Due to the turbidity of the ground water, the samples collected for metal analyses were filtered in the field, transferred to a plastic pint jar and then preserved with nitric acid. Sample containers were immediately placed on ice in a cooler. A trip blank and duplicate sample from MW-1 were analyzed for quality assurance/quality control purposes. The bottom-loading stainless steel bailer was decontaminated between each well

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using an alconox wash, potable water rinse, methyl alcohol rinse, and a final distilled water rinse. The decontamination fluids were allowed to drain onto the ground surface. The laboratory report and chain of custody forms are presented in Appendix F.

2.05 Surface Water Sampling

Surface water samples were collected on October 27, 1989 to evaluate if the site had affected the quality of the nearby surface water. The sample locations are shown on Figure 2. The surface water samples were collected from standing water adjacent to the edge of the landfill. Care was taken not to disturb the sediment. The samples were transferred from a glass jar to the following containers and preserved in the field:

2-40 ml glass vials (HCL) Volatile organics

1 plastic pint jar (NaOH) Cyanide

1 plastic pint jar (HNO_3) metals

Chain of custody procedures were adhered to throughout the sampling program. The analytical data and chain of custody forms are presented in Appendix F.

During the investigation no seeps were observed emanating from the face of the landfill.

2.06 Subsurface Soil Sampling

Six soil borings (B-1, B-2, B-3, B-4, B-5, and B-6) were drilled and sampled on December 29, 1989. The soil borings were completed in the vicinity of the settling ponds to evaluate the thickness of fill material and its chemical characteristics. The borings were completed in accordance with the protocols presented in Appendix B. Parratt-Wolff Inc., of Syracuse, New York advanced the soil borings under the supervision of an O'Brien & Gere Engineers, Inc. hydrogeologist.

The soil borings were advanced until native material was encountered using a CME 850 equipped with 3 1/4-inch I.D. hollow stem augers. Continuous split-spoon samples were

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collected for each boring in accordance with ASTM Method D1586-84. The following intervals were composited in the field and placed in 16 oz. glass jars with teflon lined lids for analyses of EP toxicity lead (USEPA Method 1310,7470):

Boring	Depth
B-1	0-4 ft, 4-7 ft
B-2	0-4 ft, 4-5.5 ft
B-3	0-4 ft, 4-6 ft
B-4	0-4 ft
B-5	0-4 ft, 4-8 ft, 8-11.5 ft.
B-6	2-6 ft, 6-9 ft

These samples were immediately placed in a cooler and transported to the laboratory. Chain of custody procedures were strictly followed and are presented in Appendix B. Laboratory results are presented on Table 4.

The six soil borings were backfilled upon completion using bentonite pellets. Lithologic classifications are presented on the soil boring logs in Appendix C.

Drilling equipment that contacted soil or water was decontaminated using a steam cleaner. The rinse water was allowed to drain onto the landfill surface. Additionally, the split spoon was cleaned between samples using an Alconox wash followed with a potable water rinse.

The locations of the soil borings were surveyed using traditional field survey methods by a licensed New York State surveyor.

2.07 Surface Soil Sampling

Two surface soil samples (SSL-1 and SSL-2) were collected along the western portion of the site where waste water treatment sludge is found at the ground surface (Figure 2). Additionally, a surface sludge sample (SP-1) was collected where plant effluent discharges to Settling Pond 1. The samples were collected from a depth of 0 to 1 ft below

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the ground surface using a clean trowel and placed in a 16 oz. glass jar. The samples were analyzed for EP toxicity lead in accordance with USEPA methods 1310 and 7470.

Additionally, ten soil samples were collected from the berms located on the western portion of the site on January 4, 1990 (Figure 2). The samples were collected from a depth of 0 to 1 ft below the ground surface using a clean trowel and placed in a 16 oz. glass jar. The samples were analyzed for PCBs in accordance with USEPA Method 8080.

Chain of custody procedures were adhered to throughout the sampling program. Analytical data and chain of custody forms are presented in Appendix F. Analytical results are summarized in Table 4.

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SECTION 3 - SUBSURFACE CHARACTERISTICS

3.01 Regional Geology and Hydrogeology

The Syracuse China Corporation's landfill is located in the Ontario Lowlands Physiographic Province of New York State (Todd, 1983). The area is characterized by flat to gently rolling lake plain topography and is bounded by Lake Ontario on the northwest, Oneida Lake on the northeast, Onondaga Lake on the southwest and the east- west trending escarpment of the Allegheny Plateau.

The facility is located in the Ley Creek watershed. Ley Creek drains an area of approximately 30 square miles. Ley Creek is located immediately north of the site (Figure 1) and flows southwesterly to Onondaga Lake. The Ley Creek watershed can be described as urbanized with large areas of man made impermeable surfaces which causes rapid runoff during storms. The creek is relatively shallow and in most places is less than 15 ft wide. It drains the area encompassing the landfill.

The northern portion of the landfill encroaches upon New York State designated wetland SYE-6 which borders the Ley Creek flood plain along both sides of the New York State Thruway (Route 90). Soils proximate to the site include, the poorly drained Minoa, Palms, Appleton and Wayland series, and the moderately to well drained Williamson series (U.S.D.A.,1938)

The geology of the area is characterized by Paleozoic age sedimentary bedrock overlain by Pleistocene age unconsolidated deposits of till, glaciofluvial, and glaciolacustrine deposits. The uppermost silt, clay and fine sand unit was deposited by glacial Lake Iroquois during the recessional stage of the Wisconsin glaciation. The sequence is vertically stratified with occasional lenses of fine to medium sand. Beneath this unit is a glacial till unit consisting primarily of a dense reddish brown clay/silt matrix and a subordinate amount of sand and gravel. The till unit is exposed in places along Ley Creek. In the vicinity of the

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landfill the thickness of the till unit is unknown. Underlying the glacial till is the Vernon Shale of Silurian Age. The Vernon Shale consists of horizontally bedded red and green shales and siltstones (Rickard and Fisher, 1970).

Neither the unconsolidated materials nor the bedrock are considered major aquifers in the area. Well yields from the unconsolidated glacial till and glacial lacustrine deposits are estimated to be 0.1 to 0.5 gallons per minute (Kantrowitz, 1970). Well yields for the Vernon Shale are estimated at 20 gal/min with some industrial well yields as high as 240 gal/min. The water quality of the Vernon Shale is considered poor due to high hardness and sulfate levels (Kantrowitz, 1970).

3.02 Site Geology and Hydrogeology

A review of the subsurface samples collected during the ground water monitoring well and test boring installations at the Syracuse China landfill show that the geology at the site consists of glacial lacustrine and till deposits. Figures 4 and 5 present the geology at the site. The glacio-lacustrine deposits consist primarily of silt, clay, fine sand, and varying amounts of gravel. The lacustrine deposits vary in thickness from at least 17 feet at MW-1 to about 10 feet at MW-4. These deposits do not exhibit well defined stratigraphy and most likely represent glaciolacustrine sediments reworked by and deposited by recent fluvial activity before the reconstruction of Ley Creek. At MW-1, MW-2, MW-3, MW-4, and MW-5 a dense reddish-brown till layer consisting of silt and clay with sand and imbedded gravel fragments was encountered. The thickness of the till layer was 2 ft at MW-1 and varied to 4 feet at MW-2. At MW-2, and MW-3, the thickness of the till was not determined. The till layer likely represents a localized layer. At MW-1 and MW-5 the glacial till layer is underlain by fine sand. A complete set of boring logs is presented in Appendix C.

Ground water elevation data were collected from each monitoring well on October 13 and October 26, 1989. The data are summarized in Table 2. The elevation data indicate

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that shallow ground water occurs at about 14 ft below the ground surface at MW-1 and near the ground surface at MW-2, MW-3, MW-4, and MW-5. This variation is due to topographic changes across the site.

Using the ground water elevation data collected on October 26, 1989 a ground water flow map was constructed (Figure 6). Ground water at the site flows north towards Ley Creek under an approximate hydraulic gradient of 0.03 ft/ft from MW-1 to MW-4. Additionally, the ground water elevation data suggest that ground water in or beneath the landfill likely discharges to the surface water in the adjacent wetlands.

A complicating factor is the current landfill. Typically, a ground water mound exists beneath the landfills due to their potential for infiltration. Such a mound may result in radial flow from the center of the landfill. The data collected during this Preliminary Hydrogeologic Site Assessment does not indicate whether a mound is present beneath the Syracuse China landfill.

Based on the in-situ hydraulic conductivity test the horizontal hydraulic conductivity of the unconsolidated deposits range between 4.4×10^{-5} cm/sec at MW-2 to greater than 1.0×10^{-3} cm/sec at MW-4 (Appendix E).

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SECTION 4 - ENVIRONMENTAL CHEMISTRY

As part of the Preliminary Hydrogeologic Assessment, samples were collected for laboratory analysis from three different media: ground water, surface water, and soils (surface and subsurface). This section presents the results of these analyses.

4.01 Ground Water Chemistry

The analytical results of the ground water sampling performed on October 26, 1989 from the five newly installed ground water monitoring wells did not indicate volatile organic compounds (VOCs) above the detection limit of 1 ppb (USEPA methods 601 and 602). Analyses for dissolved metals (USEPA series 6000 - 7000) indicated 0.07 ppb of lead was detected at MW-2. The concentration of lead at MW-2 is above the NYS Class GA ground water standard of 0.025 ppm and NYS Maximum Concentration Limit (NYS MCL) of 0.05 ppm. Other dissolved metals (USEPA series 6000 - 7000) were below detection limits. A summary of the detectable results are presented in Table 3. Laboratory data and chain of custody forms are present in Appendix F.

A duplicate sample from MW-1 and a field blank also did not detect VOCs or dissolved metals.

4.02 Surface Water Chemistry

Five surface water samples were collected on October 27, 1989 (Figure 2). The results indicated that VOCs (USEPA methods 601 and 602) and dissolved metals (USEPA series 6000 - 7000) were below detection limits except at SW-3. At SW-3, 4 ppb of 1,1-dichloroethane and 30 ppb of 1,1,1-trichloroethane were detected. These values are below the New York State Class A surface water guidance value of 50 ppb for 1,1,1-trichloroethane and 1,1-dichloroethane. The detection limit for lead at SW-2 and SW-3 was 0.1 ppm which is above the NYS Class A surface water standard of 0.05 ppm. This is due

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to the presence of a matrix interference. A duplicate sample from SW-1 and a field blank did not detect VOCs. A duplicate sample from SW-1 did not detect any dissolved metals (USEPA series 6000 - 7000) at a detection limit which was at or below drinking water standards. A summary of the detectable results are presented in Table 3. Laboratory data and chain of custody forms are present in Appendix F.

4.03 Subsurface Soil Chemistry

Six soil borings were completed at the landfill, in the area of the settling ponds, and samples of the subsurface materials were analyzed for EP toxicity lead (Figure 2). The analytical results of samples collected from B-1, B-2, and B-6 indicate concentrations of EP Toxicity lead above 5 ppm. Specifically, EP toxicity levels of excess lead at B-1, B-2, and B-6 ranged from 27 ppm at B-1 (0-4 ft) and B-6 (6-9 ft) to 5.6 ppm at B-1 (4-7 ft). At B-5, the sample from 0-4 ft had an EP toxicity lead concentration of 4.1 ppm. However, samples collected at B-5 from 4-8 ft and 8-11.5 ft were 16 ppm and 23 ppm respectively. At borings B-3 and B-4 mainly broken china was encountered. Analytical results for samples from borings B-3 and B-4 indicate EP toxicity lead concentrations below 5 ppm. A summary of the detectable results are presented in Table 4. Laboratory data and chain of custody forms are present in Appendix F.

4.04 Surface Soil Chemistry

Samples of waste water treatment sludge collected from the surface along the western portion of the site indicate EP toxicity lead levels of 2.9 ppm at SSL-1 and 8.0 ppm at SSL-2. A miscellaneous sludge sample collected where plant effluent discharges to Settling Pond 1 had an EP toxicity lead level of 0.5 ppm.

Ten surface soil samples collected from the berms constructed of Ley Creek sediments were analyzed for PCBs according to USEPA Method 8080. No PCBs were

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detected at the detection limit of 0.6 ppm. A summary of the results are presented in Table 4. Laboratory data and chain of custody forms are present in Appendix F.

4.05 DISCUSSION

To summarize, the magnetometer survey conducted over a 400 ft by 550 ft grid on the older portion of the landfill, indicated the presence of several small magnetic anomalies. It was not possible to determine the source of the magnetic anomalies. The anomalies could be due to barrels, steel rebar, or other ferrous objects.

The analytical results did not detect any Volatile Organic Compounds (USEPA methods 601/602) in the ground water at the site. Ground water samples for dissolved metals (USEPA series 6000 - 7000) at MW-2 indicated 0.07 ppm of lead, but below detection limits for all other dissolved metals. Dissolved metals at the other monitoring wells were not detected.

The results of four surface water samples indicate at SW-3, 4 ppb of 1,1-dichloroethane, and 30 ppb of 1,1,1-trichloroethane were detected. These results may represent compounds emanating from the landfill or from another source. VOCs and dissolved metals were not detected at other surface water sampling locations.

The results of the subsurface soil sampling in areas where waste water treatment sludge was encountered (B-1, B-2, B-6) indicate concentrations of EP toxicity lead above 5 ppm. At B-5 the sample collected from 0-4 ft had an EP toxicity lead value of 4.1 ppm, while the samples collected 4-8 ft and 8-11.5 ft at the same boring were above 5 ppm. At B-3 and B-4 where broken china was mainly encountered, the concentration of EP toxicity lead was below the detection limit of 0.05 ppm.

Along the western portion of the landfill where waste water treatment sludge is present at the surface, EP toxicity lead levels were variable, ranging from 2.1 ppm at SSL-1, and 8.0 ppm at SSL-2. The waste water treatment sludge sample collected from the south end of Settling Pond 1 (SP-1) indicated an EP toxicity lead level of 0.5 ppm.

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The analytical results of ten surface soil samples collected from the berms constructed of Ley Creek sediments demonstrate that PCBs were not detected.

SECTION 5 - CONCLUSIONS & RECOMMENDATIONS

Based upon information from the Preliminary Hydrogeologic Site Assessment described herein, the following conclusions and recommendations are presented.

5.01 Conclusions

1. A magnetometer survey conducted over a 400 ft by 550 ft grid on the older portion of the landfill, indicated the presence of several small magnetic anomalies. The anomalies could be due to barrels, steel rebar, or other ferrous objects.

2. The geology at the site is characterized by glaciolacustrine deposits comprised of silt, clay, fine sand, and occasional gravel. A layer of a dense reddish brown till occurs within the glaciolacustrine layer.

3. The depth to ground water across the site varies from approximately 14 ft beneath the surface at MW-1 to near the ground surface at MW-2, MW-3, MW-4, and MW-5. This variation is largely due to topographic changes across the site. Ground water elevation data indicate that ground water flow is to the north, towards Ley Creek. However, a ground water mound may exist beneath the landfill resulting in some degree of radial flow from the landfill.

4. The ground water quality data indicates Volatile Organic Compounds (VOCs) were not found above detection limits. Dissolved metals analyzed only indicated 0.07 ppm of lead at MW-2. Dissolved metals at other ground water monitoring wells were not detected. The results of the surface water analyses indicate that dissolved metals and volatile organic compounds were not detected except at SW-3. At SW-3, 1,1,1-trichloroethane and 1,1-

dichloroethane were detected at concentrations below the New York State Surface Water Guidance Values.

5. The EP toxicity lead results of six test borings completed in the vicinity of settling ponds indicate that the waste water treatment sludge subsurface samples collected from B-1, B-2,and B-6 exceeded the 5 mg/l threshold for characteristic hazardous waste. At B-5, two of three sludge samples analyzed also exceeded the EP toxicity lead threshold. Subsurface samples collected from B-3 and B-4 did not exceed the threshold. One of two samples of waste water treatment sludge taken along the western portion of the site was in excess of the EP Toxicity lead threshold (SSL-2).

6. The analytical results of soil samples collected from the berms constructed of Ley Creek sediments did not detect PCBs.

5.02 Recommendations

1. Prepare to close the landfill. Arrange to meet with NYSDEC to discuss this report and the landfill closure.

2. Further investigate the chemical characteristics and extent of waste water treatment sludge.

3. Collect a second round of ground water and surface water samples for analyses of volatile organic compounds and metals analyses to confirm the results of the previous sampling effort.

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Tables

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TABLE 1
BACKGROUND ANALYTICAL DATA
PRELIMINARY HYDROGEOLOGIC SITE ASSESSMENT
SYRACUSE CHINA CORPORATION

ANALYSES

TOTAL METALS	NYS CLASS A SURFACE WATER	#1 2/10/86	#1 9/88	#1 9/15/89	#1 9/22/89	#2 2/10/86	#2 9/88	#2 9/15/89	#2 9/22/89	#3 2/10/86	#3 9/88
ARSENIC	0.05	<0.001	0.002	---	---	<0.001	0.005	---	---	0.019	0.002
BARIUM	1	<0.3	0.4	---	---	2.7	1.1	---	---	0.5	<0.3
CADMIUM	0.01	<0.005	0.01	---	---	<0.005	<0.005	---	---	<0.005	<0.005
CHROMIUM	0.05	<0.05	<0.05	---	---	<0.05	<0.05	---	---	<0.05	<0.05
LEAD	0.05	<0.1	0.1	0.4	<0.1	0.5	0.6	360	---	0.1	0.1
MERCURY	0.002	<0.1	<0.0004	---	---	<0.1	<0.0004	---	---	<0.1	0.0005
SELENIUM	0.01	<0.001	<0.001	---	---	<0.001	<0.001	---	---	<0.001	<0.001
SILVER	0.05	<0.05	<0.05	---	---	<0.05	<0.05	---	---	<0.05	<0.05
DISSOLVED METALS	NYS CLASS A SURFACE WATER										
ARSENIC	0.05	<0.001	0.001	---	---	<0.001	0.005	---	---	0.020	0.001
BARIUM	1	<0.3	<0.3	---	---	2.2	1.3	---	---	0.4	<0.3
CADMIUM	0.01	<0.005	<0.005	---	---	<0.005	<0.005	---	---	<0.005	<0.005
CHROMIUM	0.05	<0.05	<0.05	---	---	<0.05	<0.05	---	---	<0.05	<0.05
LEAD	0.05	<0.1	<0.1	---	---	<0.1	<0.1	---	---	<0.1	<0.1
MERCURY	0.002	<0.1	<0.0004	---	---	<0.1	<0.0004	---	---	<0.1	0.0005
SELENIUM	0.01	<0.001	<0.001	---	---	<0.001	<0.001	---	---	<0.001	<0.001
SILVER	0.05	<0.05	<0.05	---	---	<0.05	<0.05	---	---	<0.05	<0.05
EP TOXICITY	MAX CONC										
ARSENIC	5	0.01	---	---	---	<0.001	0.002	0.002	---	---	---
BARIUM	100	1.3	---	---	---	2.3	0.9	1.1	---	---	---
CADMIUM	1	<0.005	---	---	---	<0.005	<0.005	<0.005	---	---	---
CHROMIUM	5	<0.05	---	---	---	<0.05	<0.05	<0.05	---	---	---
LEAD	5	0.2	---	---	<0.1	0.9	<0.1	1	2.7	---	---
MERCURY	0.2	<0.01	---	---	---	<0.01	<0.0004	<0.0004	---	---	---
SELENIUM	1	<0.001	---	---	---	<0.001	<0.001	<0.001	---	---	---
SILVER	5	<0.05	---	---	---	<0.05	<0.05	<0.05	---	---	---

NOTE: CONCENTRATIONS IN MG/L
SAMPLES ANALYZED BY UPSTATE LABORATORIES
NEW YORK STATE CLASS A SURFACE WATER
MAX CONC: CONCENTRATION ABOVE LIMIT IS CONSIDERED HAZARDOUS WASTE
LOCATIONS- #1 PRIMARY POND NORTH END (SETTLING POND 1)
#2 PRIMARY POND SOUTH END (SETTLING POND 1)
#3 NORTH SIDESTREAM DISCHARGE BY R.R.TRACKS
#4 UNTREATED PLANT EFFLUENT
#5 WATER FROM MAIN FLOW
#6 SLUDGE - NORTH END OF SLUDGE POND
#7 SLUDGE - SOUTH END OF SLUDGE POND
#8 SLUDGE FROM CREEK
#9 SLUDGE REMOVED FROM SETTLING POND #2

TABLE 1
BACKGROUND ANALYTICAL DATA
PRELIMINARY HYDROGEOLOGIC SITE ASSESSMENT
SYRACUSE CHINA CORPORATION

ANALYSES

TOTAL METALS	NYS CLASS A SURFACE WATER	#3 5/89	#3 9/15/89	#3 9/22/89	#4 2/10/86	#4 9/88	#4 9/15/89	#4 9/22/89	#5 2/10/86	#6 9/88
ARSENIC	0.05	---	---	---	0.02	0.003	---	---	0.009	---
BARIUM	1	---	---	---	<0.3	<0.3	---	---	<0.3	---
CADMIUM	0.01	---	---	---	<0.005	<0.005	---	---	<0.005	---
CHROMIUM	0.05	---	---	---	<0.05	<0.05	---	---	<0.05	---
LEAD	0.05	4800	<0.1	---	<0.1	<0.1	1.6	<0.1	<0.1	2000
MERCURY	0.002	---	---	---	<0.1	0.0005	---	---	<0.1	---
SELENIUM	0.01	---	---	---	<0.001	<0.001	---	---	<0.001	---
SILVER	0.05	---	---	---	<0.05	<0.05	---	---	<0.05	---
DISSOLVED METALS	NYS CLASS A SURFACE WATER									
ARSENIC	0.05	---	---	---	<0.001	<0.001	---	---	<0.001	---
BARIUM	1	---	---	---	<0.3	<0.3	---	---	<0.3	---
CADMIUM	0.01	---	---	---	<0.005	<0.005	---	---	<0.005	---
CHROMIUM	0.05	---	---	---	<0.05	<0.05	---	---	<0.05	---
LEAD	0.05	---	---	---	<0.1	<0.1	---	---	<0.1	---
MERCURY	0.002	---	---	---	<0.1	0.0004	---	---	<0.1	---
SELENIUM	0.01	---	---	---	<0.001	<0.001	---	---	<0.001	---
SILVER	0.05	---	---	---	<0.05	<0.05	---	---	<0.05	---
EP TOXICITY	MAX CONC									
ARSENIC	5	<0.001	---	---	---	---	---	---	---	<0.001
BARIUM	100	6.2	---	---	---	---	---	---	---	0.4
CADMIUM	1	<0.005	---	---	---	---	---	---	---	<0.005
CHROMIUM	5	<0.05	---	---	---	---	---	---	---	<0.05
LEAD	5	5.5	---	<0.1	---	---	---	<0.1	---	<0.1
MERCURY	0.2	<0.0004	---	---	---	---	---	---	---	0.0005
SELENIUM	1	<0.001	---	---	---	---	---	---	---	<0.001
SILVER	5	<0.05	---	---	---	---	---	---	---	<0.05

NOTE: CONCENTRATIONS IN MG/L
SAMPLES ANALYZED BY UPSTATE LABORATORIES
NEW YORK STATE CLASS A SURFACE WATER
MAX CONC: CONCENTRATION ABOVE LIMIT IS CONSIDERED HAZARDOUS WASTE
LOCATIONS- #1 PRIMARY POND NORTH END (SETTLING POND 1)
#2 PRIMARY POND SOUTH END (SETTLING POND 1)
#3 NORTH SIDESTREAM DISCHARGE BY R.R.TRACKS
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#5 WATER FROM MAIN FLOW
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#8 SLUDGE FROM CREEK
#9 SLUDGE REMOVED FROM SETTLING POND #2

TABLE 1
BACKGROUND ANALYTICAL DATA
PRELIMINARY HYDROGEOLOGIC SITE ASSESSMENT
SYRACUSE CHINA CORPORATION

ANALYSES

TOTAL METALS	NYS CLASS A SURFACE WATER	#6 5/89	#6 9/15/89	#6 9/22/89	#7 9/88	#7 5/89	#7 9/15/89	#7 9/22/89	#8 2/10/86	#9 5/89
ARSENIC	0.05	---	---	---	---	---	---	---	---	---
BARIUM	1	---	---	---	---	---	---	---	---	---
CADMIUM	0.01	---	---	---	---	---	---	---	---	---
CHROMIUM	0.05	---	---	---	---	---	---	---	---	---
LEAD	0.05	3300	1300	---	2300	2400	1500	---	---	2500
MERCURY	0.002	---	---	---	---	---	---	---	---	---
SELENIUM	0.01	---	---	---	---	---	---	---	---	---
SILVER	0.05	---	---	---	---	---	---	---	---	---
DISSOLVED METALS	NYS CLASS A SURFACE WATER									
ARSENIC	0.05	---	---	---	---	---	---	---	---	---
BARIUM	1	---	---	---	---	---	---	---	---	---
CADMIUM	0.01	---	---	---	---	---	---	---	---	---
CHROMIUM	0.05	---	---	---	---	---	---	---	---	---
LEAD	0.05	---	---	---	---	---	---	---	---	---
MERCURY	0.002	---	---	---	---	---	---	---	---	---
SELENIUM	0.01	---	---	---	---	---	---	---	---	---
SILVER	0.05	---	---	---	---	---	---	---	---	---
EP TOXICITY	MAX CONC									
ARSENIC	5	0.002	0.002	---	0.005	0.002	<0.001	---	0.007	<0.001
BARIUM	100	2.1	0.4	---	0.5	3.8	1.8	---	2.8	0.3
CADMIUM	1	<0.005	<0.005	---	<0.005	<0.005	<0.005	---	<0.005	<0.005
CHROMIUM	5	<0.05	<0.05	---	<0.05	<0.05	<0.05	---	<0.05	0.05
LEAD	5	1.4	7	3.7	<0.1	3	6.4	9	<0.1	0.2
MERCURY	0.2	<0.0004	<0.0004	---	<0.0004	<0.0004	<0.0004	---	<0.1	<0.0004
SELENIUM	1	<0.001	<0.001	---	<0.001	<0.001	<0.001	---	<0.001	0.003
SILVER	5	<0.05	<0.05	---	<0.05	<0.05	<0.05	---	<0.05	<0.05

NOTE: CONCENTRATIONS IN MG/L
SAMPLES ANALYZED BY UPSTATE LABORATORIES
NEW YORK STATE CLASS A SURFACE WATER
MAX CONC: CONCENTRATION ABOVE LIMIT IS CONSIDERED HAZARDOUS WASTE
LOCATIONS- #1 PRIMARY POND NORTH END (SETTLING POND 1)
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#4 UNTREATED PLANT EFFLUENT
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#6 SLUDGE - NORTH END OF SLUDGE POND
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#9 SLUDGE REMOVED FROM SETTLING POND #2

TABLE 2
WELL SUMMARY
PRELIMINARY HYDROGEOLOGIC SITE ASSESSMENT
SYRACUSE CHINA CORPORATION

WELL NUMBER	TOP OF CASING ELEVATION (FT)	TOP OF PVC ELEVATION (FT)	GROUND ELEVATION (FT)	SCREENED ELEVATION (FT)	GROUNDWATER ELEVATIONS (FT) 10/13/89	10/26/89
MW-1	200.00	199.81	197.5	175.5 - 185.5	181.30	184.37
MW-2	181.10	180.92	177.9	167.9 - 172.9	176.15	176.77
MW-3	174.09	173.92	170.9	161.7 - 166.7	170.00	170.01
MW-4	171.83	171.68	168.6	158.7 - 163.7	166.18	166.45
MW-5	176.64	176.48	173.7	163.8 - 168.8	172.82	173.33

NOTE: ELEVATIONS BASED UPON ASSUMED ELEVATION (200.00 FT)
TO THE TOP OF STEEL CASING AT MW-1.

TABLE 3
GROUND WATER AND SURFACE WATER ANALYTICAL DATA SUMMARY
PRELIMINARY HYDROGEOLOGIC SITE ASSESSMENT
SYRACUSE CHINA CORPORATION

GROUND WATER CHEMISTRY 10/26/89

USEPA METHOD 601/602 PARAMETERS BELOW DETECTION LIMITS FOR
MONITORING WELLS MW-1, MW-2, MW-3, MW-4, MW-5

	NYS MCL	MW-1	MW-1 (DUP)	MW-2	MW-3	MW-4	MW-5
LEAD	0.05	<0.05	<0.05	0.07	<0.05	<0.05	<0.05

CONCENTRATION IN MG/L
ANALYZED USING USEPA SERIES 6000-7000.
ALL OTHER COMPOUNDS BELOW DETECTION LIMITS

SURFACE WATER CHEMISTRY (10/27/89)

	NYS CLASS A SURFACE WATER	SW-1	SW-2	SW-3	SW-4
1,1 - DICHLOROETHANE	50	<1	<1	4	<1
1,1,1 - TRICHLOROETHANE	50	<1	<1	30	<1

CONCENTRATION IN UG/L
ANALYSES PERFORMED USING USEPA METHOD 601/602
ALL OTHER COMPOUNDS BELOW DETECTION LIMITS

	NYS CLASS A SURFACE WATER	SW-1	SW-2	SW-3	SW-4
LEAD	0.05	<0.05	<0.05	<0.1*	<0.1*
SILVER	0.05	<0.01	<0.02*	<0.02*	<0.01

CONCENTRATION IN MG/L
* MATRIX INTERFERENCE
ANALYZED USING USEPA SERIES 6000-7000.
ALL OTHER COMPOUNDS BELOW DETECTION LIMITS

TABLE 4
SURFACE AND SUBSURFACE SOIL DATA SUMMARY
PRELIMINARY HYDROGEOLOGIC SITE ASSESSMENT
SYRACUSE CHINA CORPORATION

SUBSURFACE SOIL CHEMISTRY (12/29/89)

BORING NO.	SAMPLE DEPTH	EP TOXICITY LEAD	BORING NO.	SAMPLE DEPTH	EP TOXICITY LEAD
B-1	0-4 FT	27	B-4	0-4 FT	<0.5
	4-7 FT	5.6	B-5	0-4 FT	4.1
B-2	0-4 FT	17		4-8 FT	16
	4-5.5 FT	16		8-11.5 FT	23
B-3	0-4 FT	<0.5	B-6	2-6 FT	17
	4-6 FT	<0.5		6-9 FT	27

CONCENTRATIONS IN MG/KG DRY WEIGHT
ANALYSES PERFORMED USING USEPA METHOD 1310, 7420

SURFACE SOIL CHEMISTRY (1/4/89)

SAMPLE LOCATIONS	PCB (PPM)
BERM 1 THROUGH BERM 10	<0.6

CONCENTRATIONS IN MG/KG DRY WEIGHT
ANALYSES PERFORMED USING USEPA METHOD 8080

SAMPLE LOCATION	EP TOXICITY LEAD
SSL-1	2.9
SSL-2	8
SP-1	0.5

CONCENTRATIONS IN MG/KG DRY WEIGHT
ANALYSES PERFORMED USING USEPA METHOD 1310, 7420

Figures

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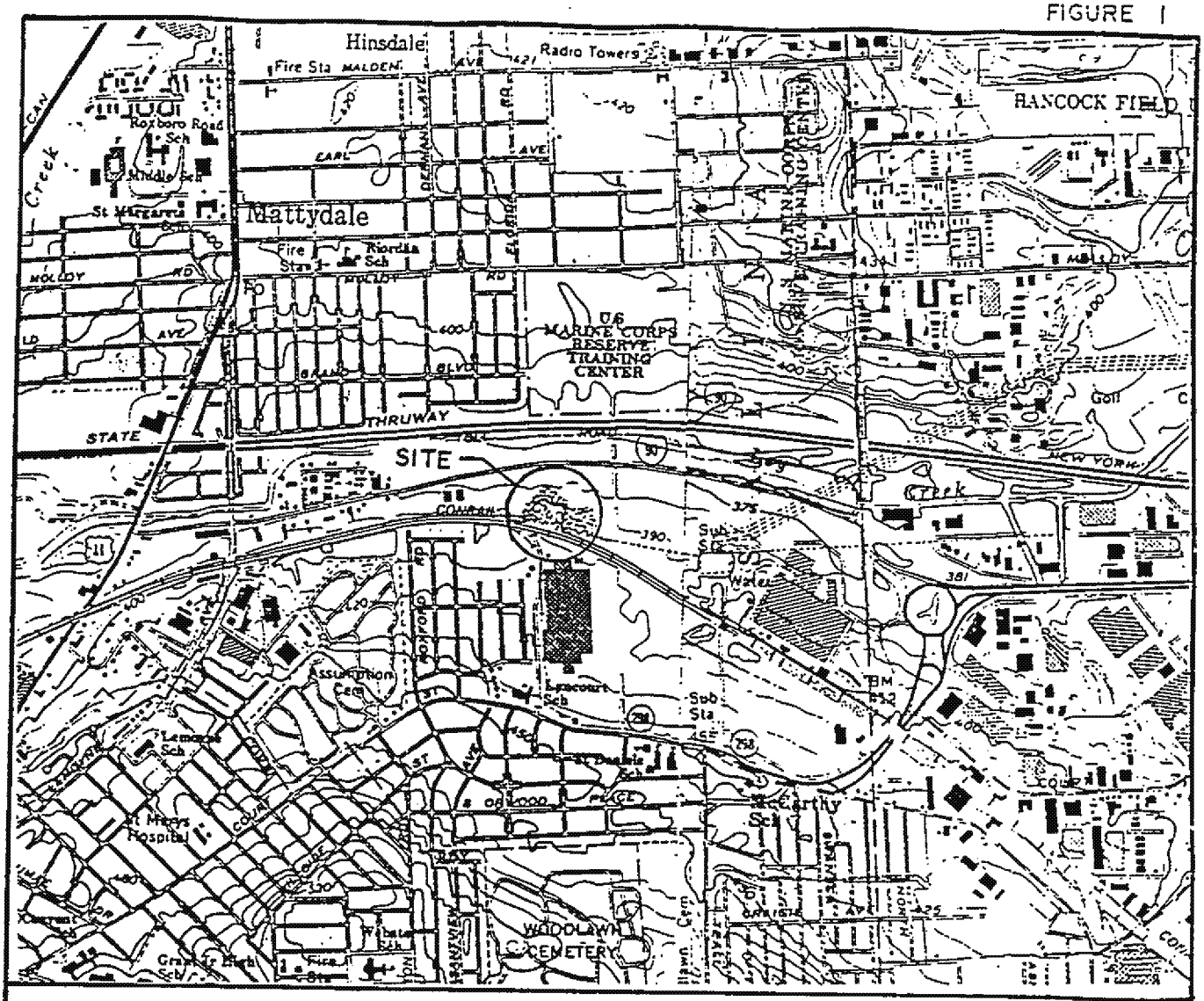
FIGURE 1



SYRACUSE CHINA CORPORATION

SYRACUSE, NEW YORK

SITE LOCATION MAP

QUADRANGLE LOCATION

0 2000 4000

SCALE IN FEET

LEGEND

GROUND SURFACE CONTOUR (10' INTERVAL)

ADAPTED FROM U.S.G.S. SYRACUSE, NEW YORK. EAST & WEST QUADRANGLE, 1978

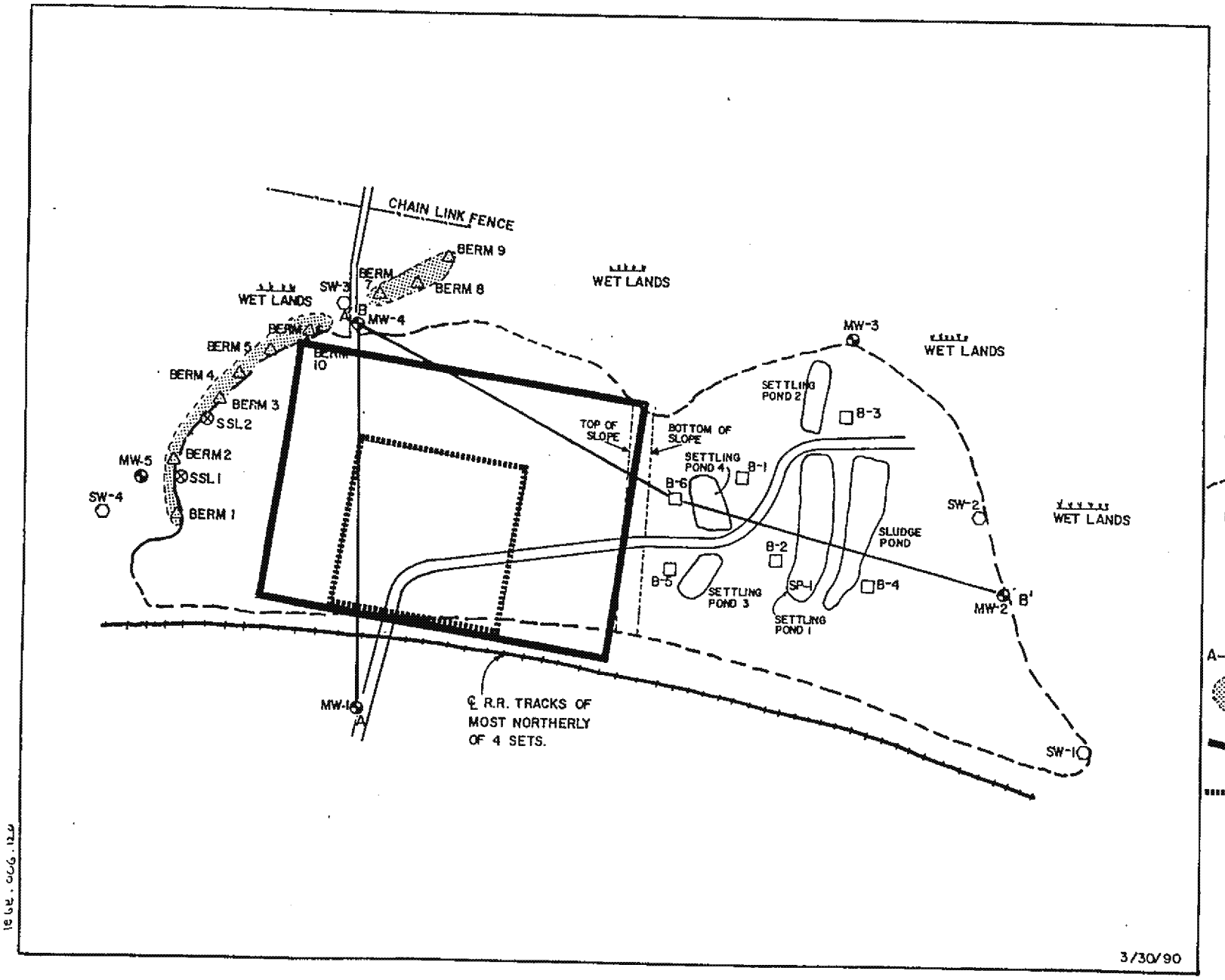


FIGURE 2

SYRACUSE CHINA CORP.
SYRACUSE, N.Y.

SITE PLAN

LEGEND

- GROUND WATER MONITORING WELL
- APPROXIMATE PERIMETER OF LANDFILL
- TEST SOIL BORINGS
- SURFACE WATER SAMPLE
- BERM SOIL SAMPLE
- SURFACE SLUDGE SAMPLE
- A—A' HYDROGEOLOGIC CROSS SECTION
- BERM
- APPROXIMATE LIMITS OF MAGNETOMETER SURVEY AREA
- PERIMETER OF CONCERNED AREA

0 150 300
SCALE IN FEET

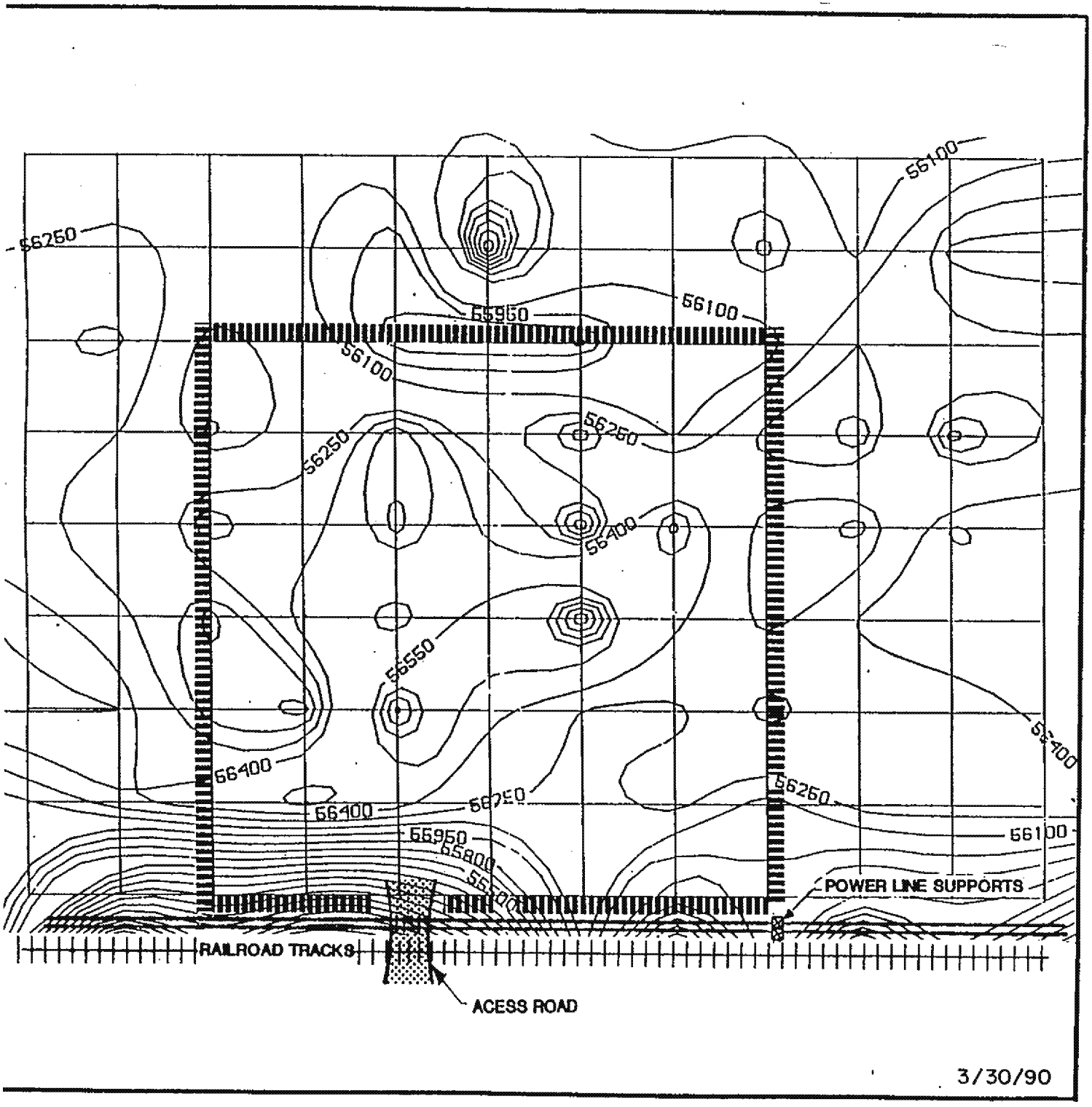
O'BRIEN & GERE ENGINEERS, INC.
Syracuse, New York

ED_006185_00000991-00034

FIGURE 3

SYRACUSE CHINA CORP.
SYRACUSE, N.Y.

MAGNETOMETER SURVEY



LEGEND

PERIMETER OF CONCERNED AREA

SURVEY GRID (50 ft. 50 ft.)

MAGNETIC CONTOURS
CONTOUR INTERVAL= 150 gammas

0 80 160
SCALE IN FEET

O'BRIEN & GERE ENGINEERS, INC.

ED_006185_00000991-00035

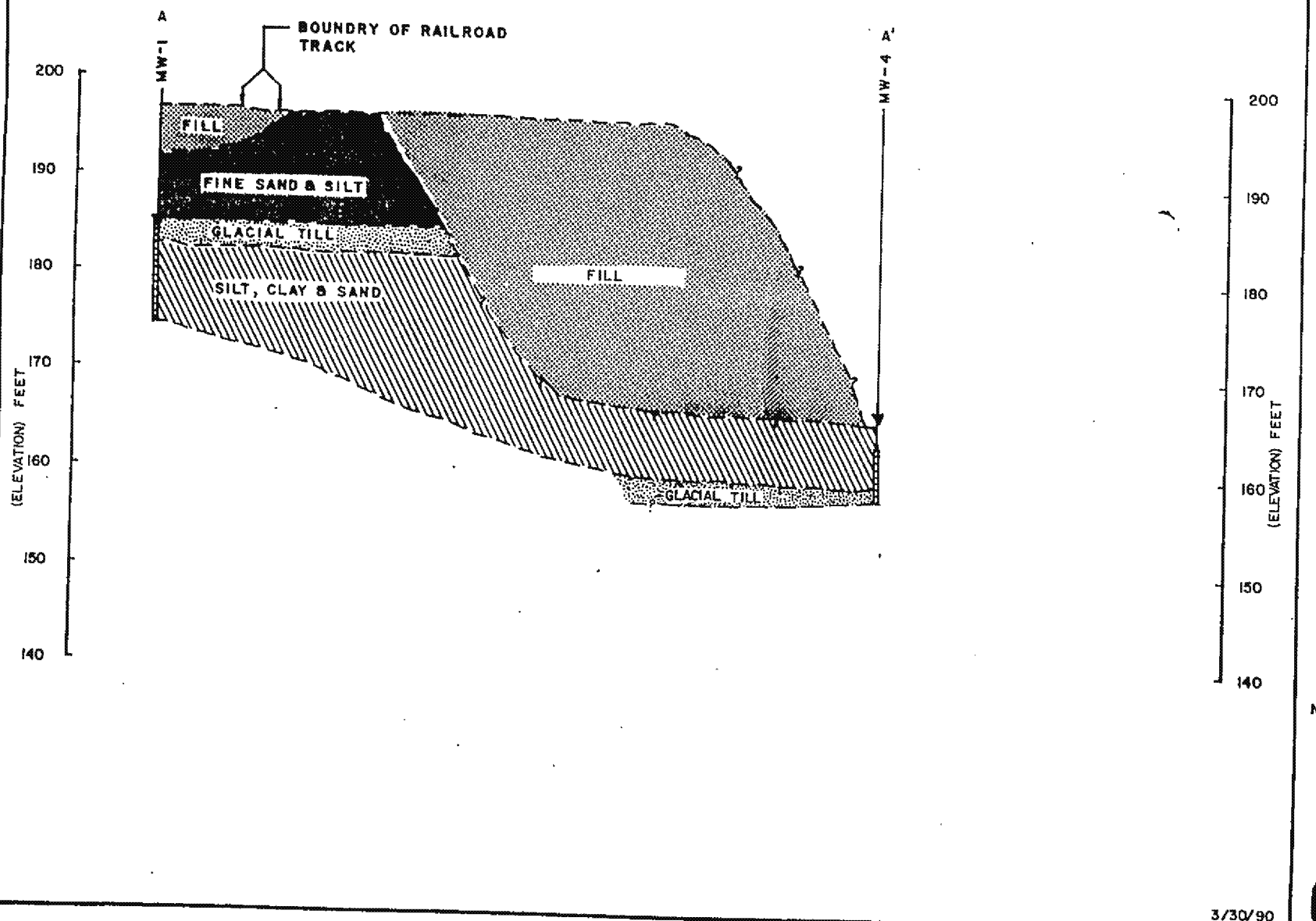


FIGURE 4

SYRACUSE CHINA CORP.
SYRACUSE, N.Y.

HYDROGEOLOGIC
CROSS SECTION A - A'

LEGEND

SCREENED INTERVAL

GROUND WATER ELEVATION (10/26/89)

LITHOLOGIC BOUNDARY

NOTE: ASSUMED DATUM BASED UPON ASSUMED ELEVATIONS OF 200.00' (TOP OF STEEL CASING MW-1)

0 100 200
HORIZ. SCALE IN FEET

O'BRIEN & GERE ENGINEERS, INC.

ED_006185_00000991-00036

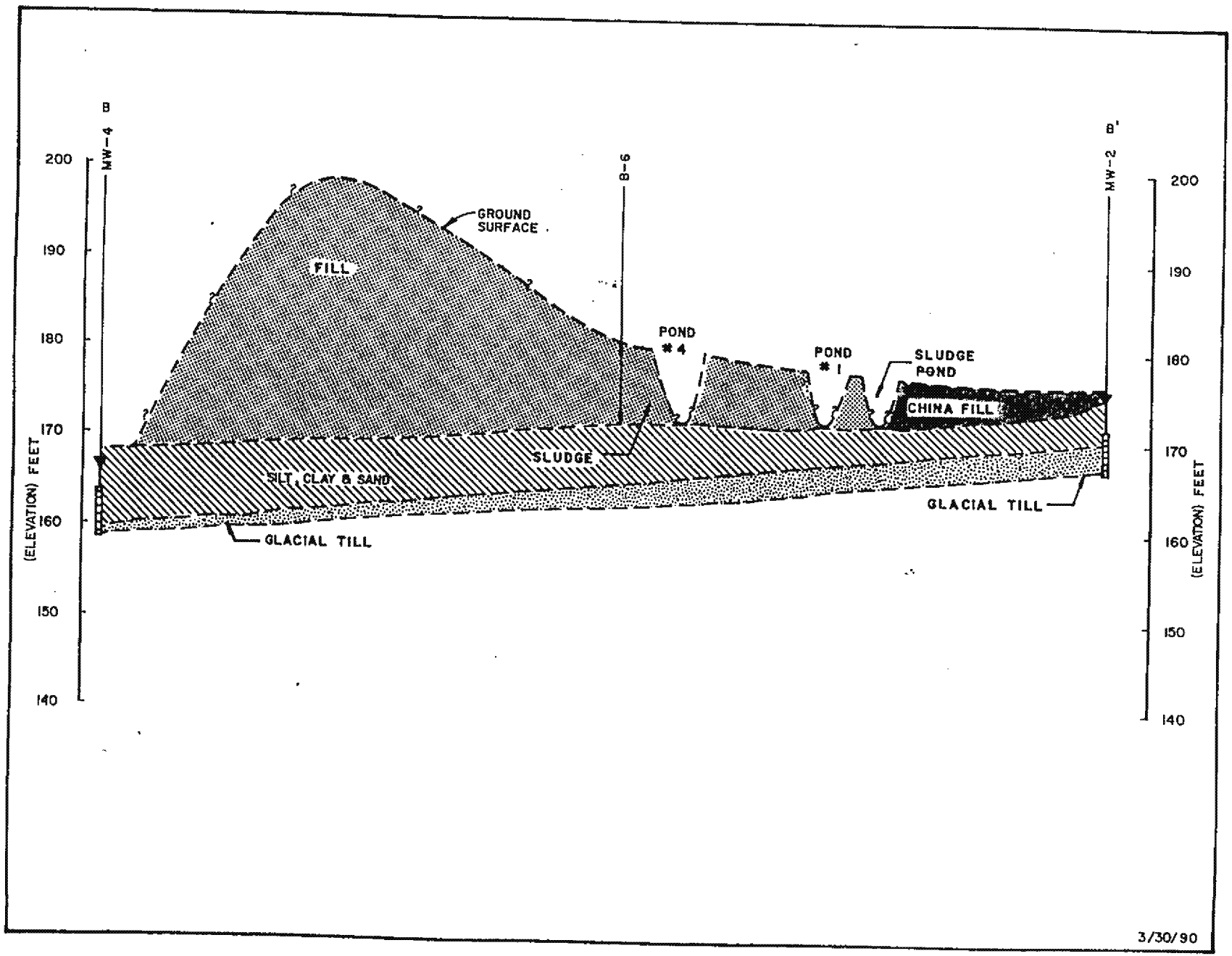


FIGURE 5

SYRACUSE CHINA CORP.
SYRACUSE, N.Y.

HYDROGEOLOGIC CROSS SECTION B - B'

LEGEND

SCREENED INTERVAL

GROUND WATER ELEVATION (10/26/89)

LITHOLOGIC BOUNDARY

NOTE: ASSUMED DATUM BASED UPON ASSUMED ELEVATIONS OF 200.00' (TOP OF STEEL CASING MW-1)

0 100 200
HORIZ. SCALE IN FEET

O'BRIEN & GERE ENGINEERS, INC.

ED_006185_00000991-00037

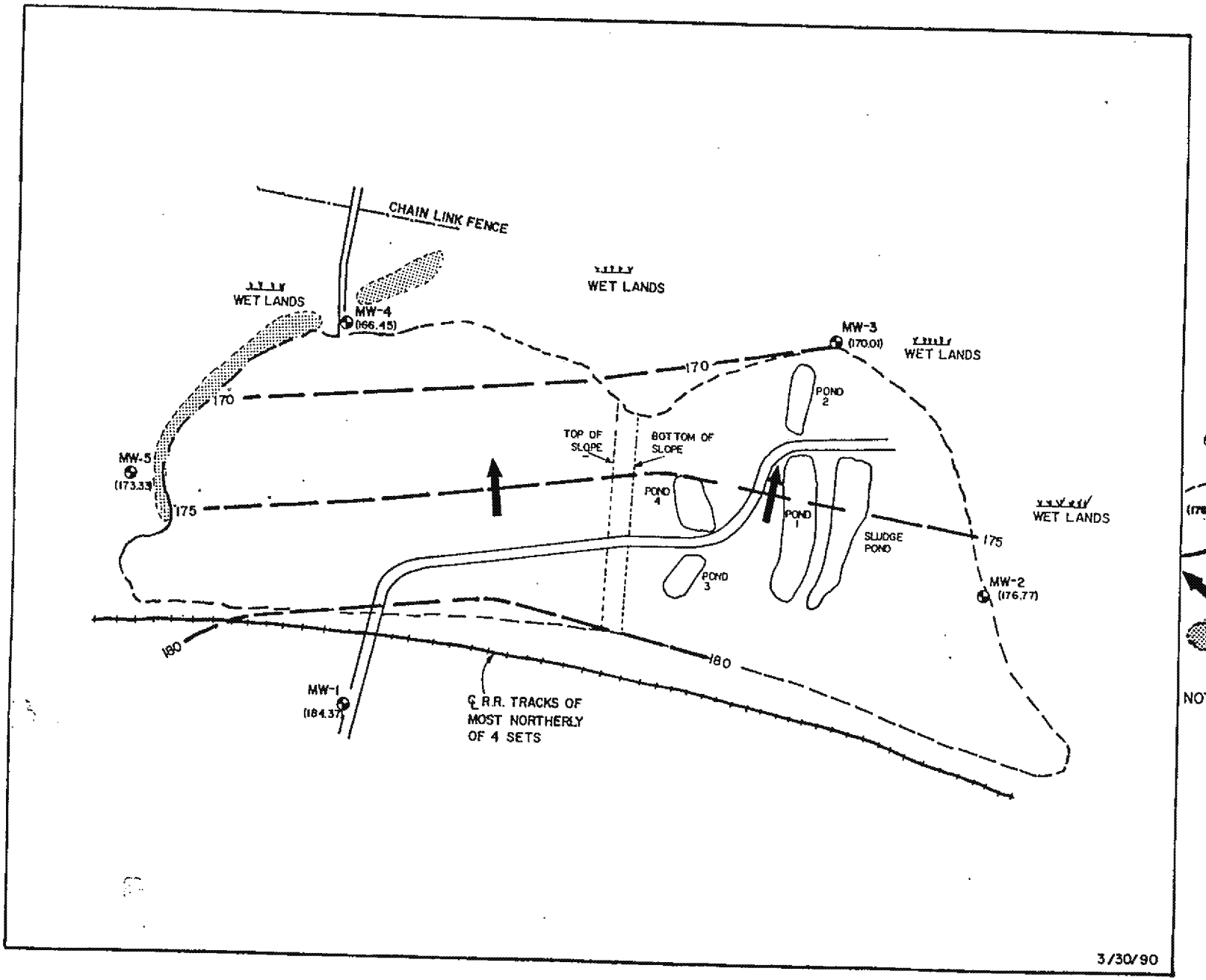


FIGURE 6

SYRACUSE CHINA CORP.
SYRACUSE, N.Y.

GROUND WATER ELEVATION MAP
10/26/89

LEGEND

- GROUND WATER MONITORING WELL
- APPROXIMATE PERIMETER OF LANDFILL
- (176.77) GROUND WATER ELEVATION
- GROUND WATER ELEVATION CONTOUR
- GROUND WATER FLOW DIRECTION
- BERM

NOTE: M.W. ELEVATIONS BASED UPON ASSUMED ELEVATIONS OF 200.00' (TOP OF STEEL CASING-MW-1)

0 150 300
SCALE IN FEET

O'BRIEN & GERE ENGINEERS INC

ED_006185_00000991-00038

Appendices

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APPENDIX A

Magnetometer Survey Data

SYRACUSE CHINA

X	Y	Z
0	0	56103
50	0	53300
100	0	54400
150	0	53450
200	0	53800
250	0	54700
300	0	56130
350	0	54860
400	0	55940
450	0	54700
500	0	55560
550	0	54670
0	50	56010
50	50	56400
100	50	56510
150	50	56710
200	50	56530
250	50	56255
300	50	56245
350	50	56360
400	50	56030
450	50	56350
500	50	56325
550	50	56380
0	100	56570
50	100	56560
100	100	55975
150	100	55850
200	100	57040
250	100	56410
300	100	56220
350	100	56200
400	100	56480
450	100	56350
500	100	56300
550	100	56460
0	150	56570
50	150	56290
100	150	55865
150	150	56560
200	150	56285
250	150	56610
300	150	57280
350	150	56430
400	150	56190
450	150	56415
500	150	56530
550	150	56450
0	200	56260
50	200	56120
100	200	56555
150	200	56280

SYRACUSE CHINA

X	Y	Z
200	200	56780
250	200	56335
300	200	55690
350	200	56750
400	200	56160
450	200	56025
500	200	56570
550	200	56515
0	250	56380
50	250	56260
100	250	55910
150	250	56110
200	250	56685
250	250	56250
300	250	56640
350	250	56070
400	250	56460
450	250	56700
500	250	55890
550	250	56260
0	300	56380
50	300	56460
100	300	56040
150	300	56160
200	300	55650
250	300	55800
300	300	55605
350	300	56005
400	300	55960
450	300	56400
500	300	56395
550	300	56360
0	350	56230
50	350	56270
100	350	56240
150	350	56100
200	350	55830
250	350	57280
300	350	56235
350	350	56215
400	350	56454
450	350	56040
500	350	56610
550	350	56650
0	400	56200
50	400	56200
100	400	56200

SYRACUSE CHINA

X	Y	Z
150	400	56200
200	400	56200
250	400	56200
300	400	56070
350	400	56020
400	400	56080
450	400	56010
500	400	55995
550	400	56060

APPENDIX B

Field Investigation Protocols

SECTION 1 - DRILLING AND SAMPLING PROTOCOL FOR TEST SOIL BORINGS AND GROUND WATER MONITORING WELL INSTALLATIONS

1.01 Introduction

The following Quality Assurance Protocols have been prepared for the Hydrogeologic Site Assessment of the Syracuse China Corporation Landfill. These protocols address sampling efforts associated with the installation of ground water monitoring wells and related sampling tasks described in the Work Plan.

1.02 Test Soil Boring Installation Procedures

1.02.01 Drilling/Sampling Procedures

Test borings shall be completed using the hollow stem auger drilling method to a depth specified by the supervising geologist. The minimum inside diameter of the augers shall be 3-3/4 inches.

Subsurface soil samples shall be collected continuously to a depth specified by the supervising geologist. The sampling method employed shall be ASTM D-1587-84/Split Barrel Sampling using either a standard 2 ft. long, 2 in. outside diameter split spoon sampler with a 140 lb. hammer or a 3 in. outside diameter sampler with a 300 lb. hammer. Upon retrieval of the sampling barrel, the collected sample shall be placed in glass jars and labelled, stored on site.

A geologist will be on site during the drilling operations to fully describe each soil sample including 1) Soil type, 2) color, 3) percent recovery, 4) moisture content, 5) odor and 6) miscella-

neous observations such as organic content. The supervising geologist will be responsible for retaining a representative portion of each sample in a one pint glass jar labeled with: 1) the site; 2) the boring number; 3) the interval sample/interval preserved; 4) the date; and, 5) the time of sample collection.

The drilling contractor will be responsible for obtaining accurate and representative samples, informing the supervising geologist of changes in drilling pressure, keeping a separate general log of soils encountered including blow counts (i.e. the number of blows from a soil sampling drive weight (140 pounds), driving the split spoon sampler in 6-inch increments and installing monitoring wells to levels directed by the geologist following specifications further outlined in this protocol.

1.02.02 Unconsolidated Monitoring Well Installation Procedures

All monitoring wells will be constructed of ten (10) feet of 2 inch ID, 0.010 or 0.020 inch slot size Schedule 40 PVC well screen, and a riser casing that will extend from the screened interval to two feet above existing grade. The screen slot size and sand pack will be selected based on the site soils. Other materials utilized for completion will be washed, graded, silica sand of appropriate size for the well screen, bentonite grout, Portland Cement and a protective steel locking well casing and cap with locks.

The monitoring well installation method for 2 inch wells installed within unconsolidated sediments shall be to place the screen and riser assembly into the casing once the screen interval has

been selected. At that time a washed silica sand pack will be placed around the well screen if required to prevent screen plugging. If a sand pack is not warranted, the auger string will be pulled back to allow the native aquifer material to collapse to two feet above the top of the screen. Three feet of bentonite pellets will then be added to the annulus between the casing and the inside auger to insure proper sealing. Cement/Bentonite grout will continue to be added during the extraction of the augers until the entire aquifer thickness has been sufficiently sealed off from horizontal and/or vertical flow above the screened interval. During placement of sand and bentonite pellets frequent measurements will be made to check the height of the sand pack and thickness of bentonite layers by a weighted drop tape measure.

A vented protective steel casing shall be located over the PVC standpipe extending 2 ft below grade and 2-3 ft above grade secured by a Portland Cement seal. The cement seal shall extend laterally at least 1 ft. in all directions from the protective casing and shall slope gently away to drain water away from the well. A vented steel cap will be fitted on the protective casing. The cap shall be constructed so it may be secured with a steel lock.

The on-site geologist shall specify the monitoring well design to the drilling contractor prior to installation.

1.03 Well Development Protocol

All monitoring wells will be developed or cleared of all fine grained materials and sediments that have settled in or around the well during

installation to ensure the screen is transmitting representative portions of the ground water. The development will be by one of two methods: pumping or bailing ground water from the well until it yields relatively sediment free water.

In pumping or bailing, a decontaminated pump or bailer will be used following procedures outlined in the decontamination protocol. Ground water will be pumped from the top of the water column using a pump or bailed using a stainless steel bailer. Clean plastic will be placed on the ground to avoid surface contamination and new polypropylene rope on the bailer will be used for each well. Pumping or bailing will cease when the ground water yields sediment free water.

1.04 Hydraulic Conductivity Tests

The tests will be performed by removing water from the monitoring well in order to create a sufficient hydraulic gradient between the monitoring well and aquifer. The rate of change in water levels will be recorded and analyzed using Hvorslev's or Papadopulos' method.

If no significant drawdown can be obtained by removing water from the monitoring well an Enviro-Labs Model DL-120-MCP pressure transducer system will be utilized. This test will involve inserting a teflon rod into the well in order to create a positive potential between the well and aquifer. After the Enviro-Labs system records the response to the positive potential, the teflon rod will be removed in order to create a negative hydraulic potential between the well and aquifer. The rate of ground water recovery will then be recorded using the Environ-Labs system. The data collected from both the positive displacement (slug) and negative displacement will be analyzed using Hvorslev's or Papadopolous' method.

All equipment which comes in contact with the monitoring well will be decontaminated with a methanol swabbing and distilled water rinse between each monitoring well.

SECTION 2 - SAMPLING PROCEDURES

The sampling procedures used by O'Brien & Gere are presented in the following subsections. These procedures have been standardized to allow applicability to a wide type of environmental investigations. Sampling procedures associated with the ground water and soil at the Syracuse China Corporation site will be conducted as outlined below.

2.01 Ground Water Sampling Procedures

The general site-specific protocols for the Syracuse China site are presented in this section.

2.01.01 Preparation for Sampling

Preparation for sampling includes the acquisition of all necessary monitoring equipment and site-specific information to perform the required monitoring. Prior to initiating any ground water sampling activities, a complete round of depth to water level measurements will be measured to the nearest 0.01 ft.

Total well depths necessary to calculate the required purge volumes will be tabulated following completion of the well installations.

2.01.02 Well Evacuation

Monitoring wells will be evacuated such that a minimum of three well volumes equivalent to the amount of water standing in

the well casing is removed or for low yielding wells, until the well goes dry and recovers sufficiently prior to sample acquisition. The volume of water to be purged from each well will be calculated by the on-site geologist.

Either a submersible pump, bladder pump, positive displacement pump, foot valve pump, or bailer will be used to evacuate the monitoring wells. Pump placement depth will be dependent on well yields. High yielding wells will necessitate placement of the pump intake at the top of the water column. Low well yields require pump placement to be at the bottom of the well. Proper pump placement will ensure complete and proper evacuation. Upon completion of the required purge volume, the pumping system will be removed from the well. Wells that are inaccessible with the pump system will be hand bailed using a bottom-loading stainless steel bailer.

2.01.03 Sample Acquisition

Prior to obtaining ground water samples for laboratory analysis, all monitoring wells must be developed as described in the Well Development Protocol (Section 4.03). Either a submersible pump, bladder pump, positive displacement pump, foot valve pump or stainless steel bailer may be used to collect ground water samples for transfer into the proper sample containers (Table B-2). If well yields are low at the site, the samples will be collected as the well recovers and provides a sufficient volume for sample collection. The portion of sample required for analysis of volatiles will be collected first.

Use of the following procedures for the sampling of ground water observation wells is dependent upon the size and depth of the well to be sampled and the volume of ground water in the well. To obtain representative ground water samples from wells containing only a few gallons of ground water, the bailing procedure is preferred. To obtain representative ground water samples from wells containing more than a few gallons, the pumping procedure generally facilitates more rapid sampling. Each of these procedures is outlined below.

A. Sampling Procedures (BAILER)

1. Identify the well and record the location on the Ground Water Sampling Field Log or in a field notebook.
2. Put on a new pair of disposable gloves.
3. Cut a slit in the center of a clean plastic sheet, and slip it over the well creating a clean surface onto which the sampling equipment can be positioned.
4. Clean all meters, tools, equipment, etc., before placing on the plastic sheet.
5. Disposable shoe covers should be placed over the samplers shoes to prevent potential contamination from dirty shoes contacting the plastic sheet. Do not kick, transfer, drop, or in any way let soils or other materials fall onto this plastic sheet unless it comes from inside the well.
6. Remove the well cap and plug placing both on the plastic sheet.

7. Using an electric well probe, measure the depth to the water table and the bottom of the well. Record this information in the Ground Water Sampling Field Log or field notebook.

8. Clean the well depth probe with a methanol soaked towel and rinse it with distilled water after use.

9. Compute the volume of water in the well, and record this volume on the Ground Water Sampling Field Log or field notebook.

10. Attach enough polypropylene rope to a bailer to reach the bottom of the well, and lower the bailer slowly into the well making certain to submerge it only far enough to fill one-half full. The purpose of this is to recover any oil film, if one is present on the water table.

11. Pull the bailer out of the well keeping the polypropylene rope on the plastic sheet. Empty the ground water from the bailer into a glass quart container and observe its appearance. NOTE: This sample will not undergo laboratory analysis, and is collected to observe the physical appearance of the ground water.

12. Record the physical appearance of the ground water on the Ground Water Sampling Field Log.

13. Initiate bailing the well from the well top making certain to keep the polypropylene rope on the plastic sheet. All ground water should be dumped from the bailer into a graduated pail to measure the quantity of water removed from the well.

14. Continue bailing the well from the top of the water column until a sufficient volume of ground water in the well has been removed, or until the well is bailed dry. If the well is bailed dry, allow sufficient time for the well to recover before proceeding with Step 15. Record this information on the Ground Water Sampling Field Log.

15. Remove the sampling bottles from their transport containers, and prepare the bottles for receiving samples. Inspect all labels to ensure proper sample identification. Sample bottles should be kept cool with their caps on until they are ready to receive samples. Arrange the sampling containers to allow for convenient filling. Always fill the containers designated for purgeable priority pollutant first. Filter and add preservatives to appropriate samples.

16. To minimize agitation of the water in the well, initiate sampling by lowering the bailer slowly into the well making certain to submerged it only far enough to fill it completely. After filling, return each sample bottle to its proper transport container.

17. If the sample bottles cannot be filled quickly, keep them cool with the caps on until they are filled. The vials designated for volatile analysis should be filled from one bailer, then securely capped. NOTE: Samples must not be allowed to freeze.

18. Record the physical appearance of the ground water observed during sampling on the Ground Water Sampling Field Log or field notebook.

19. After the last sample has been collected, record the date and time, and, and if required, empty one bailer of water from the surface of the water in the well into the 200 ml beaker and measure and record the pH, conductivity and temperature of the ground water following the procedures outlined in the equipment operation manuals. Record this information on the Ground Water Sampling Field Log. The 200 ml beaker must then be rinsed with distilled water prior to reuse.

20. Begin the Chain of Custody Record. A separate form is required for each well with the required analysis listed individually.

21. Replace the well cap, and lock the well protection assembly before leaving the well location.

22. Place the polypropylene rope, gloves, rags, and plastic sheeting into a plastic bag for disposal.

23. Clean the bailer by rinsing with control water, methanol and 1% nitric acid, deionized water. Store the clean bailer in a fresh plastic bag.

B. Sampling Procedures (PUMP)

1. Identify the well and record the location on the Ground Water Sampling Field Log or in a field notebook.

2. Put on a new pair of disposable gloves.

3. Cut a slit in the center of a clean plastic sheet, and slip it over the well creating a clean surface onto which the sampling equipment can be positioned.

4. Clean all meters, tools, equipment, etc., before placing on the plastic sheet.

5. Disposable shoe covers should be placed over the samplers shoes to prevent potential contamination from dirty shoes contacting the plastic sheet. Do not kick, transfer, drop, or in any way let soils or other materials fall onto this plastic sheet unless it comes from inside the well.

6. Remove the well cap, and plug placing both on the plastic sheet.

7. Using an electric well probe, measure the depth to the water table and the bottom of the well. Record this information in the Ground Water Sampling Field Log or field notebook.

8. Clean the well depth probe with a methanol soaked towel and rinse it with distilled water after use.

9. Compute the volume of water in the well, and record this volume on the Field Log or field notebook.

10. Attach enough polypropylene rope to a bailer to reach the bottom of the well, and lower the bailer slowly into the well making certain to submerge it only far enough to fill one-half full. The purpose of this is to recover any oil film, if one is present on the water table.

11. Pull the bailer out of the well keeping the polypropylene rope on the plastic sheet. Empty the ground water from the bailer into a glass quart container and observe its appearance. NOTE: This sample will not undergo laboratory analysis, and is collected to observe the physical appearance of the ground water.

12. Record the physical appearance of the ground water on the Ground Water Sampling Field Log.

13. Prepare the pump for operation.

14. Lower the pump to immediately below the water level and pump the ground water into a graduated pail. Pumping should continue until sufficient well volumes have been removed or the well is pumped dry. If the well is pumped dry, allow sufficient time for the well to recover before proceeding with Step 16. Record this Information on the Ground Water Sampling Field Log.

15. Remove the sampling bottles from their transport containers, and prepare the bottles for receiving samples. Inspect all labels to ensure proper sample identification. Sample bottles should be kept cool with their caps on until they are ready to receive samples. Arrange the sampling containers to allow for convenient filling. Always fill the vials designated for volatile analyses first. Filter and add preservatives to appropriate samples.

16. To minimize agitation of the water in the well, initiate sampling by lowering the bottom loading stainless steel bailer slowly into the well making certain to submerge it only far enough to fill it completely. After filling, return each sampling bottle to its proper transport container. NOTE: While filling the sample vial designated for volatiles, ensure that the submersible pump intakes are

located at a sufficient depth below the surface of the water to ensure air is not introduced while filling the vials.

17. If the sample bottles cannot be filled quickly, keep them cool with the caps on until they are filled. NOTE: Samples must not be allowed to freeze.

18. Record the physical appearance of the ground water observed during sampling on the Ground Water Sampling Field Log or field notebook.

19. After the last sample has been collected, record the date and time, and if required, empty one bailer of water from the surface of the water in the well into the 200 ml beaker and measure and record the pH, conductivity and temperature of the ground water following the procedures outlined in the equipment operation manuals. Record this information. The 200 ml beaker must then be rinsed with methanol and distilled water prior to re-use.

20. Begin the Chain of Custody Record. A separate form is recommended for each well with the required analysis listed individually.

21. Remove the pump from the well and clean the pumps and necessary tubing both internally and externally. Cleaning is comprised of rinses with potable water.

22. Replace the well plug, and lock the well protection assembly before leaving the well location.

23. Place the gloves, towels, and plastic sheet into a plastic bag for disposal.

2.02 Decontamination Protocols

Decontamination procedures will be applicable to all drilling and sampling activities. All drilling and well construction equipment mobilized to the Syracuse China site will receive an initial decontamination. Decontamination will consist of steam cleaning of the entire rig and associated equipment to the satisfaction of the supervising geologist.

The rear portion of the drill rig will be decontaminated by steam cleaning between test borings and/or monitoring well installations. In addition equipment entering a test boring or well boring but not used for sample collection, will be decontaminated using a high pressure steam cleaner to remove soil and volatilize organics followed by a control water rinse. Sample collecting equipment contacting soil and/or rock samples will be decontaminated after each use by a low phosphate detergent wash followed by a potable clean water rinse. Carbon steel split spoons will be rinsed in a 1% Nitric Acid solution and rinsed with clean water. A methanol rinse followed by a final rinse with potable or deionized water will complete the decontamination procedure. Solvents used for decontamination will be pesticide grade or better and will be stored separately from the analyte free deionized water.

It may be necessary to insert hoses and/or narrow diameter pipe into a test boring and/or well during installation, development, purging, and sampling. These items will also be decontaminated prior to, and following each use. The hoses will be cleaned with soapy water

and rinsed with potable water. Decontamination procedures required for site personnel are described in the Health and Safety Plan.

2.03 Sample Preparation and Preservation

Samples collected for metals analysis will be filtered and preserved to a pH less than 2 using nitric acid and the other field filtered through a 0.45 um membrane (cellulose ester) filter prior to preservation to a pH less than 2.

Samples requiring refrigeration for preservation will be immediately transferred to coolers packed with ice or ice packs. All samples will be shipped within 24 hours of being collected. Proper chain-of-custody documentation will be maintained as discussed in Section 6 of this QAPP.

APPENDIX C

Boring Logs - Well Specifications

O'BRIEN & GERE ENGINEERS, INC.

TEST BORING LOG

Report of Boring No. MW-1
Sheet 1 of 1

Project Location: Syracuse, New York
Client: Syracuse China

SAMPLER
Type: Split Spoon
Hammer: 140 lbs. Fall: 30 inches

Ground Water Depth Date
Depth Date
File No.: 1868.004.120

Boring Co.: Parratt-Wolff
Foreman: Rick Navotney
OBG Geologist: Peter Bogardus

Boring Location: Upgradient near Rail Road tracks
Ground Elevation:
Dates: Started: 10/9/89 Ended: 10/9/89

Depth	Sample No	Sample Depth	Blows /6"	Penetr/ Recovry	"N" Value	Sample Description	Stratum Change General Descript	Equipment Installed	Field Testing pH	Sp Cond	HNU	Rmks
0	1	0-2'	4-7-7-6	2'/1'	14	Top soil, black, moist SILT.	0.5'					
	2	2-4'	7-7-6-4	2'/1.2'	13	Brown, stiff, moist, SILT, little fine sand some fine to medium gravel (FILL).						
	3	4-6'	2-1-2-4	2'/0.5'	3	Reddish/brown, stiff, moist, SILT, some coarse sand to medium gravel, trace of clay black cinders present (FILL).						
5						Golden brown, moist, loose, fine SAND, little silt.	5.0'					
	4	6-8'	4-4-4-4	2'/1.8'	8	Brown, loose, moist to wet, fine to medium, SAND, little to trace of silt.						
	5	8-10'	6-5-5-5	2'/1.8'	10	Brown, moist, medium dense, fine SAND, some silt with medium to coarse sand seams, also some silt seams (iron oxide staining).						
10	6	10-12'	5-5-5-4	2'/0.8'	10	Same as above with trace of fine gravel.						
	7	12-14'	8-9-13-14	2'/1.8'	22	Brownish/red, moist, very stiff SILT, some coarse sand to medium gravel, little fine to medium sand, little to trace of clay (apparent TILL).	12.0'					
	8	14-16'	12-12-21-26	2'/1'	33	Same as above.	14.0'					
15												
	9	16-18'	12-19-21-22	2'/1.5'	40	Gray, wet, dense, fine SAND, little silt with medium to coarse seams, trace of medium gravel.						
	10	18-20'	12-14-18-21	2'/1.8'	32	Brownish/red, wet, dense, fine to medium SAND, trace of silt.						
20	11	20-22'	12-21-26-32		47	Same as above.	22.0'					
						Bottom of boring at 22.0 ft.						

22-12 - 0.010" Slot 2" PVC Well Screen
22-10 - Washed Sand Grade 0
10-9 - Washed Sand Grade 00
9-6 - Bentonite Pellets
6-0 - Bentonite/Cement Grout

MW1.KJF

O'BRIEN & GERE ENGINEERS, INC.

TEST BORING LOG

Report of Boring No. MW-2
Sheet 1 of 1

Project Location: Syracuse, New York

Client: Syracuse China

SAMPLER
Type: Split Spoon
Hammer: 140 lbs. Fall: 30 inches

Ground Water Depth Date
Depth Date
File No.: 1868.004.120

Boring Co.: Parratt-Wolff
Foreman: Rick Navotney
OBG Geologist: Peter Bogardus

Boring Location: Eastern End of Landfill
Ground Elevation:
Dates: Started: 10/10/89 Ended: 10/10/89

Depth	Sample No	Sample Depth	Blows /6"	Penetr/ Recovry	"N" Value	Sample Description	Stratum Change General Descript	Equipment Installed	Field Testing pH	Sp Cond	HNU	Rmks
0	1	0-2'	1-2-3-4	2'/1.5'	5	Top soil, black SILT, some fine sand.	0.5'					
						Golden brown, wet, SILT, some fine sand.	3.5'					
	2	2-4'	5-4-6-9	2'/1.8'	10							
	3	4-6'	4-6-6-8	2'/1'	12	Brown, wet, loose, fine to medium SAND, trace of silt with some gray silt seams.						
5												
	4	6-8'	8-7-5-10	2'/1.5'	12	Reddish/brown, wet, fine to medium SAND, some silt with reddish/brown silt seams, with little coarse sand to fine gravel, (apparent TILL).						
	5	8-10'	16-19-25-22	2'/1'	44	Same as above.	9.5'					
10	6	10-12'	13-20-26-30	2'/1'	46	Wet, reddish/brown, dense, fine to medium SAND, trace of silt.	10.0'					
						Bottom of boring at 10.0 ft.						

10-5 - 0.010" Slot 2" PVC Well Screen
10-4.2 - Washed Sand Grade 0
4.2-3.7 - Washed Sand Grade 00

2-0 - Cement/Bentonite Grout

MW2.KJF

O'BRIEN & GERE ENGINEERS, INC.

TEST BORING LOG

Report of Boring No. MW-3
Sheet 1 of 1

Project Location: Syracuse, New York
Client: Syracuse China

SAMPLER
Type: Split Spoon
Hammer: 140 lbs. Fall: 30 inches

Ground Water Depth Date
Depth Date
File No.: 1868.004.120

Boring Co.: Parratt-Wolff
Foreman: Rick Navotney
OBG Geologist: Peter Bogardus

Boring Location: Eastern Edge of Landfill, lower section
Ground Elevation:
Dates: Started: 10/10/89 Ended: 10/10/89

Depth	Sample No	Sample Depth	Blows /6"	Penetr/ Recovry	"N" Value	Sample Description	Stratum Change General Descript	Equipment Installed	Field Testing pH	Sp Cond	HNU	Rmks
0	1	0-2'	WOH-WOH	2'/0.5'	10	FILL material						
			10-3			Black wood, sulfur odor, moist.	1.0'					
	2	2-4'	1-4-3-4	2'/1'	7	Moist, brown, stiff, fine SAND, some silt, iron oxide staining water at approx. 3 ft.	2.0'					
	3	4-6'	6-5-3-3	2'/1.8'	8	Same as above with trace of clay.						
5												
	4	6-8'	1-3-3-16	2'/1.8'	6	Wet, gray, SILT and fine SAND, little clay.						
	5	8-10'	2-2-12-16	2'/1.3'	14							
						Brownish/red, SILT, some coarse sand to medium gravel, little to trace of clay (apparent TILL).	9.0'					
10	6	10-12'	23-33-	2'/0.5'	59							
			26-33									
						Bottom of boring at 12.0 ft.	12.0'					

9.25-4.25 - 0.010" Slot 2" PVC Well Screen
9.25-4.25 - Wash Sand Grade 0
4.25-3.75 - Wash Sand Grade 00
3.75-1.5 - Bentonite Pellets

1.5-0 - Cement/Bentonite Grout

MW3.KJF
11/6/89

O'BRIEN & GERE ENGINEERS, INC.

TEST BORING LOG

Report of Boring No. MW-4
Sheet 1 of 1

Project Location: Syracuse, New York
Client: Syracuse China

SAMPLER
Type: Split Spoon
Hammer: 140 lbs. Fall: 30 inches

Ground Water Depth Date
Depth Date
File No.: 1868.004.120

Boring Co.: Parratt-Wolff
Foreman: Rick Navotney
OBG Geologist: Peter Bogardus

Boring Location: Near Access Road
Ground Elevation:
Dates: Started: 10/11/89 Ended: 10/11/89

Depth	Sample No	Sample Depth	Blows /6"	Penetr/ Recovry	"N" Value	Sample Description	Stratum Change General Descript	Equipment Installed	Field Testing pH	Sp Cond	HNU	Rmks
0	1	0-2'	4-4-7-6	2'/1'	11	FILL material. White sludge, china, slag, some silt.						
	2	2-4'	4-7-7-4	NR	14							
						Water at approximately 4 ft.	3.5'					
	3	4-6'	1-2-1-1	2'/1.5'	3	Wet, brown/gray, SILT, little clay, little fine sand, (iron oxide staining).						
5												
	4	6-8'	2-1-1-2	2'/1.5'	2	Wet, brown, SILT and CLAY with fine to medium sand.						
						Wet, brown SILT, little to trace of clay.						
	5	8-10'	2-2-1-4	2'/1.2'	3	Wet, brown SAND and GRAVEL, little silt, (iron oxide staining).	8.5'					
10						Brownish/red SILT, some coarse sand to medium gravel, little to trace of clay (apparent TILL).	9.0'					
						Bottom of boring at 10.0 ft.	10.0'					

9.9-4.9 - 0.010" Slot 2" PVC Well Screen
9.9-4.5 - Washed Sand Grade 0
4.5-4 - Washed Sand Grade 00
4-2 - Bentonite Pellets

MW4.KJF
11/6/89

O'BRIEN & GERE ENGINEERS, INC.

TEST BORING LOG

Report of Boring No. MW-5
Sheet 1 of 1

Project Location: Syracuse, New York
Client: Syracuse China

SAMPLER
Type: Split Spoon
Hammer: 140 lbs. Fall: 30 inches

Ground Water Depth Date
Depth Date
File No.: 1868.004.120

Boring Co.: Parratt-Wolff
Foreman: Rick Navotney
OBG Geologist: Peter Bogardus

Boring Location: Eastern edge of Landfill in woods
Ground Elevation:
Dates: Started: 10/11/89 Ended: 10/11/89

Depth	Sample No	Sample Depth	Blows /6"	Penetr/ Recovry	"N" Value	Sample Description	Stratum Change General Descript	Equipment Installed	Field Testing pH	Sp Cond	HNU	Rmks
0	1	0-2'	2-1-2-5	2'/0.7'	3	Brown, moist, SILT, some fine sand.	0.5'					
	2	2-4'	10-5-4-4	2'/0.5'	9	Black, moist, SILT, little clay, root hairs and organic matter.	3.0'					
	3	4-6'	4-6-7-8	2'/1'	13	Brownish/red, SILT, some fine sand, little coarse sand to fine gravel. Water at ~4 ft.						
5												
	4	6-8'	2-3-5-8	2'/1.2'	8	Wet, brownish/red, fine sand, little silt.						
	5	8-10'	8-9-12-14	2'/1.5'	21	Same as above.						
10	6	10-12'	2-6-19-21	2'/0.5'	25	Same as above.						
						Bottom of boring at 12 ft.	12.0'					

9.9-4.9 - 0.010" Slot 2" PVC Well Screen
9.9-4.5 - Washed Sand Grade 0
4.5-4.0 - Washed Sand Grade 00
4-1.5 - Bentonite Pellets

1.5-0 - Cement/Bentonite Grout

MW5.KJF
11/6/89

O'BRIEN & GERE ENGINEERS, INC.

TEST BORING LOG

Report of Boring No. B-1, B-2, B-3 & B-4
Sheet 1 of 1

Project Location: Syracuse, New York

Client: Syracuse China Corp.

SAMPLER
Type: Split Spoon
Hammer: 140 lbs. Fall: 30 inches

Ground Water Depth N/A Date
Depth Date
File No.: 1868.006.130

Boring Co.: Parratt-Wolff
Foreman: Rick Navotney
OBG Geologist: Peter Bogardus

Boring Location: Silty Pond Area
Ground Elevation:
Dates: Started: 12/29/89 Ended: 12/29/89

Depth	Sample No	Sample Depth	Blows /6"	Penetr/ Recovry	"N" Valve	Sample Description	Stratum Change General Descript	Equipment Installed	Field Testing pH	Sp Cond	HNU	Rmks*
0	B1	0-2'	5-6-5-3	2'/1'	11	Broken BISQUE.	0.5'					
		2-4'	2-2-4-4	2'/1'	6	White/gray, medium stiff SLUDGE.						
		4-6'	1-2-1-1	2'/1.5'	3	Same as above.						
5		6-8'	6-4-6-5	2'/1.5'	10							
						Brown SILT, some coarse sand to medium gravel, little fine sand to medium sand, little clay. (Apparrent till)	7.5'					
0	B2	0-2'	4-4-4-4	2'/1'	8	Brown SILT and fine SAND.						
						White to gray, medium stiff SLUDGE.	0.5'					
		2-4'	3-3-3-4	2'/1.2'	6							
		4-6'	3-4-6-6	2'/1.7'	10							
5						Brown/red fine SAND, little silt.	5.5'					
0	B3	0-2'	6-11-7-5	2'/1'	18	Broken BISQUE CHINA.						
		2-4'	4-4-5-5	2'/1.2'	9							
		4-6'	2-2-3-3	2'/1.5'		Black cinder fill material.	3.5'					
5						Brown/red fine SAND, some silt.	5.0'					
0	B4	0-2'	11-17-2-4	2'/1.5'	19	Broken CHINA, little sludge.						
		2-4'	1-2-2-2	2'/1'	4							
						Brown/red fine SAND, little silt.	3.5'					

NOTE: All borings backfilled with bentonite pellets.

B1234.KJF
2/9/90

O'BRIEN & GERE ENGINEERS, INC.	TEST BORING LOG	Report of Boring No. B-5, B-6 Sheet 1 of 1
Project Location: Syracuse, New York Client: Syracuse China Corp.	SAMPLER Type: Split Spoon Hammer: 140 lbs. Fall: 30 inches	Ground Water Depth N/A Date Depth Date File No.: 1868.006.130

Boring Co.: Parratt-Wolff
Foreman: Rick Navotney
OBG Geologist: Peter Bogardus

Boring Location: Silty Pond Area
Ground Elevation:
Dates: Started: 12/29/89 Ended: 12/29/89

Depth	Sample No	Sample Depth	Blows /6"	Penetr/ Recovry	"N" Valve	Sample Description	Stratum Change General Descript	Equipment Installed	Field Testing pH	Sp Cond	HNU	Rmks*
0	B5	0-2'	1-4-4-4	2'/1.2'	8	WOOD fragments.						
						Black CINDERS.	0.5'					
		2-4'	5-3-4-3	2'/1.2'	7	Broken CHINA with white/gray SLUDGE.	0.75'					
		4-6'	2-1-2-2	2'/1.2'	3	Same as above.						
5												
		6-8'	1-WOH-1.5	2'/1.8'	1	White, gray and pink SLUDGE. Water at 6.5 ft.	6.0'					
		8-10'	1-WOH-1.5	2'/1.8'	1							
10		10-12'	6-4-	2'/1.8'	27							
			16-22			Brown/red fine SAND.	11.5'					
0	B6	0-2'	8-8-3-4	2'/1.5'	11	Broken CHINA, little white sludge.						
		2-4'	5-3-3-4	2'/1.2'	6							
		4-6'	1-WOH-1.5	2'/1.8'	1	White, gray and pink SLUDGE.	3.5'					
5												
		6-8'	WOH		1							
		8-10'	3-4-		13							
			9-12			Brown/red fine SAND, little silt.	9.0'					
10												

NOTE: All borings backfilled with bentonite pellets.

B56.KJF
2/9/90

TABLE 1
WELL SUMMARY
PRELIMINARY HYDROGEOLOGIC SITE ASSESSMENT
SYRACUSE CHINA CORPORATION

WELL NUMBER	TOP OF CASING ELEVATION (FT)	TOP OF PVC ELEVATION (FT)	GROUND ELEVATION (FT)	SCREENED ELELVATION (FT)	GROUNDWATER ELEVATIONS (FT) 10/13/89	10/26/89
MW-1	200.00	199.81	197.5	175.5 - 185.5	181.30	184.37
MW-2	181.10	180.92	177.9	167.9 - 172.9	176.15	176.77
MW-3	174.09	173.92	170.9	161.7 - 166.7	170.00	170.01
MW-4	171.83	171.68	168.6	158.7 - 163.7	166.18	166.45
MW-5	176.64	176.48	173.7	163.8 - 168.8	172.82	173.33

NOTE: ELEVATIONS BASED UPON ASSUMED ELEVATION (200.00 FT)
TO THE TOP OF STEEL CASING AT MW-1.

APPENDIX D

Ground Water Sampling Logs

WATER SAMPLING FIELD LOG

Sample Location SYRACUSE CHINA Well No. MW-1
Sampled By C.P. ODELL Date 10/26/89 Time 1620
Weather 70°-SUNNY Sampled with Bailer X Pump ____

A. WATER TABLE:

Well depth: (below top of casing) 24.5 ft. Well elevation: (top of casing) ____ ft.

15'5¼" Depth to water table: (below top of casing) 15.44 ft. Water table elevation: ____ ft.

Length of water column (LWC) 9.01 ft.

Volume of water in well:

2" diameter wells = 0.163 x (LWC) = 1.47 gallons +3 = 4.41 gals
4" diameter wells = 0.653 X (LWC) = ____ gallons
6" diameter wells = 1.469 X (LWC) = ____ gallons

B. PHYSICAL APPEARANCE AT START:

Color BROWN Odor NONE Turbidity HIGH

Was an oil film or layer apparent? NO

C. PREPARATION OF WELL FOR SAMPLING:

Amount of water removed before sampling 45 gallons.

Did well go dry? NO

D. PHYSICAL APPEARANCE DURING SAMPLING:

Color BROWN Odor NONE Turbidity HIGH

Was an oil film or layer apparent? NO

E. CONDUCTIVITY ____

F. pH ____

G. TEMPERATURE ____

NOT TAKEN

H. WELL SAMPLING NOTES:

GROUND WATER SAMPLING FIELD LOG

Sample Location SYRACUSE CHINA Well No. MW-2
Sampled By C.P.ODeLL Date 10/26/89 Time 1230
Weather 70°-SUNNY Sampled with Bailer X Pump ____

A. WATER TABLE:

Well depth: (below top of casing) ~13. ft. Well elevation: (top of casing) ____ ft.

4'1⅞" Depth to water table: (below top of casing) 4.15 ft. Water table elevation: ____ ft.

Length of water column (LWC) 8.85 ft.

Volume of water in well:

2" diameter wells = 0.163 x (LWC) = 1.44 gallons ×3 = 4.32 gals
4" diameter wells = 0.653 X (LWC) = ____ gallons
6" diameter wells = 1.469 X (LWC) = ____ gallons

B. PHYSICAL APPEARANCE AT START:

Color BROWN Odor NONE Turbidity HIGH
Was an oil film or layer apparent? NO

C. PREPARATION OF WELL FOR SAMPLING:

Amount of water removed before sampling 2.5 gallons.
Did well go dry? Yes

D. PHYSICAL APPEARANCE DURING SAMPLING:

Color BROWN Odor NONE Turbidity HIGH
Was an oil film or layer apparent? NO

E. CONDUCTIVITY ____

F. pH ____

G. TEMPERATURE ____

} NOT TAKEN

H. WELL SAMPLING NOTES:

GROUND WATER SAMPLING FIELD LOG

Sample Location SYRACUSE CHINA Well No. MW-3
Sampled By C. PODELL Date 10/26/87 Time 1350
Weather 70°-SUNNY Sampled with Bailer X Pump ____

A. WATER TABLE:

Well depth:
(below top of casing) ~12 ft.

Well elevation:
(top of casing) ____ ft.

3.11" Depth to water table:
(below top of casing) 3.91 ft.

Water table elevation: ____ ft.

Length of water column (LWC) 8.09 ft.

Volume of water in well:

2" diameter wells = 0.163 x (LWC) = 1.31 gallons ×3 = 3.93 gal
4" diameter wells = 0.653 X (LWC) = ____ gallons
6" diameter wells = 1.469 X (LWC) = ____ gallons

B. PHYSICAL APPEARANCE AT START:

Color DARK BROWN-GRAY Odor SLIGHT Turbidity HIGH
Was an oil film or layer apparent? NO

C. PREPARATION OF WELL FOR SAMPLING:

Amount of water removed before sampling 4.0 gallons.
Did well go dry? NO

D. PHYSICAL APPEARANCE DURING SAMPLING:

Color DARK BROWN-GRAY Odor SLIGHT Turbidity HIGH
Was an oil film or layer apparent? NO

E. CONDUCTIVITY ____

F. pH ____

G. TEMPERATURE ____

} NOT TAKEN

H. WELL SAMPLING NOTES:

GROUND WATER SAMPLING FIELD LOG

Sample Location SYRACUSE CHINA Well No. MW-4

Sampled By C.P.O'DeLL Date 10/26/89 Time 1445

Weather 70° — SUNNY Sampled with Bailer X Pump ____

A. WATER TABLE:

Well depth: (below top of casing) 13.3 ft. Well elevation: (top of casing) ____ ft.

5' 2¾" Depth to water table: (below top of casing) 5.23 ft. Water table elevation: ____ ft.

Length of water column (LWC) 8.07 ft.

Volume of water in well:

2" diameter wells = 0.163 x (LWC) = 1.32 gallons ×3 = 3.96 gals

4" diameter wells = 0.653 X (LWC) = ____ gallons

6" diameter wells = 1.469 X (LWC) = ____ gallons

B. PHYSICAL APPEARANCE AT START:

Color BROWN Odor NONE Turbidity HIGH

Was an oil film or layer apparent? NO

C. PREPARATION OF WELL FOR SAMPLING:

Amount of water removed before sampling 4 gallons.

Did well go dry? NO

D. PHYSICAL APPEARANCE DURING SAMPLING:

Color BROWN Odor NONE Turbidity HIGH

Was an oil film or layer apparent? NO

E. CONDUCTIVITY ____

F. pH ____

G. TEMPERATURE ____

NOT TAKEN

H. WELL SAMPLING NOTES:

GROUND WATER SAMPLING FIELD LOG

Sample Location SYRACUSE CHINA Well No. MW-5

Sampled By C.P. ODELL Date 10/26/89 Time 15:35

Weather _____ Sampled with Bailer X Pump _____

A. WATER TABLE:

Well depth: (below top of casing) 13.3 ft. Well elevation: (top of casing) _____ ft.

Depth to water table: (below top of casing) 3.15 ft. Water table elevation: _____ ft.

3' 1 3/4"

Length of water column (LWC) 10.15 ft.

Volume of water in well:

2" diameter wells = 0.163 x (LWC) = 1.66 gallons ×3 = 4.98 gal

4" diameter wells = 0.653 X (LWC) = _____ gallons

6" diameter wells = 1.469 X (LWC) = _____ gallons

B. PHYSICAL APPEARANCE AT START:

Color ~~TAN~~ BROWN Odor NONE Turbidity HIGH

Was an oil film or layer apparent? NO

C. PREPARATION OF WELL FOR SAMPLING:

Amount of water removed before sampling 3 gallons.

Did well go dry? Yes

D. PHYSICAL APPEARANCE DURING SAMPLING:

Color BROWN Odor NONE Turbidity HIGH

Was an oil film or layer apparent? NO

E. CONDUCTIVITY _____

F. pH _____

G. TEMPERATURE _____

NOT TAKEN

H. WELL SAMPLING NOTES:

APPENDIX E

Hydraulic Conductivity Tests

IN-SITU PERMEABILITY TEST
FIELD LOG

PROJECT: SYRACUSE CHINA
WELL NUMBER: MW-1
DATE: 10/13/89

EVACUATION METHOD: RECOVERY
PERSONNEL: PETER BOGARDUS
DATUM USED FOR CALCULATIONS: TOP OF PVC

STATIC HEAD (H) = 18.51 ft

PIPE RADIUS (r) = 0.083 ft

SCREEN RADIUS (R)= 0.66 ft

SCREEN LENGTH (L)= 5.75 ft

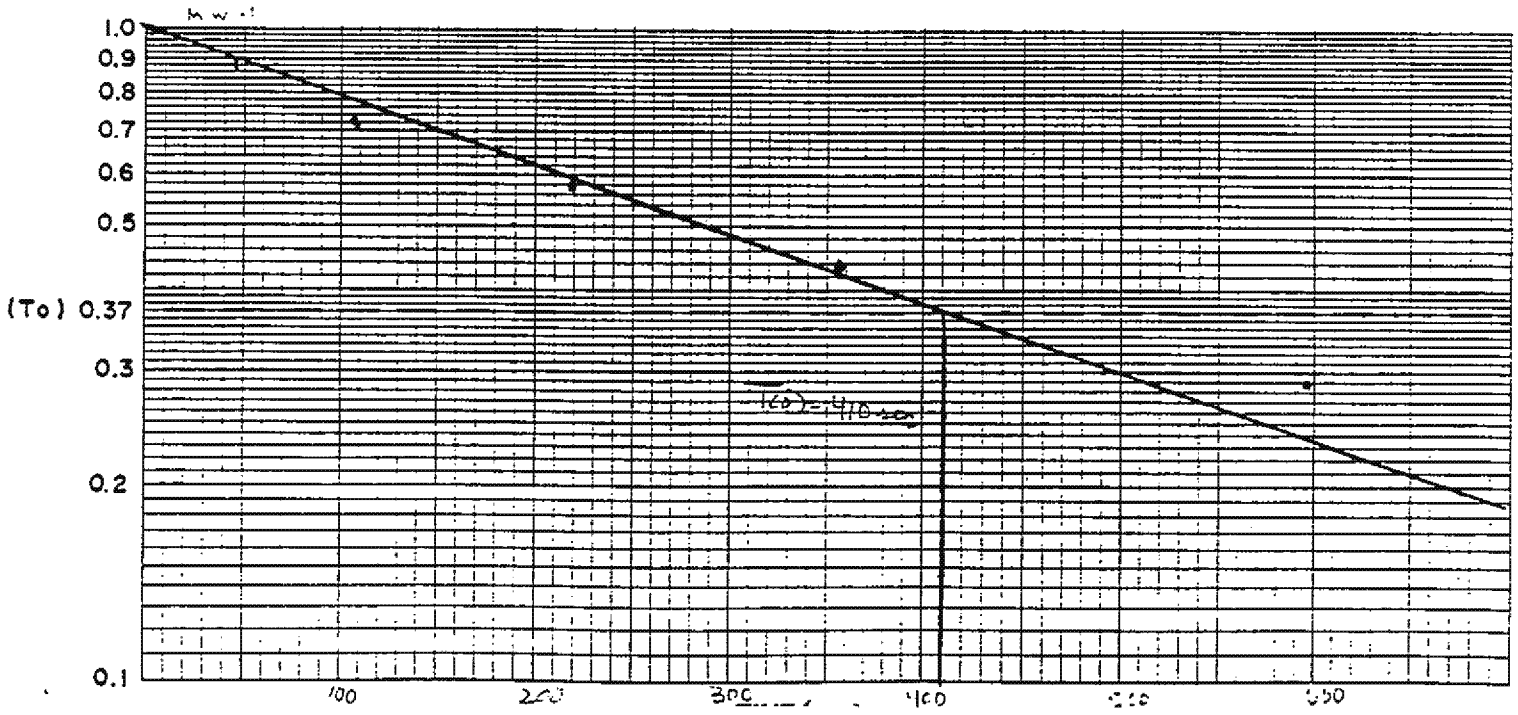
INITIAL HEAD (Ho)= 21.92 ft

To (from graph) = min
410 sec

TIME (sec)	h	H-h / H-Ho
0	21.92	1
45	21.50	0.88
107	21.00	0.73
217	20.50	0.58
355	20.00	0.44
595	19.50	0.29

HYDRAULIC CONDUCTIVITY

$$\frac{r^2 \ln(L/R)}{2LTo} = \begin{array}{l} 3.2E-6 \text{ ft/sec} \\ 9.6E-5 \text{ cm/sec} \end{array}$$



IN-SITU PERMEABILITY TEST
FIELD LOG

PROJECT: SYRACUSE CHINA
WELL NUMBER: MW-2
DATE: 10/13/89

EVACUATION METHOD: RECOVERY
PERSONNEL: PETER BOGARDUS
DATUM USED FOR CALCULATIONS: TOP OF PVC

STATIC HEAD (H) = 4.77 ft

PIPE RADIUS (r) = 0.083 ft

SCREEN RADIUS (R)= 0.66 ft

SCREEN LENGTH (L)= 5 ft

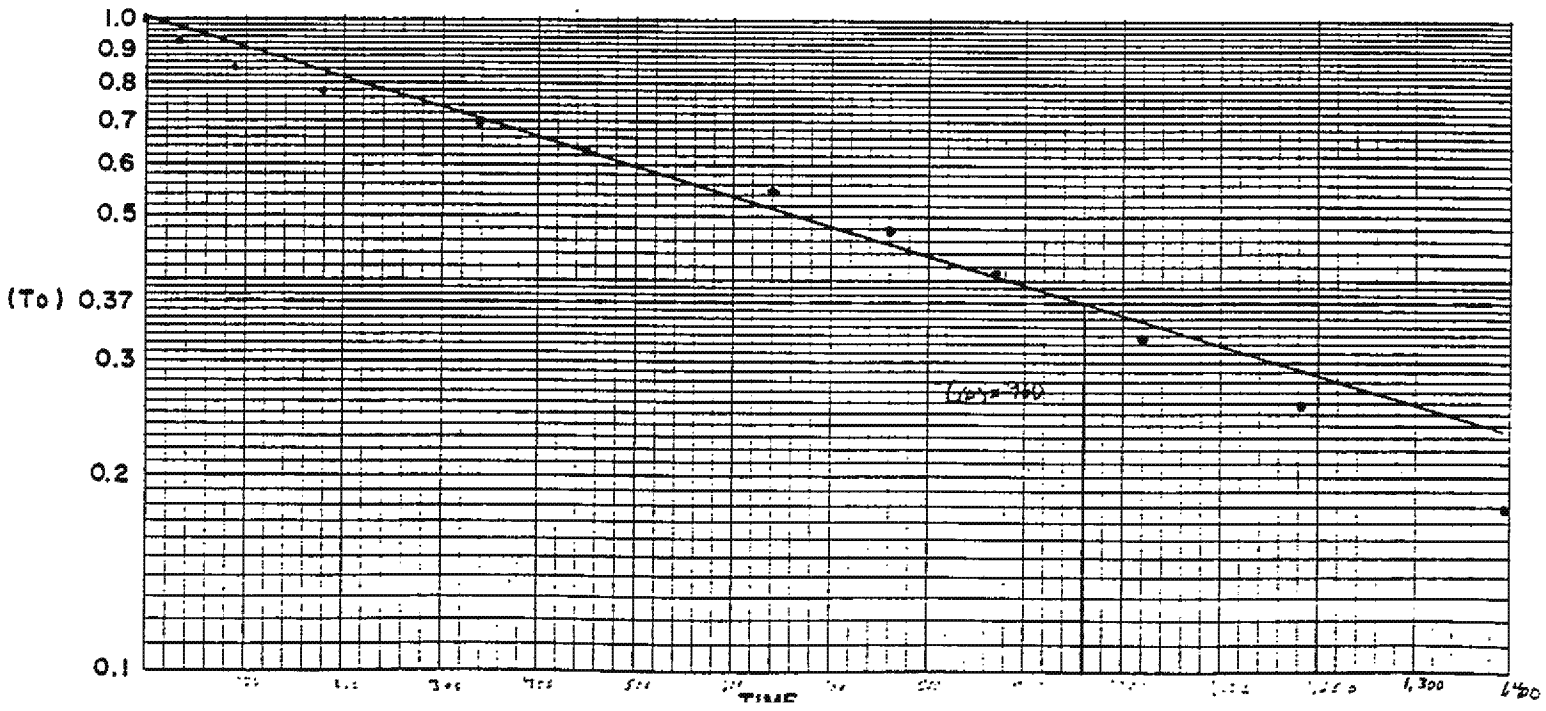
INITIAL HEAD (Ho)= 11.5 ft

To (from graph) = min
960 sec

TIME (sec)	h	H-h / H-Ho
0	11.50	1
34	11.00	0.93
84	10.50	0.85
180	10.00	0.78
343	9.50	0.70
457	9.00	0.63
640	8.50	0.55
760	8.00	0.48
872	7.50	0.41
1019	7.00	0.33
1184	6.50	0.26
1394	6.00	0.18
1693	5.50	0.11

HYDRAULIC CONDUCTIVITY

$$\frac{r^2 \ln(L/R)}{2LTo} = \begin{array}{l} 1.5E-6 \text{ ft/sec} \\ 4.4E-5 \text{ cm/sec} \end{array}$$



IN-SITU PERMEABILITY TEST
FIELD LOG

PROJECT: SYRACUSE CHINA
WELL NUMBER: MW-3
DATE: 10/13/89

EVACUATION METHOD: RECOVERY
PERSONNEL: PETER BOGARDUS
DATUM USED FOR CALCULATIONS: TOP OF PVC

STATIC HEAD (H) = 3.92 ft

PIPE RADIUS (r) = 0.083 ft

SCREEN RADIUS (R)= 0.66 ft

SCREEN LENGTH (L)= 5 ft

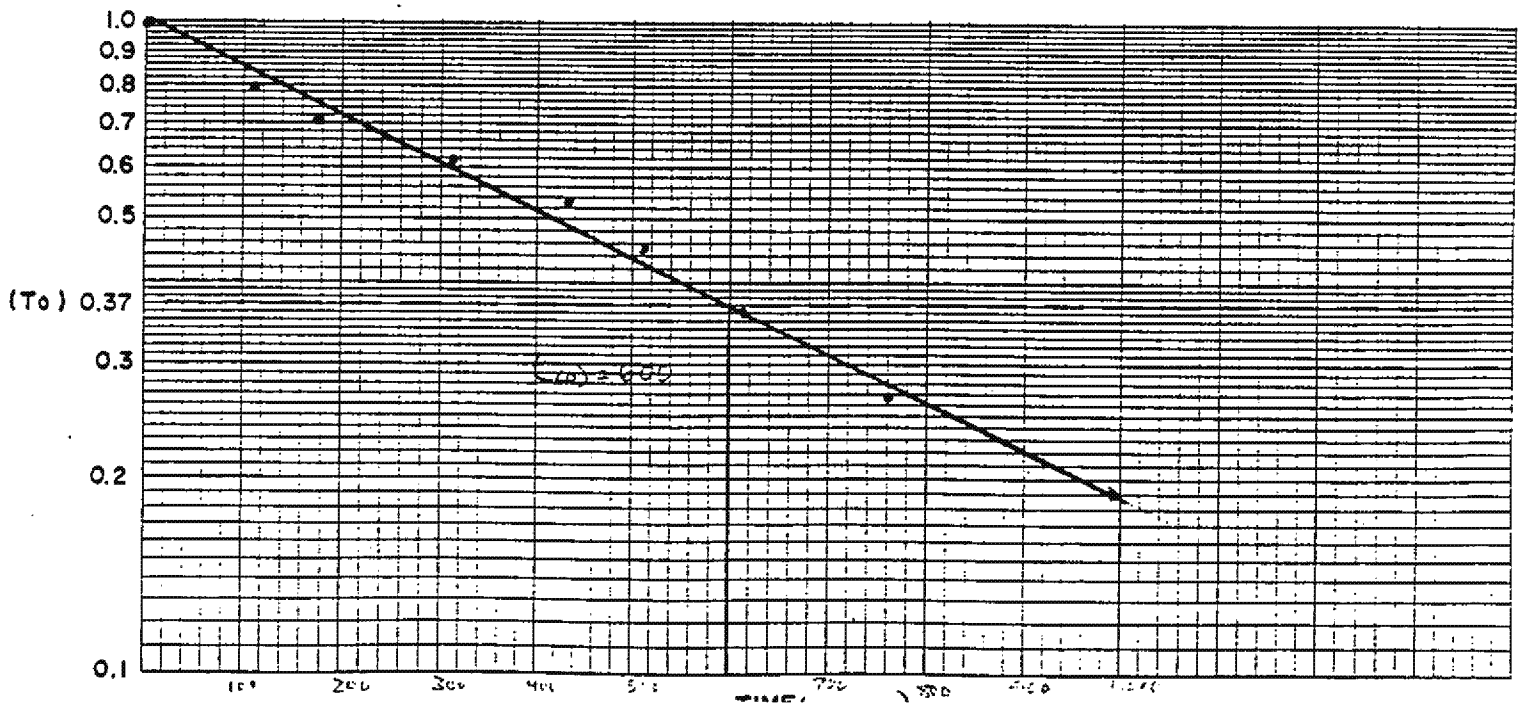
INITIAL HEAD (Ho)= 9.68 ft

To (from graph) = min
600 sec

TIME (sec)	h	H-h / H-Ho
0	9.68	1
112	8.50	0.80
177	8.00	0.71
309	7.50	0.62
433	7.00	0.53
511	6.50	0.45
613	6.00	0.36
758	5.50	0.27
994	5.00	0.19

HYDRAULIC CONDUCTIVITY

$$\frac{r^2 \ln(L/R)}{2LTo} = \begin{array}{l} 2.3E-6 \text{ ft/sec} \\ 7.1E-5 \text{ cm/sec} \end{array}$$



IN-SITU PERMEABILITY TEST
FIELD LOG

PROJECT: SYRACUSE CHINA
WELL NUMBER: MW-5
DATE: 10/13/89

EVACUATION METHOD: RECOVERY
PERSONNEL: PETER BOGARDUS
DATUM USED FOR CALCULATIONS: TOP OF PVC

STATIC HEAD (H) = 3.66 ft

PIPE RADIUS (r) = 0.083 ft

SCREEN RADIUS (R)= 0.66 ft

SCREEN LENGTH (L)= 5 ft

INITIAL HEAD (Ho)= 10.9 ft

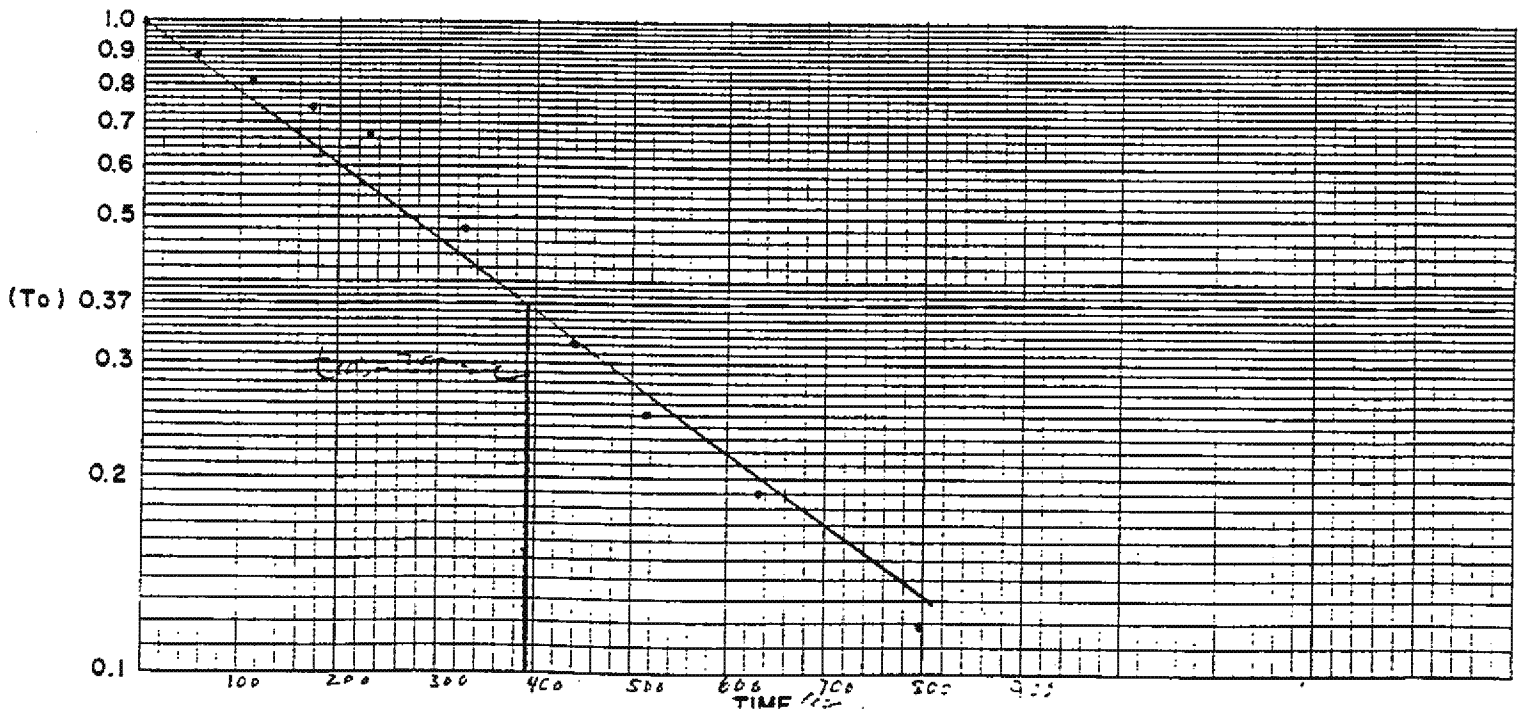
To (from graph) = min
390 sec

TIME (sec)	h	H-h / H-Ho
0	10.90	1
57	10.00	0.88
110	9.50	0.81
170	9.00	0.74
233	8.50	0.67
325	7.15	0.48
443	6.00	0.32
518	5.50	0.25
632	5.00	0.19
799	4.50	0.12

HYDRAULIC CONDUCTIVITY

$$\frac{r^2 \ln(L/R)}{2LTo} = 3.6E-6 \text{ ft/sec}$$

1.1E-4 cm/sec



APPENDIX F

Laboratory and Chain of Custody Forms

UPSTATE LABORATORIES, INC.

Analysis Results
Report Number 30386001
March 3, 1986

Client I.D.	Primary Pond North End #1	Primary Pond South End #2	Discharge by Tracks North Side Stream #3	Sludge from Creek #4	Untreated Plant Water #4	Water from Main Flow #5
ULI I.D.	04186025	04186026	04186027	04186029	04186030	04186031
Total Arsenic	<0.001	<0.001	0.019	—	0.020	0.009
Total Barium	<0.3	2.7	0.5	—	<0.3	<0.3
Total Cadmium	<0.005	<0.005	<0.005	—	<0.005	<0.005
Total Chromium	<0.05	<0.05	<0.05	—	<0.05	<0.05
Total Lead	<0.1	0.5	0.1	—	<0.1	<0.1
Total Mercury	<0.1	<0.1	<0.1	—	<0.1	<0.1
Total Selenium	<0.001	<0.001	<0.001	—	<0.001	<0.001
Total Silver	<0.05	<0.05	<0.05	—	<0.05	<0.05
Dissolved Arsenic	<0.001	<0.001	0.020	—	<0.001	<0.001
Dissolved Barium	<0.3	2.2	0.4	—	<0.3	<0.3
Dissolved Cadmium	<0.005	<0.005	<0.005	—	<0.005	<0.005
Dissolved Chromium	<0.05	<0.05	<0.05	—	<0.05	<0.05
Dissolved Lead	<0.1	<0.1	<0.1	—	<0.1	<0.1
Dissolved Mercury	<0.1	<0.1	<0.1	—	<0.1	<0.1
Dissolved Selenium	<0.001	<0.001	<0.001	—	<0.001	<0.001
Dissolved Silver	<0.05	<0.05	<0.05	—	<0.05	<0.05
EP Toxicity Arsenic	0.010	<0.001	—	0.007	—	—
EP Toxicity Barium	1.3	2.3	—	2.8	—	—
EP Toxicity Cadmium	<0.005	<0.005	—	<0.005	—	—
EP Toxicity Chromium	<0.05	<0.05	—	<0.05	—	—
EP Toxicity Lead	0.2	0.9	—	<0.1	—	—
EP Toxicity Mercury	<0.01	<0.01	—	<0.1	—	—
EP Toxicity Selenium	<0.001	<0.001	—	<0.001	—	—
EP Toxicity Silver	<0.05	<0.05	—	<0.05	—	—

All results are expressed as ppm.

Approved: Anthony Scala 3/03/86

Disclaimer: The test results and procedures utilized, and laboratory interpretations of data obtained by ULI as contained in this report are believed by ULI to be accurate and reliable for sample(s) tested. In accepting this report, the customer agrees that the full extent of any and all liability for actual and consequential damages of ULI for the services performed shall be equal to the fee charged to the customer for the services as liquidated damages.

Upstate Laboratories inc.

143 Midler Park Drive • Box 289 • Syracuse, New York 13206 • (315) 437-0255
Southern Region (607) 272-2708 ext. 1
Western Region (716) 244-8760

KEY TO REPORT #101288003

#1	Primary Pond North End, near exit end of first pond, clear water east of discharge to flow station and second pond, 9/28/88
#2	Primary Pond South End, entrance end of first pond northwest current delta, 9/28/88
#3	North Side Stream Discharge by RR Tracks, just below discharge pipe from 011, 9/28/88
Untreated	Untreated Plant Effluent, taken at 011 before treatment, 9/28/88
#6	Sludge Removed From Primary Pond May 1988, taken from North end of sludge drying basin, 9/28/88
#7	Sludge Removed From Primary Pond May 1988, taken from South end of sludge drying basin, 9/28/88

UPSTATE LABORATORIES, INC.

Analysis Results
Report Number 101288003
Date: October 12, 1988

CLIENT I.D. Syracuse China Corporation	#1	#2	#3	Untreated
ULI I.D.	27388006	27388007*	27388008	27388009
TOTAL: (mg/1)				
Arsenic	0.002	0.005	0.002	0.003
Barium	0.4	1.1	<0.3	<0.3
Cadmium	0.010	<0.005	<0.005	<0.005
Chromium	<0.05	<0.05	<0.05	<0.05
Lead	0.1	0.6	0.1	<0.1
Mercury	<0.0004	<0.0004	0.0005	0.0005
Selenium	<0.001	<0.001	<0.001	<0.001
Silver	<0.05	<0.05	<0.05	<0.05
DISSOLVED: (mg/1)				
Arsenic	0.001	0.005	0.001	<0.001
Barium	<0.3	1.3	<0.3	<0.3
Cadmium	<0.005	<0.005	<0.005	<0.005
Chromium	<0.05	<0.05	<0.05	<0.05
Lead	<0.1	<0.1	<0.1	<0.1
Mercury	<0.0004	<0.0004	0.0005	0.0004
Selenium	<0.001	<0.001	<0.001	<0.001
Silver	<0.05	<0.05	<0.05	<0.05
EP TOXICITY: (mg/1)				
Arsenic	—	0.002	—	—
Barium	—	0.9	—	—
Cadmium	—	<0.005	—	—
Chromium	—	<0.05	—	—
Lead	—	<0.1	—	—
Mercury	—	<0.0004	—	—
Selenium	—	<0.001	—	—
Silver	—	<0.05	—	—

*Analysis on water layer for Total/Dissolved Metals; analysis on sludge layer for EP Toxicity Metals.

Approved: _____

Date: 10/12/88

Disclaimer: The test results and procedures utilized, and laboratory interpretations of data obtained by ULI as contained in this report are believed by ULI to be accurate and reliable for sample(s) tested. In accepting this report, the customer agrees that the full extent of any and all liability for actual and consequential damages of ULI for the services performed shall be equal to the fee charged to the customer for the services as liquidated damages.

UPSTATE LABORATORIES, INC.

Analysis Results
Report Number 101288003
Date: October 12, 1988

CLIENT I.D. Syracuse China Corporation	#6	#7		
ULI I.D.	27388010	27388011		
EP TOXICITY:(mg/l)				
Arsenic	<0.001	0.005		
Barium	0.4	0.5		
Cadmium	<0.005	<0.005		
Chromium	<0.05	<0.05		
Lead	<0.1	<0.1		
Mercury	0.0005	<0.0004		
Selenium	<0.001	<0.001		
Silver	<0.05	<0.05		

NYS DOH I.D.: 10170

Approved: _____

Date: 10/12/88

Disclaimer: The test results and procedures ut[illegible] laboratory interpretations of data obtained by [illegible] contained in this report are believed by ULI to [illegible] rate and reliable for sample(s) tested. In [illegible] this report, the customer agrees that the full [illegible] any and all liability for actual and consequen[illegible] of ULI for the services performed shall be equa[illegible] fee charged to the customer for the services [illegible] ted damages.

UPSTATE LABORATORIES, INC.

Analysis Results
Report Number 100688007-Supplemental Report
Date: October 14, 1988

CLIENT I.D. Syracuse China Corporation	#6	#7	
ULI I.D.	27388010	27388011	
Total Lead	2000	2300	

All results are expressed as ppm as received.
NYS DOH I.D.: 10170

Approved: [signature]

Date: 10/14/88

Disclaimer: The test results and procedures utilized, and laboratory interpretations of data obtained by ULI as contained in this report are believed by ULI to be accurate and reliable for sample(s) tested. In accepting this report, the customer agrees that the full extent of any and all liability for actual and consequential damages of ULI for the services performed shall be equal to the fee charged to the customer for the services as liquidated damages.

Upstate Laboratories inc.
143 Midler Park Drive • Box 289 • Syracuse, New York 13206 • (315) 437-0255
Southern Region (607) 272-2708 ext. 1
Western Region (716) 244-8760

June 29, 1989

Mr. Phil Harvard
Syracuse China Corporation
2900 Court Street
P.O. Box 4820
Syracuse, New York 13221

Re: Analysis Report #062989011 - Effluent Waste Stream Sludge

Dear Mr. Harvard:

Please find enclosed the results for your sludge samples which were picked up by ULI personnel on June 7, 1989.

If you have any questions about this report, or if we can be of any further service to you, please do not hesitate to call.

Very truly yours,

UPSTATE LABORATORIES, INC.

Daniel J. Pastuf
Manager

DJP/sh

Enclosures: report, invoice

cc/encs: N. Scala, ULI
file

Disclaimer: The test results and procedures utilized, and laboratory interparetations of data obtained by ULI as contained in this report are believed by ULI to be accurate and reliable for sample(s) tested. In accepting this report, the customer agrees that the full extent of any and all liability for actual and consequential damages of ULI for the services perfromed shall be equal to the fee charged to the customer for the services as liquidated damages.

UPSTATE LABORATORIES INC.
Analysis Results
Report Number 062989011
Date: June 29, 1989

CLIENT I.D.	#1 Northside Stream Discharge	#2 Primary Pond North End *	#3 Primary Pond South End **	#4 Second Pond North End ***
Syracuse China Corporation (Effluent Waste Stream Sludge) (5/89, GRAB)				
ULI I.D.	15889059	15889060	15889061	15889062
TOTAL:				
Lead *	4800	3300	2400	2500
EP TOXICITY:				
Arsenic	<0.001	0.002	0.002	<0.001
Barium	6.2	2.1	3.8	0.3
Cadmium	<0.005	<0.005	<0.005	<0.005
Chromium	<0.05	<0.05	<0.05	0.05
Lead	5.5	1.4	3.0	0.2
Mercury	<0.0004	<0.0004	<0.0004	<0.0004
Selenium	<0.001	<0.001	<0.001	0.003
Silver	<0.05	<0.05	<0.05	<0.05

All results are expressed as mg/l unless otherwise stated.
*Results are expressed as ppm as received.
Sampled by client.
NYS DOH I.D.: 10170

Approved: ML 6/29/89

Note: See disclaimer on cover letter.

Notes added 4/10/90 for clarification
* sample taken from north end of sludge pond.
** sample taken from south end od sludge pond.
*** sample taken from along side of settling pond 2.

UPSTATE LABORATORIES, INC.
Analysis Results
Report Number 092889005
Date: September 28, 1989

CLIENT I.D. Syracuse China Corporation (Effluent Waste Stream Sludge) (9/15/89, GRAB)	Primary Pond North End 1410 hrs.	North Side Stream Discharge By RR Tracks 1415 hrs.	Untreated Plant Effluent 1420 hrs.	Sludge Removed South End 1425 hrs.
ULI I.D.	25889065	25889066	25889067	25889068
Total Lead	0.4	<0.1	1.6	1500 *
EP TOXICITY:				
Arsenic	--	--	--	<0.001
Barium	--	--	--	1.8
Cadmium	--	--	--	<0.005
Chromium	--	--	--	<0.05
Lead	--	--	--	6.4
Mercury	--	--	--	<0.0004
Selenium	--	--	--	<0.001
Silver	--	--	--	<0.05

All results are expressed as mg/l unless otherwise stated.
*Results are expressed as ppm as received.
Sampled by ULI.
Approved: _____ ML 9/28/89

Note: See disclaimer on cover letter.

UPSTATE LABORATORIES, INC.
Analysis Results
Report Number 101389008
Date: October 13, 1989

CLIENT I.D. Syracuse China Corporation (Special) (9/22/89, GRAB)	ULI I.D.	Total Lead	EP TOXICITY Lead		
Sludge-North End, Primary Pond, 1035 hrs. *	26589008	--	3.7		
Sludge-Northside Stream, Disch. by RR Track, 1010 hrs.	26589009	--	<0.1		
Sludge-South End, Primary Pond, 1020 hrs.	26589010	--	2.7		
Sludge-South End, 1030 hrs.**	26589011	--	9.0		
Untreated Plant Effluent, 1000 hrs.	26589012	<0.1	<0.1		
North End, Primary Pond, 1040 hrs.	26589013	<0.1	<0.1		

All results are expressed as mg/l.
Sampled by ULI.
NYS DOH I.D.: 10170

Approved: ML 10/13/89

Note: See disclaimer on cover letter.

Notes added 4/10/90 for clarification:

* Sludge sample taken from north end of sludge pond.
** Sludge sample taken from south end of sludge pond.

UPSTATE LABORATORIES, INC.
Analysis Results
Report Number 092889005
Date: September 28, 1989

CLIENT I.D.	Sludge Removed North End 1430 hrs.	Primary Pond South End 1435 hrs.		
Syracuse China Corporation (Effluent Waste Stream Sludge) (9/15/89, GRAB)				
ULI I.D.	25889069	25889070		
Total Lead	1300 *	360 *		
EP TOXICITY:				
Arsenic	0.002	0.002		
Barium	0.4	1.1		
Cadmium	<0.005	<0.005		
Chromium	<0.05	<0.05		
Lead	7.0	1.0		
Mercury	<0.0004	<0.0004		
Selenium	<0.001	<0.001		
Silver	<0.05	<0.05		

All results are expressed as mg/l unless otherwise stated.
*Results are expressed as ppm as received.
Sampled by ULI. NYS DOH I.D. 10170
Approved: _____ ML 9/28/89

Note: See disclaimer on cover letter.

LABORATORIES, INC.

Purgeable Priority Pollutants

CLIENT O'BRIEN & GERE ENGINEERS, INC.

DESCRIPTION Syracuse China - Waters

JOB NO. 3435.001.760

DATE COLLECTED 10-26-89

DATE REC'D. 10-27-89

DATE ANALYZED 10-31 thru 11-1-89

DESCRIPTION:	MW-1	MW-1 Dup.	MW-2	MW-3	MW-4	MW-5
SAMPLE NO.:	J2932	J2933	J2934	J2935	J2936	J2937
Chloromethane	<10.	<10.	<10.	<10.	<10.	<10.
Bromomethane	<1.	<1.	<1.	<1.	<1.	<1.
Vinyl chloride						
Chloroethane						
Methylene chloride						
1,1-Dichloroethene						
1,1-Dichloroethane						
t-1,2-Dichloroethene						
Chloroform						
1,2-Dichloroethane						
1,1,1-Trichloroethane						
Carbon tetrachloride						
Bromodichloromethane						
1,2-Dichloropropane						
t-1,3-Dichloropropene						
Trichloroethene						
Benzene						
Dibromochloromethane						
1,1,2-Trichloroethane						
c-1,3-Dichloropropene						
2-Chloroethylvinyl ether	<10.	<10.	<10.	<10.	<10.	<10.
Bromoform	<10.	<10.	<10.	<10.	<10.	<10.
1,1,2,2-Tetrachloroethane	<1.	<1.	<1.	<1.	<1.	<1.
Tetrachloroethene						
Toluene						
Chlorobenzene						
Ethylbenzene						
Xylenes						

UNITS: µg/l

Methodology: Federal Register—40 CFR, Part 136, October 26, 1984

Comments:

Units: µg/l (ppb) unless otherwise noted

Authorized

LABORATORIES, INC.

Purgeable Priority Pollutants

CLIENT O'BRIEN & GERE ENGINEERS, INC. JOB NO. 3435.001.760

DESCRIPTION Syracuse China - Waters

DATE COLLECTED 10-26-89 DATE REC'D. 10-27-89 DATE ANALYZED 11-1-89

DESCRIPTION:	QC Trip Blank					
SAMPLE NO.:	J2938					
Chloromethane	<10.					
Bromomethane	<1.					
Vinyl chloride						
Chloroethane						
Methylene chloride						
1,1-Dichloroethene						
1,1-Dichloroethane						
t-1,2-Dichloroethene						
Chloroform						
1,2-Dichloroethane						
1,1,1-Trichloroethane						
Carbon tetrachloride						
Bromodichloromethane						
1,2-Dichloropropane						
t-1,3-Dichloropropene						
Trichloroethene						
Benzene						
Dibromochloromethane						
1,1,2-Trichloroethane						
c-1,3-Dichloropropene						
2-Chloroethylvinyl ether	<10.					
Bromoform	<10.					
1,1,2,2-Tetrachloroethane	<1.					
Tetrachloroethene						
Toluene						
Chlorobenzene						
Ethylbenzene						
Xylenes						
					UNITS:	µg/l

Methodology: Federal Register—40 CFR, Part 136, October 26, 1984

Units: µg/l (ppb) unless otherwise noted

Comments:

Authorized: Thomas R. Alexander

November 27, 1989

OBG LABORATORIES, INC.

Laboratory Report

CLIENT O'BRIEN & GERE ENGINEERS, INC. JOB NO. 3435.001.760

DESCRIPTION Syracuse China - Waters

DATE COLLECTED 10-26-89 DATE REC'D. 10-27-89 DATE ANALYZED

Description	MW-1	MW-1 Dup.	MW-2	MW-3	MW-4	MW-5
Sample #	J2932	J2933	J2934	J2935	J2936	J2937
Total Metals:						
ARSENIC	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
BARIUM	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
CADMIUM 0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
CHROMIUM	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
LEAD 0.025	<0.05	<0.05	0.07	<0.05	<0.05	<0.05
MERCURY	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
SELENIUM	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
SILVER	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

UNITS: mg/l

Methodology: Federal Register — 40 CFR, Part 136, October 26, 1984

Units: mg/l (ppm) unless otherwise noted

Comments:

Authorized: Thomas P. Alexander

OBG Laboratories, Inc., an O'Brien & Gere Limited Company

OBG LABORATORIES, INC. CHAIN OF CUSTODY RECORD

SURVEY: SYRACUSE CHINA

SAMPLERS: (Signature) Chaun R. O'Neill

STATION NUMBER	STATION LOCATION	DATE	TIME	SAMPLE TYPE: Water Comp.	Water Grab	Air	SEQ. NO.	NO. OF CONTAINERS	ANALYSIS REQUIRED
	MW-2	10/26/89	1230		X			4	601/602 / METALS 6000
	MW-3	10/26/89	1350		X			4	"
	MW-4	10/26/89	1445		X			4	
	MW-5	10/26/89	1535		X			4	
	MW-1	10/26/89	16:20		X			4	
	MW-1 DUP.	10/26/89	16:25		X			4	↓

Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Chaun R. O'Neill		
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by Mobile Laboratory for field analysis: (Signature)	Date/Time

Dispatched by: (Signature)	Date/Time	Received for Laboratory by:	Date/Time
	10/26/89 1730	Wendy Smith	10/27/89 10:00

Method of Shipment:

OBG Laboratories, Inc.
Box 4942 / 1304 Buckley Road / Syracuse, New York 13221 / (315) 457-1494

LABORATORIES, INC.

Laboratory Report

CLIENT O'BRIEN & GERE ENGINEERS, INC. JOB NO. 3435.001.760

DESCRIPTION Syracuse China - Waters

DATE COLLECTED 10-27-89 DATE REC'D. 10-27-89 DATE ANALYZED

Description	SW-1	SW-1 Dup.	SW-2	SW-3	SW-4
Sample #	J2964	J2965	J2966	J2967	J2968
Total Metals:					
ARSENIC	<0.005	<0.005	<0.005	<0.005	<0.005
BARIUM	<0.5	<0.5	<0.5	<0.5	<0.5
CADMIUM	<0.01	<0.01	<0.01	<0.01	<0.01
CHROMIUM	<0.05	<0.05	<0.05	<0.05	<0.05
LEAD	<0.05	<0.05	<0.1*	<0.1*	<0.05
MERCURY	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
SELENIUM	<0.005	<0.005	<0.005	<0.005	<0.005
SILVER	<0.01	<0.01	<0.02*	<0.02*	<0.01

UNITS: mg/l

Methodology: Federal Register — 40 CFR, Part 136, October 26, 1984

Comments: *The detection limit has been raised due to the presence of matrix interference.

Units: mg/l (ppm) unless otherwise noted

Authorized: Thomas A. Alexander

Date: November 27, 1989

OHG Laboratories, Inc., an O'Brien & Gere Limited Company
P.O. Box 4872 / 1304 Buckley Rd. / Syracuse, NY 13221 / (315) 457-1494

OBG LABORATORIES, INC.

Purgeable Priority Pollutants

CLIENT O'BRIEN & GERE ENGINEERS, INC. JOB NO. 3435.001.760

DESCRIPTION Syracuse China - Waters

DATE COLLECTED 10-27-89 DATE REC'D. 10-27-89 DATE ANALYZED 10-31-89

DESCRIPTION:	SW-1	SW-1 Dup.	SW-2	SW-3	SW-4	QC Trip Blank
SAMPLE NO.:	J2964	J2965	J2966	J2967	J2968	J2969
Chloromethane	<10.	<10.	<10.	<10.	<10.	<10.
Bromomethane	<1.	<1.	<1.	<1.	<1.	<1.
Vinyl chloride						
Chloroethane						
Methylene chloride						
1,1-Dichloroethene						
1,1-Dichloroethane				4.		
t-1,2-Dichloroethene				<1.		
Chloroform						
1,2-Dichloroethane						
1,1,1-Trichloroethane				30.		
Carbon tetrachloride				<1.		
Bromodichloromethane						
1,2-Dichloropropane						
t-1,3-Dichloropropene						
Trichloroethene						
Benzene						
Dibromochloromethane						
1,1,2-Trichloroethane						
c-1,3-Dichloropropene						
2-Chloroethylvinyl ether	<10.	<10.	<10.	<10.	<10.	<10.
Bromoform	<10.	<10.	<10.	<10.	<10.	<10.
1,1,2,2-Tetrachloroethane	<1.	<1.	<1.	<1.	<1.	<1.
Tetrachloroethene						
Toluene						
Chlorobenzene						
Ethylbenzene						
Xylenes						

UNITS: µg/l

Methodology: Federal Register—40 CFR, Part 136, October 26, 1984

Units: µg/l (ppb) unless otherwise noted

Comments:

Authorized: Thomas A. Alexander

November 27, 1989

OBG LABORATORIES, INC. CHAIN OF CUSTODY RECORD

SURVEY: SYRACUSE CHINA

SAMPLERS: (Signature) Chawn P. O'Dell

STATION NUMBER	STATION LOCATION	DATE	TIME	SAMPLE TYPE: Water Comp.	Water Grab	Air	SEQ. NO.	NO. OF CONTAINERS	ANALYSIS REQUIRED
	SW-1	10/27/89	1130		X		1	4	601/602/METALS 6000/7000
	SW-1 DUP	10/27/89	1135		X		2	4	
	SW-2	10/27/89	1220		X		3	4	
	SW-3	10/27/89	1310		X		4	4	
	SW-4	10/27/89	1355		X		5	4	

Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Chawn P. O'Dell		
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by Mobile Laboratory for field analysis: (Signature)	Date/Time

Dispatched by: (Signature)	Date/Time	Received for Laboratory by:	Date/Time
	10/27/89 1500	Anne Barnes	10-27-89 1500

Method of Shipment:

OBG Laboratories, Inc.
Box [illegible] Buckley Road / Syracuse, New York [illegible] / (315) 457-[illegible]

OBG LABORATORIES, INC.

Laboratory Report

CLIENT O'BRIEN & GERE ENGINEERS, INC. JOB NO. 3435.001.760

DESCRIPTION Syracuse China - Soils

DATE COLLECTED 12-29-89 DATE REC'D. 12-29-89 DATE ANALYZED

		Sample #	EPTOX LEAD
B-1	0'-4'	J5197	27.
B-1	4'-7'	J5198	5.6
B-2	0'-4'	J5199	17.
B-2	4'-5.5'	J5200	16.
B-3	0'-4'	J5201	<0.5
B-3	4'-6'	J5202	<0.5
B-4	0'-4'	J5203	<0.5
B-5	0'-4'	J5204	4.1
B-5	4'-8'	J5205	16.
B-5	8'-11.5'	J5206	23.
B-6	2'-6'	J5207	17.
B-6	6'-9'	J5208	27.

UNITS: mg/l

Methodology: Federal Register — 40 CFR, Part 136, October 26, 1984

Units: mg/ℓ (ppm) unless otherwise noted

Comments:

Authorized: Michael N. Pettenelli

Date: January 19, 1990

OBG Laboratories, Inc., an O'Brien & Gere Limited Company
Box 4942 / 1304 Buckley Rd. / Syracuse, NY 13221 / (315) 457-1494

OBG LABORATORIES, INC.

Laboratory Report

CLIENT O'BRIEN & GERE ENGINEERS, INC. JOB NO. 3435.001.760

DESCRIPTION Syracuse China

Soil

DATE COLLECTED 1-4-90 DATE REC'D. 1-4-90 DATE ANALYZED 1-5-90

Description	Sample #	PCB	AROCLOR	PERCENT TOTAL SOLIDS
Berum #1	J5325	<0.6	-	79.
Berum #2	J5326	<0.6	-	84.
Berum #3	J5327	<0.6	-	87.
Berum #4	J5328	<0.6	-	83.
Berum #5	J5329	<0.6	-	82.
Berum #6	J5330	<0.6	-	81.
Berum #7	J5331	<0.6	-	82.
Berum #8	J5332	<0.6	-	82.
Berum #9	J5333	<0.6	-	78.
Berum #10	J5334	<0.6	-	80.

UNITS: mg/kg dry weight

Methodology: Federal Register — 40 CFR, Part 136, October 26, 1984

Units: mg/l (ppm) unless otherwise noted

Comments:

Authorized: Michael N. Pettell

Date: January 23, 1990

OBG Laboratories, Inc., an O'Brien & Gere Limited Company
Box 4942 / 1304 Buckley Rd. / Syracuse, NY 13221 / (315) 457-1494

OBG LABORATORIES, INC.

Laboratory Report

CLIENT O'BRIEN & GERE ENGINEERS, INC. JOB NO. 3435.001.760

DESCRIPTION Syracuse China
Soils

DATE COLLECTED 1-4-90 DATE REC'D. 1-4-90 DATE ANALYZED

Description	Sample #	EP TOX LEAD			
SSL-1	J5335	2.9			
SSL-2	J5336	8.0			
Lagoon #1	J5337	0.5			

UNITS: mg/l

Methodology: Federal Register — 40 CFR, Part 136, October 26, 1984

Units: mg/l (ppm) unless otherwise noted

Comments:

Authorized: Michael N. Pettelle

Date: January 23, 1990

OBG Laboratories, Inc., an O'Brien & Gere Limited Company
Box 4942 1304 Buckley Rd., Syracuse, NY 13221 / (315) 457-1494

OBG LABORATORIES, INC. CHAIN OF CUSTODY RECORD

SURVEY: Syracuse China

SAMPLERS: (Signature) Peter Bogardus

STATION NUMBER	STATION LOCATION	DATE	TIME	SAMPLE TYPE: Water Comp.	Water Grab	Soil	SEQ. NO.	NO. OF CONTAINERS	ANALYSIS REQUIRED
	B-1 0'-4'	12/29						1	E.P Tox Pb, PCTS
	4'-7'								
	B-2 0'-4'								
	4'-5.5'								
	B-3 0'-4'								
	4'-6'								
	B-4 0'-4'								
	B-5 0-4								
	4-8								
	8-11.5								
	B-6 2-6								
	6-9								

Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by Mobile Laboratory for field analysis: (Signature)	Date/Time

Dispatched by: (Signature)	Date/Time	Received for Laboratory by:	Date/Time
Peter G. Bogardus	12/29 3:20 pm	Wendy Smith	12/29/89 15:20

Method of Shipment: Company Vehicle

OBG Laboratories, Inc.
... New York 13221 (315) 457-1494

ED_006185_00000991-00102

OBG LABORATORIES, INC.

CHAIN OF CUSTODY RECORD

SURVEY: Syracuse China

SAMPLERS: (Signature): Peter G. Bozanich / James Moon

STATION NUMBER	STATION LOCATION	DATE	TIME	SAMPLE TYPE: Water Comp	Water Grab	Soil	SEQ. NO.	NO. OF CONTAINERS	ANALYSIS REQUIRED
	Lagoon Sample #1	1/4/90				Soil	1	13	E.P. Tox Pb

Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by Mobile Laboratory for field analysis: (Signature)	Date/Time

Dispatched by: (Signature)	Date/Time	Received for Laboratory by:	Date/Time
Peter G. Bozanich	1/4/90 3:24	Wendy Smith	1/4/90 15:35

Method of Shipment: Company Van

OBG Laboratories, Inc.
Box 4942 / 1304 Buckley Road / Syracuse, New York 13221 / (315) 457-1494

OBG LABORATORIES, INC. CHAIN OF CUSTODY RECORD

SURVEY: Syracuse China

SAMPLERS: (Signature) Peter G. Bogardus / James A. Moore

STATION NUMBER	STATION LOCATION	DATE	TIME	SAMPLE TYPE: Water Comp.	Water Grab	Soil	SEQ. NO.	NO. OF CONTAINERS	ANALYSIS REQUIRED
	Berm #1	1/4/90				X	1	1	PCB's / PCT's
	Berm #2						2	1	
	Berm #3						3	1	
	Berm #4						4	1	
	Berm #5						5	1	
	Berm #6						6	1	
	Berm #7						7	1	
	Berm #8						8	1	
	Berm #9						9	1	
	Berm #10						10	1	
	SSL-1						11	1	E.P. Tox Pb
	SSL-2						12	1	

Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by: (Signature)	Date/Time
Relinquished by: (Signature)	Received by Mobile Laboratory for field analysis: (Signature)	Date/Time

Dispatched by: (Signature)	Date/Time	Received for Laboratory by:	Date/Time
Peter G. Bogardus	1/4/90 3:25	Wendy Smith	1/4/90 15:35

Method of Shipment: Company Van

OBG Laboratories, Inc.
Box 4942 / 1304 Buckley Road / Syracuse, New York 13221 / (315) 457-1494