ENI ENGINEERING, INC.

PART II PHASE 2 DATA COLLECTION WORK PLAN

FOR THE

FOCUSED FEASABILITY STUDY ("FFS")
ALCAS CUTLERY CORPORATION FACILITY SITE
OLEAN, NEW YORK

February 2010
Revised July 2010

Prepared for:

ALCOA

Alcoa, Inc.
2300 North Wright Road
Alcoa, Tennessee 37701

Prepared by:

ENI ENGINEERING, INC.
810 Highway 6 South, Suite 200
Houston, Texas 77079
281-493-9005

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1.0 INTRODUCTION

The U.S. Environmental Protection Agency ("*EPA*") added the Olean Well Field to the National Priorities List in September 1983. Based on the results of the early studies and interim actions, the EPA issued the Record of Decision for the First Operable Unit ("*OU1 ROD*") in September 1985. Following implementation of the OU1 ROD, the EPA issued the Record of Decision for the Second Operation Unit ("*OU2 ROD*") in September 1996. The OU2 ROD set forth selected remedies for the four source areas identified in the Well Field. The selected remedial action for Alcas property was VER for the soils and Upper Water-Bearing Zone.

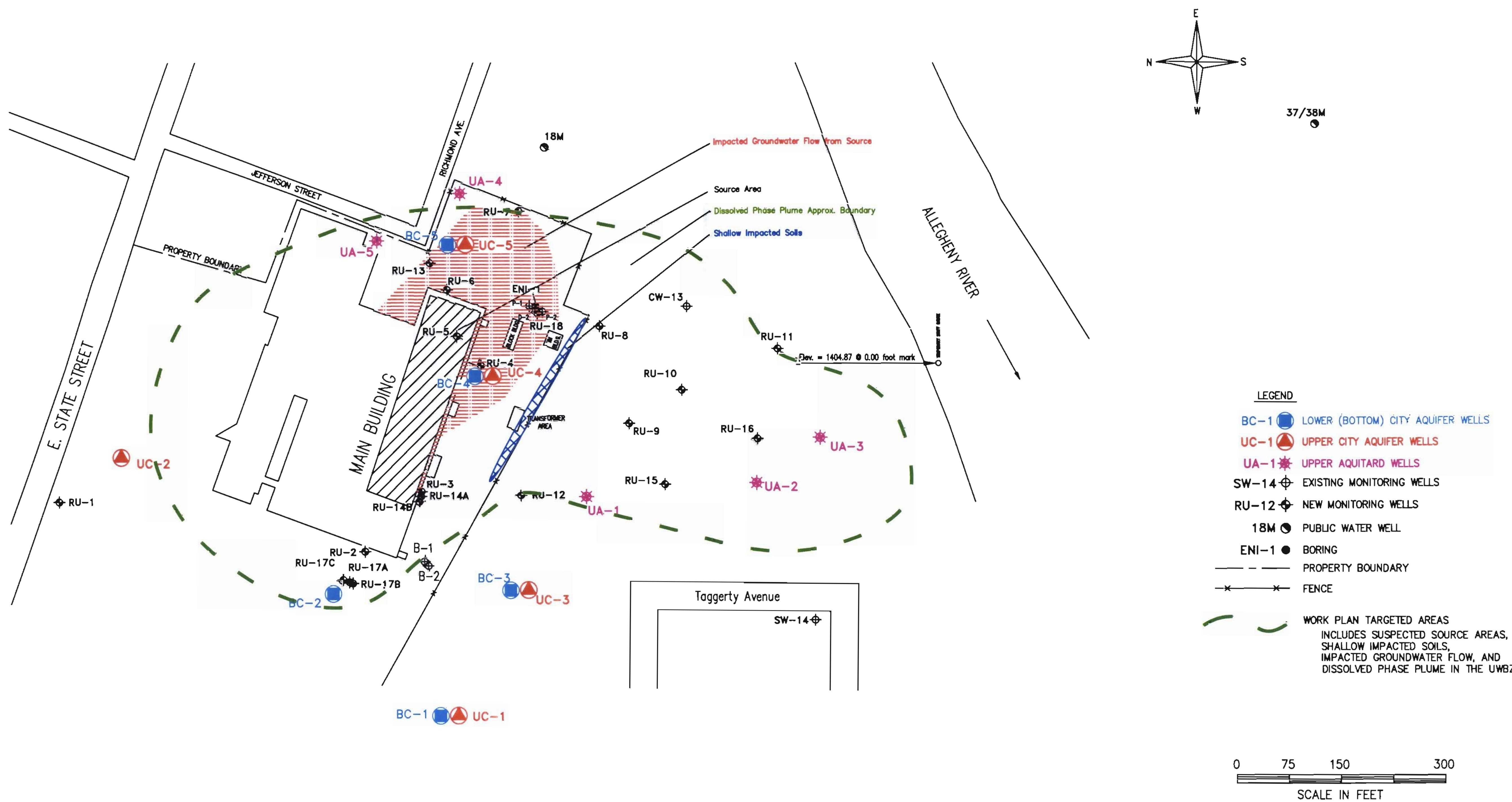
After the issuance of the OU2 ROD, and for the purpose of obtaining better site definition, a pre-design investigation was performed at Alcas. At the conclusion of the pre-design investigations it became obvious that fundamental problems existed with the selected remedy for the Alcas property due to the determination that the governing source of the chlorinated compounds found in the Upper and City aquifers was from residual DNAPL located underneath the main building. Over the next several years, Alcoa then proceeded with a series of supplemental investigations to further characterize the extent of impact at the site. At the conclusion of the investigations EPA and Alcoa concluded that a Focused Feasibility Study ("*FSS*") was needed for the Alcas property

Alcoa presented its organized approach for the FSS for the Alcas Property. Alcoa's approach to the FSS process was divided into three parts, called Part 1, 2 and 3. Part 1 entailed the Development and Screening of Remedial Technologies, which included screening of remedial technologies and technology process options against technical implementability and constraints. Initially the technologies were screened against potential effectiveness (both short and long term), implementability, and cost. Part 1 was completed and the results submitted to EPA in February 2009.

Part II of the FFS involved the further Develop and Screening of Remedial Alternatives that were selected for further evaluation in Part I. This part of the process is subdivided into 3 separate phases. The first phase of the process included with the evaluation of site data to continue the screening process of the FFS. The evaluation of data called for the review of existing site characterization data and the identification of data needed to assess technologies. In a letter the EPA dated September 30, 2009, Alcoa identified data needed to further assess the technologies that were "short listed" in Part 1of the FSS.

The phased approach to the FSS identified four target media at or near the Alcas property. Three of the target media have been identified to minimize the migration of COCs from the Property to the City Aquifer. They include shallow impacted soils, impacted groundwater flow from the source area in the Upper Aquitard, and the source areas in the Upper Aquitard. The fourth target area is included to address the dissolved phase plume in the Upper Aquitard south of the Property. Targeted Media are shown on Figure 1-1.

This work plan ("*WP*") defines the scope of work for successfully implementing a planned investigative effort at the Alcas Cutlery Corporation facility ("*Site*") in Olean, Cattaraugus County, New York. The purpose of the investigative effort is to outline a WP will collect data needed to further assess the technologies that were "short listed" in the previously submitted Part 1 of the FFS.



Notes:

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Elevation datum from the City of Olean, Engineering Office, Olean, NY. Base being USGS.

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FIGURE 1-1

PART 2 - PHASE 2 FFS

WORK PLAN TARGETED AREAS

ALCAS FACILITY

OLEAN, NEW YORK

DRAWN BY:	DATE:	PROJ. NO. 137-20

2.0 SCOPE AND OBJECTIVES

2.1 Project Objectives

The purpose of this Work Plan is to provide a guidance document for the investigative actions to be performed for the FFS project. The objective of the FFS project is to collect data needed to further assess the technologies that were "short listed" in the previously submitted Part 1of the FFS.

To accomplish the project objective, specific project strategies will be implemented as part of this Work Plan. The specific project strategies are as follows in the following sequence:

- Hydrogeologic Conditions - Evaluate hydrogeologic conditions of the water bearing units through the collection of groundwater elevation data and aquifer testing;
- Water Quality Assessment- Evaluate the water quality of the water bearing units through groundwater sampling and analysis; and
- Groundwater Modeling - Simulate the existing hydrogeologic conditions of the water bearing units through three dimensional groundwater flow modeling.

2.2 Project Tasks

To accomplish the Project Objectives, the following scope of work has been developed.

1. Hydrogeologic Conditions:
   a. Collect Groundwater Elevation Data
   b. Conduct Aquifer Pumping Test
2. Water Quality Assessment:
   a. Collect Groundwater Elevation Data
   b. Sample groundwater
3. Groundwater Modeling:
   a. Refining the Hydrogeologic Conceptual Model
   b. Development and Calibration of the Model
   c. Calibration Sensitivity Analysis
   d. Documentation of the Modeling Effort

A detailed discussion of each of these tasks in presented below.

2.2.1 Task 1 – Hydrogeologic Conditions

Collect Groundwater Elevation Data

For the first phase of Task 1, field personnel will collect groundwater elevation data for all pertinent wells to the aquifer test. Each well will be gauged from the top of casing with an electronic resistivity probe, which measures the groundwater level. The water levels will be measured in all wells before any actions are performed on the well which may affect water levels. The total depth of each well will also be measured. Measurements will be made to a precision of +/- 0.01 ft. The measuring device will be cleaned prior to use in each well. The water levels in the wells will be made consecutively and in the shortest period of time possible to measure the water levels in all the monitoring wells. A list of wells for the Task 1 gauging event, separated by hydrogeologic unit, is provided in Table 2-1.

Table 2-1 Well Gauging Selection - Task 1

Upper Water Bearing Zone	Upper City Aquifer	Lower City Aquifer
UA-1	UC-1	BC-1
UA-2	UC-2	BC-2
UA-3	UC-3	BC-3
UA-4	UC-4	BC-4
UA-5	UC-5	BC-5
RU-1	Alcas D2	18M
RU-2	B-2	37/38M
RU-3	RU-2	CW-13
RU-4	RU-17C	
RU-5	RU-18	
RU-6		
RU-7		
RU-8		
RU-9		
RU-10		
RU-11		
RU-12		
RU-14B		
RU-15		
RU-17A		
B-1		
CW-13A		

Locations of wells are shown on Figure 1-1.

Conduct Aquifer Tests

To accomplish the second phase of Task 1, field personnel will conduct pumping and slug tests on the Upper Water-Bearing Zone and the Upper City Transitional Zone. The purpose of the aquifer testing is to determine the hydraulic properties of the aquifers. Hydraulic properties of the aquifers will be used in the groundwater flow model to evaluate various remedial alternative scenarios.

A slug test will be conducted in UA-1, UA-5, RU-4, and RU-18. The slug tests will be performed by creating a vacuum in the well casing raising the water level in the well. After the aquifer equilibrates to the increased head in the well, the vacuum will be released and the declining water level will be measured. The slug test data will be analyzed based on the shape of the water-level decline curve. It is anticipated that the analyses will be performed using Bouwer and Rice, Hvorslev, or Cooper solution techniques. The information gained from these tests will be used to help determine the pumping rate for the pumping tests.

The pumping test wells will undergo preliminary pumping to establish the test flow rate from each well. The goal will be to select the maximum pumping without causing dewatering of the aquifer at the well. To accomplish this, the pumping rate selected will create a drawdown approximately one fourth of the total available drawdown in each pumping well. After this preliminary pumping to select the test pumping rate, each well will be given sufficient time to recover before the actual pumping test is begun.

Prior to starting the pumping test, the water level in each pumped well will be measured over time until any pre-test trend in the water levels can be establish. It is expected that no trends will be observed. However, if there are any trends, these can be accounted for prior to analyzing the pumping test data.

Based on the Hydrogeologic Conceptual Model, it is expected that the wells will exhibit the characteristics of a water-table or a confined aquifer well. The zones that will be tested are in very low permeable formations that are in the 10^{-5} to 10^{-4} cm/sec range. With a relatively thin producing zone of 5 to 10 feet, the transmissivity of these formations should be 1 to 20 gallons per day per foot (gpd/ft). At these transmissivities, the expected test pumping rates will be 0.1 to 0.25 gallons per minute (gpm).

The methods of analyses will be determined by the response of the aquifers to the pumping stress. However, it is expected that they will exhibit the characteristics of a confined aquifer with no leakage. If the formations are water table or semi-confined, the early portion of any pumping will respond like a confined aquifer. Given the low pumping rates, it is doubtful than any gravity drainage or delayed yield will be observed during these pumping tests even if run for 72 hours.

The duration of each test will be determined during the test based on the water-level trend observed. The test will be run until the time-drawdown curve has "turned over" so that the appropriate type curve can be fit to the data. The two tests in the Upper Water-Bearing Zone will be run for at least 2 hours each, and the test in the Upper City Transition Zone will be run for at least 8 hours.

During each test, the flow rate will be measured frequently throughout the test and controlled to maintain a constant flow. The flow rate will be maintained to within ±5 percent of the test flow rate. The flow rate will be measured as often as possible during the first five minutes of the test. The flow rate will be measured every minute for the next ten minutes, and then as often as necessary to ensure a constant flow rate test. At least 20 measurements of water levels for each time log cycle will be made in the test well. Water pumped during the pumping tests will not be allowed for recharge the tested aquifer. The pumped water will be stored in a mobile liquid storage tank and disposed of upon completion of the tests.

Three pumping tests will be conducted with two in the Upper Water-Bearing Zone (UA-1 and UA-5) and one in the Upper City Aquifer Transition Zone (RU-18). Locations of these wells are shown on Figure 2-1.

2.2.2 Task 2 – Water Quality Assessment

Groundwater samples from the source and plume zones have been collected at the site for several years. An understanding of the extent of soil and groundwater impacts has been documented and a reasonable understanding of the site's conceptual model has been presented to the agency.

However to further evaluate alternative treatment technologies; a better understanding of groundwater geochemistry is needed. Groundwater samples will need to be collected from selected wells and analyzed for geochemical parameters to help evaluate the monitored natural attenuation, in-situ chemical oxidation, and permeable reactive barrier technologies discussed in Part I of the FFS.

Collect Groundwater Elevation Data

For the first phase of Task 2, field personnel will collect groundwater elevation data for selected wells. Each well will be gauged from the top of casing with an electronic resistivity probe, which measures the groundwater level. The water levels will be measured in all wells before any actions are performed on the well which may affect water levels. The total depth of each well will also be measured. Measurements will be made to a precision of +/- 0.01 ft. The measuring device will be cleaned prior to use in each well. The water levels in the wells will be made consecutively and in the shortest period of time possible to measure the water levels in all the monitoring wells. A list of wells for the Task 2 gauging event, separated by hydrogeologic unit, is provided in Table 2-3.

Notes:

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Elevation datum from the City of Olean, Engineering Office, Olean, NY. Base being USGS.

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FIGURE 2-1
AQUIFER TESTING LOCATION
MAP FOR TASK 1
ALCAS FACILITY
OLEAN, NEW YORK

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Table 2-2 Well Gauging Selection – Task 2

Upper Water-Bearing Zone	Upper City Aquifer	Lower City Aquifer
UA-1	UC-1	BC-1
UA-2	UC-2	BC-2
UA-3	UC-3	BC-3
UA-4	UC-4	BC-4
UA-5	UC-5	BC-5
RU-1	Alcas D2	18M
RU-3	B-2	37/38M
RU-4	RU-2	CW-13
RU-5	RU-17C	
RU-6	RU-18	
RU-7		
RU-8		
RU-9		
RU-10		
RU-11		
RU-12		
RU-14B		
RU-15		
RU-17A		

Locations of wells are shown on Figure 1-1.

Collect Groundwater Samples

To accomplish second phase of Task 2, field personnel will collect selected groundwater samples for analysis. Locations of the wells selected for groundwater sampling are shown on Figure 2-2, and are presented in Table 2-4. Procedures for sampling and analysis are detailed in Section 3.0.

Table 2-3 Well Sampling Selection – Task 2

Upper Water-Bearing Zone		Upper City Aquifer
UA-1	RU-3	UC-1
UA-2	RU-4	UC-2
UA-3	RU-6	UC-3
UA-4	RU-8	UC-4
UA-5	RU-10	UC-5

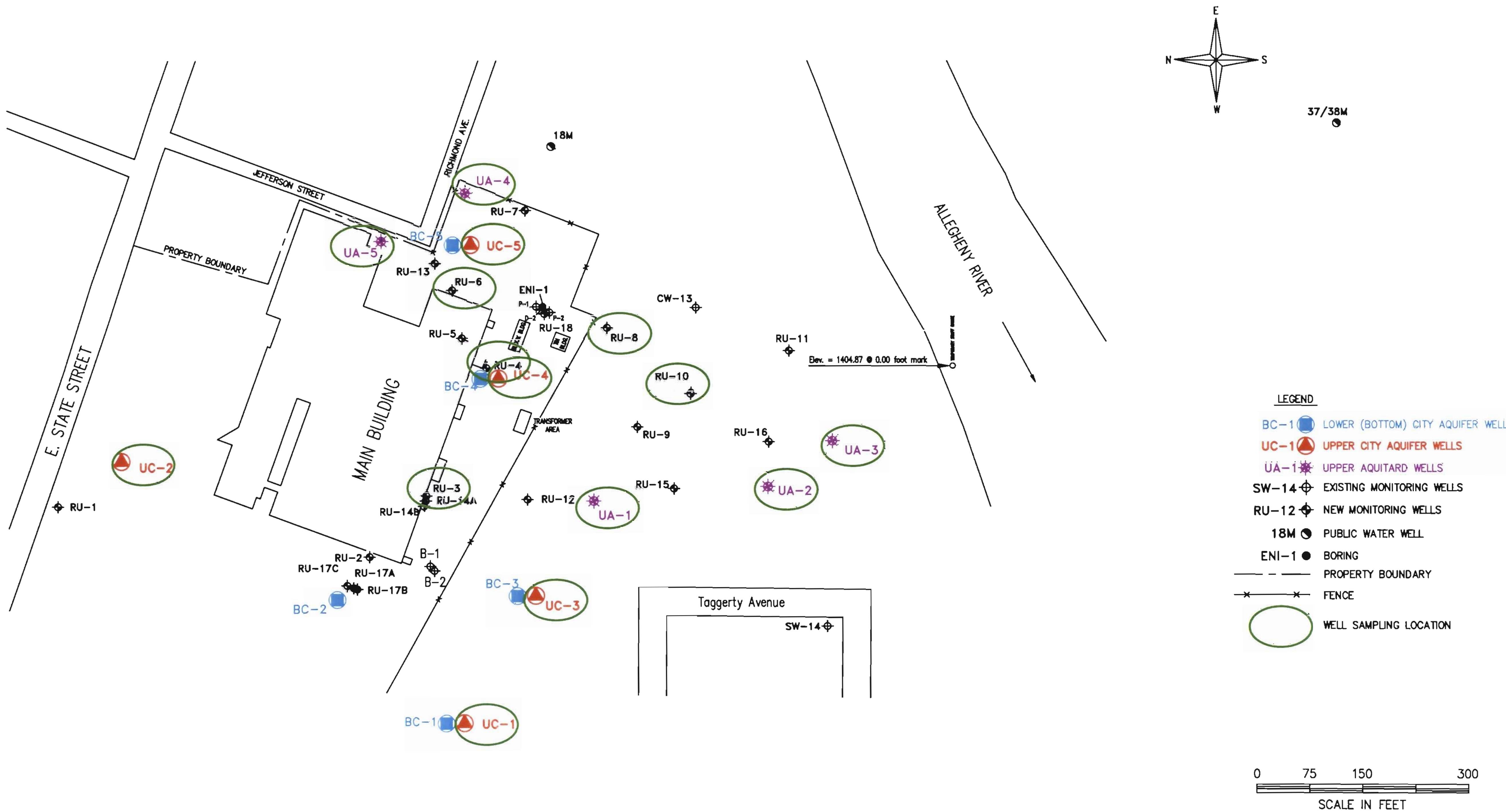

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FIGURE 2-2
WELL SAMPLING LOCATION
MAP FOR TASK 2
ALCAS FACILITY
OLEAN, NEW YORK

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2.2.3 Task 3 – Groundwater Modeling

The purpose of groundwater modeling is to generate a visual representation of the aquifers including the overall groundwater movement and the fate and transport of contaminants. Groundwater modeling can also used to predict contaminant plume movement or to predict the aquifer and plume response to remedial activities.

To evaluate extraction based technologies, groundwater modeling is needed to determine effective spacing frequency, well screen intervals, and optimal pumping rates. The modeling will be conducted to determine groundwater flow beneath the Alcas Property, and will incorporate quantitative data gathered from water level measurements, meteorological data, and hydrogeological data gathered from aquifer testing to approximate the groundwater flow conditions beneath the site. The process of model development will be broken down into five sub-tasks.

Sub-Task 1 – Geological Assessment and Model Selection

ENVIRONEERING has developed the site geological description over the past several years. This process has involved installing numerous monitoring wells, borings, and piezometers. Using this subsurface information, we constructed cross sections to better understand the shallow geological system, and how site contaminants could migrate in and around the site. We will use the aquifer test data that will be performed during this proposed investigation to characterize the flow parameters for the model input.

The model that will be used for this project is MODFLOW using Visual MODFLOW®. It is anticipated that the model will be 3-dimensional so that the four water-bearing formations can be included in the model. The model will also incorporate the Alleghany River as well as the three City of Olean production wells.

Sub-Task 2 – Develop Model Grid and Initial and Boundary Conditions

The geological parameters and boundary conditions are put into the model using a grid overlay of the site. Geology and flow parameters required are input into each model grid. The design of the model grid is based on the location of geological boundaries and the intended use of the model. For example, in the area of the existing recovery wells, the grid spacing will be very small to simulate a well. The grid spacing in the model will be variable to allow the evaluation of future groundwater remedial actions.

After the grid is designed and the geological data developed in Task 1, initial and boundary conditions will be input. A regional groundwater flow will be imposed on the model using constant head nodes at selected boundaries of the model grid. These boundaries will be sufficiently far from the site that they will not unduly influence the model results. In addition, surface recharge will be estimated and input into each model grid. It is anticipated that the model will contain four layers to simulate the Upper Water-Bearing Zone, Upper City Transition Zone, Upper City Aquifer, and Lower City Aquifer. The initial flow parameter values will be refined during model calibration, which should allow us to estimate these numbers reasonably well.

Sub-Task 3 - Model Calibration

After the model grid is designed and the data is in the model, the model will be run to simulate steady-state flow conditions. We will select a groundwater contour map of measured groundwater elevation heads to represent steady state. The model will be run and the resulting heads will be contoured and compared to the measured steady state heads. Model parameters, such as hydraulic conductivities and recharge, will be modified, and the model will be rerun until the measured and simulated heads are reasonably close.

Sub-Task 4 – Remedy Evaluation

As part of this Focused Feasibility Study, the remedial alternatives that will control groundwater flow emanating from the source area (under the building) will be evaluated using this groundwater flow model. It is expected that numerous pumping schemes will be evaluated including recovery wells, horizontal wells, and recovery trenches in the Upper Water-Bearing Zone and the Transition Zone. The model will also predict the pumping rates from each recovery well or trench. In addition, the model will compute the time required to establish the capture zone for each system evaluated.

Sub-Task 5 – Modeling Report

A report documenting the model will be prepared. The calibrated input parameters will be shown and discussed. The results of the steady-state calibration will be discussed. The remedies evaluated will be presented and the results of those remedies will be presented.

3.0 FIELD PROCEDURES

3.1 Sample Collection and Decontamination

During well gauging and sampling events, each well will be gauged from the top of casing with an electronic resistivity probe, which measures the groundwater level. The water levels will be measured in all wells before any actions are performed on the well which may affect water levels. Measurements will be made to a precision of +/- 0.01 ft. The measuring device will be cleaned prior to use in each well.

During well purging and immediately prior to sampling, field parameters will be monitored and recorded in the field notes. The field parameters will consist of Dissolved ("DO"), Oxidation/Reduction Potential ("ORP"), Ferrous Iron, pH, Temperature, specific conductivity ("SC"), and turbitity.

Samples will be obtained using Low Stress/Low Flow sampling techniques. If the need arise and low flow sampling cannot be used, either dedicated materials or new, disposable equipment or tubing will be used for the sampling. Low flow sampling protocol is outlined in Attachment A. Precautions will be taken so that sampling materials do not contact the ground or other potentially contaminated surfaces. Contents will be retrieved from the sampling location and placed into a clean sample container. Upon completion of the field measurements, samples will be collected from the sample location for laboratory analyses, and placed in laboratory-prepared containers appropriate for the analyses to be performed. Trip and equipment blanks (not required if dedicated equipment are used), and replicate samples will be collected for analyses. Each sample container will be labeled with the sample number; the identity of the sampler; the time and date of collection; the preservatives (if any); and the required analyses. All samples collected will be placed into laboratory-prepared containers and preserved as noted on Table 3-1.

Table 3-1 Bottling and Preservative Parameters

Analyte	Bottle	Preservative	Holding Time
Volatile Organic Constituents			
All Volatile Organic Constituents	3x40 ml V-TSL	4°C, HCl	14 days
Ethane, Ethene, & Methane	3x40 ml V-TSL	4°C,	14 days
General Chemistry			
Nitrate	200 ml P,G	4°C, H_2SO_4	2 days
Sulfate	200 ml P,G	4°C	28 days
Chloride	200 ml P,G	4°C	28 days
Alkalinity	100 ml P,G	4°C	14 days
COD	100 ml P,G	4°C, H_2SO_4	28 days
Sulfide,	100 ml P,G	4°C, Zinc Acetate, Sodium Hydroxide	7 day
TOC,	100 ml P,G	Sulfuric Acid	28 days

ml – milliliters
P – Plastic
G – Glass
V-TSL – Glass Vial Teflon-lined Septum

Any reusable equipment and materials used to record field measurements and/or collect samples will be cleansed by washing with a deionized detergent and rinsing with deionized or distilled water.

Sample collection points will be geolocated and placed on aerial photograph base map and incorporated into a georeferenced database for the site. The ArcView® visualization program will be used to integrate the database and geo-referenced aerial photographs and topographic map set.

3.2 Sample Analysis

Samples will be analyzed in accordance with the EPA methods, listed in Table 3-2 or an equivalent procedure, by a New York-certified laboratory. All collected samples will be analyzed for the presence of the following five volatile organic constituents, general chemistry parameters, and field parameters:

Table 3-2 Analytical Parameters

Analyte	Matrix	Method Number	Laboratory Reportable Detection Limit
Volatile Organic Constituents			
Tetrachloroethene	Water	8260	0.005 mg/L
Trichloroethene	Water	8260	0.005 mg/L
cis 1,2-Dichloroethene	Water	8260	0.005 mg/L
1,1,1-Trichloroethane	Water	8260	0.005 mg/L
Vinyl Chloride	Water	8260	0.005 mg/L
BTEX,	Water	8260	0.005 mg/L
trans-1,2-DCE,	Water	8260	0.005 mg/L
chloroethane,	Water	8260	0.005 mg/L
1,1-dichloroethane,	Water	8260	0.005 mg/L
1,2-dichloroethane,	Water	8260	0.005 mg/L
carbon tetrachloride,	Water	8260	0.005 mg/L
chloroform,	Water	8260	0.005 mg/L
dichloromethane,	Water	8260	0.005 mg/L
ethane,	Water	RSK 175	0.35 ug/L
ethene,	Water	RSK 175	0.33 ug/L
methane,	Water	RSK 175	0.19 ug/L
General Chemistry			
Nitrate	Water	300	0.1 mg/L
Sulfate	Water	300	1 mg/L
Chloride	Water	300	1 mg/L
Alkalinity	Water	2320B	2 mg/L
Sulfide,	Water	4500S2E	1 mg/L
TOC,	Water	1960	1 mg/L
COD	Water	410.4	10 mg/L
Field Parameters			
Dissolved Oxygen	Water	NA	NA
Oxidation/Reduction Potential	Water	NA	NA
Ferrous Iron	Water	NA	NA
pH	Water	NA	NA
Temperature	Water	NA	NA
Specific Conductivity	Water	NA	NA
Turbidity	Water	NA	NA

NA – Not Applicable

3.3 Field Quality Control

The quality of data for the collection of samples will be ensured by the use of trip blanks, and equipment blanks (not required if dedicated materials are used), and replicate samples. Trip blanks measure any cross-contamination of the samples during transport, handling, and storage. Equipment blanks demonstrate that the sample equipment is free of contamination and that adequate decontamination was performed after the use of the sample equipment. Replicate samples indicate the precision of the sampling process by calculating the relative percent difference in the results for a sample and its replicate. Each sampling event will include at least one trip blank, and one equipment blank (if required), and one replicate sample. Trip blanks, and equipment blanks, and replicate samples will be analyzed for the same analytes and in the same manner as the accompanying samples.

3.4 Sample Shipment

All samples will be packaged securely and placed on ice to cool (reduce the sample temperature to 4° C), and transported to the analytical laboratory following strict chain-of-custody protocol.

3.5 Chain-Of-Custody

Each sample container will be individually identified as to sample number, date and time collected, and source of sample. A chain-of-custody record will be prepared which will include:

- The name of the person collecting the samples;
- The identity of each sample;
- Analytical requirements; and
- Name of person accepting sample.

Custody transfers of samples will be recorded on the chain-of-custody form by signatures of the transferor (relinquisher) and the transferee (receiver). This procedure will be repeated, as necessary, until final delivery is made to the analytical laboratory.

3.6 Laboratory Quality Control

The quality of data from the laboratory will be ensured by the use of instrument tuning, initial calibration, continuing calibration, internal standards, method blanks, surrogate recoveries, and matrix spike/spike duplicate analyses.

4.0 SCHEDULE

All activities shall be implemented according to a schedule agreed upon by Alcoa and EPA. Within 30 days of the EPA's approval of the WP, Alcoa will begin implementation of the plan. Field activities will be staged such that Task 3 will be conducted independently of the other Tasks. Tasks 1 and 2 will be conducted concurrently to best utilize equipment and resources.

Alcoa will notify EPA 7 days prior to commencing field activities. Field activities are anticipated to require approximately 180 days to complete from the time approval is received. A report will be submitted for review by the EPA within 180 days of the completion of all field activities.

5.0 INVESTIGATION DERIVED WASTES

The source of the chlorinated compounds detected in the Olean Well Field aquifer has not been directly linked to a known source or listed waste. It is not definitively known when or how these compounds were released to the environment. The compounds are likely associated with historic releases, de minimis operating losses or small business/residential usage and spillage within the Well Field. In an EPA Memorandum entitled "Management of Remediation Waste Under RCRA" dated October 14, 1998 (EPA 530-F-98-026), it states:

"Where a facility owner/operator makes a good faith effort to determine if a material is a listed hazardous waste but cannot make such a determination because documentation regarding a source of contamination, contaminant, or waste is unavailable or inconclusive, EPA has stated that one may assume the source, contaminant or waste is not listed hazardous waste and, therefore, provided the material in question does not exhibit a characteristic of hazardous waste, RCRA requirements do not apply."

It goes on further to state: "*...if, after a good faith effort to determine dates of disposal a facility owner/operator is unable to make such a determination because documentation of dates of disposal is unavailable or inconclusive, one may assume disposal occurred prior to the effective date of applicable land disposal restrictions."*

In order for groundwater IDW to be considered a listed waste in accordance with the contained-in rule, documentation to a listed waste must be known. In the case of groundwater IDW generated at the Alcas site, such is not known. Based on this lack of a direct knowledge to specific releases, groundwater IDW generated during this investigation will be managed based upon the hazardous characteristics as defined in 40 CFR Subpart C.

IDW water samples will be collected one sample per 275 gallons. Samples will be analyzed for TCLP volatile constituents. Upon receipt of the results, the waste materials will be shipped off-site for proper disposal, as either a characteristic hazardous waste or as non-hazardous waste material.