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FINAL REPORT

CORRECTIVE MEASURES IMPLEMENTATION PLAN ONSITE SYSTEM

BELL AEROSPACE TEXTRON WHEATFIELD PLANT

Bell Aerospace TEXTRON

Division of Textron Inc.

Prepared by:

Golder Associates

923-9055

MARCH 1993

Golder Associates Inc.

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Golder Associates

FINAL REPORT ON

CORRECTIVE MEASURES IMPLEMENTATION PLAN ON-SITE SYSTEM BELL AEROSPACE TEXTRON WHEATFIELD PLANT

Submitted to:

Textron Defense Systems
201 Lowell Street
Wilmington, Massachusetts 01887

Start

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March 1993

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Golder Associates

March 12, 1993

923-9055

Textron Defense Systems
201 Lowell Street
Wilmington, Massachusetts 01887

Attention: Mr. Brian D. Smith

RE: FINAL REPORT ON CORRECTIVE MEASURES
IMPLEMENTATION PLAN ON-SITE SYSTEM
BELL AEROSPACE TEXTRON, WHEATFIELD PLANT

Gentlemen:

Please find attached the Final Report on the Corrective Measures Implementation Plan (CMI) for the on-site system at the Bell Aerospace Textron (BAT) Wheatfield Plant, Wheatfield, New York. This report contains a hydraulic performance and data collection plan, a ground water sampling plan, and a laboratory analysis plan, to be utilized for the on-site system. This report also includes detailed drawings and construction specifications for the on-site ground water extraction system and the on-site wastewater treatment facility.

Golder Associates Inc. appreciates the opportunity to provide continuing engineering services to BAT. If you should have any questions regarding any portion of this document, please do not hesitate to call.

Very truly yours,

GOLDER ASSOCIATES INC.

Anthony L. Grasso, P.G.
Senior Hydrogeologist

ALG:cr

Attachments

F/N: ONSITE.CMI

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1.0 INTRODUCTION

1.1 General

Bell Aerospace Textron (BAT) investigated ground water degradation associated with the Wheatfield Plant Facility in Niagara Falls, New York (see Figure 1), in order to comply with Consent Order No. RCRA 85-010-91, Index No. 051485 issued by the New York State Department of Environmental Conservation (NYSDEC). The ground water degradation was associated with release of chlorinated solvents from a Neutralization Pond Solid Waste Management Unit (SWMU) located at the BAT facility. The pond has since been closed. Investigation of the ground water contamination was performed as a five phase investigation, culminated by submission of the RCRA Facility Investigation (RFI) report (Golder Associates Inc. (Golder Associates), 1991a). The RFI report was accepted by the NYSDEC and the United States Environmental Protection Agency (USEPA) on June 7, 1991.

The investigation included sampling of soils, bedrock, and ground water with subsequent analytical chemistry analyses performed on representative samples to define the presence of hazardous materials. In addition, analysis and testing of subsurface aquifer systems were undertaken to determine aquifer characteristics and local ground water flow patterns. Subsequent to these investigations, a Corrective Measures Study (CMS) was performed and the results were submitted to the NYSDEC and the USEPA for review and approval (Golder Associates, 1991b). The CMS included an evaluation of remedial alternatives and related actions, and provides a basis for determining final remedial measures. The NYSDEC and the USEPA accepted the CMS on June 7, 1991.

The CMS contains a conceptual remedial program which the NYSDEC and USEPA have determined to be appropriate for remediation of the contaminant plumes emanating from the site. The corrective measures involve extraction wells, configured into both off-site and on-site systems, to withdraw water from area soils and bedrock and deliver the water to treatment facilities. In addition, the CMS proposed modification to the storm water drainage system along Walmore Road adjacent to the BAT facility. These modifications to the storm sewer were completed in June 1991 (Golder Associates, 1991c).

1.2 Post Closure Permit

On May 22, 1992, NYSDEC was delegated corrective action authority under the Hazardous and Solid Waste Amendments (HSWA). BAT negotiated a resolution of its comments on the draft 6NYCRR Part 373 Permit (Part 373 Permit) issued by NYSDEC and was subsequently issued a final Part 373 Permit, effective September 14, 1992. With the delegation of HSWA authority to NYSDEC, BAT does not expect the USEPA to issue a post closure permit. The Part 373 Permit requires BAT to submit Corrective Measures Implementation Plans (CMIs) for the on-site and off-site remedial systems.

The NYSDEC and USEPA have determined that the most effective and timely way to achieve remediation of the contaminant plumes is to separately implement on-site and off-site remedial systems. Due to the less complex nature of the off-site plume remediation system, the NYSDEC and USEPA determined that implementation of the off-site corrective measures would take precedence over the on-site corrective measures. The final CMI for the off-site remedial system (Golder Associates, 1992) was submitted to and accepted by the NYSDEC and USEPA, as stated in a letter dated April 22, 1992, from the NYSDEC to BAT. Construction for the off-site remedial system was initiated in October 1992.

This document constitutes BAT's CMI for the on-site remedial system. This plan presents the on-site remedial system which consists of a ground water extraction system and on-site wastewater treatment facility. This plan also presents monitoring plans and a data collection plan for the ground water extraction system (including Standard Operations Procedures (SOPs) in Appendix A) to gauge system performance (physical/chemical). In addition, reporting criteria, clean-up standards, termination protocols, and sampling methodology and laboratory analysis plans for the ground water extraction system are presented herein. The Health and Safety Plan (Golder Associates, 1991d), previously accepted by the NYSDEC and USEPA, presents the general health and safety protocols and requirements to be implemented during construction of the on-site remedial design. If the on-site system specified herein does not meet anticipated remedial goals, BAT may be required to modify the system as delineated in the Part 373 Permit.

1.3 Site Background

A complete discussion of site history and previous investigations and studies are contained in the RFI report (Golder Associates, 1991a).

1.4 Design Scope

A general description of the on-site remedial system and design components are presented in Section 2.0 of this plan. A detailed design package, including design drawings and specifications, for the ground water extraction system is presented in Appendix B while the design package for the on-site treatment facility is presented in Appendix C. The ground water extraction system was designed by Golder Associates and by Conserva-Tech Engineering Services (Conserva-Tech), under subcontract to Golder Associates. The on-site wastewater treatment facility was designed by Resource Technologies Group, Inc. (RTG).

1.5 Project Schedule

Within 30 days of the NYSDEC approval of this on-site CMI, weather permitting, BAT shall commence the activities for construction of the on-site remedial system.

1.6 On-Site Treatment System

The ground water extracted from the on-site remedial systems will be pre-treated by the proposed on-site treatment facility prior to discharge to an on-site sanitary sewer inlet. Once the water has entered the sewer, it will be transferred via the sewer line to the Niagara County Sewer District (NCSD) #1, the local publicly owned treatment works (POTW) facility, for further treatment. BAT anticipates being granted an Industrial Waste Discharge Permit from the sewer district to discharge the treated water into the on-site sewer. This permit will establish the maximum contaminant loadings and required monitoring for discharge. A sampling and analysis plan for monitoring the discharge from the treatment facility will be prepared in accordance with the requirements specified in the Industrial Waste Discharge Permit. This plan will be submitted to the NYSDEC after the Industrial Waste Discharge Permit is issued to BAT. In addition, any air monitoring discharge permits required to operate the on-site treatment facility will be obtained prior to system start-up.

1.7 Ground Water Extraction System Monitoring and Modifications

Monitoring of the installed ground water extraction system will be subdivided into three categories: effectiveness, termination, and post termination monitoring. A data collection plan will also be implemented as part of the monitoring system. The monitoring programs provide for both physical and chemical evaluation of the installed system and the data to be collected will include, but not be limited to:

- Well pumping rates;
- Ground water elevations;
- Meteorologic information (from Niagara Falls International Airport Weather Station);
- Ground water chemistry information; and
- Operational activities.

Dependent upon the information collected, BAT will make minor modifications to the system. BAT will make modifications to the pumping rates, as required, to create the desired level of drawdown (i.e., fine tune the system) and regulate the inflow into and discharge out of the on-site treatment facility. These modifications to the system will be presented in quarterly reports, which will be submitted to the NYSDEC. Other modifications to either system configuration or operation will require written approval from the NYSDEC.

2.0 ON-SITE REMEDIAL SYSTEM DESIGN

2.1 General

This section presents a generalized description of the on-site remedial system design. The ground water extraction system design consists of two separate ground water extraction systems to be installed at the BAT facility. One system is designed primarily to extract ground water from the Zone 1 aquifer to remediate the aquifer of dissolved phase contaminants present in the ground water system, and is referred to as the dissolved phase extraction system. The second extraction system is designed to extract ground water from the Zone 1 aquifer in order to hydraulically contain the dense non-aqueous phase liquid (DNAPL) plume, and is referred to as the DNAPL phase extraction system. The dissolved phase extraction system includes two ground water extraction wells located in the southern portion of the facility adjacent to Niagara Falls Boulevard. The DNAPL phase extraction system includes four ground water extraction wells positioned around the perimeter of the known DNAPL plume. Provisions have been made in the design for additional DNAPL extraction wells, if necessary.

The extracted ground water from each system will be transferred via separate pipeline networks for each on-site system to an on-site treatment facility. The treatment train for the on-site treatment facility will consist of the following major unit processes:

- Phase Separator;
- Shallow Tray Air Strippers;
- Carbon Adsorption Columns; and
- Thermal Oxidation Off-Gas Treatment.

The treated ground water will be discharged to a sanitary sewer inlet at the facility. Once the treated water enters the sewer it will be transferred to a local POTW facility for further treatment. Appendix B presents the detailed design package for the ground water extraction system and Appendix C presents the design package for the On-Site Wastewater Treatment Facility.

2.2 System Components

The layout of the on-site ground water extraction system is based on results of ground water modeling completed as part of the CMS (Golder Associates, 1991b) and on results of the solute transport model, submitted as an appendix to the off-site CMI (Golder Associates, 1992). The number of extraction wells, spacing of the wells, anticipated ground water extraction rates, anticipated drawdown, and anticipated reduction in ground water contaminants resulting from operation of the on-site system are based on these modeling efforts and are presented in the above referenced documents.

Each extraction well has been designed to be capable of extracting from one gallon per minute (gpm) to seven gpm. The well head will be recessed, installed in a vault buried below the ground surface. A buried double-walled pipeline network, fitted with a leak detection device, will transmit the extracted ground water as a force main to the treatment plant. The pipeline system has been over designed to accommodate the maximum flow volume from the extraction wells, and additional flow from extraction wells that may be added to the system in the future.

A 2-inch diameter pipe, consisting of polypropylene material, will serve as the carrier pipe, and a 6-inch diameter pipe, consisting of HDPE material, will serve as the containment pipe. These piping materials are chemically compatible with the contaminants previously reported in ground water samples obtained from the Zone 1 aquifer. Pipe movements and stress in the double-walled piping system are controlled with factory installed anchors. As a result, there is no relative movement between the carrier and secondary containment pipe.

The vaults will consist of concrete and be made "water tight" with a steel "trap" door cover. The piping in the vaults will be single-walled as the vault will serve as the secondary containment. Each vault will house a sampling port to sample the extracted ground water and a flow sensor to monitor the flow rate at each well.

The water level in each extraction well will be maintained between prescribed elevations by using water level control switches to activate and deactivate the pump based on the

water level in the well. Furthermore, the pumping rate for each well will be controlled by adjusting two butterfly valves at the well head to establish the desired flow rate. The elevation settings for the water level switches and pumping rate for each well will be established after the extraction wells are installed.

The on-site system has been designed to be monitored from a monitoring station at the BAT facility. The system will be manually operated at each well head, with operational data sent via a communication line to the monitoring station, and will indicate the basic operational status of the system (e.g., flow rate, flow volume, water level at each well).

3.0 PERFORMANCE MONITORING SYSTEM

3.1 Introduction

As required in the Part 373 Permit, monitoring of the ground water will be necessary throughout and beyond the operation of the on-site extraction system to evaluate the effectiveness of the corrective measures. The effectiveness of the corrective measures will be evaluated through impact on the local hydrogeologic systems (e.g., hydraulic containment), quality of ground water at selected monitoring well locations, and quality of ground water extracted by the extraction wells. The measurement of piezometric heads and sampling and analysis of the ground water will occur with set frequencies (detailed in the following sections) with the results presented in quarterly reports. The information derived from these analyses will be compared to baseline data presented in the RFI report (Golder Associates, 1991a) in order to demonstrate that containment (inward gradients) and clean-up (reduced concentrations) of the contaminated ground water are occurring.

This section is also considered as the Data Collection Plan that will be used to characterize the performance of the on-site system during the first 12 months of system operation. The data collection protocols presented herein will provide sufficient information about the operation of the system to allow BAT to develop a final Operation and Maintenance Program for the on-site system.

3.2 Hydraulic Monitoring Criteria

3.2.1 Hydraulic Gradient Criteria

Measurement of the drawdown developed due to pumping of the dissolved phase extraction wells and the DNAPL phase extraction wells (proposed locations shown on Figure 2) will be used to evaluate the effectiveness of the system for establishing a zone of capture and maintaining an upward hydraulic gradient between the Zone 3 and Zone 1 aquifers and a downward gradient between the overburden and Zone 1 in the vicinity of the DNAPL plume. Ground water elevations will be measured from the defined monitoring points presented in Table 1 and Figure 2.

The ground water elevation data will be used to determine the hydraulic gradients created by the extraction system and to estimate the extent and geometry of the capture zone.

Measurements of the ground water elevations will be performed on a periodic basis throughout start-up and continued operation of the extraction/containment system at the frequencies specified in Table 1. Field measurements will be referenced to geodetic datum.

A stable configuration of the cone-of-depression (i.e., near steady-state conditions), due to operation of the on-site system, is not expected to develop until after a minimum of 12 months of operation, depending on seasonal fluctuations. After this 12-month period, if water level measurements indicate the observed drawdown is not producing an effective capture zone, then operation of the system may be modified (i.e., adjusting the pumping rate or depth of pump actuation within a well) or additional pumping wells may be added.

3.2.2 System Performance

Following start-up of the on-site extraction system, data pertinent to changes in ground water elevation, chemistry, and system operation will be collected and evaluated as described in this plan. Also, meteorological data from the Niagara Falls International Airport and discharge data from Atlantic Research Corporation located at the BAT facility will be evaluated.

3.3 Ground Water Quality Monitoring

3.3.1 General

Monitoring of on-site ground water quality has been conducted at the BAT facility since 1985 and has indicated the presence of both a dissolved phase contaminant plume and a DNAPL plume. This baseline information has been summarized in the RFI report (Golder Associates, 1991a). Monitoring of on-site ground water quality will be evaluated for different sets of contaminants, from different wells, depending on the stage of monitoring being performed (i.e., effectiveness, termination, or post termination) throughout and following the operation of the on-site system. The analytes of concern for the on-site extraction system are presented in Table 2.

The purpose of the respective monitoring programs is to evaluate the effectiveness of the corrective measures as instituted, determine when the prescribed clean-up levels have been met, and provide a method for determining a system shut off date. No allowance

for an alternative basis for system shutdown has been established at this time. Each phase of the monitoring protocol will utilize several different well types. The designated well type for each well described below is specific to each zone that particular well is designated to monitor (i.e., overburden (O), Zone 1 bedrock, or Zone 3 bedrock). These well types are referred to as:

- Internal Monitoring Wells (INT Wells)

  Wells within the presently existing dissolved phase and/or DNAPL plumes that will be monitored for chemical and water elevation data;

- Perimeter Monitoring Wells (PMW Wells)

  Existing monitoring wells located on the leading edge or outside of the existing dissolved phase plume area, that will be monitored for chemical and water level elevation data;

- Supplemental Monitoring Wells (SUPP Wells)

  These wells will be the dissolved phase extraction wells for the remedial system and will be monitored for chemical and water elevation data; and

- DNAPL Extraction Wells (DW Wells)

  These wells will be the DNAPL phase extraction wells and will be monitored for chemical and water elevation data.

For all phases of ground water monitoring, samples will be collected in general accordance with the Ground Water Sampling Plan described in Section 5.0. Analyses will be conducted in accordance with the Laboratory Analysis Plan described in Section 6.0.

3.3.2 Effectiveness Monitoring

Effectiveness monitoring for the on-site system is designed to show that the system, as planned and constructed, is performing as expected. The goal of effectiveness monitoring is to demonstrate that the clean-up of the dissolved phase plume is occurring (i.e., targeted at a 50-percent average reduction in hazardous waste constituents within 10 years and a 75-percent average reduction within 15 years for the on-site system, as defined in the Part 373 Permit) **and** that containment of the DNAPL plume is also occurring (i.e., preventing the migration of dissolved phase contaminants from the DNAPL plume). Effectiveness

monitoring will begin with the system initiation and will consist of analyses for the volatile organic compounds (VOCs) listed in Table 2. Effectiveness monitoring for the on-site remedial systems will continue until the next phase, termination monitoring, commences.

The monitoring and extraction wells to be sampled during the effectiveness monitoring program are presented in Table 3. The program will consist of monitoring Zone 1 wells adjacent to and hydraulically downgradient of the DNAPL plume and adjacent to the dissolved phase extraction wells in order to monitor the effectiveness of hydraulic containment of the DNAPL plume as well as to evaluate the effectiveness of the on-site dissolved phase extraction system. Zone 3 monitoring wells will also be monitored to evaluate the effect the operation of the DNAPL phase remedial system has on remediating the dissolved phase contaminants present in Zone 3. Further, several overburden wells located on-site and off-site will also be monitored. Monitoring of on-site overburden wells will evaluate the effect the operation of the remedial systems has on remediating the dissolved phase contaminants present in the overburden material. Monitoring of the overburden wells located off-site will demonstrate that contaminants are not migrating off-site in the overburden material (to date, contaminants have not been reported off-site in the overburden material). Lastly, effectiveness monitoring will consist of monitoring both dissolved phase extraction wells and the DW wells (Table 3).

A database of baseline concentrations of constituents for all the wells sampled during the effectiveness monitoring program will be established. The first four quarters of data collected for the newly installed extraction wells will be used to establish baseline concentrations of constituents for such wells. Historical data collected during the RFI and from subsequent sampling events will be used to establish baseline concentrations for the existing wells. Effectiveness monitoring trends will be measured from these baseline concentrations. The first four quarters of the baseline data for all proposed on-site designated wells will be evaluated for system performance. Based on review of this data, the effectiveness monitoring program may be modified. Recommendations for any proposed modifications to this program will be included within the first annual report as discussed further in Section 3.5.3.

Table 3 shows the analytical scheme to be employed during effectiveness monitoring. A total of 13 monitoring wells (including ten Zone 1 wells (either INT or PMW wells) and three Zone 3 wells) and two dissolved phase extraction wells (SUPP wells) will be monitored either on a quarterly or modified quarterly (quarterly for the first two years and annually thereafter) basis. On an annual basis, an additional seven monitoring wells (including five overburden wells (PMW and INT wells) and two Zone 1 PMW wells) and the four DW wells will be sampled. Therefore, a total of 26 wells will be monitored during the effectiveness monitoring program.

When it can be demonstrated, based on the analytical data from a well(s) through the effectiveness monitoring program, that the concentrations of VOCs do not exceed the Ground Water Protection Standards listed in Table 2, the well(s) will be considered for Termination Monitoring. Prior to initiation of the Termination Monitoring Program, the wells designated in the Effectiveness Monitoring Program will be analyzed for VOCs using the methodologies described above or the Contract Laboratory Program (CLP) methodologies in existence at that time. The laboratory will be allowed to report the Method Detection Limits (MDLs) rather than the Contract Required Reporting Limits, providing that the MDLs do not exceed Ground Water Protection Standards. The laboratory will provide a data package which conforms to the specifications of the approved Quality Assurance Project Plan (QAPP). The purpose of this sampling event will be to provide data that are defensible to demonstrate that the on-site pre-termination monitoring criteria have been achieved for VOCs for the dissolved phase plume prior to entering termination monitoring. If the listed goals are not met within the time frames specified in the Part 373 Permit, BAT will submit a plan to the NYSDEC stating its strategy to achieve the defined clean-up criteria.

3.3.3 Termination Monitoring

Once it has been demonstrated that the on-site pre-termination monitoring criteria have been achieved for VOCs for any of the designated monitoring wells, BAT will implement the Termination Monitoring Program for the dissolved phase system 60 days after submittal of a Termination Monitoring Plan (TMP) to the NYSDEC. The TMP will describe the wells to be monitored and the analytical scheme to be employed during

termination monitoring. Based on the Solute Transport Model presented in the Off-Site CMI (Golder Associates, 1992), it is envisioned that termination monitoring will occur at different times for the various zones of plume capture; hence, monitoring of the ground water chemistry in the wells will occur on a phased approach. Table 4 illustrates a conceptual monitoring scheme for the termination of the two on-site extraction wells; this conceptual scheme is described below.

On a quarterly basis, a select group of the termination monitoring wells will be analyzed for VOCs using Method 8260 to insure that termination criteria are met. Similarly, on an annual basis, semi-volatiles and polychlorinated biphenyls (PCBs) will be analyzed using SW-846 (SW-846, 3rd Edition, 1986, Update I, 1989) Method 8270 and Method 8080, respectively. The laboratory will report the MDLs as opposed to the Practical Quantitation Limits (PQLs) for semi-volatiles because the PQLs may be greater than the Ground Water Protection Standards. Moreover, samples will be collected annually for inorganic analysis. The laboratory will use appropriate SW-846 (SW-846, 3rd Edition, 1986, Update I, 1989) methodologies for the analysis of the inorganic analytes such that the detection limits do not exceed the greater of the Ground Water Protection Standards or background values. Table 2 shows the analytes which will be analyzed during termination monitoring. This analytical scheme will be employed for a minimum of eight consecutive quarters. In addition to meeting the Ground Water Protection Standards on a per well basis, as set forth in Table 2, BAT will need to demonstrate, through termination monitoring, that the total concentration of all organic compounds is not greater than 100 parts per billion (ppb), and no single organic compound concentration exceeds 50 ppb.

The analytical data collected will be evaluated to determine the mean concentration for each constituent. Since the primary indicators at the BAT site are VOCs, the mean concentration will be determined by using the arithmetic mean of the analytical results of VOCs from eight consecutive quarterly monitoring events during termination monitoring. Alternately, data for the other analytes will be evaluated on an annual basis. If the mean concentration of each constituent in ground water samples taken from designated monitoring wells within the capture zone of a recovery well is less than the Ground Water Protection Standards and the criteria for total organic compounds

(described above) is met, then the on-site termination criteria will have been achieved for that recovery well. In accordance with the Part 373 Permit, "constituents that can be demonstrated as not attributable to releases from the BAT site may be excluded from the data evaluation used to determine whether the termination criteria have been met." BAT will notify the NYSDEC that these analytes are not being used and provide justification for excluding the data.

3.3.4 Post Termination Monitoring (PTM)

Upon demonstrating the on-site termination criteria described in Section 3.3.3, BAT will petition the NYSDEC for shut down of the part of the on-site remedial system which relates to remediation of the dissolved phase plume. A program for PTM will be submitted for approval to the NYSDEC, and will include a description of which well or wells BAT is intending to shut down and which wells will be utilized for post termination ground water monitoring. At that time, a revised Ground Water Sampling and Analysis Plan will be submitted by BAT to the NYSDEC. The revised plan will fully detail sampling procedures, analytical methodologies, and any other pertinent information. PTM will continue for a minimum of three years following plan approval. During PTM, the remedial system will be kept in place in order to be placed into service, if required, within a reasonable time period.

As part of the data evaluation procedure established for PTM, a method for establishing the average overall precision of analytical data will be developed by BAT and approved by the NYSDEC. In the event that one of the following events occur during PTM, BAT will notify the NYSDEC:

- Two successive quarterly monitoring results from any designated monitoring well located in the discontinued portion of the system exceed the termination criteria by an amount greater than the average overall precision of the analytical data; or

- The yearly average results of quarterly monitoring from any designated monitoring well located in the discontinued portion of the system exceed the termination criteria.

Also, if during PTM, analytical results of a sample from a discontinued portion of the system indicates that the concentration of total organic compounds to be greater than ten times the on-site termination criteria, the well will be resampled within 30 days. The results of this resampling event will be submitted to the NYSDEC.

3.3.5 Data Verification and Resampling

In the event that, during any of the specified monitoring programs, a result from the analytical laboratory is deemed suspect by BAT, then BAT, at its discretion, may order a resampling of the suspect well or wells. Prior to resampling, BAT may request that the laboratory validate its data. If no errors are found, BAT will notify the NYSDEC and resample the suspect well or wells. Each sample will be collected in duplicate with both duplicates being analyzed for the appropriate monitoring program and the average result presented to the NYSDEC for evaluation. Upon NYSDEC approval, BAT will submit the averaged values into a database developed by BAT with either a reference note or footnote.

3.4 Monitoring of Discharge to On-Site Treatment Facility

An on-site treatment facility will be installed to receive and treat ground water from the on-site extraction system. As stated previously, a sampling and analysis plan for monitoring the effluent discharge will be submitted to the NYSDEC after BAT obtains an Industrial Waste Discharge Permit. The effluent discharge from the treatment plant to the sanitary sewer at the site will be monitored to comply with requirements established by the NCSD No. 1. BAT will obtain all necessary permits from the appropriate agencies prior to discharge of the treated water.

3.5 Reporting Summary

3.5.1 Construction Certification Report

Within 60 days after completion of construction of the on-site system, BAT will submit to the NYSDEC a construction certification document detailing the materials and activities utilized in the construction of the on-site system. This report will contain an executive summary of construction activities, daily field inspection reports, certification documents, including as-built documentation, quality assurance/quality control (QA/QC) records and

a listing of all approved changes, with substantiating documentation. The report will also include the date and time the system began continuous operation, the initial pumping rates for each of the extraction wells, modifications made to those pumping rates, observations regarding the development of the induced hydraulic gradients, and appropriate figures, graphs, and tabulated analytical data.

3.5.2 Quarterly Reports

Beginning with the first quarter following initiation of the on-site system, BAT will submit a quarterly ground water monitoring data report to the NYSDEC which describes results of sampling events and ground water elevation measurements obtained during the previous quarter. Copies of analytical data will be provided in both hard copies and an acceptable digital format such as 5¼-inch, 1.2 MB diskette, comma delimited ASCII file in DOS format.

In addition, BAT will submit to the NYSDEC a quarterly system operational report that will characterize system operations for the previous quarter and provide tabulated flow data, average pumping rates, detailed description of any system down times encountered, and/or modification of operational protocols required to improve system operational characteristics. This report will be submitted either with the above mentioned quarterly ground water monitoring data report or under separate cover as deemed appropriate by BAT.

3.5.3 Annual Reports

BAT will submit to the NYSDEC an annual report of the previous year's activities prepared in accordance with the guidelines and requirements of 6NYCRR 373-2.6(i)(5). The annual report shall be due by April 1 of each year and shall contain a summary of all pertinent data and evaluations as required for quarterly reports. In addition, the following information should be included in the annual report:

- Determination of ground water flow rate and direction of ground water flow in Zone 1; and
- A proposal for any changes to BAT's Ground Water Monitoring Plan (GWMP).

3.5.4 Down Time Reporting

The ground water extraction system will be operated on an essentially continuous basis, excepting periods of planned maintenance or unscheduled mechanical or electrical failures. If any part of the system fails and renders the system inoperable for a period longer than three consecutive days or more than five days in a 30-day period, BAT will notify the NYSDEC in writing. All such notification will explain the occurrence, the actions which have been taken to restore the system, and activities or modifications which will be undertaken to possibly prevent a repetition of the failure.

3.5.5 System Performance Reporting

A report entitled "Final System Performance Report" will be submitted to the NYSDEC following a period of 12 months of continuous operation of the on-site system. This report will include a proposal for a final Operation and Maintenance Program for the on-site system. If appropriate, this performance report may be submitted as part of the annual report.

3.6 System Modification

3.6.1 Adjustments Due to Drawdown Development

At BAT's discretion, and without prior NYSDEC approval, adjustments will be made to pumping rates or depths of pump actuation within each well that will enhance overall system performance. Any such adjustment will be reported to the NYSDEC in the next scheduled quarterly report. All other changes, whether to the physical system or to an operational protocol, will be considered a system modification and will require written approval from the NYSDEC.

3.6.2 Adjustments Due to Ground Water Quality

BAT, following receipt of analytical data from a sampling event, may modify the overall pumping rate of the on-site system to maintain compliance with requirements to be established by the NCSD No. 1. These modifications include increases or decreases to an extraction well(s) pumping rate, or adjusting the depth of pump actuation within an individual extraction well(s). Any such adjustment will be reported to the NYSDEC in the next scheduled quarterly report.

4.0 TERMINATION OF GROUND WATER REMEDIATION

4.1 General

Termination of ground water extraction activities for the dissolved phase portion of the on-site remedial system may only occur after the conditions in Section 3.3.3 have been met and the appropriate notifications have been submitted. Based on the modeling performed for the Solute Transport Model presented in the Off-Site CMI (Golder Associates, 1992), it is estimated that on-site extraction activities related to remediation of the dissolved phase plume may continue for a period of up to 21 years. As discussed previously, a specific PTM plan will be submitted to the NYSDEC. This plan will be based on conditions which actually develop and the general guidelines outlined below.

4.1.1 Clean-Up Standards

After a minimum of eight quarters of termination monitoring, successful clean-up of the on-site plume will be considered to have occurred, on a per well basis when:

- All analytes remain below the limits listed in Table 2;
- After three years of PTM, the analytes remain below the values specified in Table 2; and
- The total concentration of VOCs is below 100 ppb, with no single constituent concentration exceeding 50 ppb.

4.1.2 Clean-Up Guidelines

A listing of on-site specific analytes targeted for remediation is presented in Table 2. The guideline concentrations associated with each chemical constituent are based on values promulgated by USEPA and/or the NYSDEC. If, however, it is determined that these guidelines are inappropriately low, due either to technological constraints or hydrogeologic conditions, BAT may petition the NYSDEC for a variance.

4.2 Termination Criteria

In the event that all standards and guidelines are met or BAT has obtained and met Alternate Concentration Limits, BAT may petition the NYSDEC to terminate the operation of a single well, multiple wells, or the entire dissolved phase remediation system. The

petition will include all pertinent analytical data, tabulations of analyzed data reflecting compliance with termination criteria, and rationale for the request.

5.0 GROUND WATER SAMPLING PLAN

5.1 Introduction

The sampling procedures associated with the ground water monitoring of the on-site ground water extraction system were developed to minimize the potential contamination of ground water samples during sampling and prior to analytical testing. All sampling activities will be conducted according to the protocols detailed in the GWMP (Golder Associates, 1993) and as discussed below. These activities involve obtaining water level measurements, monitoring well purging and sampling, QA/QC requirements, and health and safety requirements. Additional activities related to the monitoring for the presence of DNAPL are discussed in detail below. These procedures only refer to the monitoring points listed in Tables 1 and 3. Sampling procedures and protocols (as discussed in more detail below) will be conducted according to the SOPs as detailed in Appendix A. Upon approval of the on-site CMI, BAT's GWMP will be revised to incorporate the sampling requirements discussed herein.

5.2 Sampling Preparation

5.2.1 Checklist

Prior to any sampling event, the following steps will be taken by personnel responsible for sampling:

- Review the sampling procedures, well records, and logs;
- Assemble and inspect field equipment necessary for sample collection, verify that equipment is clean and in proper working order;
- Calibrate equipment to manufacturer's specifications;
- Examine shipping containers, bottles, and preservatives; contact laboratory immediately if any problems are found;
- Confirm sample delivery time and method of sample shipment with the laboratory;
- Establish a sampling team of at least two people; and
- Establish a well purging and sampling schedule.

5.2.2 Tracking and Authorization

All individuals involved in the on-site sampling will have read the GWMP, the Health and Safety Plan, be technically qualified, received appropriate (Occupational Safety and Health Administration (OSHA) approved) health and safety training, and follow the sampling plan whenever ground water samples are obtained.

5.3 Sampling Equipment and Procedures

5.3.1 Ground Water Monitoring

This section presents a step-by-step description of the sampling procedures for obtaining ground water samples from the monitoring wells and extraction wells. Additional sampling procedures are included in the SOPs in Appendix A. The following protocols will be followed for sampling the monitoring wells and extraction wells:

- Inspect the well or vault entranceway for damage or inadvertent entry. Note any such evidence on the Chain-of-Custody Record, in the field notebook, and on the Sample Collection Form;

- For Monitoring Wells:

  a. Open the well cap or plug and monitor the air quality at the well head using an air monitoring detector (i.e., organic vapor analyzer (OVA) or organic vapor monitor (OVM)). If the concentration of organic vapors are detected at over 5 ppm above background levels, for more than a brief peak, refer to the health and safety protocols outlined in the attached Health and Safety Program (Appendix D). Air monitoring data must be recorded by the sampling contractor;

  b. Before and after use, triple rinse the water level sounding probe and the bottom two feet (or more) of cable with deionized water;

  c. Measure and record in the field notebook the depth to the water surface in the well from the top of the inner casing using the water level sounding probe;

  d. Calculate and record the standing volume of water in each well. Purge each well by removing a minimum of three times this volume, or if the well yield is low, by removing water to within a nominal 6-inches of the bottom of the well (i.e., purged "dry"). All purge water will be containerized on site;

e. A vacuum dewatering system (peristaltic pump) or a bailer will be used to purge the wells;

- The vacuum dewatering system will consist of a polyethylene tube connected to two 5-gallon bottles in series and a portable vacuum pump. Each well will have a dedicated length of tubing to prevent possible cross-contamination between the wells. The lower end of the tube will be positioned just below the water surface and lowered, as necessary, during pumping. This process will allow stagnant water to be removed from the well and allow representative formation water to flow into the well; and

- The bailer dewatering system will consist of a stainless steel or Teflon® bailer attached to a new polypropylene rope. The bailer will be lowered slowly into the water in the well to minimize disturbance of the water.

- The volume of water removed from each well will be measured and recorded and the purge water will be accumulated at the BAT facility for proper disposition.

f. A glass beaker will be filled with water from the well for measuring temperature, pH, and specific conductance. The pH and specific conductance meter probes will be triple rinsed with distilled water before and after use. Record the temperature, pH, specific conductance, and physical appearance of the water (e.g., color, turbidity, etc.) during purging. Generally, these field parameters should be taken after a well volume has been purged for a minimum of three measurements during purging. The temperature data will be used to correct specific conductance data to the 25-degree centigrade standard condition. Record field parameter measurements and observations on a Sample Collection Form;

g. Immediately after purging, the wells will be sampled. Wells with slow recovery will be sampled for VOCs within three hours of purging, if possible. Recovery of the low yield wells will be monitored so that sampling for volatiles can be done as quickly as practicable (i.e., sufficient volume of water available to fill the containers). Proper documentation of the delay, if any, will be provided;

h. Ground water samples for analysis will be obtained from the monitoring wells by bailing using dedicated bailers. Bailers used to obtain samples will be decontaminated before initial use (bailers will be dedicated to each well). New polypropylene rope will be used for each well. Flush the bailer several times with deionized water and remove three bails of well water before collecting the sample;

i. When sampling, the bailer will be lowered slowly into the well to minimize disturbance of the water in the well. The bailer will be used to obtain samples from the bottom of the well. The initial sample could have been subject to some degassing, so this sample will not be used for volatile organic analyses. The first bailer volume removed will be used for field measurements of pH, specific conductance, and temperature;

j. After obtaining the field measurement samples, the required volume of water for the volatile organic samples (about 40 ml) will be bailed from the well. The laboratory-prepared container will be filled to overflowing and covered with a Teflon® septa and capped so that no air bubbles will be present in the sample. If air bubbles are encountered, the container will be refilled and recapped until bubbles are removed;

k. Place samples in the pre-labelled containers and store on ice (wet ice or blue packs);

l. Wipe the well cap with a clean rag, replace the cap and protective cover (if present). Lock the protective cap;

m. Verify that each sample is placed in its appropriate container (holder) in the shuttle and that the shuttle has sufficient ice (wet ice or blue packs) to preserve the samples for transportation to the laboratory;

n. Complete the Chain-of-Custody Forms. One copy of the Chain-of-Custody Form is retained. Secure the shuttle with sufficient packing tape and a Custody Seal. Forward the samples via overnight (express) mail or hand deliver to the designated laboratory, preferably within 24 hours but no later than 48 hours after sampling. Notify the laboratory that samples have been shipped, and make special arrangements if Saturday delivery is necessary; and

o. Wrap dedicated sampling equipment (bailers and hoses) with a suitable material (e.g., aluminum foil or plastic bags). Discard the cord, rags, gloves, etc., in a manner consistent with the Health and Safety Program.

- For Extraction Wells:

a. Open the hatch and lower a MSA 361, or equivalent, meter and an OVM into the vault to check for the presence of hydrogen sulfide (H_2S), an oxygen deficiency, percent of the lower explosive limit (%LEL), and organic vapors. If the level of H_2S is greater than 10 ppm, the oxygen is less than 19.5 percent, percent of the LEL is greater than 20, or the concentration of organic vapors detected is

greater than 5 ppm above background for a sustained period (approximately one minute), withdraw from the area and follow the health and safety requirements outlined in the attached Health and Safety Program (Appendix D). Air monitoring data must be recorded by the sampling contractor;

b. Entry into the vaults is anticipated for sampling of the extraction wells. As the vaults are considered a confined space, all personnel entering a vault must adhere to confined space entry procedures as defined by OSHA for confined space entry and any BAT procedures for contractors that may be required for confined space entry;

c. The extraction wells will be sampled by securely attaching new Teflon® tubing onto the top of the sampling port at the well head in the vault. Slowly open the sampling port valve by turning the control lever to the "on" position. Purge the system for at least one minute prior to sampling. Extend the tubing to the sample container(s) and collect the sample(s). (NOTE: Pump for the extraction well must be operating for at least five minutes immediately prior to sampling). Record the volume of water purged prior to sampling;

d. Immediately prior to sampling and after sampling, record the temperature, pH, conductivity, and physical appearance of the water (e.g., color, turbidity, odor, etc.) during purging. A glass beaker will be filled with water from the well for measuring temperature, pH, and specific conductance. The pH and specific conductance meter probes will be triple rinsed with distilled water before and after use. A minimum of two measurements shall be made for each field parameter. The temperature data will be used to correct specific conductance data to the 25-degree centigrade standard condition. Temperature, pH, and specific conductance measurements and observations will be recorded on a Sample Collection Form;

e. After obtaining the field measurement samples, the required volume of water for the volatile organic samples (about 40 ml) will be obtained from the sampling port. The laboratory-prepared container will be filled to overflowing and covered with a Teflon® septa and capped so that no air bubbles will be present in the sample. If air bubbles are encountered, the container will be refilled and recapped until bubbles are removed;

f. Place samples in the pre-labelled containers and store on ice (wet or blue packs);

g. Slowly close the sampling port valve by turning the control lever to the "off" position. Disconnect the tubing from the port and replace the hatch on the vault;

h. Verify that each sample is placed in its appropriate container (holder) in the shuttle, and that the shuttle has sufficient ice (wet ice or blue packs) to preserve the samples for transportation to the laboratory;

i. Complete the Chain-of-Custody Forms. One copy of the Chain-of-Custody Form is retained. Secure the shuttle with sufficient packing tape and a Custody Seal. Forward the samples via overnight (express) mail or hand deliver to the designated laboratory preferably within 24 hours, but no later than 48 hours after sampling. Notify the laboratory that samples have been shipped, and make special arrangements if Saturday delivery is necessary; and

j. Wrap dedicated sampling equipment (tubing) with a suitable material (e.g., aluminum foil or plastic bags). Discard the rags, gloves, etc., in a manner consistent with the Health and Safety Program.

5.3.2 DNAPL Monitoring

This section presents monitoring and extraction procedures for obtaining a measurement of the possible presence of DNAPL present in the DW wells. The following is a step-by-step presentation of the monitoring procedures:

- Inspect the vault entranceway and chamber for damage or inadvertent entry. Note any such evidence on the Chain-of-Custody Record and the field notebook;

- Open the hatch and lower a MSA 361, or equivalent, meter and an OVM into the vault to check for the presence of H_2S, an oxygen deficiency, a LEL and/or organic vapors. If the level of H_2S is greater than 10 ppm, the oxygen is less than 19.5-percent, LEL is greater than 20-percent, or the concentration of organic vapors detected is greater than 5 ppm for a sustained period (approximately one minute), withdraw from the area and follow appropriate health and safety requirements outlined in the attached Health and Safety Program (Appendix D). Air monitoring data must be recorded by the sampling contractor;

- As the vaults are considered a confined space, all personnel entering a vault must adhere to confined space entry procedures as defined by OSHA for confined space entry and any BAT procedures for contractors that may be required for confined space entry;

- A battery powered "interface probe" capable of measuring two distinct fluid levels will be used to monitor for the presence of DNAPL within the well(s);

- Before each use, triple rinse the "interface probe" and bottom two feet (at least) with deionized water;

- Gently lower the probe into the stilling well at the well head in the vault until the first liquid level is reached. Record the depth of this level (to the nearest one hundredth of a foot) in the field book. Continue gently lowering the probe until the second level is reached (if encountered) and record this level (to the nearest one hundredth of a foot);

- Gently remove the probe from the well and calculate the thickness of the DNAPL layer (if encountered) by subtracting the depth to the second layer from the total depth of the well (measured from the top of the stilling well);

- After each use, the probe and all the cable that has come into contact with the ground water will be decontaminated as follows:

  a. Wipe off or remove any DNAPL residuals remaining on probe;
  b. Wash probe and cable with tap water and Alconox® soap mixture;
  c. Tap water rinse;
  d. Reagent-grade Hexane rinse;
  e. Triple rinse with deionized water; and
  f. Air dry or paper towel dry.

- All used decontamination fluids will be containerized on site;

- If DNAPL is observed to be present, a vacuum dewatering system or bottom filling bailer will be used to remove the DNAPL from the well(s), as follows:

  a. A vacuum dewatering system will consist of using an electrically powered peristaltic pump to remove DNAPL. Each well will have a dedicated length of Teflon® tubing to prevent possible cross-contamination between the wells. The lower end of the tube will be positioned at the bottom of the well during pumping. This process will allow the DNAPL to be removed from the well; and

  b. A pre-cleaned bottom filling stainless steel or Teflon® bailer will be attached to an appropriate length of new polypropylene rope. The bailer will be lowered, as gently as possible, through the water column to the bottom of the well as not to create turbulence in the water column.

- The volume of DNAPL removed from each well will be measured and recorded and the DNAPL will be containerized (separately from purge and/or decontamination fluids) at the BAT facility for proper disposition by BAT.

- Decontaminate all equipment prior to leaving the BAT facility. Place all purge water, decontamination fluids, etc., into the on-site containers and make sure each container (drum) is secured and labelled prior to leaving the site; and

- Replace the hatch on the vault upon exiting the vault.

5.3.3 Sample Containers

All sample containers will be pre-cleaned and contaminant free. The cleanliness of a batch of containers will be verified by the laboratory prior to use. Containers will be cleaned based on the analyte(s) of interest. Cleaning procedures will be as follows:

Metals Analyses (Termination Monitoring Only)

New plastic (metal) or borosilicate glass bottles (1 liter minimum) and caps that are:

- Detergent (non-phosphate) washed with hot water;
- Tap water rinsed, three times with hot water;
- Acid washed (1:1 nitric);
- Deionized water rinsed, three times with American Standard Testing Methods (ASTM) Type 1 water;
- Air dried; and
- Capped when dry.

VOCs

New 40 ml borosilicate vials with Teflon® lined septa and screw caps that are:

- Detergent (non-phosphate) washed with hot water;
- Tap water rinsed, three times with hot water;
- Deionized water rinsed, three times with ASTM Type 1 water;
- Oven dried at 110-degrees centigrade for one hour; and
- Capped while still hot, making sure that Teflon® side is facing the interior of the vial.

Extractable Organic Analyses (Phenols, Base/Neutral and Acids (BNAs), PCBs, Pesticides) (Termination Monitoring Only)

New amber glass bottles (1-liter minimum capacity) with Teflon® lined screw caps from which cardboard cap liners have been removed and rinsed with methanol. Caps and Teflon® cap liners should then be:

- Detergent (non-phosphate) washed with hot water;
- Tap water rinsed, three times with hot water;

- Deionized water rinsed, three times with ASTM Type 1 water;
- Rinsed with methylene chloride; and
- Oven dried at 110-degrees centigrade for one hour.

Once cleaned, sample bottles should be capped and stored in a clean environment. When samples bottles are received by the sampling team, all labels will be inspected to insure proper sample identification.

5.3.4 Holding Times and Laboratory Protocols

The holding times for samples are outlined below:

- All VOC samples are to be analyzed according to methods specified in Table 3. Due to the potential presence of carbonate materials the samples will not be preserved with acid and will be refrigerated (4-degrees Celsius). The samples will be analyzed within seven days of collection; and

- The approved QAPP presented in the Off-Site CMI (Golder Associates, 1992) specifies the holding times related to other constituents.

5.3.5 Sample Preservation and Shipment

Immediately following collection of the samples, they will be placed in a cooler with ice packs in order to maintain sample integrity. Any preservatives required will be added during sampling as directed by the analytical laboratory and applicable methodology. Sample bottles to be used for VOC analyses will be filled to capacity to minimize any headspace. The samples will be shipped by overnight courier to the laboratory to ensure holding times are met.

The shipping container used will be designed to prevent breakage, spills, and contamination of the samples. Tight packing material will be provided around each sample container and any void around the ice packs. The container will be securely sealed, clearly labeled, and accompanied by a Chain-of-Custody Record. Separate shipping containers will be used for clean and heavily contaminated samples.

5.4 Sample Custody

The Chain-of-Custody Record will be filled out by the sample collector for each sample point. Additionally, information will be recorded in the field notebooks. The Chain-of-

Custody Records will be provided as an attachment or appendix to each Technical Sampling Report. The following information is to be documented:

- Site name (BAT), sample identification, and other identifiers;
- Date, time, and elapsed hours from sample start to sample finish;
- Information regarding purging the well prior to sampling;
- Field test results including pH, temperature, and specific conductance;
- Sampling method used, such as bailer, vacuum pump, etc. Note the construction material of equipment in margin;
- Type of sample and information which appears significant (i.e., sampled in conjunction with regulatory authorities or auditing personnel);
- Field observations/sampling conditions (i.e., weather);
- Appearance of sample, such as color, turbidity, sediment, oil on surface, DNAPL, etc.; and
- Sampler's identity and signature.

In order to maintain the integrity of the ground water samples, strict chain-of-custody procedures will be followed. To ensure that the samples have not been altered from the time the sample is collected until the sample is in the custody of the analytical laboratory, the samples will be:

- In the sampler's possession;
- In the sampler's view, after being in their possession;
- In the sampler's possession and is then locked in a designated, secure area to prevent tampering; or
- In a shipping container sealed with a tamper proof Chain-of-Custody Seal.

A written Chain-of-Custody Record of the transference of samples will be maintained. The Chain-of-Custody Record will be attached to the sample container at the time the sample is collected. All sample bottles will be properly labeled. When transferring the possession of samples, the person making the transference will sign and record the date

and time on the record. The number of custodians in the Chain-of-Possession will be as few as possible.

The Chain-of-Custody Record form will be sealed in the shipping container and transported to the laboratory. Upon receipt by the laboratory, the seal will be broken, and the condition of the samples, temperature of the container, date and time of receipt will be recorded on the form by the person receiving the sample. The Chain-of-Custody Record will be included in the technical analytical reports prepared by the laboratory.

5.5 Health and Safety

Personnel performing the sampling will adhere to all Health and Safety requirements for contractors and/or visitors of the BAT facility. Personnel performing the sampling will, at a minimum, wear gray or blue colored Tyvek® coveralls (white or yellow Tyvek® will not be used), suitable field boots, protective gloves, and safety glasses. Additional Health and Safety protocols and equipment that may be deemed necessary as the program progresses are outlined in the Health and Safety Program included as Appendix D.

5.6 Sampling QA/QC

5.6.1 Blank and Duplicate Samples

Blank and duplicate samples will be obtained during a sampling event to assess conditions existing in the field and during sample shipment. They are critical in the overall integrity and QA/QC of a sampling and analysis plan.

- Trip Blank

  A trip blank will be prepared by the laboratory for each sampling event. If sampling of the monitoring network takes more than one day, trip blanks will be prepared for each day's sample set. The trip blank will be created by filling a 40 ml VOC vial sampling container that will be used for samples with analyte-free water, transporting the container to the site and to each sampling location. The container will be packed in the cooler in the same manner as the samples are packed. Trip blanks will be analyzed for VOC parameters only.

- Equipment Blank

  Equipment blanks will only be obtained each day that samples are collected using non-dedicated equipment. The equipment blank will be prepared by filling one of the sampling devices with distilled water and subsequently transferring the water to the appropriate sampling bottles. Equipment blanks will be analyzed for the same suite of parameters as the samples.

- Field Blank

  Field blanks are used to determine if contamination is being introduced by the sampling environment during sample collection. Field blanks will be prepared when equipment blanks are not necessary (i.e., dedicated equipment is used for sample collection). The field blank will be prepared at one of the sampling points by exposing distilled water to the air and transferring the water to a set of sampling bottles. Field blanks will be analyzed for the same suite of parameters as the samples. Field blanks will be obtained for each sampling event or every 20 samples, whichever is more frequent.

- Duplicate Samples

  At least one duplicate suite of samples will be collected and analyzed each time the monitoring network is sampled or for every 20 samples, whichever is more frequent. It is recommended that the duplicate sample be obtained at a different well for each sampling event.

- Matrix Spike/Matrix Spike Duplicates (MS/MSDs)

  A separate sample or additional sample volume (the samples will be split at the laboratory to provide the MS/MSD) will be collected in the field and sent to the laboratory for analysis. The results provide information about the effect of sample matrix on the digestion and measurement methodology. MS/MSDs will be collected for each sampling event or for every 20 samples, whichever is more frequent. MS/MSDs will not be obtained at the same locations as duplicates.

5.6.2 Split Samples

Split samples are used in a sampling program to assess the replication of results from the same analysis between two laboratories. In this case, the NYSDEC and the USEPA have the right to split samples with BAT and have all or a portion of the analytical parameters tested by their laboratory of choice. If split samples are to be collected, the following procedure is to be used:

- Ground water will be placed directly from the bailer into two 40 ml vials for VOC analyses; and

- Ground water will be placed directly from the bailer into a larger glass jar (greater or equal to one gallon) and will be cleaned in the same manner as the sample bottles. The ground water in the glass jar will then be thoroughly mixed (composited) and poured directly into individual sample bottles.

The split samples will be from select monitoring wells in which the ground water has been analyzed as having less than 1,000 $\mu g/l$ Total Organics (the sum of the organic constituents analyzed), during the previous year of sampling.

5.7 Sampling Completion (Clean-Up, Security, and Well Records)

The area in the vicinity of the well being sampled will be cleaned and the well will be locked and secured before proceeding to the next well. Well Records will be updated at the termination of each sampling event (last sample taken from last well and post sampling procedures complete). The Well Record will contain all pertinent information regarding well integrity, volumes purged, and water level measurements.

6.0 LABORATORY ANALYSIS PLAN

6.1 Introduction

BAT's Part 373 Permit requires ground water monitoring throughout and following the operation of the on-site extraction system. Due to the expected duration of the performance monitoring necessary for the permit, different laboratories may be used during the life of the permits. As such, the laboratory analysis plan presented herein is described in general terms. Individual laboratories will have different QA/QC programs. However, at a minimum, the laboratory performing the ground water analyses will perform the QA/QC specified in this section and within the approved GWMP (Golder Associates, 1993) and QAPP presented in the Off-Site CMI (Golder Associates, 1992). The chosen laboratory will be required to follow the protocols specified in the QAPP. The analytical laboratory chosen to perform the analyses will maintain certifications in the programs necessary for this project. This section describes QA/QC protocols for the ground water analysis.

As stated previously, BAT reserves the right to engage different laboratories at its choosing for completion of analytical work. The chosen laboratory will perform work in accordance with the approved GWMP and QAPP. Therefore, a new laboratory-specific QAPP will not be written unless directed by the NYSDEC. However, any modifications to the QAPP will be submitted to the NYSDEC for approval.

It should also be noted that over the course of time, specific items in the methodologies themselves may change (i.e., MDLs, analytical procedures, and/or requirements may change due to improvements). These items cannot be foreseen and are beyond BAT's control.

6.2 Methodology

Ground water samples will be analyzed using methodologies specified in SW-846 "Test Methods for Evaluating Solid Waste," 3rd Edition (1986), and Update I (1989). VOCs will be analyzed using Method 8240 and Method 8260. During Termination Monitoring semi-volatiles will be analyzed using Method 8270; PCBs will be analyzed using Method 8080; and specific metals will be analyzed using Method 6010 by Inductively Coupled Plasma

or appropriate methods for Graphite Furnace Atomic Absorption. In order to achieve the Ground Water Protection Standards specified in the on-site termination criteria (see Table 2) for semi-volatiles, the laboratory will report the MDLs as opposed to the PQLs, as necessary.

In certain cases, ground water samples may be analyzed using CLP methodologies for specific analytes. The laboratory will use the most current Statements of Work (SOWs) to perform these analyses. The current SOWs are document OLM01.1 (March 1990, revised December 1990) for Organic analyses and document ILM01.0 (March 1990) for inorganic analyses.

6.3 Documentation

Documentation of activities as they pertain to ground water analysis is a critical aspect of laboratory performance. Chain-of-Custody Records for the samples will be maintained by the laboratory. All tasks involved in the preparation and/or analysis of the samples, preparation of standards, calibration procedures, data reduction and reporting procedures, and preventative maintenance procedures will be documented by the laboratory in notebooks or the equivalent. The laboratory will maintain files containing records for method validation studies, performance evaluation studies, internal QC studies, audits, and corrective actions. The data will be accessible to BAT, the NYSDEC, and the USEPA in the event of an audit.

6.4 Laboratory QC

The laboratory contracted to perform the required analyses will have a QA and QC program which conforms to that specified in SW-846 (SW-846, 3rd Edition, 1986, and Update I, 1989). The QA/QC program can be used to evaluate the accuracy and precision of the data measurements in order to assess the data quality. The program also provides information which can be used as an indication of the need for corrective action and as an indication of the effectiveness of corrective action.

The laboratory will analyze QC samples for each analytical batch and at the frequency dictated by the specific methodologies. An analytical batch is a group of environmental

samples of similar composition which are analyzed together with the same method sequence and the same lots of reagents and standards within the same time period or in continuous sequential time periods. For organic analyses, the analytical batch size is usually restricted to 20 environmental samples. The laboratory will provide all QA/QC information in the analytical report for the environmental samples for data evaluation purposes.

6.4.1 Laboratory Blanks

Laboratory (method) blank samples are used to monitor the possible introduction of target analytes into the analytical process. The laboratory blank is an aliquot of reagent-grade (analyte-free) water or solvent which is prepared and analyzed using the same procedures as the environmental samples. The results of the laboratory blanks are used to assess whether the analytical system is "in-control" with regard to possible introduction of contaminants which might lead to the reporting of elevated concentration levels or false positives in the environmental samples.

A laboratory blank will be analyzed with each batch of samples processed. The results of the laboratory blank will be evaluated, as well as other batch QC information, to determine analytical batch acceptability. In the event that laboratory blank results are unacceptable, the analytical batch will be re-prepared and/or re-analyzed.

6.4.2 Reference Standards

In order to generate quality data, it is necessary to assure the purity and traceability of the standard solutions and reagents used in the analytical procedures. Primary reference standards and standard solutions should be obtained from the USEPA repository or other reliable commercial sources. All standards and standard solutions should be documented in a laboratory notebook which identifies the supplier, lot number, purity/concentration, analytes, receipt/preparation date, preparer's name, method of preparation, expiration date, and any other information pertinent to the standard.

6.5 Analytical Spikes

Spiked samples are aliquots of a sample to which predetermined quantities of specific target analytes are added prior to sample preparation and/or analysis. When an aliquot of reagent-grade water is used, the resultant QC check sample is used to evaluate the laboratory's performance of routine analytical procedures. When an aliquot of an environmental sample is used, the resultant MS sample is used to evaluate the effect of the matrix on the accuracy of the analysis as well as the laboratory's performance of routine analytical procedures.

6.5.1 Analyte Spikes

For each analytical batch or for every 20 environmental samples, the laboratory will analyze a MS sample containing the appropriate target analytes specified in the methods. For the organic analyses, the laboratory will also analyze a MSD sample. The MS/MSD recoveries will be compared to the recovery ranges specified in the methods and used to evaluate the effect of the matrix on the accuracy and precision of the analysis.

For each analytical batch or for every 20 environmental samples, the laboratory will analyze a QC check sample containing the appropriate target analytes specified in the methods. The QC check sample recovery criteria specified in the individual methodologies will be used to monitor the laboratory's performance of routine analytical procedures. The laboratory will keep updated records of the accuracy data and develop laboratory acceptance criteria based upon method performance. The QC check sample recoveries will be compared to the laboratory acceptance criteria to determine if the analyses are in-control. If the analyses are determined to be out-of-control, the analysts will take corrective action in order to eliminate procedural errors.

6.5.2 Surrogate Spikes

Surrogates are organic compounds which have similar chemical composition and characteristics (extraction and chromatographic) to the analytes of interest but which are not normally found in environmental samples. These compounds are spiked into all blanks, standards, samples, and spiked samples prior to preparation and/or analysis. Percent recoveries are calculated for each surrogate compound. The surrogate recoveries

are used to monitor the effect of the matrix on the accuracy of the analysis as well as the laboratory's performance of routine analytical procedures. The surrogate compounds to be used and the associated recovery ranges may be found in the individual methodologies. As presented previously, other field QA/QC samples will be required as part of the QA/QC protocol, including trip blanks, equipment blanks (if appropriate), and field blanks.

6.6 Laboratory Reporting

The laboratory will provide the analytical results in hard copy and in digital format on a computer diskette. The laboratory will submit analytical results in accordance with the requirements outlined in BAT's Part 373 Permit. However, consistent with the requirements of the off-site ground water monitoring program, it is understood that the NYSDEC is not requiring BAT, at this time, to submit expanded laboratory QA/QC supporting documentation as detailed in Appendix A of Module III of BAT's Part 373 Permit. In some cases, the laboratory may be required to produce a "CLP-type" data package. This data package will contain all information as outlined above as well as any additional information required by the CLP. In these cases, the analytical data for environmental and QA/QC samples would be evaluated using existing federal and/or regional data validation guidelines developed for the CLP or the specific methodologies (if they exist).

7.0 SUMMARY

This plan contains detailed drawings and construction specifications for the on-site ground water extraction system and the on-site wastewater treatment facility. Also included in this document are monitoring plans, a data collection plan, reporting requirements, and laboratory analytical methodologies and QA/QC requirements.

The on-site remedial system consists of a ground water extraction system to be installed on the BAT facility. Six extraction wells will be installed within the Zone 1 aquifer. Ground water extracted from this zone will be transferred via a double-contained pipeline to an on-site facility for pre-treatment. Treated ground water from the on-site treatment plant will be discharged to an off-site POTW for further treatment. The system has been designed to reduce the concentration of dissolved phase contamination present in the Zone 1 aquifer and hydraulically contain a DNAPL plume present on-site.

Ground water monitoring and data collection plans presented herein will be used to evaluate the effectiveness of the on-site ground water extraction system. Based on the results of the monitoring programs, the system may be adjusted to enhance the overall system performance. Ground water monitoring of the on-site system utilizing wells screened within the overburden, Zone 1, and Zone 3 systems will be evaluated for different sets of contaminants, from different wells, depending on the stage of monitoring being performed during the operation of the system.

The reporting requirements include quarterly reports describing the results of monitoring, pertinent data collected, adjustments made to the system, problems encountered, and general operational activities. An annual report is also required and will include a summary of pertinent data, evaluation of the system, a presentation of the ground water flow rate and direction in the on-site system, and proposed changes to the ground water monitoring plan. Other reporting requirements include reports presenting the performance of the system and a construction certification report documenting construction of the on-site system.

The detailed design packages, together with the various plans and associated reporting and analytical requirements, as presented in this document, constitutes BAT's CMI for the on-site remedial system. Within 30 days of the NYSDEC approval of this on-site CMI, weather permitting, BAT shall commence activity for construction of the on-site remedial system.

GOLDER ASSOCIATES INC.

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Senior Hydrogeologist

William B. Lozier, P.E.
Associate

ALG/WBL:dml

F/N: ONSITE.CMI

REFERENCES

Golder Associates Inc., June 1991a, Volumes I and II, "Final Report, RCRA Facility Investigation, Neutralization Pond, Bell Aerospace Textron, Wheatfield Plant".

Golder Associates Inc., June 1991b, "Final Report, Corrective Measures Study, Bell Aerospace Textron, Wheatfield Plant".

Golder Associates Inc., August 1991c, "Final Report on the Walmore Road Storm Drainage Improvement Project at Bell Aerospace Textron".

Golder Associates Inc., December 1991d, "Final Health and Safety Plan for the Corrective Measures Implementation Plan, Bell Aerospace Wheatfield Plant, Niagara Falls, New York".

Golder Associates Inc., March 1992, "Final Report on Corrective Measures Implementation Plan, Off-Site System, Bell Aerospace Textron, Wheatfield Plant".

Golder Associates Inc., February 1993, "Final Report on Ground Water Monitoring Plan, Bell Aerospace Textron, Wheatfield, New York (February 1993 Revision)".

SW-846, 3rd Edition (1986) and Update I (1989), "Test Methods for Evaluating Solid Waste".

TABLE 1
PERFORMANCE MONITORING
(ON-SITE EXTRACTION AND CONTAINMENT SYSTEM)
BELL AEROSPACE TEXTRON
WHEATFIELD PLANT
NIAGARA FALLS, NEW YORK

FREQUENCY OF GROUND WATER ELEVATION MEASUREMENTS

MONITORING WELL IDENTIFICATION	WELL TYPE	STARTUP 0 - <3 MONTHS	3 MONTHS - <1 YEAR	+1 YEAR
87-01(0)	INT	BIWEEKLY	QUARTERLY	ANNUALLY
87-04(0)	PMW	BIWEEKLY	QUARTERLY	ANNUALLY
87-10(0)	PMW	BIWEEKLY	QUARTERLY	ANNUALLY
87-13(0)	INT	BIWEEKLY	QUARTERLY	ANNUALLY
87-14(0)	INT	BIWEEKLY	QUARTERLY	ANNUALLY
87-15(0)	PMW	BIWEEKLY	QUARTERLY	ANNUALLY
87-22(0)	INT	BIWEEKLY	QUARTERLY	ANNUALLY
89-14(0)	PMW	BIWEEKLY	QUARTERLY	ANNUALLY
B-12(0)	INT	BIWEEKLY	QUARTERLY	ANNUALLY
87-01(1)	PMW	BIWEEKLY	QUARTERLY	ANNUALLY
87-02(1)	INT	BIWEEKLY	QUARTERLY	ANNUALLY
87-04(1)*	INT	HOURLY	DAILY	ANNUALLY
87-05(1)	INT	BIWEEKLY	QUARTERLY	ANNUALLY
87-06(1)	INT	BIWEEKLY	QUARTERLY	ANNUALLY
87-08(1)	INT	BIWEEKLY	QUARTERLY	ANNUALLY
87-10(1)	INT	BIWEEKLY	QUARTERLY	ANNUALLY
87-12(1)	INT	BIWEEKLY	QUARTERLY	ANNUALLY
87-13(1)	INT	BIWEEKLY	QUARTERLY	ANNUALLY
87-14(1)	INT	BIWEEKLY	QUARTERLY	ANNUALLY

DW = DNAPL Extraction Well
INT = Internal (Dissolved Phase) Plume Monitoring Well
PMW = Perimeter (Dissolved Phase) Plume Monitoring Well
SUPP = Dissolved Phase Extraction Well

* Water level data will be monitored with automated datalogger for one year period following start-up of system.

** DNAPL Extraction Wells will also be monitored for presence of DNAPL quarterly for first two years and then annually thereafter. However, this schedule is subject to change based on field conditions.

F/N: TABLE1.WK1

TABLE 1
PERFORMANCE MONITORING
(ON-SITE EXTRACTION AND CONTAINMENT SYSTEM)
BELL AEROSPACE TEXTRON
WHEATFIELD PLANT
NIAGARA FALLS, NEW YORK

FREQUENCY OF GROUND WATER ELEVATION MEASUREMENTS

MONITORING WELL IDENTIFICATION	WELL TYPE	STARTUP 0 - <3 MONTHS	3 MONTHS - <1 YEAR	+1 YEAR
87-15(1)	INT	BIWEEKLY	QUARTERLY	ANNUALLY
87-17(1)	INT	BIWEEKLY	QUARTERLY	ANNUALLY
87-18(1)	INT	BIWEEKLY	QUARTERLY	ANNUALLY
87-22(1)	INT	BIWEEKLY	QUARTERLY	ANNUALLY
87-23(1)	PMW	BIWEEKLY	QUARTERLY	ANNUALLY
89-02(1)	INT	BIWEEKLY	QUARTERLY	ANNUALLY
89-12(1)	INT	BIWEEKLY	QUARTERLY	ANNUALLY
89-14(1)	PMW	BIWEEKLY	QUARTERLY	ANNUALLY
89-15(1)	INT	BIWEEKLY	QUARTERLY	ANNUALLY
B-13(1)	INT	BIWEEKLY	QUARTERLY	ANNUALLY
B-14(1)	INT	BIWEEKLY	QUARTERLY	ANNUALLY
87-02(3)	PMW	BIWEEKLY	QUARTERLY	ANNUALLY
87-04(3)	INT	BIWEEKLY	QUARTERLY	ANNUALLY
87-05(3)	INT	BIWEEKLY	QUARTERLY	ANNUALLY
87-13(3)	INT	BIWEEKLY	QUARTERLY	ANNUALLY
87-14(3)	INT	BIWEEKLY	QUARTERLY	ANNUALLY
87-15(3)	PMW	BIWEEKLY	QUARTERLY	ANNUALLY
87-16(3B)	INT	BIWEEKLY	QUARTERLY	ANNUALLY
89-02(3)	PMW	BIWEEKLY	QUARTERLY	ANNUALLY

DW = DNAPL Extraction Well
INT = Internal (Dissolved Phase) Plume Monitoring Well
PMW = Perimeter (Dissolved Phase) Plume Monitoring Well
SUPP = Dissolved Phase Extraction Well

* Water level data will be monitored with automated datalogger for one year period following start-up of system.

** DNAPL Extraction Wells will also be monitored for presence of DNAPL quarterly for first two years and then annually thereafter. However, this schedule is subject to change based on field conditions.

F/N: TABLE1.WK1

TABLE 1
PERFORMANCE MONITORING
(ON-SITE EXTRACTION AND CONTAINMENT SYSTEM)
BELL AEROSPACE TEXTRON
WHEATFIELD PLANT
NIAGARA FALLS, NEW YORK

FREQUENCY OF GROUND WATER ELEVATION MEASUREMENTS

MONITORING WELL IDENTIFICATION	WELL TYPE	STARTUP 0 - <3 MONTHS *	3 MONTHS - <1 YEAR	+1 YEAR
DW-9**	DW	BIWEEKLY	QUARTERLY	QUARTERLY
DW-10**	DW	BIWEEKLY	QUARTERLY	QUARTERLY
DW-11**	DW	BIWEEKLY	QUARTERLY	QUARTERLY
DW-12**	DW	BIWEEKLY	QUARTERLY	QUARTERLY
EW-7	SUPP	BIWEEKLY	QUARTERLY	ANNUALLY
EW-8	SUPP	BIWEEKLY	QUARTERLY	ANNUALLY

DW = DNAPL Extraction Well
INT = Internal (Dissolved Phase) Plume Monitoring Well
PMW = Perimeter (Dissolved Phase) Plume Monitoring Well
SUPP = Dissolved Phase Extraction Well

* Water level data will be monitored with automated datalogger for one year period following start-up of system.

** DNAPL Extraction Wells will also be monitored for presence of DNAPL quarterly for first two years and then annually thereafter. However, this schedule is subject to change based on field conditions.

F/N: TABLE1.WK1

TABLE 2
PERFORMANCE MONITORING PROGRAM
(ON-SITE EXTRACTION SYSTEM)
BELL AEROSPACE TEXTRON
WHEATFIELD PLANT
NIAGARA FALLS, NEW YORK

ANALYTES OF CONCERN - VOLATILE ORGANIC COMPOUNDS

PARAMETER	UNITS	CAS NUMBER	NYSDEC GROUND WATER PROTECTION STANDARD	FEDERAL MCLs	METHODOLOGY	
					8260 ** PUBLISHED MDL	8240 PQL
VOLATILE ORGANIC COMPOUNDS						
Methylene Chloride	µg/l	75-09-2	5.0	---	0.03	5
Trichloroethylene (TCE)	µg/l	79-01-6	5.0	5.0	0.19	5
1,1,1-Trichloroethane	µg/l	71-55-6	5.0	200.0	0.08	5
Acetone	µg/l	67-64-1	5.0	---	--- *	100
1,2-Dichloroethylene (DCE)	µg/l	540-59-0	---	---	---	---
cis-1,2-Dichloroethylene	µg/l	156-59-4	---	70	0.12	---
trans-1,2-Dichloroethylene	µg/l	156-60-5	5.0	100	0.06	5
Vinyl Chloride	µg/l	75-01-4	2.0	2.0	0.17	10
Carbon Disulfide	µg/l	75-15-0	50	---	--- *	5
1,1-Dichloroethylene (DCE)	µg/l	75-35-4	5.0	7.0	0.12	5
1,1-Dichloroethane	µg/l	75-34-3	5.0	---	0.04	5
Xylene (total)	µg/l	1330-20-7	5.0	10000	---	5
1,2-Xylene	µg/l	95-47-6	5.0	---	0.11	---
1,3-Xylene	µg/l	108-38-3	5.0	---	0.05	---
1,4-Xylene	µg/l	106-42-3	5.0	---	0.13	---
Chloroform	µg/l	67-66-3	50	100 ***	0.03	5
Toluene	µg/l	108-88-3	5.0	1000	0.11	5
Benzene	µg/l	71-43-2	0.7	5.0	0.04	5
Ethylbenzene	µg/l	100-41-4	5.0	700	0.06	5
Trichlorofluoromethane	µg/l	75-69-4	5.0	---	0.08	--- *
Chloromethane	µg/l	74-87-3	5.0	---	0.13	10
Tetrachloroethylene	µg/l	127-18-4	5.0	5.0	0.14	5
2-Hexanone	µg/l	591-78-6	---	---	--- *	50

NOTES:

* Additional compound to published list.
** Method 8260 PQL is 1 ug/l for compounds listed in method; may not be achievable by all laboratories.
*** Total Trihalomethane MCL = 100 ug/l.
--- No standard or not available.
IND MDL not determined.
MCL Maximum Contaminant Level – Drinking water standards currently in effect and/or finalized 01/30/91 (FR 3526).
MDL Method Detection Limit as published in method; may not be achievable by all laboratories.
ND Not detected using the approved methodology.
PQL Practical Quantitation Limit
8240 and 8260 are GC/MS methods for volatile organics published in EPA document "Test Methods for Evaluating Solid Waste," (SW-846) 3rd Edition (1986), Update 1 (1989).

F/N: TABLE2-1.WK1

TABLE 2
(CONT'D)
PERFORMANCE MONITORING PROGRAM
(ON-SITE EXTRACTION SYSTEM)
BELL AEROSPACE TEXTRON
WHEATFIELD PLANT
NIAGARA FALLS, NEW YORK

ANALYTES OF CONCERN - SEMI-VOLATILE ORGANIC COMPOUNDS

PARAMETER	UNITS	CAS NUMBER	NYSDEC GROUND WATER PROTECTION STANDARD	METHODOLOGY	
				FEDERAL MCLs	8270 PQL
SEMIVOLATILE ORGANICS					
Acid Extractable:					
2,3,4,6-Tetrachlorophenol	µg/l	58-90-2	50	---	--- *
2,4-Dimethylphenol	µg/l	105-67-9	50	---	10
2-Chlorophenol	µg/l	95-57-8	5.0	---	10
Phenol	µg/l	108-95-2	50	---	10
Base Neutral Extractable:					
1,2,4,5-Tetrachlorobenzene	µg/l	95-94-3	5.0	---	--- *
Naphthalene	µg/l	91-20-3	50	---	10
Di-n-octyl phthalate	µg/l	117-84-0	50	---	10
o-Dichlorobenzene	µg/l	95-50-1	4.7	600	10
p-Dichlorobenzene	µg/l	106-46-7	4.7	75	10
Anthracene	µg/l	120-12-7	50	---	10
Benzo (a) anthracene	µg/l	56-55-3	ND	---	10
Benzo (b) fluoroanthene	µg/l	205-99-2	20	---	10
Benzo (a) pyrene	µg/l	50-32-8	ND	---	10
bis (2-Ethyl hexyl) phthalate	µg/l	117-81-7	50	---	10
Chrysene	µg/l	218-01-9	0.2	---	10
Acenaphthene	µg/l	83-32-9	50	---	10
Acenaphthylene	µg/l	208-96-8	50	---	10
Benzo (ghi) perylene	µg/l	191-24-2	50	---	10
Fluorene	µg/l	86-73-7	50	---	10
Phenanthrene	µg/l	85-01-8	50	---	10
Pyrene	µg/l	129-00-0	50	---	10
Di-n-butyl phthalate	µg/l	84-74-2	50	---	10
Fluoranthene	µg/l	206-44-0	50	---	10
4-Nitroquinoline-1-oxide	µg/l	56-57-5	5.0	---	---
Methapyriline	µg/l	91-80-5	50	---	---
Indeno (1,2,3-cd) pyrene	µg/l	193-39-5	0.4	---	10
1,2,4-Trichlorobenzene	µg/l	120-82-1	6.0	---	10
2-Methylnaphthalene	µg/l	91-57-6	50	---	10

NOTES:

* Additional compound to published list.
--- Not available.
MCL Maximum Contaminant Level - Drinking water standards currently in effect and/or finalized 01/30/91 (FR 3526).
MDL Method Detection Limit as published in method; may not be achievable by all laboratories.
ND Not detected using the approved methodology.
PQL Practical Quantitation Limit
8270 is a GC/MS method for semivolatile organics published in EPA document "Test Methods for Evaluating Solid Waste," (SW-846), 3rd Edition (1986), Update 1 (1989).

F/N: TABLE2-2.WK1

TABLE 2
(CONT'D)
PERFORMANCE MONITORING SYSTEM
(ON-SITE EXTRACTION SYSTEM)
BELL AEROSPACE TEXTRON
WHEATFIELD PLANT
NIAGARA FALLS, NEW YORK

ANALYTES OF CONCERN - PESTICIDES, PCBs, AND INORGANIC COMPOUNDS

PARAMETER	UNITS	CAS NUMBER	NYSDEC GROUND WATER PROTECTION STANDARD	FEDERAL MCLs	METHODOLOGY 8080 PUBLISHED MDL
Pesticides and PCBs					
PCB-1254	µg/l	11097-69-1	100 **	0.5 **	IND
PCB-1260	µg/l	11097-82-5	100 **	0.5 **	IND

PARAMETER	UNITS	CAS NUMBER	NYSDEC GROUND WATER PROTECTION STANDARD	FEDERAL MCLs	METHODOLOGY FURNACE AA EST. DL
Inorganics					
Arsenic	µg/l	7440-38-2	25	50	1
Barium	µg/l	7440-39-3	1000	2000	2
Cadmium	µg/l	7440-43-9	5.0	5.0	2
Chromium	µg/l	7440-47-3	50	100	2
Lead	µg/l	7439-92-1	25	50	3
Nickel	µg/l	7440-02-0	100	100	2
Selenium	µg/l	7782-49-2	10	50	4
Vanadium	µg/l	7440-62-2	250	---	2
Zinc	µg/l	7440-66-6	300	5000 ***	2

NOTES:

* Additional compound to published list.
** Total PCB concentration cannot exceed this value.
*** Value is the Secondary Maximum Contaminant Level (SMCL) – Drinking water standards currently in effect.
--- Not available.
Furnace AA Estimated Detection Limits (DL) are published in the methodologies as guidance.
ICP Estimated Detection Limits (DL) are published in the methodologies as guidance.
IND MDL not determined
MCL Maximum Contaminant Level – Drinking water standards currently in effect and/or finalized 01/30/91 (FR 3526).
MDL Method Detection Limit as published in method; may not be achievable by all laboratories.
(1) The arsenic value pertains to EPA method 206.2 and SW-846 method 7060.
(2) Values pertain to EPA method 200.7 and SW-846 method 6010 for analysis of metals by Inductively Coupled Plasma.
(3) The Lead value pertains to EPA method 239.2 and SW-846 method 7421.
(4) The Selenium value pertains to EPA method 270.2 and SW-846 method 7740.

F/N: TABLE2-3.WK1

TABLE 3
PERFORMANCE MONITORING WELLS
(ON-SITE EXTRACTION SYSTEM)
BELL AEROSPACE TEXTRON
WHEATFIELD PLANT
NIAGARA FALLS, NEW YORK

EFFECTIVENESS MONITORING PROGRAM

MONITORING WELL IDENTIFICATION	WELL TYPE	FREQUENCY			METHODOLOGY *		
		Q (Quarterly)	QM (Varies)	A (Annual)	INITIAL	EVENTUAL	PRIOR TO TERMINATION
87-01(0)	INT			X	8260	8260	CLP
87-10(0)	PMW			X	8260	8260	CLP
87-14(0)	INT			X	8260	8260	CLP
87-22(0)	PMW			X	8260	8260	CLP
89-14(0)	PMW			X	8260	8260	CLP
87-01(1)	PMW			X	8240	8260	CLP
87-02(1)	INT		X		8240	8260	CLP
87-04(1)	INT		X		8240	8260	CLP
87-08(1)	INT		X		8240	8260	CLP
87-12(1)	INT		X		8240	8260	CLP
87-15(1)	INT		X		8240	8260	CLP
87-17(1)	INT		X		8240	8260	CLP
87-18(1)	INT		X		8240	8260	CLP
87-22(1)	INT		X		8240	8260	CLP
89-02(1)	INT		X		8240	8260	CLP
89-14(1)	PMW			X	8240	8260	CLP
B-14(1)	INT		X		8240	8260	CLP
87-02(3)	INT		X		8260	8260	CLP
87-13(3)	INT		X		8260	8260	CLP
89-02(3)	PMW		X		8260	8260	CLP

NOTES:

DW DNAPL Extraction Wells
INT Internal Dissolved Phase Plume Monitoring Well
PMW Perimeter Dissolved Phase Plume Monitoring Well
SUPP Dissolved Phase Ground Water Extraction Well

PROGRAMS:

Q Quarterly Program (4 times per year)
QM Quarterly Modified (monitored quarterly for 2 years and then annually thereafter
A Annual Program (Once per year)

METHODOLOGY:

8240 – SW846 3rd Edition
8260 – SW846 3rd Edition
CLP Contract Laboratory Protocol (in existence at time of termination).
NA Not applicable to these wells

* Method 8240 and Method 8260 will be used at the onset of the Effectiveness Monitoring Program. As concentrations of constituents decrease within the dissolved phase plume, Method 8260 will be used due to lower method detection limits. Prior to initiation of Termination Monitoring, CLP methodology will be used to verify that Effectiveness Monitoring requirements have been met and Termination Monitoring is to be instituted. (See text for further explanation.)

F/N: TABLE3 WK1

TABLE 3
PERFORMANCE MONITORING WELLS
(ON-SITE EXTRACTION SYSTEM)
BELL AEROSPACE TEXTRON
WHEATFIELD PLANT
NIAGARA FALLS, NEW YORK

EFFECTIVENESS MONITORING PROGRAM

MONITORING WELL IDENTIFICATION	WELL TYPE	FREQUENCY			METHODOLOGY *		
		Q (Quarterly)	QM (Varies)	A (Annual)	INITIAL	EVENTUAL	PRIOR TO TERMINATION
DW-9	DW			X	8240	NA	NA
DW-10	DW			X	8240	NA	NA
DW-11	DW			X	8240	NA	NA
DW-12	DW			X	8240	NA	NA
EW-7	SUPP	X			8240	8260	CLP
EW-8	SUPP	X			8240	8260	CLP

NOTES:

DW DNAPL Extraction Wells
INT Internal Dissolved Phase Plume Monitoring Well
PMW Perimeter Dissolved Phase Plume Monitoring Well
SUPP Dissolved Phase Ground Water Extraction Well

PROGRAMS:

Q Quarterly Program (4 times per year)
QM Quarterly Modified (monitored quarterly for 2 years and then annually thereafter
A Annual Program (Once per year)

METHODOLOGY:

8240 - SW846 3rd Edition
8260 - SW846 3rd Edition
CLP Contract Laboratory Protocol (in existence at time of termination).
NA Not applicable to these wells

* Method 8240 and Method 8260 will be used at the onset of the Effectiveness Monitoring Program. As concentrations of constituents decrease within the dissolved phase plume, Method 8260 will be used due to lower method detection limits. Prior to initiation of Termination Monitoring, CLP methodology will be used to verify that Effectiveness Monitoring requirements have been met and Termination Monitoring is to be instituted. (See text for further explanation.)

F/N: TABLE3 WK1

TABLE 4
PERFORMANCE MONITORING WELLS
(ON-SITE EXTRACTION SYSTEM)
BELL AEROSPACE TEXTRON
WHEATFIELD PLANT
NIAGARA FALLS, NEW YORK

CONCEPTUAL TERMINATION MONITORING PROGRAM

EXTRACTION WELL I.D.	PREDICTED TERMINATION MONITORING WELL(S) *	WELL TYPE	FREQUENCY (TOTAL OF EIGHT QUARTERS)		METHODOLOGY	
			Q (Quarterly)	A (Annual)	Q (Quarterly)	A (Annual)
EW-7	87-18(1)	INT	X	X	8260	8260, 8270, 8080, ING
	EW-8	SUPP	X	X	8260	8260, 8270, 8080, ING
	87-12(1)	INT	X	X	8260	8260, 8270, 8080, ING
EW-8	87-12(1)	INT	X	X	8260	8260, 8270, 8080, ING
	87-18(1)	INT	X	X	8260	8260, 8270, 8080, ING
	89-02(1)	INT	X	X	8260	8260, 8270, 8080, ING
	89-02(3)	PMW	X	X	8260	8260, 8270, 8080, ING

NOTES:

INT Internal Dissolved Phase Plume Monitoring Well
PMW Perimeter Dissolved Phase Plume Monitoring Well
SUPP Dissolved Phase Ground Water Extraction Well
* Predicted well identification will monitor termination criteria.

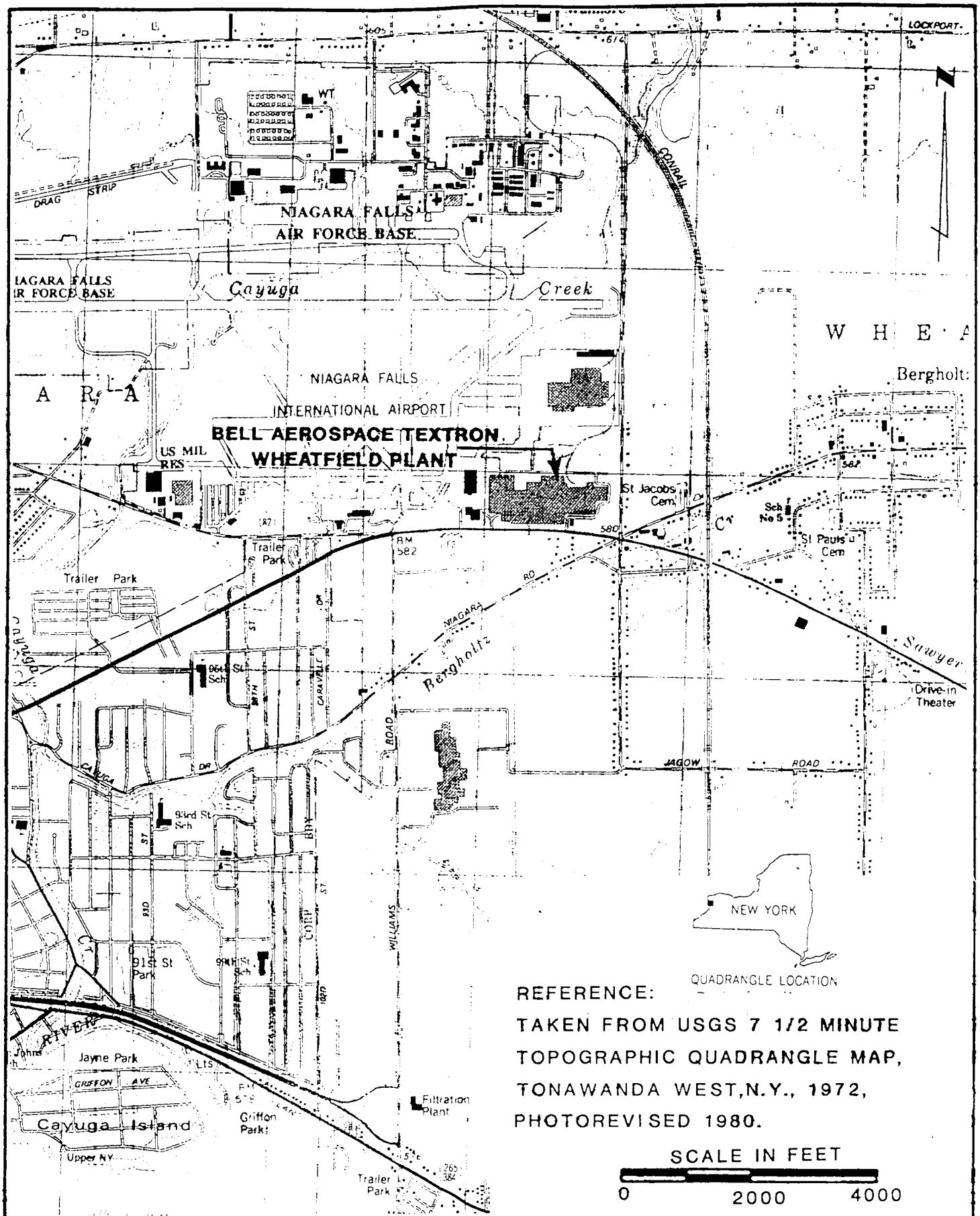
PROGRAMS:

Q Quarterly Program (3 times per year)
A Annual Program (Once per year)

METHODOLOGY:

8260 - SW846 3rd Edition (low level concentration method)
8270 - SW846 3rd Edition
8080 - SW846 3rd Edition
ING Inorganic parameters (SW846 3rd Edition)
(See Table 2 for parameters)

F/N: TABLE4.WK1



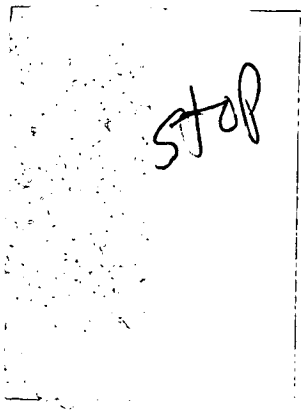
REFERENCE:
TAKEN FROM USGS 7 1/2 MINUTE TOPOGRAPHIC QUADRANGLE MAP, TONAWANDA WEST,N.Y., 1972, PHOTOREVISED 1980.

SCALE IN FEET
0 2000 4000

JOB No.: 914-1014	SCALE: AS SHOWN	SITE LOCATION MAP	
DRAWN: EAH	DATE: 8/20/91		
CHECKED: ALD	DWG. No.: 8		
Golder Associates		BELL AEROSPACE TEXTRON	FIGURE 1

158698

BUF/FILE # 9141014


STOP

APPENDIX A

STANDARD OPERATING PROCEDURES

TABLE OF CONTENTS

1.0 STANDARD OPERATING PROCEDURE FOR THE INITIAL DECONTAMINATION OF DEDICATED BAILERS

The following is the decontamination procedure for the bailers that will be used as dedicated sampling equipment at the Bell Aerospace Textron (BAT) facility.

- Wear disposable gloves (e.g. latex) while cleaning bailer to avoid contamination and change gloves as needed;
- Prepare a non-phosphate, laboratory grade detergent solution with potable water in a bucket;
- Disassemble bailer (if applicable) and scrub each part with the detergent solution using a brush;
- Rinse bailer with potable water;
- Rinse bailer with distilled or deionized water and reassemble bailer;
- Rinse bailer with distilled or deionized water;
- Rinse bailer with methanol (to remove volatile organic compounds);
- Allow bailer to air dry;
- Rinse with distilled or deionized water;
- Wrap bailer in aluminum foil (non-coated side against bailer) and then place bailer in dedicated plastic sheath; and
- Collect all cleaning solutions and rinse water in a container for proper disposal.

Dedicated bailers will be used, therefore, this decontamination procedure should be used only before the initial use of the bailer. Prior to a sampling event, rinse the bailer with distilled or deionized water and collect all rinsate in a container for disposition. The bailers will be stored on-site at the BAT facility.

2.0 STANDARD OPERATING PROCEDURE FOR SAMPLING GROUND WATER MONITORING WELLS

2.1 Materials and Equipment

The following items may be required for monitoring well sampling and data collection:

- Appropriate bailer(s) (i.e. constructed of stainless steel or Teflon® materials);
- Nonabsorbent cord (e.g., polypropylene);
- Premeasured plastic bucket(s);
- Plastic sheeting;
- Water level indicator (i.e. M-scope, electronic water level indicator);
- Tape measure (steel - tenth of a foot measurement increments) and chalk;
- Pen knife;
- Field forms/field notebook;
- Well location map;
- Pump and associated materials such as:
  1. Teflon tape;
  2. Appropriate tubing (e.g. polyethylene) if using peristaltic pump; and
  3. Portable generator if using peristaltic pump.
- Calculator;
- Hard hat (if required on location);
- pH meter;
- Conductivity meter;
- Buffer/calibration solutions;
- Thermometer;
- Paper towels, clean rags;
- Black pen and pencil;
- Wet ice and/or blue packs;
- Sample jars, codes, and labels;
- Electrical tape;
- Pipe wrench;
- Screwdriver, hammer;
- Cooler(s);
- Water jugs;
- Disposable gloves;
- Well keys;
- Masking and packing tape;
- Water-proof marker;
- Well sampling form(s);
- Non-phosphate, laboratory-grade detergent;
- Distilled/deionized water;
- Chain-of-Custody form(s);
- Custody seal(s); and,
- Extra batteries (meters, thermometer).

2.2 Procedure

- Daily sampling activities shall be documented in the field notebook;
- All non-dedicated sampling equipment shall be decontaminated before use, with the exception of new precleaned equipment.
- Document well identification and presampling information in the field notebook as needed;
- Inspect the protective casing of the well and note any items of concern such as a missing lock or bent casing;
- Place plastic sheeting around the well to protect sampling equipment from potential contamination;

For Monitoring Wells/Extraction Wells

- Refer to Section 5.0 of this document.

3.0 STANDARD OPERATING PROCEDURE FOR MEASURING WATER TEMPERATURE

3.1 Calibration

- Calibration of thermometers will be performed before entering the field and checked upon return to the office;

- Thermometers will be calibrated against a National Bureau of Standards (NBS) - traceable thermometer;

- The thermometer must read within 1-degree to 1.5-degrees centigrade of the NBS - traceable thermometer. If the thermometer does not read within this range and the thermometer cannot be calibrated, then it will not be used for temperature measurements and will be disposed of in an appropriate manner. If the thermometer does not read within this range and the thermometer can be calibrated, then the thermometer will be calibrated to the NBS - traceable thermometer; and

- The following information is documented in the calibration logbook at the time of calibration:

  a. Date
  b. Thermometer Identification
  c. Initials
  d. Calibration Data.

3.2 Procedure

- The thermometer is immersed in water until the temperature equilibrates. The temperature is read in Celsius; and

- Temperature data are recorded in the field notebook, initialed (of the sampler) and dated.

NOTE: Temperature measurement must be made within 15 minutes of obtaining the sample.

4.0 STANDARD OPERATING PROCEDURE FOR MEASURING THE pH OF WATER SAMPLES

4.1 Calibration

- Calibration of the pH meter is to be performed prior to its use each day at the end of the day, and at least every four hours;

- Recalibration must occur if:

  a. The pH of the samples being measured is outside the previous calibration range; or

  b. The battery is replaced.

- Two buffer calibrations bracketing the expected pH range of samples are to be performed prior to the meters use each day. Three pH buffers (4.0, 7.0, and 10.0) are read after standardization at pH of 7.0 to evaluate the linearity and electrodes. The samples and buffers are to be measured at the same temperature; and

- The following information is documented in the calibration logbook at the time of calibration:

  a. Date;
  b. pH meter identification;
  c. Initials (of the sampler); and
  d. Calibration results using pH standards.

4.2 Procedure

- The pH electrode must be kept moist;

- The electrodes must be carefully rinsed with deionized water before each measurement;

- Follow manufacturer's operating instructions;

- The pH readings are documented in the field notebook, initialed (of the sampler) and dated;

- The electrodes are rinsed with deionized/distilled water and the unit stored properly. The electrodes are not to be stored in tap water or deionized/distilled water.

NOTE: pH measurement must be made within 15 minutes of obtaining the sample.

5.0 STANDARD OPERATING PROCEDURE FOR MEASURING THE CONDUCTIVITY OF WATER SAMPLES

5.1 Calibration

- Calibration is in accordance with the manufacturer's specific directions, and the following information is documented in the calibration logbook:

  a. Date;
  b. Conductivity meter identification;
  c. Calibration results; and
  d. Initials (of the sampler).

- Calibration is performed at the beginning and end of the day, and at least every four hours.

5.2 Procedure

- The probe is immersed in a water sample until the meter equilibrates;

- In reading the conductivity meter scale, one or more of the following may have to be considered:

  a. The reading may have to be multiplied appropriately (e.g., the reading is expressed in x1, x10, x100 scales);

  b. If the conductivity meter is not capable of compensating for temperature differences, then note that the conductance measurements are not temperature compensated and document the temperatures of the standards and samples; and

  c. If the conductivity meter can be compensated for temperature, then adjust the temperature control before reading the conductance measurement.

- Conductivity measurements and any other relevant information are recorded in the field notebook, initialed (of the sampler) and dated.

NOTE: Conductivity measurement must be made within 15 minutes of obtaining the sample.

6.0 STANDARD OPERATING PROCEDURE FOR MEASURING WATER LEVELS USING AN ELECTRONIC WATER LEVEL METER

6.1 Procedure

- The probe of the water level meter must be precleaned (decontaminated) using a non-phosphate, laboratory-grade solution and distilled/deionized water before use. The wire should be rinsed with distilled water;

- The manufacturer's model should be noted because some have switches, lights, beepers, or a combination of the above. If a test switch is available, test the light or beeper prior to use;

- The water-level measurement is taken by lowering the probe into the well until the instrument-specific detection method (e.g., light, beeper, or both) is activated by contacting the water. Avoid lowering the probe below the water surface;

- Measurements will be taken accurately and to the nearest 0.01 foot to the top of the inner casing; and

- The depth to water from the measuring point (top of the inner casing), the elevation of the outer protective casing and inner well casing, will be documented in the field notebook and initialed and dated.

F/N: APPENDIX.A

APPENDIX B

ON-SITE GROUND WATER EXTRACTION SYSTEM DESIGN AND SPECIFICATIONS

TABLE OF CONTENTS

1.0 GENERAL

These specifications and accompanying drawings are intended to cover the provisions of all labor, material, and equipment necessary for construction of the On-Site Ground Water Extraction System for Bell Aerospace Textron (Owner). Any reference to a specific manufacturer is to establish a standard of quality. Substitution of equipment of equal or better quality is acceptable, following Owner or Owner's Representative approval. It is the Contractor's responsibility to coordinate, adjust, and install the equipment and materials in accordance with the manufacturer's recommendations, in accordance with the intent of the design, and in accordance with workmanlike practices which includes notification of and coordination with the other trades on the project.

It is the intent and purpose of these specifications and accompanying drawings to cover and include all materials, machinery, apparatus, and labor necessary to properly install, equip, adjust, and place into perfect operation the respective portions of the installation and to so interconnect the various items or sections of the work as to form a complete and properly operating system. Any equipment, apparatus, machinery, material, small items not mentioned in detail, and labor not specifically mentioned which may be found necessary to complete any portion of the installation in a substantial manner, and in compliance with these requirements, implied or intended in these specifications shall be the responsibility of the Contractor. This shall include all materials, devices, or methods peculiar to the machinery, equipment, apparatus, or systems furnished and installed by the selected Contractor(s).

The Contractor shall obtain all necessary permits or licenses, arrange for and perform all tests on any or all parts of his work, as may be required by State and/or local authorities. Each trade shall perform their work in strict compliance with applicable laws, regulations and codes, including those of the Federal, State or Municipal; National Fire Protection Agency; BOCA, Occupational Safety and Health Administration (OSHA), and any other authority having jurisdiction. Four copies of all certificates and permits shall be submitted to the Owner or Owner's Representative. All the associated fees for the above shall be paid by the Contractor and shall not be the responsibility of the Owner.

2.0 STANDARD CLAUSES AND CODES

- All Contractors shall work in conjunction with each of the other trades to facilitate proper execution of work and with minimum of interference. Each Contractor shall carefully examine all drawings and shall be responsible for the proper fitting of all material and equipment as planned and without interference with other piping or equipment. Proper judgment shall be exercised to secure reasonable space conditions throughout, to provide adequate arrangements for piping and conduit, and to overcome all local difficulties and interference to best advantage. Approval of any and all changes to plans and specifications shall be obtained from the Owner or Owner's Representative before proceeding. Each Contractor should carefully examine the specifications and drawings, visit the site and fully inform themselves as to all existing conditions and limitations to be met;

- Should any discrepancies occur between the existing conditions and the drawings and specifications, they shall be reported immediately to the Owner or Owner's Representative for clarification;

- Each Contractor shall be responsible for delivery of their equipment and shall unload and store same in a manner not to interfere with operations of other trades;

- All work shall be completed in an approved first class workmanlike manner and shall conform to the standard construction practices;

- Before ordering any material or doing any work each trade shall verify all measurements at the site and shall be responsible for correctness of same. Any difference which may be found shall be submitted to Owner or Owner's Representative for consideration before proceeding any further with the work; and

- All trades shall layout work and establish heights and grades for all lines and equipment in strict accordance with the intent expressed by the drawings and all the physical conditions and shall be responsible for the accuracy of the same.

Physical Test Methods - American Society for Testing and Materials (ASTM) Standards

- D-422 Method for Particle-Size Analysis of Soils;
- D-2922 Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depths);
- D-4253 Standard Test Methods for Maximum Index Density of Soils Using a Vibratory Table; and
- D-4254 Standard Test Methods for Minimum Index Density of Soils and Calculation of Relative Density.

3.0 SUBMITTALS AND TESTING

Submittals

All submittals, unless otherwise indicated, shall be provided by the Contractor to the Owner.

- An estimated schedule for construction to be submitted with the Bid;
- To be submitted prior to construction:
  - A Health and Safety Plan prepared for use during construction; and
  - Shop Drawings and Manufacturer's data sheets on all equipment, materials, and construction configurations and diagramatics. A total of ten copies of each Shop Drawing and Manufacturer's data sheets shall be submitted to the Owner's Representative. The Contractor must receive approval of shop drawings prior to ordering, storing, or installing any equipment or material. The Contractor proceeds at his own risk when securing equipment or materials without prior approval;
- Weekly progress reports to include:
  - Items completed and associated quantities;
  - Construction schedule update;
  - Observations made during construction; and
  - Problems encountered.

Testing

The Owner's Representative will obtain the following samples and perform analyses prior to trench backfilling operations:

- One sample of New York State Department of Transportation (NYSDOT) #1A stone delivered to the site following ASTM D-422 to obtain particle size distribution; and
- One sample of NYSDOT #1A stone delivered to the site following ASTM D-4253 and ASTM D-4254 to obtain maximum and minimum index density.

The Owner's Representative will obtain the following samples and perform analyses during trench backfilling operations:

- One sample of NYSDOT #1A stone per five truckloads delivered to the site following ASTM D-422 to obtain particle size distribution.

The Owner's Representative will perform field testing on the NYSDOT #1A stone backfill to ensure the Compaction Specifications are met following ASTM D-2922 or other method as approved by the Owner's Representative at the frequency of at least one test per 50 feet.

The Contractor shall pressure test the entire pipeline (containment and carrier pipe) after installation according to the following procedure:

- All carrier piping shall be tested to a pressure of 50 psi or 1½ times the operating pressure, whichever is greater, for a period of 24 hours. All containment piping shall be tested at 10 psi with dry air or nitrogen. Wet the joints with Snoop or a liquid soap solution for a visual check for leaks should leaks develop in any part of the piping systems. These defective sections, fittings, etc., must be removed and replaced. After proper air testing, the carrier piping shall be filled with water, voided of any air, and pressure tested at 150 psi.

4.0 PRODUCT STANDARDS

4.1 Materials and Equipment

All materials and equipment installed by the employed trades shall be new and shall conform to the grade, quality, and standards specified herein. All material and equipment offered under these specifications shall be limited to products regularly produced and recommended by the manufacturer for the service intended. This material and equipment shall have capacities and ratings sufficient to amply meet the requirements of the project. The capacities and ratings shall be in accordance with those published by the manufacturer and be in accordance with engineering data or other comprehensive literature made available to the public by the manufacturer and in effect at the time of ordering. Equipment shall be installed in strict accordance with manufacturer's instructions for type and capacity of each piece of equipment used. The effected trade shall obtain instructions from the manufacturer, and these instructions shall be considered part of these specifications. Outlined below are the primary items considered crucial to the construction of the system. Miscellaneous items not specifically specified shall be of a type suitable to operate satisfactorily for the purpose for which it is intended within the system. No experimental material or equipment shall be permitted.

4.2 System Description

4.2.1 Overview

This system from a control standpoint consists of the local operation of six submersible well pumps in vaults buried below ground surface. The operation is monitored using an RTU communication unit to an existing site monitoring computer. This computer monitors process data such as flows and level in real time for data logging, trending, and alarming. A common alarm output from the computer is transmitted to an on-site guard shack.

4.2.2 Detail

Per the design concept, the operation is as follows:

At the well vault control panel, the well level (hydraulic depth) is displayed and the indicating level controller controls the operation of the well pump. For example, the

operator set points determine the start and stop points for the pump and the high and low level alarms.

For example:

560′	High Water Alarm
558′	Pump ON
553′	Pump OFF
548′	Low Water Alarm
546′	Bottom Sensor Elevation

NOTE: Full range of sensor is fixed at 15 psi (34.5 feet).

At the well vault panel, the pump can also be controlled by an Automatic/Off/Hand selector switch. Also, at each well vault panel, the flow rate is displayed and totalized.

Per the design concept, the operation is as follows:

The RTU communication unit transmits the following data in real time continuously to an existing on-site computer monitor:

Analog:
Pump flow rate (0-7 GPM) each well
Well level depth from datum (0-32.0 ft.)
[maximum is full range]

Discrete alarms:
Leak Detect #1 Circuit N.C. and #2 Circuit N.C.
Pump Overload N.C., each well
Well Low Water Alarm, each well
Well High Water Alarm, each well

NOTE: The elevation settings for start and stop points for the pump and the high and low level alarms for each well will be established by the Owner's Representative after the extraction wells are installed.

The existing computer monitor will continuously monitor the above data in real time. This information is displayed in standard Molygraphics template formats for ease of operator use. Flows and levels are displayed in real time bar graphs, trend lines, and data logs. Alarms are handled in a standard format with time and date stamp. Molygraphics

allows the operator to print on demand, on a time basis, or on alarm initiation. Alarms shall be printed out automatically. It shall be the Contractor's responsibility to interface with the existing computer system hardware and software and provide adequate allowance as part of his base bid. Information on the existing system is available on request.

An existing common alarm output from the computer is hardwired to the single point alarm panel at the guard shack. An audible buzzer is acknowledged by pushbutton, and the status is indicated by a pilot light. The individual alarm condition is reported at the Computer Monitor Station.

4.3 Primary Components

- Underground Piping System

General

The Secondary Containment Piping for the On-Site Ground Water Extraction System lines shall be factory manufactured and fabricated by a manufacturer that has at least five years experience in the production of secondary containment piping. All straight sections, fittings, and other accessories shall be factory manufactured and prefabricated to allow for the placement of the leak detection cable in the secondary containment. The containment piping shall be drainable and air pressure testable.

All secondary containment piping shall be equipped with a PAL-AT leak detection/location system supplied by the manufacturer of the Secondary Containment piping.

A factory trained field representative of the Secondary Containment piping manufacturer shall provide technical field support during critical period of installation including the final check out of the PAL-AT leak detection/location system.

Carrier Pipe and Secondary Containment Material

The piping system shall be Double Quik E+, as manufactured by PermAlert ESP of Niles, Illinois, telephone number (708) 966-2190. Carrier pipe shall be type I Homopolymer Polypropylene in accordance with ASTM F-4101. The secondary containment pipe shall be type III High Density Polyethylene in accordance with ASTM D-3350. Carrier and containment pipes will be manufactured to an Standard Dimensional Ratio (SDR) so that the pressure

rating of the pipe will be consistent for all pipe sizes. SDRs and Pressure Ratings shall be as follows:

Carrier Pipe: SDR 11, Pressure Rate 150 psi; and
Secondary Containment Pipe: SDR 17.6, Pressure Rate 90 psi.

Fittings

All fittings shall be factory fabricated. Unless otherwise indicated secondary contained fittings shall be constructed using injection molded fittings and shall have the same pressure rating as the corresponding straight pipe. Unless otherwise indicated, all secondary contained fittings shall be unitized construction with the carrier and containment integrally anchored together to prevent movement of the carrier relative to the containment within the fitting. Anchors shall be of sufficient thickness to withstand the maximum possible end loads that can be generated by the carrier pipe during the life of the system. Bends must be anchored on both ends. Tees and laterals must be anchored on both the run and the branch connections.

Pipe Supports

Supports shall be designed and factory installed by the secondary containment manufacturer. The manufacturer shall design and fabricate the system so that the pipe is continuously double supported in order to minimize the stresses due to point loading. All pipe supports shall be circular and welded to the carrier pipe. The supports at both ends of every straight section shall be welded to both the carrier and containment pipes in order to facilitate the simultaneous welding of all secondary contained pipe and fittings. Support clips will not be allowed.

Factory Welded Joints

All factory joints shall be Butt Fusion welded in accordance with ASTM 2657 Section 9. Weld pressures, temperature, and time shall be in accordance with the manufacturer's recommended procedures. All carrier and containment joints shall be simultaneously welded.

Field Welding Machine(s)

Field welding of the Secondary Containment system shall employ the simultaneous welding method for all Carrier and Secondary Containment pipe and fittings. The system manufacturer shall supply all Butt Fusion welding equipment for all field welds. The Butt Fusion welding equipment shall include all clamps and mirrors required for the simultaneous welding of the system while the leak detection/location cable is in place. Hot air or extrusion welds shall not be used to seal or join either the carrier pipe or secondary containment. Welding equipment shall be Quik Welders.

- Leak Detection/Location System

Leak detection/location system shall be PAL-AT 40K multi-channel panel with one extra expansion cord, as manufactured by PermAlert ESP of Niles, Illinois, telephone number (708) 966-2190. The leak location/detection system shall consist of microprocessor based monitoring unit(s) capable of continuous monitoring of a sensor string for leaks/faults. The unit shall have a sensing range of 5,000 feet. The alarm unit(s) shall operate on the principal of pulsed energy reflection and be capable of mapping the entire length of the sensor cable and storing the system map in nonvolatile memory. The alarm unit(s) shall include watchdog circuitry to monitor proper functioning of the system software.

The leak location/detection system shall be capable of monitoring the entire sensing string for additional leaks after proper acknowledgement of a current leak. The system shall be capable of accounting for minor installation irregularities, static moisture, and puddles (such as condensation) with no loss in accuracy or sensitivity. The system shall locate the point of origin of the first leak or fault within ±1% of the distance from the last calibration point to the leak or ±5 feet, whichever is greater. The monitoring unit shall report and record, to nonvolatile memory, the type of vault, distance, date, and time of an alarm.

The sensor cable, connectors, (probes) and jumpers shall be supplied by the manufacturer of the monitoring unit(s). The cable sensing principal shall provide for continuous monitoring while short lengths of the cable are in contact with liquids, without altering the systems sensitivity and/or accuracy. The sensor cable shall be type AGW.

Two separate leak detection channels shall be established. One channel shall service the pipeline system for extraction wells EW-7 and EW-8; one channel shall service the pipeline system for wells DW-9, DW-10, DW-11, and DW-12. Each leak detection channel shall shut down its associated wells independently.

- Concrete Vault

Concrete, steel reinforced vault.
Concrete: 4000 P.S.I. at 28 days
Entrained air: 5% to 9%
Steel: ASTM A-496 - A-615
Grade 60-90 KSI
Design Loading: A.A.S.H.T.O. HS-20-44
with 30% impact and equivalent soil pressure of 130 (PCF).

- Vault Door

Provide and install vault access doors type "D" as manufactured by Bilco or approved equal. Cover shall be 11 gauge aluminum, insulation shall be 1-inch glass fiber covered by metal liner 18 gauge aluminum, curb shall be 12-inch 11 gauge aluminum. Provide lugs welded to the exterior door surface to receive a padlock. Door opening shall be 3 feet x 6 feet, self-supporting doors without additional center beam support.

- Bollard

Six-foot long, 6-inch diameter, steel pipe, Schedule 40. Apply compatible primecoat and topcoat (color - safety yellow) to exposed pipe.

- Gravel Backfill

NYSDOT #1A stone. Stone shall be screened gravel, consist of clean durable gravel free from coating, and shall be Material Designation 703-0203, as per NYSDOT standard specifications. Supply in accordance with the following material specifications:

Sieve Size	Percent Passing by Weight
1/2"	100
1/4"	100 - 90
1/8"	0 - 15
No. 200	0 - 1.0

The actual gradation may vary slightly from that specified but is subject to approval of the Owner's Representative.

- General Backfill

The general backfill material shall be composed of excavated on-site soils. The general backfill shall be substantially free from organic materials, obvious visual staining or contamination, wood, and other objectionable materials.

- Vault Piping System

Carrier pipe and fittings shall meet the requirements for a type I homopolymer polypropylene material according to ASTM D-4101. Carrier guides shall be as per manufacturer's recommendation.

- Butterfly Valves

Wafer style ANSI full-face flat flanges, body - polypropylene (PP), disc - PP, seats and seals- vitron, gear operated.

- Sampling Point Nipple

  One-quarter inch ID Teflon® tubing barb, attach to ball valve.

- Ball Valve at Sampling Port

  Three-quarter inch, PP, threaded, rated at 150 psi.

- Flow Indicator

  Flow indicator shall be Signet 9010 Intelek-Pro Flow Controller with frequency input for flow rate and totalizer and an output card for 4 to 20/0 to 20 mA, isolated. Flow indicator shall be compatible with both types of flow sensors utilized.

- Flow Sensor (EW-7 AND EW-8)

  PP body with six blade impeller square wave signal generator transmitted via Beldon type 9320 two conductor shielded cable . Flow range - one to 30 feet per second (ft/sec), accuracy - ±1%. Housing, impeller and bearing - PP, impeller shaft - Titanium, O-rings - Vitron, output - 1.0 Vp-p per fps. Each flow sensor shall be calibrated and checked for accuracy prior to installation. Provide PP insertion fitting.

- Flow Sensor (DW-9, DW-10, DW-11, AND DW-12)

  Magnetic flow meter. Housing material shall be PP with stainless steel electrodes. Included shall be the matching PP installation fitting. Output signals shall be 0 Hz to 135 Hz, 5v square wave, minimum conductivity of 15 micromhos with a flow range of 0.5 fps to 20 fps and 1% of full scale linearity accuracy. Enclosures shall be rated NEMA 4X. Each flow sensor shall be calibrated and checked for accuracy prior to installation.

- Panel Heater

  Provide and install a panel heater for the monitoring devices mounted in the vault panel. The panel heater shall be as manufactured by Watlow 120v, 100 watts with heater bonded to aluminum mounting plate.

- Flow Limiting Valve

  Threaded mini type, body material ductile-iron, 300 series passivated Stainless Steel internal parts as manufactured by Griswold or equal, rated at 7 gpm.

- Swing Check Valve (Type I)

  Supply and install an all PP swing check valve with vitron seats and seals having no metal to media contact and with external level and weight. Valves shall be a single disc design as manufactured by Asahi/America or approved equal.

- Swing Check Valve (Type II)

  Supply and install an all PP swing check valve with vitron seats and seals having no metal to media contact. Valves shall be a single disc design as manufactured by Asahi/America or approved equal.

- Flexible Pump Connector

  Insulflex - drained galvanized steel over a synthetic polymer tube. As manufactured by MetraFlex.

- Pipe Insulation

  Insulate all exposed piping in vaults or access areas with micro-lok fiberglass pipe insulation minimum 1-inch thick. Cover with Zeston 2000 PVC/Permaweld System 30 mil thickness as manufactured by Manville or approved equal.

- Heat Trace Tape

  Install heat trace cable to all carrier piping within the vaults and to piping sections as indicated. Raychem XL-Trace, 5W/FT, 208V with AMC-1B sensor.

- Data Acquisition System

  Molytek RTU series, 32 Channel in NEMA 12 box with display and keyboard.

- Computer Control

  Interface with existing hardware and software to provide displays as indicated in the system description.

- On-Site Alarm Panels

  Supply as configured, one for guard shack next to off-site system.

- Control Panel Housing

  Electromate E-30H240SS Nema 4X or equal.

- Overburden Casing

  Ten inch diameter, Polypropylene Schedule 40.

- Cement/Bentonite Grout

  One 94-lb bag Type I Portland Cement, mixed with 4- to 6-percent powdered bentonite, hydrated with five gallons of potable water.

- Submersible Pump

  Pump shall be Grundfos, Redi-Flow, Environmental Submersible Pump, Model Number 5E5, powered by 1/3 horsepower (hp), 208V, single phase Grundfos Environmental Submersible Motor. Pumps shall be of stainless steel and Teflon® construction.

- Pump Sleeve

  The pump sleeve shall be constructed of grade 316 stainless steel, Schedule 5, and be five inches in diameter by 25 inches long, and secured to pump riser pipe using three ¼-inch diameter stainless steel set screws.

- Pump Riser

  1-inch diameter Grade 316 stainless steel, Schedule 40, NPT, 10-foot maximum lengths.

- Stilling Well

  2-inch diameter, Schedule 40, stainless steel, NPT, 10-foot maximum lengths.

- Protective Casing

  Provide and install a recessed, protective casing over pump outs and inspection/maintenance ports. The casing shall be water tight and consist of a 16 inch diameter, ⅜-inch diamond plated steel cover with a 14 gauge, 10-inch galvanized steel skirt as available through Morris Industries. Secure cover with four hex keyed screws.

- Well Level Control System

  Supply and install a submersible pressure transducer with associated transmitter with an input voltage of 24 vdc and with an output signal of 4-20 MA. The transducer case will be 316 SS with water-tight cable seal. Transducer pressure range shall be 0-15 psig with an accuracy of ±0.5% F.S. or better. Pressure connection to be free hanging type. Standard ported nosepiece with provision for attaching weights is acceptable. For the end of

vent tube that is contained with integral sensor cable, a Keller PSI Series 810 vent filter and water vapor trap shall be installed. Operating temperature range shall meet -4°F to 130°F range. Integral sensor cable, cable shall be shielded 2 conductor with polyurethane jacket and polyethylene vent tube, provided in a length of 50 foot cable. Manufacturer shall be Keller PSI Series 200 S.

Power supply shall have an input voltage of 120 volts AC with output of 24 vdc. Current rating shall be 2.4 amps DC. Ambient temperature rating of 32°F to 131°F. Unit shall be Solo Type 83-24-225-2, or its equal.

DC alarm/trip relay (for start/stop control of well pumps, based on level signal) shall have a 4-20 MA dual-trip (high and low) relay for each extraction pump, to control the start\stop of the pump, accuracy shall be 0.1% of span trip point settings shall be configurable via front panel accessible potentiometers and shall be displayed on the front panel. Ambient temperature range shall be 0°F to 150°F. Manufacturer shall be Moore Industries Model DDA Series or equal.

Digital panel meter for 4-20 MA DC input shall be used for water level indication. The main indicator shall be 5 digit 0.56-inch high vacuum fluorescent readout, sealed metal front Bezel (NEMA 4), front access to calibration trip controls.

DIN standard panel cutout (92 x 92 MM Bezel), selectable decimal points. Power input shall be 115 VAC, 60 hz. Manufacturer shall be MCC Powers Model 535 or equal.

- Electrical Wiring

All wiring installed shall be type THWN. All wiring shall be copper, aluminum wire will not be allowed, and have 600 volt insulation. Identify all main feeder and branch circuits by color coded wire as required by code. Wire from Phelps-Dodge, General Cable, or approved equal.

- Terminal Connections

All terminal connection of feeder and branch circuits shall be of an approved solderless, high pressure clamping type equal to "Lock-Tite" by Thomas and Betts, Co.

- Connection and Splices

Make all splices, etc., using only 3M Scotchlok electrical spring connectors and insulate with approved plastic electrical tape. Wire nuts or porcelain connectors are not acceptable.

- Uninsulated Conductors

  Shall be bare type ACSR.

- Raceways

  All conduit shall be non-metallic and Class 1, Schedule 40 PVC.

- Conduit Fittings

  All fittings shall be copper-free die cast aluminum and be waterproof NEMA 4 type. All fittings and conduits are to be watertight. All insulated bushings shall be plastic or bakelight insulating rings molded into hot dip galvanized malleable iron threaded bushings.

- Junction and Pull Boxes

  Minimum of #12 gauge, NEMA 4 enclosure of type and style suitable for number of cables or wire present, located as required and for convenience, in compliance with applicable codes. Manufactured of copper-free die cast aluminum.

- Motor Controllers and Starters

  Controllers shall be full voltage magnetic having thermal overload protection and neon pilot lights. Equip all starters with at least two auxiliary contacts (one normally open, one normally closed) in addition to holding circuit contacted. Coil shall be 120 volts with overload contact side of control transformer, grounded in compliance with paragraph 430-73 of NEC. Acceptable manufacturers are Square D Company, Westinghouse and General Electric.

- Piping Rollers

  All rollers shall be Teflon® coated, minimum 5 mil. The use of pipe hooks, chains or perforated metal straps for pipe support will not be permitted. Rollers shall have a five to one safety factor and to be as manufactured by Grinnell Company, Fee and Mason, or approved equal.

- Fiberglass Grating (TO BE PROVIDED BY OWNER)

  Grating shall be fiberglass roving reinforced thermoset plastic, constructed to provide thorough wetting of the glass by the polyester resin. The resin shall be CP-84, a chemical grade thermoset resin. Color shall be green. The grating shall be made in a mold and of single piece construction so the reinforcing glass of the bearing bars are interwoven with the glass of the cross bars. Resin content will be 60-percent to 70-percent and fiberglass 30-percent to 40-percent

by weight in the reinforced portion. Angular silica particles shall be integrally embedded, to a nominal depth of 3/16-inch, in the top surface of the grating as an anti-slip surface. This resin/glass fiber composite shall contain no fillers. The tops and bottoms of the bearing bars and cross bars shall be in the same plane. The grating shall be translucent to enable inspection for defects, air bubbles, and thorough glass wetting, and the absence of fillers.

The grading grid pattern shall be 5/8-inches high, 1-inch by 4-inches. Bearing bars shall be 5/16-inches wide on 1-inch centers. Cross bars shall be 9/16-inches wide on 4-inch centers. Grating shall be suitable for a concentrated load of 250 pounds applied by a 12-inch x 3-inch block with a 1-percent deflection when supported at 24-inches on center. Grating shall have a 58-percent open area and a weight of 1.8 pounds per square foot.

Contractor shall support grating on all sides adjacent to the vault wall and provide a removable center beam positioned lengthwise in the vault.

- Geotextile

Geotextile shall meet the following criteria:

FABRIC PROPERTY	UNITS	MINIMUM VALUES
Mass Per Unit Area, ASTM D3776	oz/yd^2	≥4.5
Grab Tensile Strength, ASTM D4632	Pounds	≥90
Grab Elongation, ASTM D4632	Percent	≤50
Trapezoid Tear Strength, ASTM D4533	Pounds	≥45
Puncture Resistance, ASTM D4833	Pounds	≥65
AOS, ASTM D4751	Sieve	70 min

5.0 INSTALLATION STANDARDS

All products and materials shall be installed by the employed trades in strict accordance with the originating manufacturer's installation manual, in accordance with these specifications. Installation guidelines shall be submitted, along with product approval sheets, prior to ordering and installation for the Owner's approval and the supplied guidelines are considered to be a part of these specifications. All installation activities shall be performed in accordance with a written and approved Contractor specific Health and Safety Plan. Each Contractor shall be responsible for the development, implementation of and adherence to their Health and Safety Plan. Refer to the attached Health and Safety Plan for site specific information.

- All materials and equipment installed by each trade shall be new and shall conform to the grade, quality, and standards specified herein;

- Equipment shall be installed in strict accordance with manufacturer's instructions for type and capacity of each piece of equipment used. Each trade shall obtain these instructions from the manufacturer, and these instructions shall be considered part of these specifications. Type suitable to operate satisfactorily for the purpose for which intended in the systems. No experimental material or equipment shall be permitted;

- All work, equipment, and materials shall be protected at all times;

- Contractors of the various trades shall coordinate the installation of materials and equipment to assure a smooth and uninterrupted flow of the project;

- Each Contractor shall carefully examine all mechanical drawings and shall be responsible for the proper fitting of all material and equipment as planned and without interference with other piping or equipment. Proper judgment shall be exercised to secure reasonable space conditions throughout, to secure neat arrangements for piping and conduit, and to overcome all local difficulties and interference to best advantage;

- Each Contractor shall work in conjunction with each of the other trades to facilitate proper and intelligent execution of work and with minimum of interference;

- Check drawings of the various mechanical and electrical trades so that piping will not interfere with equipment installation or other piping systems so that equipment can be serviced or replaced without excessive pipe removal;

- Approval of any and all changes to plans and specifications shall be obtained from the Owner or Owner's Representative, in writing, before proceeding;

- All work and methods of executing same under these specifications shall be completed in an approved first class workmanlike manner and shall conform to the best mechanical practice;

- All piping shall be installed in a workmanlike manner and in accordance with standard practices of the trade as shown on the drawings and required for the complete installation of the systems;

- Contractor to provide all necessary surveying during construction of on-site system. Items to be surveyed at a minimum include:

  - Location and elevation of extraction wells prior to construction;

  - Location and elevation of the top of the installed pipe every 20 feet along entire pipeline and at all change in directions and at all high and low points between vaults; and

  - Elevation and location of top of casing in vaults and elevation of base of vault.

- Surveying shall be performed under the seal of a professional land surveyor.

- Piping shown on drawings show the general run and connections. The Contractor shall be responsible for erecting the piping suitable in every respect for the work. Piping shall be installed so that access, clearance, headroom, and pitch are maintained;

- After piping is installed between vaults, let the ground temperature at the piping stabilize to surrounding earth temperature at the same depth before cutting and connecting piping at the vault. All pipe installation shall be in accordance with the manufacturer's instructions;

- The piping Contractor shall furnish and install all supports, including angles, channels and beams for the support of all equipment and piping installed under this contract. All piping shall be arranged to maintain the required pitch and provide for proper expansion and contraction;

- All lines shall be rigidly and firmly installed to prevent swaying, vibrating, and sagging. For piping running near floor, use brackets or pedestals. Provide additional supports for heavy valves and specialties;

- Piping shall be properly supported and provisions shall be made for expansion, contraction, guiding, anchoring;

- All connections to equipment on piping two inches and larger shall be flanged, standard weight pattern, with face and gasket to match the equipment flange or as indicated on the drawings;

- All piping connecting to pumps and all other equipment shall be installed without strain at the connection to this equipment. All piping shall be clean before connecting to pump and equipment;

- All piping openings shall be closed, with caps or plugs during installation. All equipment shall be tightly covered and protected against dirt, water, chemicals or mechanical injury during entire progress of installation. The Contractor shall make good all damage caused either directly or indirectly by his workmen;

- All valves shall be selected for not less than 150 psi or 150-percent of normal working pressure, whichever is greater;

- All valves for this project shall be the product of one manufacturer when possible;

- Install all valves shown on the diagrams and specified herein without strain on the piping system;

- Valves and specialties shall be so placed to permit easy operation and access. All valves shall be regulated, packed, and adjusted before acceptance;

- All pipe connections shall be made so as to allow for perfect freedom of movement for piping during expansion and contraction, without springing or creating air pockets;

- Inspection/Maintenance Ports shall be spaced at locations shown on Drawing B-4;

- Piping shall be spaced so that it will be possible to install insulation around pipes and fittings without cutting part of the insulation. Install insulation shields at all support points;

- All piping installed underground (direct bury) shall be installed without insulation;

- The Contractor shall adjust each and every part of the new system and submit the necessary reports as required by the Owner or Owner's Representative. All equipment must be adjusted so that no vibration or sound is transmitted to adjacent areas.

- Should leaks develop in the various systems after they have been placed in operation for a period of one year, it shall be the responsibility of the Contractor to repair them;

- The Contractor will be responsible for locating and protecting all underground and overhead utilities; and the contractor will be responsible for repair of any utility damaged during construction, due to the contractors activities.

- The Contractor will excavate the trench in accordance with OSHA regulations. At all times, the Contractor will provide a safe working area;

NOTE: *Excavated asphalt and concrete materials must be stockpiled on-site for disposition by the Contractor. Location of stockpile to be determined by Owner.*

- Backfill and Compaction

  Gravel Backfill

  - The final bedding of the trench must be uniform and continuous. Remove all sharp rocks and other abrasive material from the trench bottom;

  - A layer of NYSDOT #1A stone shall be placed in the bottom of the trench (minimum six-inch thickness) and over the pipe to assure protection of the pipe, place in lifts less than six inches thick after compaction;

  - Compact stone to a dry density of at least 70-percent of the maximum relative density as determined in accordance with ASTM D-4253 and ASTM D-4254; and

  - Quality control tested following ASTM D-2922 or other method as approved by the Owner's Representative at the frequency of at least one test per 50 feet.

  General Backfill

  - Placed in lifts less than nine inches thick before compaction;

  - Compact backfill using a 120-pound Jumping Jack or a backhoe attached vibrating compactor;

  - Each lift shall be compacted with a minimum of three passes;

  - The compacted backfill shall be broken up or sorted so that the maximum aggregate particle size does not exceed three inches; and

  - Compacted backfill will be proofrolled to verify acceptable compaction, as determined by Owner's representative.

Refer to Attachment 1 for Drilling and Extraction Well Installation Procedures.

Attachment 1

Drilling and Extraction Well Installation Procedures

TABLE OF CONTENTS

1.0 INTRODUCTION

1.1 General

This attachment contains drilling and extraction well installation procedures to be completed as part of the on-site remedial system at the Bell Aerospace Textron (Owner) site located in Wheatfield, New York. In addition, decontamination procedures and a description of the site geology are contained herein.

1.2 Site Geology

The site is underlain by approximately 15 feet to 30 feet of silty and clayey overburden. Beneath the overburden, the bedrock stratigraphy consists of four zones. The zones are based on lithology and permeability characteristics as follows:

- Zone 1 comprises approximately the upper 10 feet to 20 feet of dolostone bedrock and occurs to depths of 25 feet to 50 feet below ground surface. It is a thinly bedded to laminated dolostone of moderate to high permeability and constitutes the upper bedrock aquifer;

- Zone 2 is a massive dolostone layer that averages approximately 8 feet in thickness. It directly underlies Zone 1 and is considered a bedrock aquitard that restricts the vertical movement of ground water;

- Zone 3 is a porous, vuggy dolostone of moderate permeability that varies in thickness from 18 feet to 28 feet. It constitutes an aquifer beneath Zone 2; and

- Zone 4 is a massive, low permeability dolostone underlying Zone 3.

2.0 DECONTAMINATION OF EQUIPMENT AND MATERIALS

2.1 General

This section covers the decontamination of equipment, tools, and materials utilized in the borehole drilling and well construction. An on-site decontamination area will be provided by the Owner. It will have a lined pad, be supplied with municipal water, and have a portable tank for containment of all wash fluids. The contractor will make arrangements to collect all wash fluids and debris.

The Contractor will supply all equipment and materials necessary for decontamination and subsequent handling of drilling equipment and well materials including (but not limited to): a portable steam cleaner, a portable water pump, wire brushes, a water trough to contain wash water and auger cuttings and safety equipment for personnel. Plastic sheeting may be necessary in the decontamination area to assist in containing wash water and auger cuttings. The Owner will be responsible for the finial disposition of all collected water and debris. Contractor shall decontaminate equipment/material in a manner such that the generation of waste material is minimized to the extent practical.

The condition of the equipment shall be such that its use during installation of the borehole or well does not transfer contamination to the borehole. Leaking seals or leaking tanks containing fluids other than clean potable water shall not be permitted.

2.2 Procedures to be Used for Cleaning Equipment

The Contractor shall adhere to the following procedures:

- All equipment coming into contact with the boreholes shall be degreased prior to mobilization to the site. Any lubrication of equipment after degreasing will be with vegetable oil. This includes the working area of the drill rig, drill rods, casing, and sampling equipment;

- All cleaning except the initial degreasing is to be performed on site in the decontamination area. Cleaning operations including disposal of fluids and trash generated will be done in accordance with the site's safety procedures and material handling conditions;

- Steam clean the working area of the drill rig utilizing municipal water prior to starting the job. All visible signs of grease, oil, mud, etc., shall be removed. Use brushes as required;

- Drill rod, augers, casing, soil samplers, core barrels, pipe wrenches, etc., will be placed over a trough and steam cleaned until all visible signs of grease, oil, mud, etc., are removed. Brushes will be used as required; and

- Greasy gloves will not be used when handling tools after cleaning. Latex gloves shall be used and new gloves will be used at each well location.

3.0 BOREHOLE DRILLING AND CASING PROCEDURES

3.1 General

This section describes the borehole drilling and casing installation procedures for the installation of the extraction wells as part of the on-site remedial system. The work shall be carried out using a rotary drill rig equipped for augering, soil sampling, rock coring and reaming. Coring and reaming must be carried out using air flush methods without introducing water into the rock formations, other than that which may be required to suppress dust or clear mudded cuttings. Thus the drill rig should be supplied with a suitable air compressor. The air compressor shall be provided with an oil trap on the air line. During air coring and reaming, the Contractor shall ensure that return air and water from the borehole is contained in a closed system to minimize potential for exposure at the work area. All drill cuttings and circulated fluids shall be contained and collected into 55-gallon drums for disposition by the Owner. In the event of any borehole being abandoned for any reason, the entire hole shall be grouted to ground surface.

3.2 Extraction Wells

The overburden material shall be drilled to the bedrock surface (Zone 1) using auger (16-inch outside diameter (OD)) drilling techniques. Drilling shall continue by advancing the borehole at least three feet to five feet into bedrock with a 14-inch diameter drilling bit using appropriate air rotary drilling techniques. The overburden casing shall be installed in the borehole and pressure grouted in-place by the tremie method using a cement/bentonite grout mixture. Cement/bentonite grout shall be mixed in the appropriate proportions of:

- One 94-pound bag of Portland cement;
- Five gallons to six gallons water; and
- Four percent to six percent powdered bentonite.

The grout shall be allowed to cure for a minimum of 24 hours or until the grout is set, whichever is greater. Subsequent drilling shall be completed by advancing through the inside of the casing and into the Zone 1 bedrock using HW wireline size rock coring techniques using air (3⅞-inch hole diameter). The corehole shall be centered to the 10-inch diameter casing during drilling. The rock core shall be logged and stored in core

boxes by the Owner's Representative. Rock coring shall continue to a depth of approximately 6 inches to 1 foot into the Zone 2 dolostone as determined by the Owner's Representative. The rock coring drill rods shall be removed from the borehole. Upon completion of coring, the Owner's Representative may perform a dewatering test in the open corehole to evaluate the hydraulic response of Zone 1 at the well location. The Contractor shall provide the Owner's Representative access to perform such testing. Following the dewatering test, upon approval by the Owner or Owner's Representative to proceed, drilling shall continue by reaming the cored bedrock with a nominal 9½-inch diameter bit using air rotary or downhole hammer techniques. Following reaming of the borehole, it shall be developed by blowing air through the drill rods in a "pulsing" fashion, as directed by the Owner's Representative, until drill cuttings are removed and clear water is returned to surface in a condition acceptable to the Owner's Representative. A well casing will not be installed in the open borehole.

F/N: ATTACH.1

Drawing Package

Bell Aerospace TEXTRON

WHEATFIELD, NEW YORK

ONSITE GROUNDWATER EXTRACTION SYSTEM FOR BELL AEROSPACE TEXTRON WHEATFIELD PLANT WHEATFIELD, NEW YORK

DRAWING LIST

Drawing No.	Drawing Title
B-1	COVER SHEET
B-2	ONSITE GROUNDWATER EXTRACTION SYSTEM PLAN
B-3	EXTRACTION SYSTEM PROFILE
B-4	ONSITE UNDERGROUND UTILITY LOCATIONS
B-5	EXTRACTION SYSTEM DETAILS (SHEET 1 OF 2)
B-6	EXTRACTION SYSTEM DETAILS (SHEET 2 OF 2)
B-7	VAULT DETAILS
B-8	PIPING DETAILS
E-1	EXTRACTION SYSTEM ELECTRICAL DETAILS

Prepared by:

Golder Associates

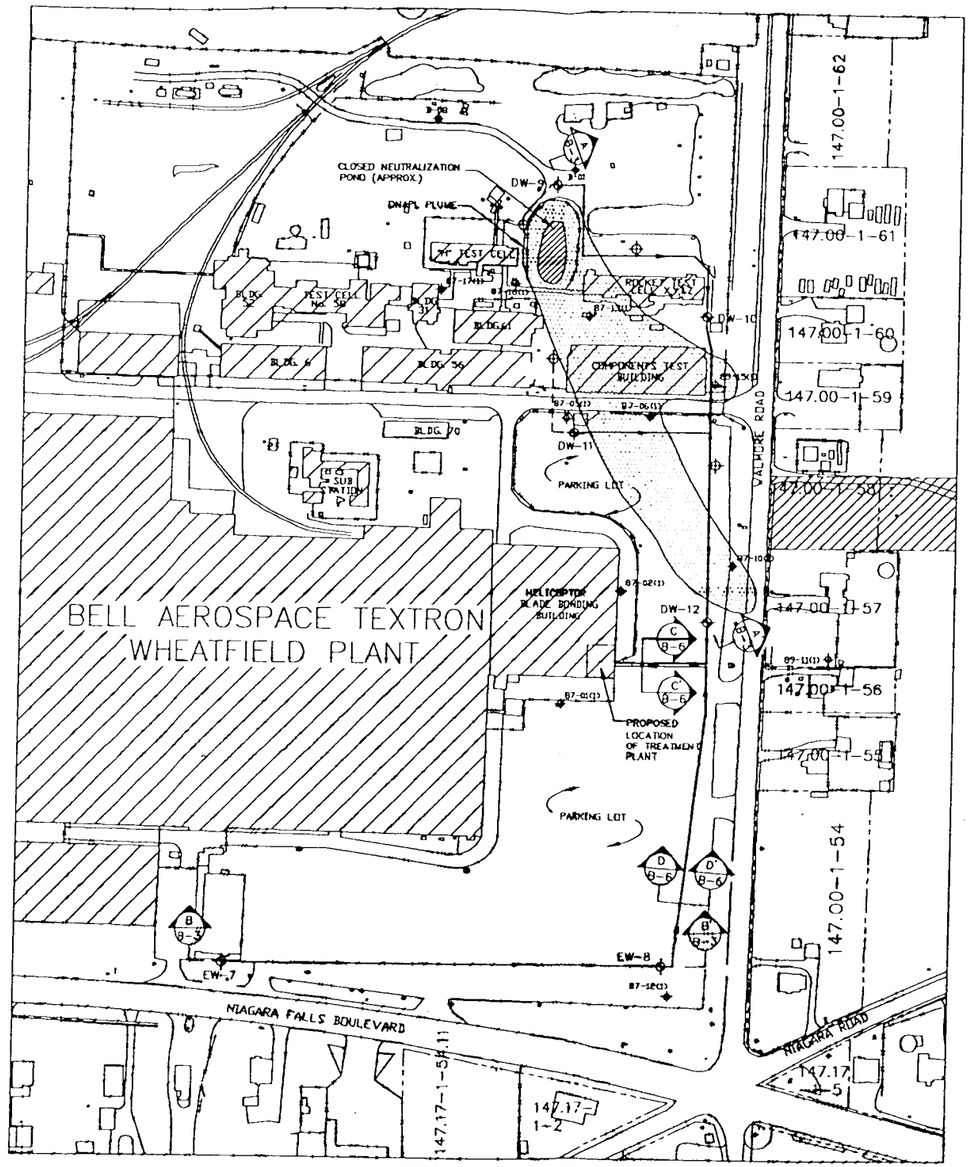
Buffalo, New York

and

CONSERVA-TECH

Williamstown, New Jersey

MARCH 1993



LEGEND

- EXISTING MONITORING WELL LOCATIONS
- DNAPL WELL
- EXTRACTION WELL
- PROPOSED LOCATION OF ADDITIONAL EXTRACTION WELL (IF NECESSARY)
- BURIED PIPELINE
- PIPELINE EXTENSION (IF NECESSARY)
- INDICATES DIRECTION OF FLOW
- INTERPRETED ZONE 1 DNAPL PLUME
- 4 / B-3 — DETAIL/CROSS SECTION DESIGNATION; DWG. No. WHERE DETAIL/CROSS SECTION IS PRESENTED

NOTES

1.) THE ACTUAL CONSTRUCTION LOCATIONS AND DETAILS MAY VARY FROM THE DESIGN SHOWN AS A RESULT OF MINOR FIELD VARIATIONS AND WILL BE SHOWN IN "AS BUILT" DRAWINGS.

2.) DESIGN DETAIL MODIFICATIONS ARE SUBJECT TO PRIOR APPROVAL OF THE OWNER OR APPROVED REPRESENTATIVE.

1 / B-2 ONSITE EXTRACTION SYSTEM

100 0 100 200
scale feet

REV	DATE	DESCRIPTION	DR BY	RVW BY

SCALE:	AS SHOWN	
PROJECT No.	923-9055	
DES BY	JPR	02/17/92
DR BY	EAH	02/17/92
CHK BY	RJH	3/23/93
RVW BY	ALG	3/24/93

PROJECT: Bell Aerospace TEXTRON, WHEATFIELD, NEW YORK

SHEET TITLE: ONSITE GROUNDWATER EXTRACTION SYSTEM PLAN

CONSERVA TECH, Westmont, New Jersey

Golder Associates, Buffalo, New York

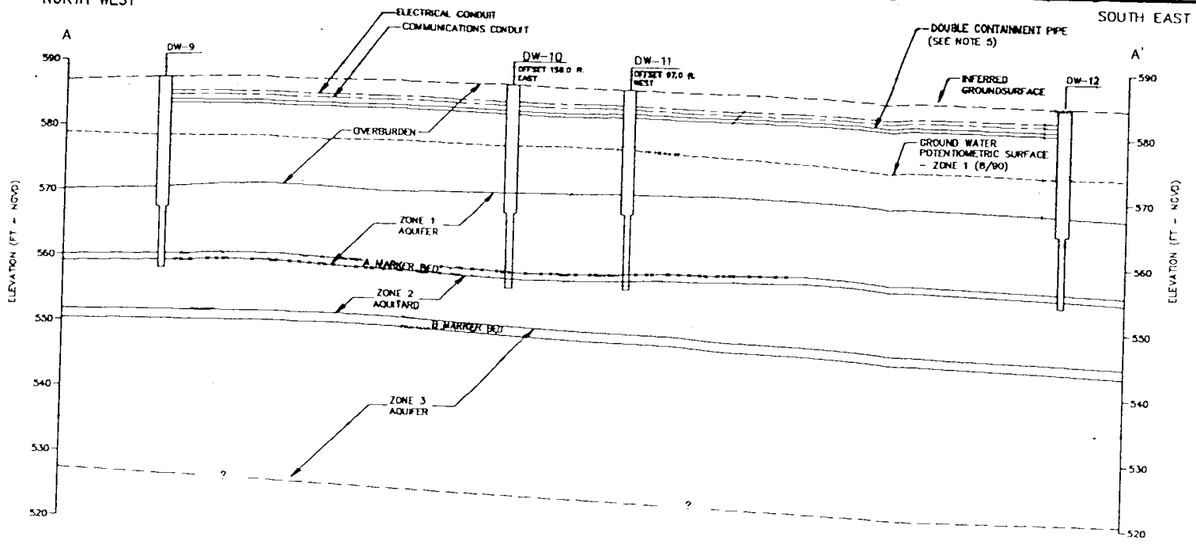
SHEET OF

FILE No. NY01-288

B-2

Fig.
B-3

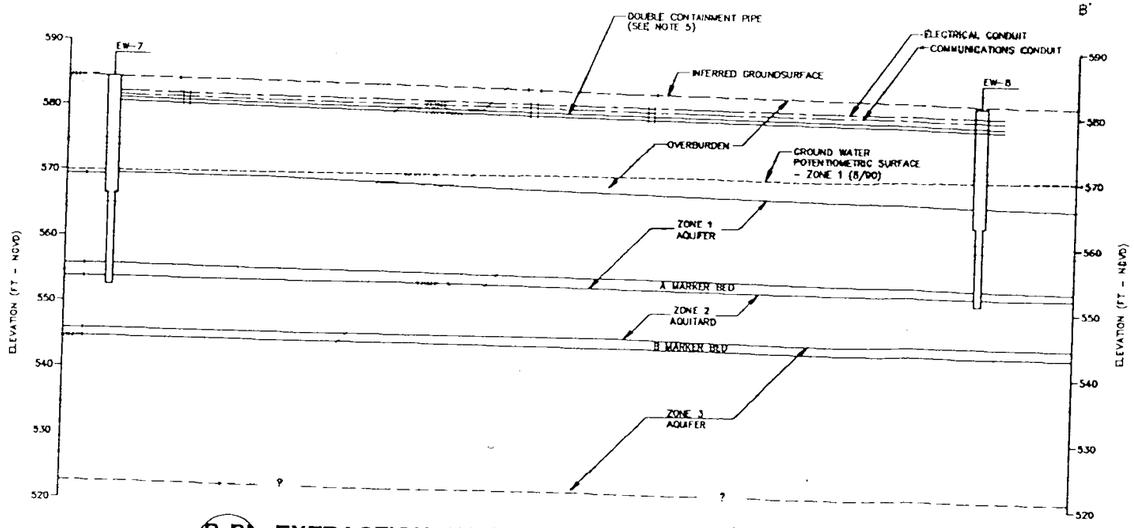
VIEW



A-A' / B-3 EXTRACTION SYSTEM PROFILE SECTION A-A'

50 0 50 100
horizontal scale feet

10 0 10 20
vertical scale feet



B-B' / B-3 EXTRACTION SYSTEM PROFILE SECTION B-B'

50 0 50 100
horizontal scale feet

10 0 10 20
vertical scale feet

LEGEND

- INFERRED GROUND SURFACE
- GROUNDWATER PHREATIC SURFACE
- GROUNDWATER POTENTIOMETRIC SURFACE - ZONE 1 AQUIFER
- EW-8 — EXTRACTION WELL ID
- SURFACE CASING
- UNCASED BOREHOLE
- PIPELINE
- CONDUIT LINES
- 4/B-5 — DETAIL/CROSS SECTION DESIGNATION; DWG. No. WHERE DETAIL/CROSS SECTION IS PRESENTED

SCHEDULE OF APPROXIMATE LOCATION AND DEPTHS

EXTRACTION WELL No.	NORTHING	EASTING	GROUND SURFACE ELEVATION (FT. MSL)	SURFACE CASING DEPTH (FT. BGS) *	BOREHOLE DEPTH (FT. BGS) **
EW-7	1129545.3	407293.8	584.5	18.0	32.0
EW-8	1129545.4	407978.6	581.5	19.0	31.0
DW-9	1130738.2	407793.1	587.3	20.0	29.0
DW-10	1130537.8	408032.4	586.4	20.0	31.0
DW-11	1130541.3	408032.4	586.4	19.0	30.5
DW-12	1130071.2	408040.3	584.3	19.5	31.0

* ASSUME 3 FT. SOCKET INTO ZONE1, VAULTS NOT SHOWN
** CASING DEPTH AND WELL DEPTH TO BE DETERMINED IN FIELD

NOTES

1.) THE ACTUAL CONSTRUCTION LOCATIONS, ELEVATIONS, AND DETAILS MAY VARY FROM THE DESIGN SHOWN AS A RESULT OF MINOR FIELD VARIATIONS AND WILL BE SHOWN IN "AS BUILT" DRAWINGS.

2.) DESIGN DETAIL MODIFICATIONS ARE SUBJECT TO PRIOR APPROVAL OF THE OWNER OR APPROVED REPRESENTATIVE.

3.) STRATIGRAPHY AND WATER LEVEL DATA OBTAINED FROM RFI REPORT. (GOLDER ASSOCIATES 1990)

4. MAINTENANCE/INSPECTION PORTS AND CHANGE OF DIRECTION IN PIPELINE ARE NOT SHOWN. SEE DRAWING B-4 FOR LOCATIONS.

5.) INVERT ELEVATION OF BURIED PIPELINE SHALL BE A NOMINAL 5.5 FT. TO 6.5 FT. BELOW GROUND SURFACE.

6.) WELLS AND SURFACE CASING NOT SHOWN TO SCALE.

7.) GROUND SURFACE ELEVATIONS AT WELL LOCATIONS ARE APPROXIMATE AND MUST BE FIELD VERIFIED BY CONTRACTOR.

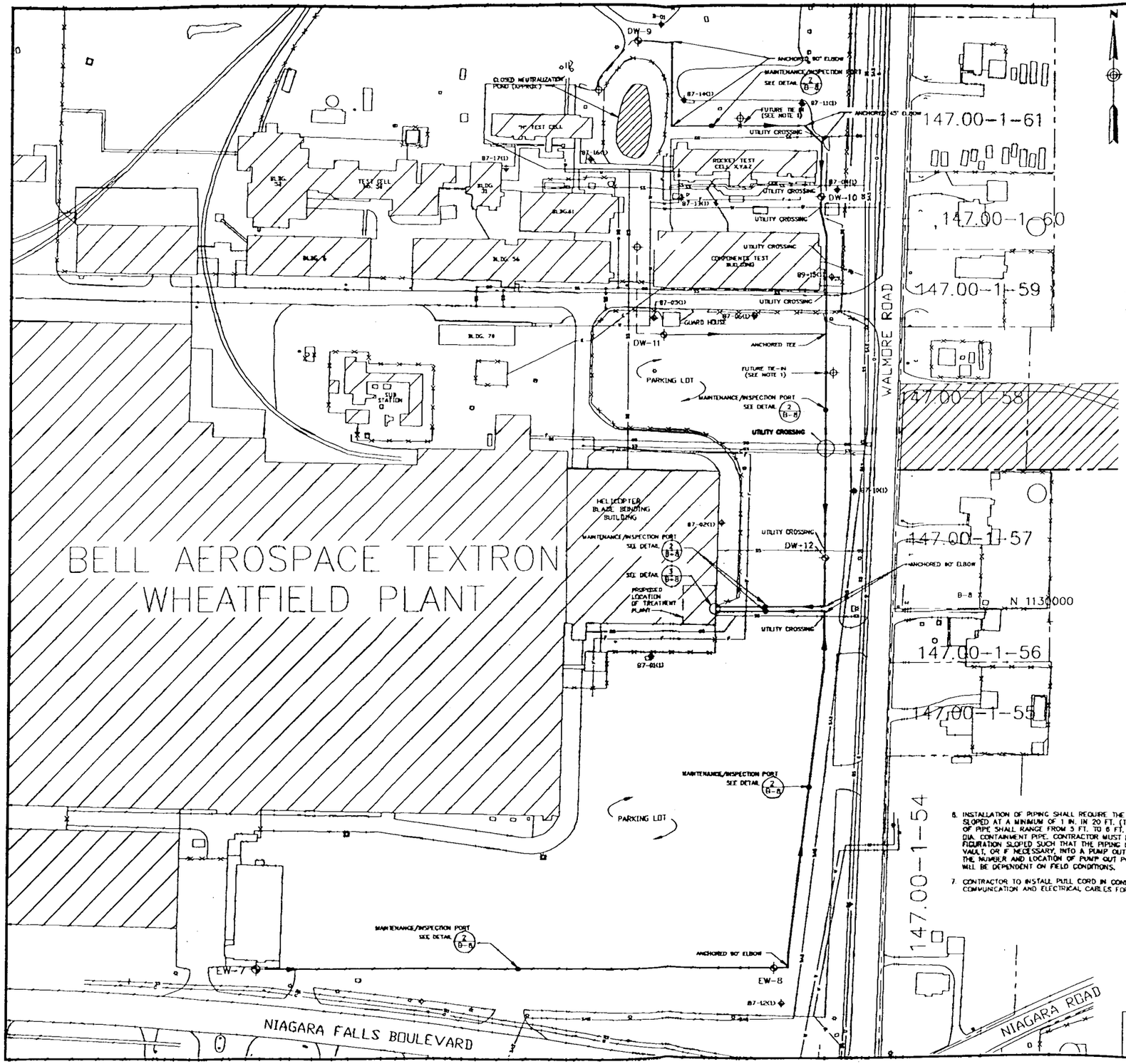
REV	DATE	DESCRIPTION	DR BY	RVW BY

SCALE: AS SHOWN		PROJECT: Bell Aerospace TEXTRON WHEATFIELD, NEW YORK	
PROJECT No. 923-9055			
DES BY	JPR	2/18/92	SHEET TITLE: EXTRACTION SYSTEM PROFILE
DR BY	EAH	2/19/92	
CHK BY	RJH	3/2/93	
RVW BY	[illegible]	3/2/93	

CONSERVA TECH Williamsburg, New Jersey

Golder Associates Buffalo, New York

SHEET OF
FILE No. NY01-296
B-3



LEGEND

- EXISTING MONITORING WELL LOCATIONS
- DW — PROPOSED DNAPL WELL
- EW — PROPOSED EXTRACTION WELL
- PROPOSED LOCATION OF ADDITIONAL EXTRACTION WELL (IF NECESSARY)
- BURIED PIPELINE
- MAINTENANCE/INSPECTION PORT
- PIPELINE EXTENSION (IF NECESSARY)
- INDICATES DIRECTION OF FLOW
- —W— WATER UTILITY
- —F— FIRE PROTECTION UTILITY
- —G— GAS UTILITY
- —E— ELECTRICAL UTILITY
- —SS— STORM SEWER UTILITY
- —SAS— SANITARY SEWER UTILITY
- 4 / B-5 — DETAIL/CROSS SECTION DESIGNATION / DWG. No. WHERE DETAIL/CROSS SECTION IS PRESENTED

NOTES

1. INSTALL ANCHORED TEE IN HORIZONTAL, WITH FLANGED END TOWARD FUTURE WELL LOCATION. ANCHORED TEE MUST INCLUDE LEAK DETECTION JUNCTION FOR LEAK DETECTION CABLE AT FUTURE WELL. SURFACE MONUMENT SHALL BE PLACED AT TEE FOR REFERENCE.
2. BASE TOPOGRAPHIC MAP PREPARED BY AERO-METRIC ENGINEERING, INC. ON 3/3/91.
3. THE UNDERGROUND UTILITIES SHOWN ARE BASED ON MAPS PROVIDED BY BELL AEROSPACE TEXTRON. THERE MAY BE ADDITIONAL UTILITIES NOT SHOWN. GOLDER ASSOCIATES IS IS NOT RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF THE UTILITY MAPS PROVIDED BY BELL AEROSPACE TEXTRON. FURTHER, UTILITIES HAVE NOT BEEN VERIFIED IN FIELD. ACTUAL LOCATIONS MAY VARY.
4. PIPING SHALL BE INSTALLED BENEATH UNDERGROUND UTILITIES. DEPTH OF UTILITY INVERT NOT ANTICIPATED TO BE GREATER THAN 5 FT. BELOW GROUND SURFACE (BGS). AT EACH UTILITY CROSSING, AN 8 IN. DIA. STEEL PIPE SLEEVE (SCH 80) SHALL BE PLACE OVER THE CONTAINMENT PIPE AS A MEANS OF PROTECTION. THE STEEL PIPE SHALL EXTEND 2 FT. BEYOND EITHER SIDE OF THE UTILITY.
5. CONTRACTOR MUST MAKE PROVISIONS TO SUPPORT AND PROTECT UTILITIES DURING CONSTRUCTION. TRENCHING ACTIVITIES SHALL BE CONDUCTED SUCH THAT THE INTEGRITY OF THE UTILITIES IS MAINTAINED. CONTRACTOR IS RESPONSIBLE FOR AND SHALL REPAIR ANY DAMAGE TO UTILITIES AS A RESULT OF CONSTRUCTION ACTIVITIES.
6. INSTALLATION OF PIPING SHALL REQUIRE THE PIPE TO BE CONTINUOUSLY SLOPED AT A MINIMUM OF 1 IN. IN 20 FT. (TYPICAL). BURIAL DEPTH OF PIPE SHALL RANGE FROM 3 FT. TO 8 FT. EGS FROM TOP OF 8 IN. DIA. CONTAINMENT PIPE. CONTRACTOR MUST PROVIDE PIPING CONFIGURATION SLOPED SUCH THAT THE PIPING IS DRAINABLE INTO A VAULT, OR IF NECESSARY, INTO A PUMP OUT PORT (SEE DETAIL 1 B-8). THE NUMBER AND LOCATION OF PUMP OUT PORTS (IF ANY) WILL BE DEPENDENT ON FIELD CONDITIONS.
7. CONTRACTOR TO INSTALL PULL CORD IN CONDUITS FOR COMMUNICATION AND ELECTRICAL CABLES FOR FUTURE WELLS.

60 0 60 120
scale feet

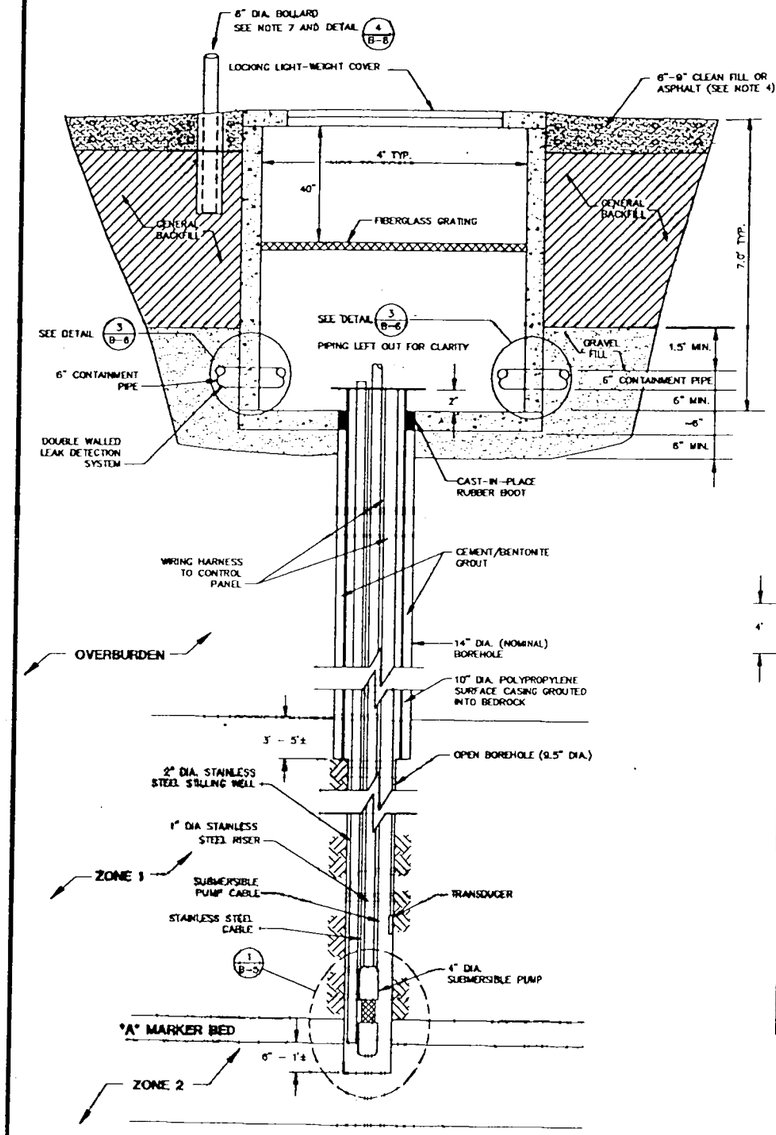
REV	DATE	DESCRIPTION	DR BY	RVW BY

SCALE: AS SHOWN	PROJECT: Bell Aerospace TEXTRON, WHEATFIELD, NEW YORK
PROJECT No. 923-9055	
DES BY JPR 2/6/92	SHEET TITLE: ONSITE UNDERGROUND UTILITY LOCATIONS
DR BY EAH 2/21/92	
CHK BY RJH 3/12/93	
RVW BY [illegible] 3/12/93	

CONSERVA TECH Williamstown, New Jersey

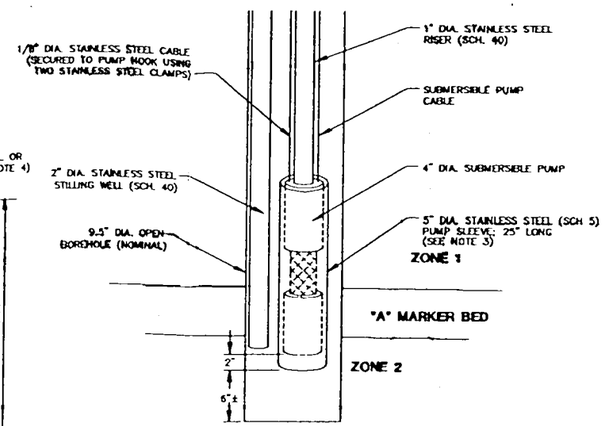
Golder Associates Buffalo, New York

SHEET OF
FILE No. NY01-297
B-4



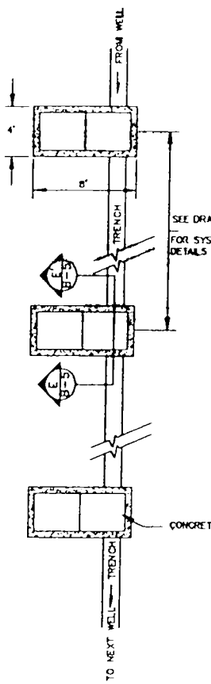
E-E' / B-5 TYPICAL EXTRACTION WELL

NOT TO SCALE



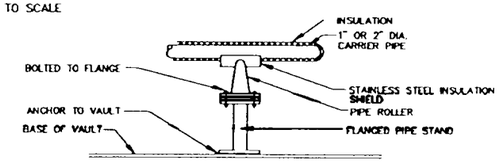
1 / B-5 BOTTOM DETAIL

NOT TO SCALE



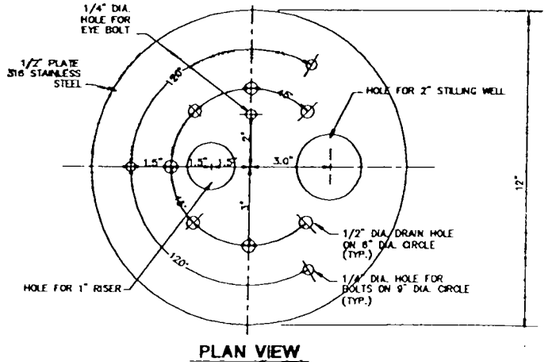
3 / B-5 TYPICAL EXTRACTION SYSTEM LAYOUT

NOT TO SCALE



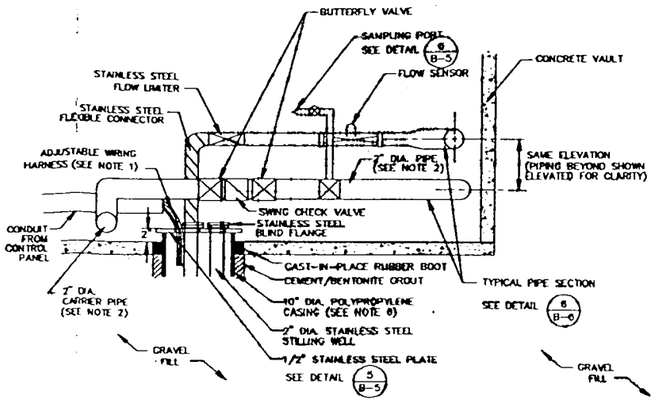
4 / B-5 PIPE ROLLER DETAIL (ELEVATION VIEW)

NOT TO SCALE



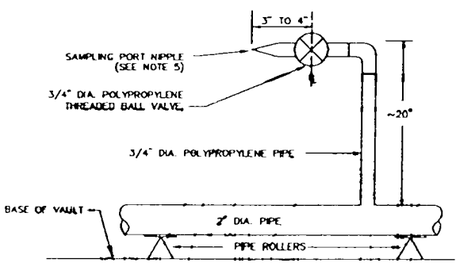
5 / B-5 STAINLESS STEEL PLATE

NOT TO SCALE



2 / B-5 CONTROL/DATA COLLECTION SYSTEM

NOT TO SCALE



6 / B-5 SAMPLING PORT - ELEVATION VIEW

NOT TO SCALE

LEGEND

4/B-5 — DETAIL/CROSS SECTION DESIGNATION
DWG. No. WHERE DETAIL/CROSS SECTION IS PRESENTED

NOTES:

1. PROVIDE 6" OF SLACK INSIDE CONTROL PANEL. FOR TRANSDUCER AND PUMP POWER CABLES. TRANSDUCER AND PUMP POWER CABLE SHALL BE INSTALLED TO MAINTAIN A 6 IN. SEPARATION IN VAULT AND IN WELL BORE.
2. INVERT OF PIPING ARRANGEMENT AT WELL HEAD SHALL BE A NOMINAL 17 IN. ABOVE BASE OF VAULT. INVERT OF 2 IN. DIA. CARRIER PIPE IN VAULT SHALL BE A NOMINAL 8 INCHES ABOVE BASE OF VAULT.
3. SECURE PUMP SLEEVE TO PUMP RISER USING TWO 1/4" DIA. STAINLESS STEEL SET SCREWS. PROVIDE HOLES IN PUMP SLEEVE TOP FOR STAINLESS STEEL AND PUMP CABLE AND ALSO DRILL TWO ADDITIONAL 1/2" DIA. HOLES IN PUMP SLEEVE TOP.
4. TOP 6"-9" OF FILL TO BE CONSISTENT WITH ORIGINAL GROUND SURFACE.
5. SLOPE SAMPLING PORT NIPPLE DOWNWARD SO THAT WATER WILL DRAIN FROM NIPPLE WHEN THE BALL VALVE IS CLOSED.
6. EXTEND 10" DIA. POLYPROPYLENE CASING 14" ABOVE BASE OF VAULT AT WELL DW-9, DW-10, DW-11, AND DW-12.
7. BOLLARDS SHALL BE INSTALLED AT THE CORNERS OF EACH VAULT.

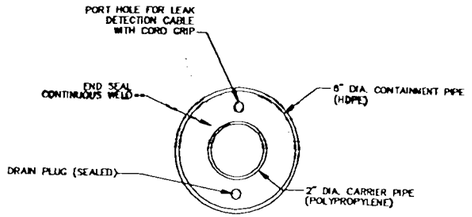
REV	DATE	DESCRIPTION	DR BY	PVW BY

SCALE:	AS SHOWN	PROJECT:	Bell Aerospace TEXTRON, WHEATFIELD, NEW YORK
PROJECT No.	923-9055		
DES BY	TMS	06/13/91	
DR BY	EAH	2/18/93	
CHK BY	RJH	3/12/93	SHEET TITLE: EXTRACTION SYSTEM DETAILS (SHEET 1 OF 2)
PVW BY		3/12/93	

CONSERVA-TECH, Hackensack, New Jersey

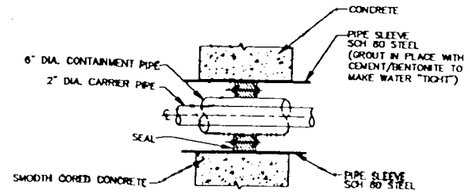
Golder Associates, Buffalo, New York

SHEET	OF
FILE No.	NY01-289
B-5	



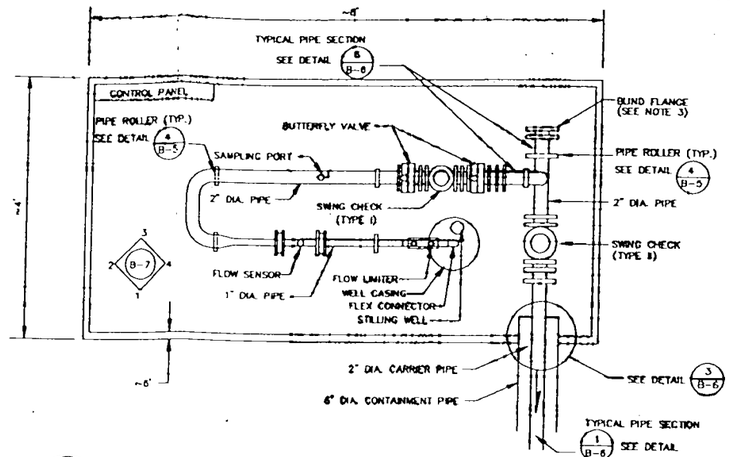
1 / B-6 TYPICAL PIPE CROSS SECTION INSIDE VAULT

NOT TO SCALE



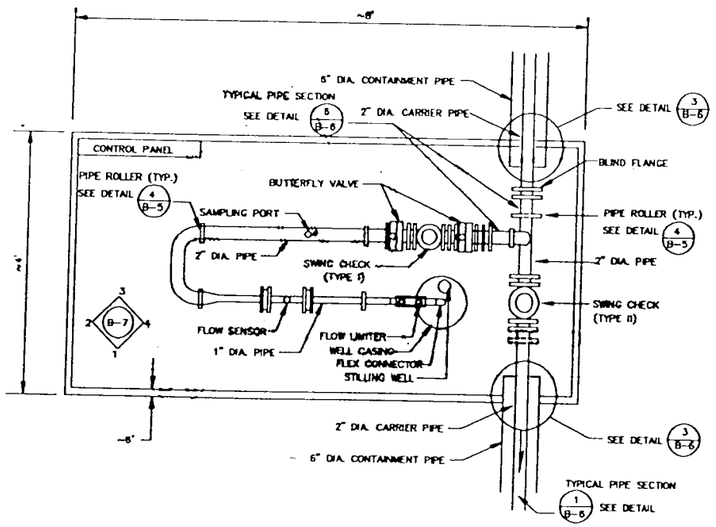
2 / B-6 LINK SEAL (TYP.)

NOT TO SCALE



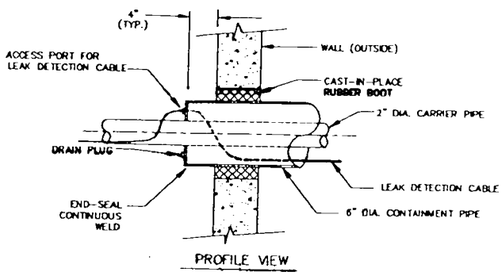
4 / B-6 VAULT DETAIL EW-7, DW-9, DW-11 (PLAN VIEW)

1 0 1 2 scale feet



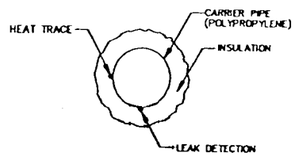
5 / B-6 VAULT DETAIL DW-10, DW-12, EW-8 (PLAN VIEW)

1 0 1 2 scale feet



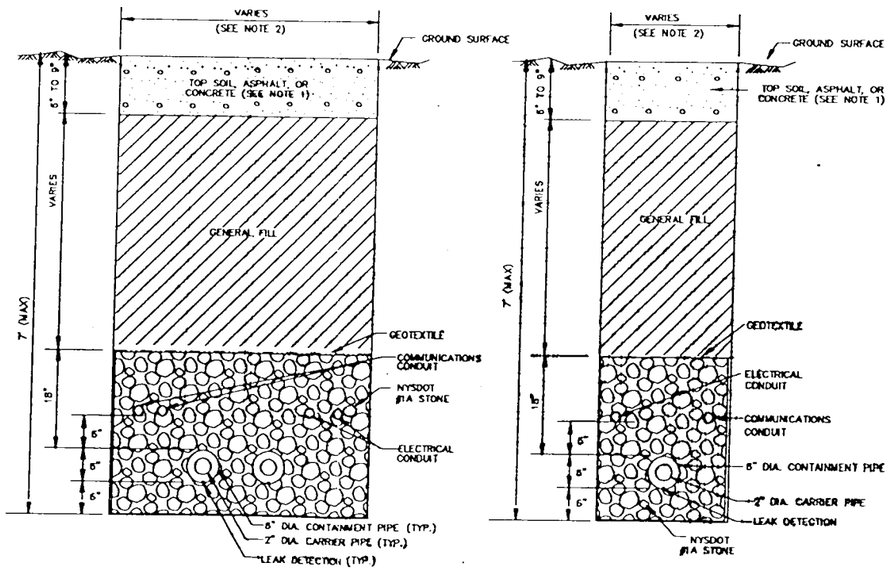
3 / B-6 CONTAINMENT / VAULT CONNECTION DETAIL

NOT TO SCALE



6 / B-6 TYPICAL PIPE CROSS SECTION INSIDE VAULT

NOT TO SCALE



C-C' / B-6 TYPICAL TRENCH DETAIL

1 0 1 2 scale feet

D-D' / B-6 TYPICAL TRENCH DETAIL

1 0 1 2 scale feet

LEGEND

4 / B-5 — DETAIL/CROSS SECTION DESIGNATION; DWG. No. WHERE DETAIL/CROSS SECTION IS PRESENTED

NOTE

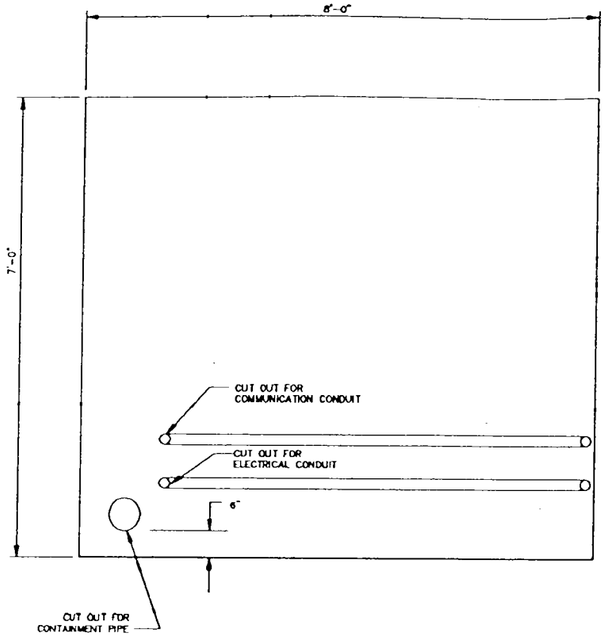
1. CONTRACTOR MUST BACKFILL TOP OF TRENCH AND RESTORE SITE TO ORIGINAL SURFACE CONDITIONS. BACKFILL TOP OF TRENCH WITH TOP SOIL AND RESEED OR RESURFACE WITH ASPHALT OR CONCRETE, AS REQUIRED.
2. TRENCHING MAY REQUIRE SLOPING OF TRENCH SIDEWALLS; SHOWN AS VERTICAL CUT FOR PRESENTATION PURPOSE ONLY. ALL TRENCH SIDES/SLOPES SHALL BE SLOPED OR BENCHED IN ACCORDANCE WITH OSHA REGULATIONS. A TRENCH BOX OR SHORING AND BRACING MAY ALSO BE USED, SUBJECT TO THE SAME REGULATIONS.
3. INCLUDE LEAK DETECTION JUNCTION FOR LEAK DETECTION CABLE FOR FUTURE WELL.

REV	DATE	DESCRIPTION	CHK BY	APVD BY

SCALE: AS SHOWN	PROJECT: Bell Aerospace TEXTRON, WHEATFIELD, NEW YORK	
PROJECT No. 923-9055		
DES BY RJM	3/13/92	SHEET TITLE: EXTRACTION SYSTEM DETAILS (SHEET 2 OF 2)
DR BY EAH	3/13/92	
CHK BY RJM	3/12/93	
APVD BY	3/12/93	

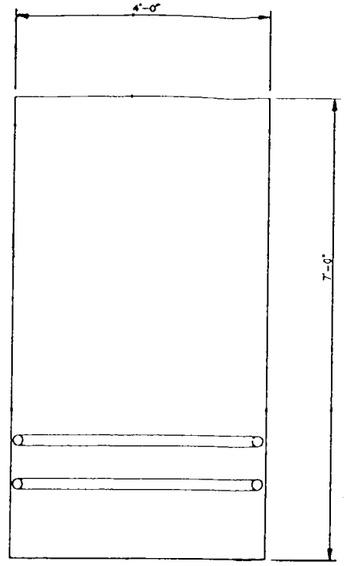
CONSERVA-TECH (Woodbridge, New Jersey) — Golder Associates, Buffalo, New York

SHEET OF — FILE No. N901-290 — B-6



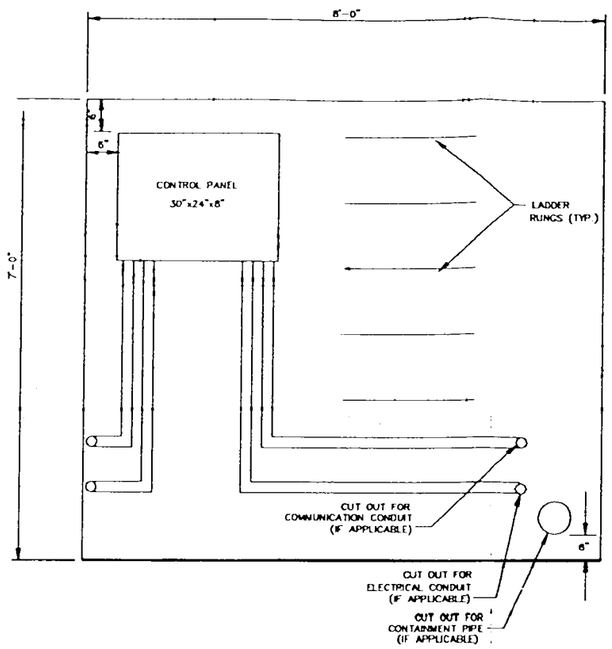
1 / B-7 **ELEVATION 1**

scale 1 0 1 2 feet



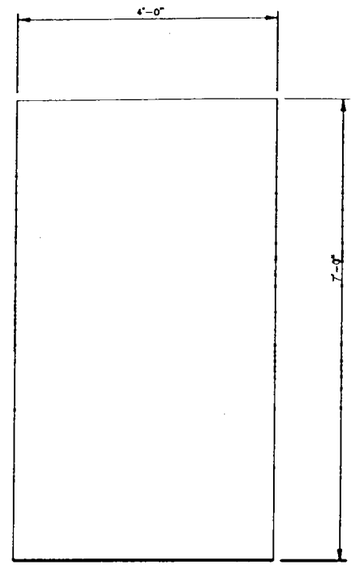
2 / B-7 **ELEVATION 2**

scale 1 0 1 2 feet



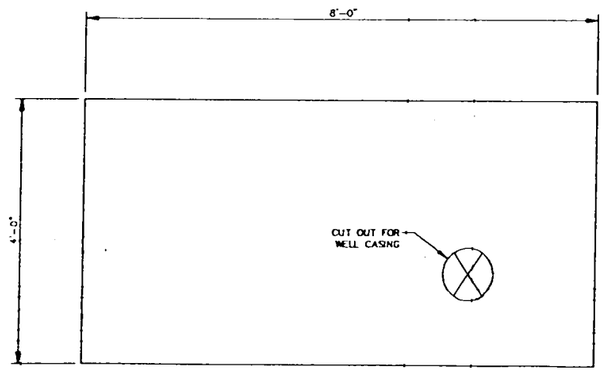
3 / B-7 **ELEVATION 3**

scale 1 0 1 2 feet



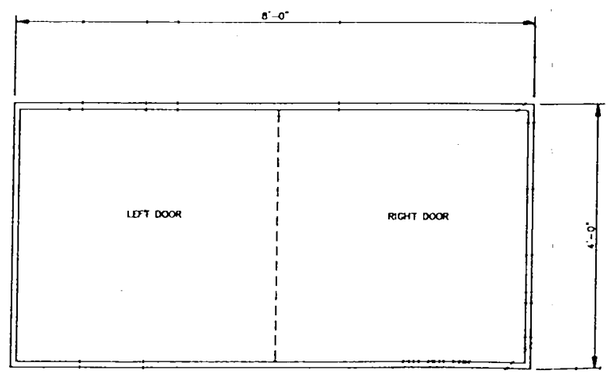
4 / B-7 **ELEVATION 4**

scale 1 0 1 2 feet



5 / B-7 **VAULT BASE PLAN**

scale 1 0 1 2 feet



6 / B-7 **VAULT CAP PLAN**

scale 1 0 1 2 feet

LEGEND

4 / B-5 — DETAIL/CROSS SECTION DESIGNATION
DWG. No. WHERE DETAIL/CROSS SECTION IS PRESENTED

NOTE

ELECTRICAL AND COMMUNICATION BOX JUNCTION BOXES NOT SHOWN.

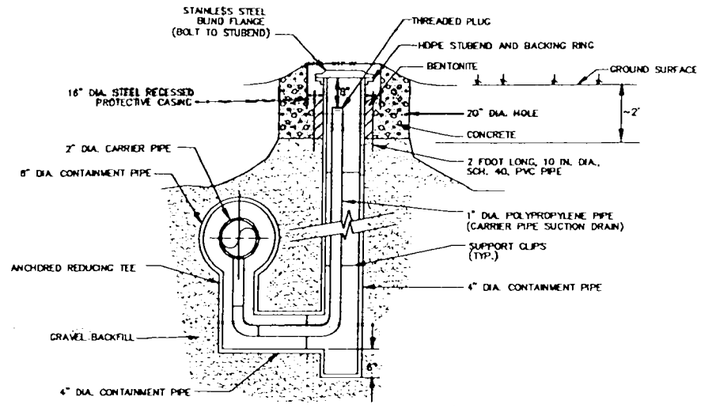
REV	DATE	DESCRIPTION	DR BY	RVW BY

SCALE: AS SHOWN	PROJECT: Bell Aerospace TEXTRON WHEATFIELD, NEW YORK	
PROJECT No. 923-9055		
DES. BY RJH	3/13/92	SHEET TITLE: VAULT DETAILS
DR. BY LAH	3/13/92	
CHK. BY RJH	3/13/92	
RVW BY ALG	3/12/93	

CONSERVA-TECH Milltown, New Jersey

Golder Associates Buffalo, New York

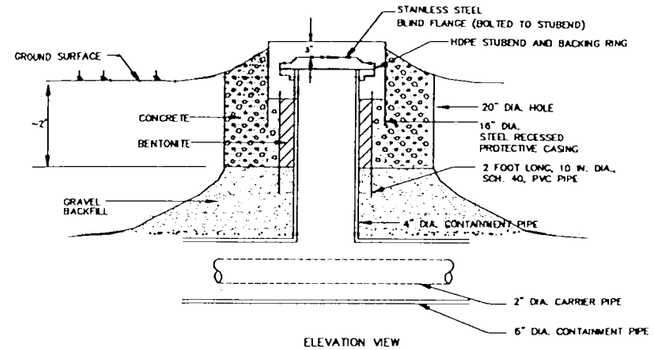
SHEET OF
File No. NY01-291
B-7



CROSS-SECTION, ELEVATION VIEW

1/B-8 PUMP OUT DETAIL (LOW POINT)

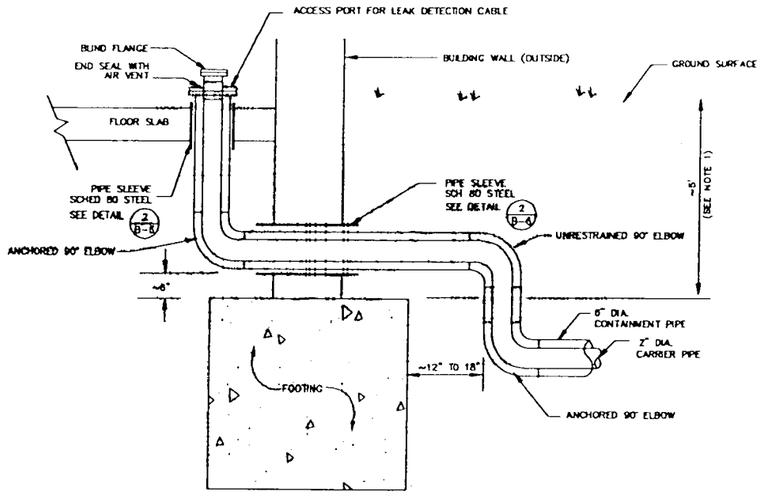
NOT TO SCALE



ELEVATION VIEW

2/B-8 MAINTENANCE/INSPECTION PORT

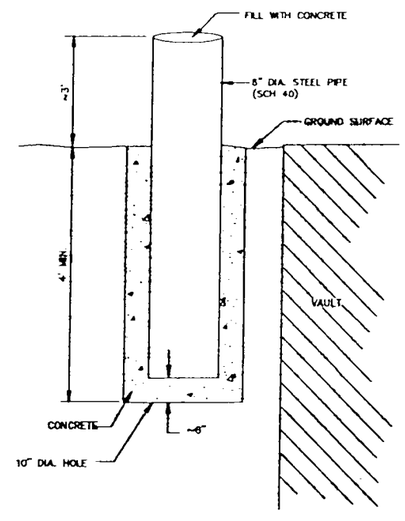
NOT TO SCALE



ELEVATION VIEW

3/B-8 PIPING INTO BUILDING ELEVATION DETAIL

NOT TO SCALE



4/B-8 BOLLARD DETAIL

NOT TO SCALE

LEGEND

4/B-5 — DETAIL/CROSS SECTION DESIGNATION
DWG. No. WHERE DETAIL/CROSS SECTION IS PRESENTED

NOTE

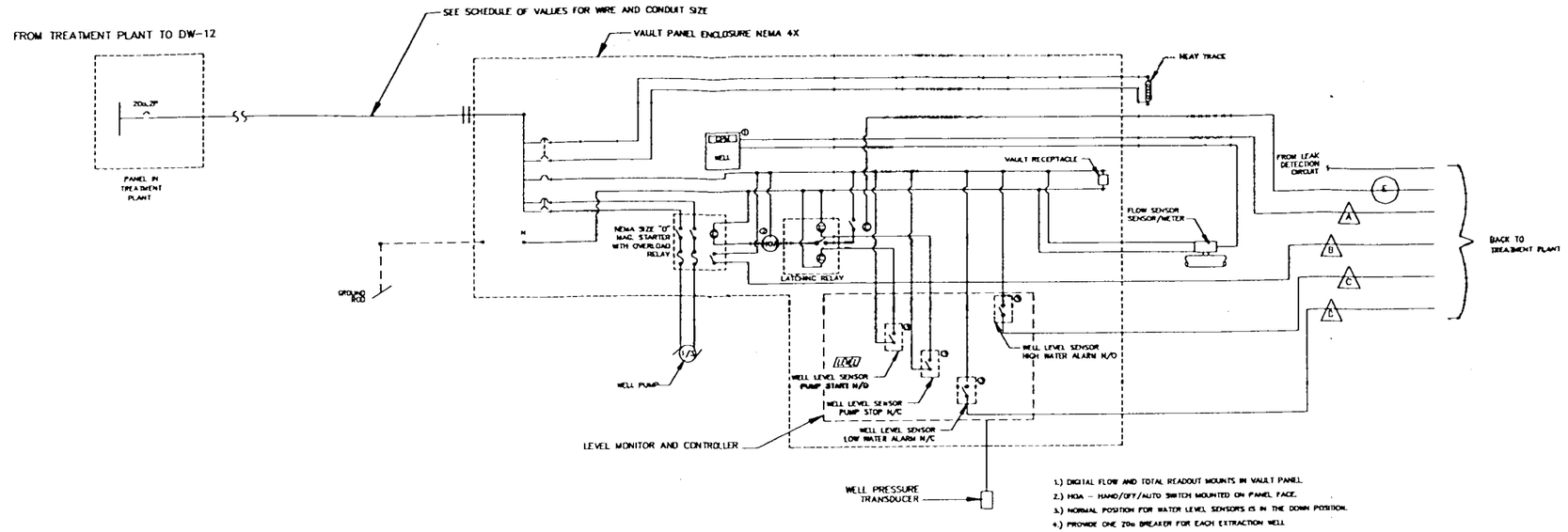
1. TOP OF FOOTING ESTIMATED TO BE 5 FT. BELOW GROUND SURFACE. CONTRACTOR SHALL NOTIFY OWNER OR OWNER'S REPRESENTATIVE FOR ANY VARIANCE.
2. TWO SEPARATE PIPELINES TO ENTER TREATMENT PLANT BUILDING, AS SHOWN ON DRAWING B-4. REFER TO ON-SITE WASTE WATER TREATMENT FACILITY DESIGN FOR ENTRANCE LOCATIONS.

REV	DATE	DESCRIPTION	DR BY	DWG BY

SCALE: AS SHOWN
PROJECT No. 923-9055
PROJECT: Bell Aerospace TEXTRON, WHEATFIELD, NEW YORK
SHEET TITLE: PIPING DETAILS

DES BY	RJH	3/14/92
DR BY	EAH	3/14/92
CHK BY	RJH	3/12/93
RVW BY	AEG	3/12/93

CONSERVA-TECH, Williamstown, New Jersey
Golder Associates, Buffalo, New York
SHEET OF
FILE No. NY01-292
B-8



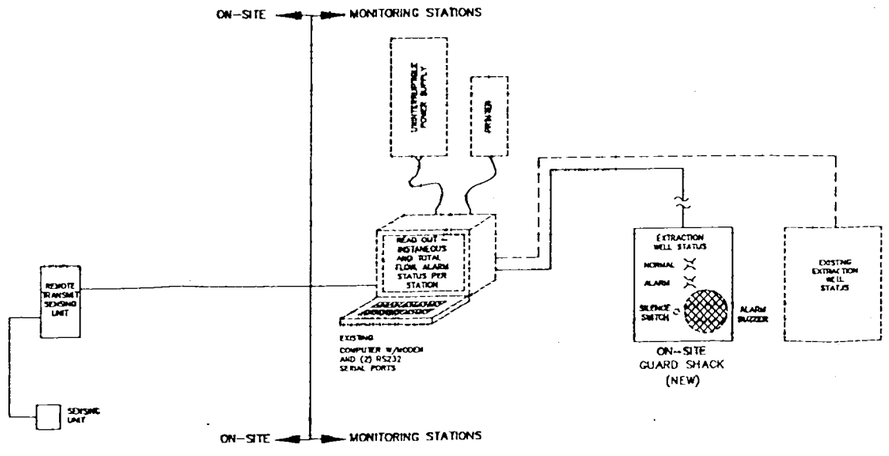
1 / E-3 **ON-SITE CONTROL AND MONITORING DIAGRAM**

NOT TO SCALE

SCHEDULE OF VALUES
WIRE AND CONDUIT

LOCATION	CONDUIT SIZE	LOCATION	WIRE SIZE
FROM EW-8 TO EW-7	1" DIA.	FROM TREATMENT PLANT TO EW-7	#4
FROM TREATMENT PLANT TO EW-8	2" DIA.	FROM TREATMENT PLANT TO EW-8	#6
FROM DW-10 TO DW-9	2" DIA.	FROM TREATMENT PLANT TO DW-9	#4
FROM DW-12 TO DW-10	2 1/2" DIA.	FROM TREATMENT PLANT TO DW-10	#6
FROM J-BOX TO DW-11	1 1/4" DIA.	FROM TREATMENT PLANT TO DW-11	#6
FROM TREATMENT PLANT TO DW-12	3" DIA.	FROM TREATMENT PLANT TO DW-12	#10

NOTE:
EACH CIRCUIT IS TWO HOT WIRES AND NEUTRAL.
INSTALL WATER PROOF IN GROUND PULL BOXES AT ALL CHANGES IN DIRECTION, PROPOSED WELL LOCATIONS, EVERY 500 FT. AND AS REQUIRED BY CODE. INSTALL PULL WIRES IN ALL CONDUITS FOR FUTURE CIRCUITS.



2 / E-2 **ONSITE MONITORING SYSTEM**

NOT TO SCALE

LEGEND

- 19 / 3#2 — CIRCUIT NUMBER / NUMBER AND SIZE OF WIRE
- B — REMOTE TRANSMIT SENSING UNIT CHANNELS
- E — INTERLOCK TO SHUT DOWN PUMP UPON SURGE TANK HIGH ALARM OR LEAK DETECTION. PROVIDE APPROPRIATE INTERFACES
- 4 / B-5 — DETAIL/CROSS SECTION DESIGNATION / SHT. No. WHERE DETAIL/CROSS SECTION IS PRESENTED

REV	DATE	DESCRIPTION	DR BY	APVD BY

SCALE: AS SHOWN
PROJECT No. 923-9055
PROJECT: Bell Aerospace TEXTRON, WHEATFIELD, NEW YORK

DES BY	RJH	3/16/92
DR BY	EAH	3/16/92
CHK BY	RJH	3/12/93
APVD BY	AMS	3/12/93

SHEET TITLE: EXTRACTION SYSTEM ELECTRICAL DETAILS

CONSERVA-TECH, Williamstown, New Jersey
Golder Associates, Buffalo, New York

SHEET OF
FILE No. NY01-294
E-1

APPENDIX C

ON-SITE WASTEWATER TREATMENT FACILITY DESIGN AND SPECIFICATIONS

DETAILED ENGINEERING
FOR
ONSITE WASTEWATER TREATMENT FACILITY

Bell Aerospace Textron
Niagara Falls, NY

August 28, 1992

Prepared for: **Bell Aerospace Textron**
2221 Niagara Falls Blvd.
Niagara Falls, New York 14304

Prepared by: **Resource Technologies Group, Inc.**
3190 S. Wadsworth Blvd., Suite 250
Lakewood, Colorado 80227

Introduction

Resource Technologies Group, Inc. (RTG) was originally retained by Bell Aerospace Textron (BAT) to construct and operate a water treatment pilot plant and conduct treatability studies for treatment of contaminated groundwater at the BAT Niagara Falls, NY facility. The results of these studies were presented in Treatability Study on Contaminated Groundwater (May 30, 1990).

In May 1991, RTG submitted a proposal to BAT to prepare a detailed design for a system to treat contaminated wastewater. This treatment system will be located at the BAT facility in an existing warehouse area.

The treatment process train flow sheet for contaminated groundwater at the BAT Niagara Falls, New York facility has been developed based on the pilot air strip tower testing and dynamic bench scale carbon column testing. The layout of the process equipment is shown on the General Arrangement on Drawing 300 while the treatment train is shown in detail on the Piping and Instrumentation Diagrams (P&IDs), Drawings 400 and 401. The treatment train consists of the following major unit processes:

- Phase Separator;
- Shallow Tray Air Stripper;
- Carbon Adsorption Columns; and
- Thermal Oxidation Off-gas Treatment;

The proposed flow sheet has been designed to treat waters from both dense non-aqueous phase liquid (DNAPL) zone and from site boundaries. Each of these unit processes will be described in greater detail, including a process description, process design criteria and equipment sizing, in the following sections. The integration of the unit processes into the treatment process train will then be discussed.

Phase Separator

The phase separator is included to remove free oil, LNAPL, DNAPL and settleable solids from the wastewater stream to prevent the fouling of downstream process equipment. The oil/water separator will be a gravity slant rib coalescing type system that promotes the separation of free oil and LNAPL from DNAPL and settleable solids in liquid streams. The removal of free oil and LNAPL is due to the impingement and adherence of fine droplets upon surfaces. Additional droplets continue to be attracted to these surfaces and coalesce or merge with previously deposited droplets to produce much larger droplets. When the droplets are large enough, they break free and rise rapidly to the surface where they are skimmed or decanted from the unit. The coalescing action allows removal of small droplets.

The use of slant rib media provides maximum surface area for coalescence and subsequent oil and LNAPL removal. The media is constructed of a material such as stainless steel that attracts oil and LNAPL. In addition, the slanted configuration of the media encourages the separation of DNAPL and settleable solids toward the bottom of the unit. If DNAPL is present in this water, it will sink to the bottom of the separator, because it is heavier than water. Similarly, if LNAPL and/or oil is present it will rise to the top of the separator because it is lighter than water. The coalescence of droplets into larger drops promotes the rise of lighter than water components by increasing the area for buoyant forces to act upon.

The wastewater enters the coalescing separator unit and is dispersed through a diffuser across the width and depth of the packing material. Larger solids drop out into the sludge chamber before entering the packing while the wastewater flows through the separation chamber filled with the slant rib packing. The ribbed plates are arranged vertically in the direction of flow. The sludge chamber is located below the separation chamber and has sloped sides to ensure the easy removal of all sludge. The DNAPL and settled solids in the sludge chamber are periodically removed to drums

for proper disposition. The separated oil and LNAPL accumulates at the surface of the separation chamber. The oil/ LNAPL layer increases until it spills over a weir into an reservoir. The clean water passes under a retention baffle and into the clean water chamber. A weir in the clean water chamber assures a constant liquid level in the separator.

The coalescing phase separator is designed for a flowrate of 15 gpm. The wastewater from DNAPL zone wells will be pumped through the phase separator to remove DNAPLs and oils and LNAPLs prior to treatment downstream.

Shallow Tray Air Stripper

Air stripping is a proven technology for the removal of volatile organic compounds (VOCs) from water streams. A VOC is a compound with a relatively high vapor pressure and therefore a high Henry's Law constant. The Henry's Law constant is the ratio of the gas phase and liquid phase concentration for a compound at equilibrium. A high Henry's constant indicates greater partitioning of the compound into the gas phase relative to the liquid phase. The Henry's constant is temperature dependent, increasing with increasing temperature.

In an air stripping process the transfer of contaminants from the liquid stream to the air stream is encouraged by continuously contacting the liquid stream with large volumes of air. The rate of mass transfer of contaminants from the liquid phase to the gas phase is proportional to the Henry's Law constant, the interfacial area for gas transfer, and the concentration gradient between the liquid and gas phase. The Henry's Law constant is a temperature dependent constant specific for each contaminant. Removal efficiency can be increased by increasing the water temperature and therefore increasing the Henry's constant. The interfacial area for gas transfer is maximized by providing surface area to break up the water stream into small droplets, fine particles or a thin film. The concentration gradient between the

liquid and gas phase is maximized by the countercurrent continuous flow of air.

For this application a shallow tray air stripper has been specified. The shallow tray unit process uses forced draft, countercurrent air stripping through baffled aeration trays to remove VOCs from water. Contaminated water is sprayed into the inlet chamber through a coarse mist spray nozzle. The water is at a sufficient velocity through the spray nozzle that plugging or fouling of the nozzle by precipitation should not occur. The water flows over a flow distribution weir and along the baffled aeration tray. Air, blown up through small diameter holes in the aeration tray, forms a froth of bubbles generating a large mass transfer surface area where the contaminants are volatilized.

The shallow tray air stripper has been designed for a flowrate of 30 gpm. The shallow tray air stripping system will consist of two units in series with four trays each. To minimize emission sources, the air from the second unit will then be routed to the first unit in the series. The influent design basis is as follows:

trichloroethene	257 mg/l
trans-1,2-dichloroethene	51 mg/l
vinyl chloride	51 mg/l
methylene chloride	154 mg/l

After treatment in the shallow tray air stripper system the effluent concentrations of each of these contaminants will be less than 1 ug/l with the exception of methylene chloride which will have an effluent concentration of 2 ug/l. The assure the removal of these contaminants to the required levels a removal efficiency of 99.99% is required, therefore, two trays in series will be used. To minimize the off-gas streams requiring treatment, the air effluent from the second tower will be used as the air influent to the first tower in the series. Therefore, only the air effluent from the first tower in the series will require off-gas treatment.

Air used for the operation of the towers can be either inside air (heated building air) or an outside air. The performance efficiency of an air strip tower is greatly affected by the water temperature, however, the air temperature has minimal effect because the mass and heat capacity of air are small relative to water at the conditions the towers will be operated. For convenience the use of inside air will be assumed since the use of outside air would require additional ductwork, wall penetrations, and possibly filter and louver installation.

Carbon Adsorption Columns

Granular activated has been used extensively for the removal of soluble organic compounds from drinking water, wastewater, and contaminated surface and ground waters. Activated carbon will adsorb trace amounts of a broad range of organics and is used as a polishing step to ensure that the effluent quality goals are consistently met. Organics and other compounds reversibly bind to active sites on the carbon. When the active sites are full the carbon is defined as being in the loaded state. The carbon can be regenerated thermally at an onsite facility or at offsite commercial thermal regeneration facilities.

Because of the potential for presence of PCBs in the wastewater, a three column system will be used with one column serving as a sacrificial column. Commercial regeneration facilities will not accept carbon loaded with PCB and therefore this carbon will probably require incineration or solidification and disposal as a solid waste. PCBs load preferentially over the other organic compounds expected to be present in the wastewater. Therefore, the first column will contain the PCB fraction of the organics. The effluent from the first column will be monitored quarterly to detect breakthrough of PCBs so that the column can be replaced. The sample frequency will be modified as data becomes available to indicate the approximate time required for column breakthrough. Sample points will be available between each of the carbon columns.

The second and third columns will be in the typical lead column, lag column mode of operation. One column will serve as the lead column and perform the majority of the organic removal. The lag or second column in the series will remain in an unloaded state and serve to catch any breakthrough from the first column when it becomes fully saturated. The effluent from the first column will be monitored to detect breakthrough and indicate that replacement of the first column is required. Operation in this type of mode allows a complete saturation of the first column. When the first column is replaced it becomes the lag column and the second column becomes the lead column. All three columns will be plumbed so that any column can operate first, second or third in the series. Additionally, sample points will be installed between all columns so that a sample can be gathered from the lead column to monitor for breakthrough of PCBs regardless of the flow configuration. It is likely that when breakthrough occurs with the sacrificial PCB column the next column in the series will become the sacrificial column because it will have caught any breakthrough and have some PCBs loaded.

The activated carbon columns are downflow fixed bed carbon columns with backwash capabilities so that the bed can be redistributed if necessary. The carbon may become packed down and accumulate fines when in operation for long periods of time, therefore backwash capability is included to redistribute the bed and allows for the removal of fines and particulate material. The column system is prepiped for the lead/lag and backwash configurations and skid mounted by the manufacturer. The columns are each designed to handle a normal flowrate of 30 gpm. Each carbon column is 57 inches in diameter and 91 inches high with approximately 2,000 pounds of carbon.

Thermal Oxidation Off-gas Treatment

The air exiting from the first air strip tower is likely to have unacceptable levels of organic contaminants for direct discharge to the atmosphere. As described earlier the air will be fed countercurrently through each of the two air strip towers with the effluent from the second column used as the countercurrent feed to the first air stripper. Therefore, the air effluent from the first air strip tower is the only discharge from the air stripper system and it also will contain the bulk of the organic contaminants as the majority of the organic removal takes place in the first air stripper. Therefore, some treatment is required for the air effluent stream from the first air strip tower before it is discharged. The process selected for the treatment is thermal oxidation.

The thermal oxidization process oxidizes the VOCs to carbon dioxide, water and hydrochloric acid. The thermal oxidation system used for this application includes a alkaline venturi scrubber system to removed hydrochloric acid and chlorine from the treated offgas prior to discharge. The liquid stream containing the chlorinated inorganic compounds will be recycled back to the front end of the plant and reprocessed. Monitors may be installed in the exhaust stack to assure that the exhaust is VOC-free.

If PCBs are present in the water, they will not be removed by air stripping due to the extremely low vapor pressure of PCBs. Physical carryover of water containing PCBs will be prevented by a dual demister section installed at the top of the air strip towers. Thus, no PCBs will go into the thermal oxidizer system.

The thermal oxidation process is designed to treat 1,000 scfm of air off-gas containing the contaminants listed in Table 1. This table shows the minimum, average, and maximum expected influent concentrations of organics and the expected effluent concentrations in the discharge air stream. For the purposes of a conservative design,

TABLE 1
TREATMENT PROCESS TRAIN OFFGAS a/
ONSITE WASTEWATER TREATMENT FACILITY
BELL AEROSPACE TEXTRON
WHEATFIELD, NEW YORK

Parameter	Air Stripper Effluent VOC Concentration (mg/m3)	Thermal Oxidizer Effluent VOC Concentration (mg/m3)
Oxidizer Efficiency: 99%		
Total VOCs		
Minimum	325	3.25
Average	994	9.94
Maximum	1,662	16.62
Specific Contaminants		
Trichloroethene		
Minimum	162	1.62
Average	497	4.97
Maximum	831	8.31
trans-1,2-Dichloroethene		
Minimum	32	0.32
Average	99	0.99
Maximum	166	1.66
Vinyl chloride		
Minimum	32	0.32
Average	99	0.99
Maximum	166	1.66
Methylene Chloride		
Minimum	97	0.97
Average	298	2.98
Maximum	499	4.99
Oxidizer Efficiency: 99.9%		
Minimum	325	0.32
Average	994	0.99
Maximum	1,662	1.66
Specific Contaminants		
Trichloroethene		
Minimum	162	0.16

TABLE 1 (continued)
TREATMENT PROCESS TRAIN OFFGAS
ONSITE WASTEWATER TREATMENT FACILITY
BELL AEROSPACE TEXTRON
WHEATFIELD, NEW YORK

Parameter	Air Stripper Effluent VOC Concentration (mg/m3)	Thermal Oxidizer Effluent VOC Concentration (mg/m3)
Oxidizer Efficiency: 99.9% (continued)		
Average	497	0.50
Maximum	831	0.83
trans-1,2-Dichloroethene		
Minimum	32	0.03
Average	99	0.10
Maximum	166	0.17
Vinyl chloride		
Minimum	32	0.03
Average	99	0.10
Maximum	166	0.17
Methylene Chloride		
Minimum	97	0.10
Average	298	0.30
Maximum	499	0.50

Notes:
a/ These values assume a 24 hour per day operation at 24 gpm with air discharge at 900 scfm.

the thermal oxidation system has been specified based on concentrations at 110% of the maximum expected values.

Treatment Process Train

The water from the DNAPL zone is received in the phase separator, TK-2, whereas the water from the site boundary is received in a surge tank, TK-1. In the phase separator, the DNAPL fraction is collected along with the settled solids in the bottom of the unit from where it is periodically pumped (DP-1) into 55-gallons drums for disposal. The oil and LNAPL fraction will rise and overflow from the top of the phase separator and will also be containerized for disposal. The water effluent from the phase separator overflows to the surge tank, TK-1, and is combined with the water from the site boundary extraction wells. The surge tank, TK-1, is a cone bottom tank to provide an area for settling of any solids present in the overflow from the phase separator or in the water from the site boundary wells. The bottoms of this tank will be periodically pumped (DP-2) to 55-gallon drums for disposal.

TK-1 is provided with a level controller. The level control system will include a level element in the tank that will send a signal to the level controller indicating the level in the tank. The level controller will be set to operate within a certain range with high and low level setpoint alarms and high high and low low level setpoint alarms. The level controller on a high high signal will turn the well pumps off. The low low level signal from TK-1 will stop feed pump, P-1 to the air stripper system so that the pump does not run dry. This pump turns on again when a pre-determined level is reached in TK-1.

The combined water from the surge tank TK-1 is pumped (P-1) through two parallel 50 micron bag filters (F-1 and F-2) and then to the air strip system. The bag filters serve to remove large particles that may adversely affect the operation of the air strip system. The discharge side of pump P-1 is equipped with a flow totalizer and a

pressure gauge. There is also a pressure gauge on the discharge side of the bag filters so that the pressure drop across the filters can be determined. The changeout of the bag filters will be determined when the pressure drop becomes unacceptable at approximately a 20 psi differential.

The contaminated water is pumped to the top of the first unit, ST-1, and flows down by gravity through the series of trays and is collected in a sump at the bottom of the unit. The water collected in the sump, is pumped to the top of the second unit by pump P-2. Air for stripping the volatiles in this water is provided by the blower B-2 and is pulled as the exhaust from the second column. The air exiting the first unit is essentially pulled from the second unit and pushed through the first unit by blower B-1. The offgas air from the first unit is treated in the thermal oxidizer prior to discharge. The second unit, ST-2, is identical to the first with water flowing by gravity through a series of trays and is collected in a sump. Air is provided to the second air strip unit by blower B-2. The water collect in the sump of ST-2 is pumped by pump P-3 through another series of filters to the carbon adsorption system.

The air strip units operate automatically. The water level in the sump of each unit is controlled by a level controller which turns Pumps P-1, P-2, and P-3 on and off as required to maintain a given level of water in the sump. Water pressure and air pressure indicators and alarms are included to help in evaluating the performance of the strip unit and can serve to indicate plugging or flow problems.

The second set of filters (F-3 and F-4) in the treatment process train are 10 micron cartridge filters. The process downstream, carbon adsorption, is more sensitive to particulate matter and so these bag filters are finer than those at the front end of the air strip system. Granular activated carbon columns can blind with excessively high particulate concentrations. These filters will also be changed out when the pressure drop across the filters reaches an unacceptable level of approximately 20 psi.

Following the cartridge filters the wastewater stream flows through the carbon adsorption system for final polishing prior to discharge. The carbon adsorption system consists of three downflow fixed bed columns in series (CA-1, CA-2, and CA-3). The effluent from the first column is fed into the second column and the effluent from the second column is fed to the third column. When carbon in the first column becomes saturated with PCBs, as determined by the assay results, the column is taken out of service and its loaded carbon is replaced with fresh carbon. The spent carbon from the PCB sacrificial column must be containerized and disposed. Once filled with the regenerated carbon, the column is brought back on-stream again, not as a lead column but as a follow-up unit. When the second column in the series becomes saturated with organics, as determined by assay results, the column is taken out of service and the carbon replaced. The spent carbon from this column can be sent to an offsite thermal regeneration facility. When this column is brought back on-line it becomes a lag column and the third column in the series acts as the lead organic removal column. The effluent from this step is received in an effluent pH adjustment tank, TK-5, where the pH is adjusted if necessary, and water is then pumped and discharged. The only instruments used by the activated carbon system are the locally-mounted pressure gauges to indicate pressure drop across the columns. The effluent pH adjustment tank, TK-5, is equipped with controls to automatically adjust the pH to the required range with either acid or base. In addition, the discharge pump is equipped with a flow element and totalizing indicator so that the flow through the system can be monitored.

The final process in the treatment process train is the off-gas treatment system, OGT-1, for the air stripper air discharge stream. This system includes a natural gas fired thermal oxidation unit,a quench tower and an alkaline scrubber that serves to remove hydrochloric acid and chlorine from the off-gas stream prior to discharge to the atmosphere. This system is a self-contained skid mounted system that comes complete from the vendor with automatic controls and the control panel. The liquid stream from the scrubber should be minimal in volume and is returned by pump P-4

to TK-1 for reprocessing in the treatment plant.

The entire treatment system will be enclosed in an existing building with secondary containment as required. The treatment process train layout is a logical procession of treatment steps with adequate room for operations and maintenance activities.

The equipment specifications for each piece of equipment described in the preceding text and also on the P&IDs are included as Appendix A.

In addition to the General Arrangement (Drawing No. 300) and the Piping and Instrumentation Diagrams (Drawing Nos. 400 and 401), a simple piping diagram (Drawing No. 500) and an electrical power distribution diagram (Drawing No. 600) were prepared. The piping diagram is intended to show the piping required that is not supplied by the various equipment vendors. For instance, the three carbon columns will be delivered with the necessary piping for backwashing any column and also allows any column to serve as the sacrificial, lead, or lag column. The electrical power distribution diagram was prepared so that an onsite or contract electrician could use the drawing to prepare an estimate for Bell Aerospace Textron and ultimately provide electrical power to the process equipment. The drawings are included as a full size package.

Appendix A

Equipment Specifications

Equipment Specification

STEEL TANK

Bell Aerospace Textron Onsite
Wastewater Treatment Facility
Wheatfield, New York

PART 1 - Scope

1.1 Work Included

A. Furnish one (1) steel tank. The tank shall be in accordance with this specification section, drawings and other referenced information.

1.2 Equipment Identification

A. TK-1 Holding Tank

1.3 Description

A. This specification describes, in part, a tank required for the Bell Aerospace Textron Onsite Wastewater Treatment Facility to be located in Wheatfield, New York. This specification section pertains to the submittal requirements, equipment to be furnished and the quality assurance criteria for this tank package.

B. This specification describes the requirements of the tank to be furnished, but does not attempt to enumerate all the details of accessories and appurtenances required to render the tank functional. Such details shall be provided in the proposal submitted by the seller, for the approval by the purchaser. The seller is to furnish the tank complete and capable of performing as specified.

PART 2 - General Provisions

2.1 Applicable Codes, Standards, and Publications

A. ASTM - American Society for Testing and Materials

B. NACE - National Association of Corrosion Engineers

C. ASME - American Society of Mechanical Engineers

D. ANSI - American National Standards Institute

E. AWS - American Welding Society

2.2 Reference Drawings and Specifications

A. Drawing 300 General Arrangement

PART 3 - Submittals

A. In addition to those requirements in section 5.2 regarding Quality Assurance, the following submittals shall be submitted by the Seller for the purchaser's review and approval before fabrication:

1. Arrangement Drawings: Drawings showing location and layout of all nozzles, legs, and lifting lugs.

2. Component Information: Information including materials of construction, coatings including color selection), and load data.

3. Installation Data: Information on installation recommendations and offloading procedures.

PART 4 - Technical Provisions

4.1 Performance Requirements

A. The tank shall be designed to properly hold wastewater and sludge as specified. The tanks will be located indoors and will be operating with liquids ranging in temperature of 32°F to 90°F.

B. The tank shall be designed for a minimum plant operating life of 20 years.

C. TK-1 Holding Tank will be used to feed the shallow tray stripper wastewater overflow from the coalescing phase separator.

4.2 Equipment Description

A. The tank shall be constructed of stainless steel. The tank shall be designed for atmospheric pressure. Size of the tank shall be as follows:

7 foot diameter by 7' straight side with a 30° cone bottom cap-capable of holding 1,800 gallons.

B. The tank shall be equipped with one (1) 4" flanged drain, one (1) 1 inch NPT-1/2 female coupling connection, and two (2) 4 inch flanged nozzles.

C. The tank shall include six (6) structural steel legs.

D. The tank shall include a ladder which extends 30 inches above the tank top and is flared to permit for a step through. The ladder shall reach the floor.

4.4 Welding

A. All welding shall be performed by certified welders in accordance with AWS standards.

PART 5 - Quality Assurance Requirements

5.1 Quality Assurance Program Requirements

A. The Seller must be regularly engaged in the design and fabrication of similar equipment.

B. The Seller may be required to participate in a preaward evaluation based on their past job performance. The evaluation requires an examination by the Purchaser including a review of other similar projects and a visit to the Seller's facilities.

C. The Purchaser reserves the right to inspection and surveillance at any time during fabrication. For this project inspections will be required to verify the conformance of activities of items to specified requirements. Surveillance of the Seller's work will be monitored by Purchaser's personnel to monitor or observe an activity to verify that the activity conforms to the specified requirements.

5.2 Quality Assurance Submittals

A. Submittals will be required for the quality assurance procedures described below.

B. Sellers list of ten (10) similar operating installations including customer name, contact name, contact telephone, description of equipment installed, date installed, and application information.

C. Seller's proposed technique for proper surface preparation, and proper coating application, hydrotesting and certification/ records demonstrating that materials of construction conform to this specification.

D. Sellers documentation of Inspection and Test Results.

5.3 Inspection and Test Requirements

A. The Seller will be required to furnish record of inspections and the qualifications of the inspector, and proper surface preparation, proper coating application.

B. A final inspection in the presence of the Purchaser's inspector may be required prior to shipping.

5.4 Surveillance

A. The Purchaser may visit the Seller's facility at any time during fabrication without notification.

B. The Seller will be required to provide one week notification prior to the hydrotesting of the tank for surveillance by the Purchaser or Purchaser's representative.

PART 6 - Packaging

A. Before shipment, all pre-assembled unit and components shall be disassembled only to the extent necessary to facilitate field handling and prevent damage during shipment. Each assembly of component shall be suitably protected against damage or loss during shipment and to facilitate field handling. All openings, except top, shall be closed with temporary closures to prevent entry of dust, dirt or other foreign matter.

B. All equipment shall be clearly marked with project information, and the equipment number.

C. All water shall be drained from the equipment.

D. Seller will be responsible for loss or damage of merchandise while shipment is in the possession of carrier and until it is delivered and unloaded at the final destination.

PART 7 - Installation, Start-up and Final Acceptance

A. Equipment will be installed and started-up by others.

B. The equipment will be accepted upon completion of the performance test and acceptance by the Purchaser or Purchaser's representative.

PART 8 - Warranties

A. The Seller shall warranty the equipment to be free from defects in equipment, material or design furnished, or workmanship performed by the Seller for a period of one year from the date of final acceptance.

B. Any equipment purchased by the Seller and part of the Seller's equipment package shall be warranted as part of the Seller's equipment.

C. Any corrective measures required during the warranty period will be at the Seller's expense.

Equipment Specification

CENTRIFUGAL PUMPS

Bell Aerospace Textron Onsite
Wastewater Treatment Facility
Wheatfield, New York

PART 1 - Scope

1.1 Work included

A. Furnish two (2) centrifugal pumps. The pumps shall be in accordance with this specification section, drawings and other referenced information.

1.2 Equipment Identification

A. **P-1** Shallow Tray Feed Pump

B. P-9 Treated Effluent Pump

1.3 Description

A. This specification describes, in part, the pumps required for the Bell Aerospace Textron Onsite Wastewater Treatment Facility to be located in Wheatfield, New York. This specification section pertains to the submittal requirements, equipment to be furnished and the quality assurance criteria for this equipment package.

B. This specification describes the requirements of the pumps to be furnished, but does not attempt to enumerate all the details of accessories and appurtenances required to render the pumps functional.

Such details shall be provided in the proposal submitted by the seller, for the approval by the purchaser. The seller is to furnish the pumps complete and capable of performing as specified.

PART 2 - General Provisions

2.1 Applicable Codes, Standard, and Publications

A. ASME - American Society of Mechanical Engineers
B. ANSI - American National Standards Institute
C. AGMA - American Gear Manufactures Association
D. Hydraulic Institute Standards

PART 3 - Submittals

A. In addition to those requirements in section 5.2 regarding Quality Assurance, the following submittals shall be submitted by the Seller for the purchaser's review and approval before fabrication:

1. Dimensional Drawings: Equipment dimensions

2. Component Information: Information including materials of construction, coatings (including color selection), and pump curves.

3. Installation Data: Information on installation recommendations.

PART 4 - Technical Provisions

4.1 Performance Requirements

A. The pumps shall be designed to pump the reagents or effluents as specified in section 4.2. The pumps will be located indoors and will be operating with liquids ranging in temperature of 32°F to 90°F.

B. The pumps shall be designed for a minimum plant operating life of 10 years.

C. P-1 Shallow Tray Feed Pump shall feed a neutral pH water at 30 feet of head at a flowrate of 30 gpm.

D. P-9 Treated Effluent Pump shall feed a neutral pH water at 20 feet of head at a flowrate of 30 gpm.

4.2 Equipment Description

A. P-1 Shallow Tray Feed Pump shall be a horizontal close-coupled, end suction centrifugal pump Model NPE as manufactured by G & L, a Goulds Pumps Company or equal. See attached data sheet.

B. P-9 Treated Effluent Pump shall be a horizontal close-coupled, end suction centrifugal pump Model NPE as manufactured by G & L, a Goulds Pumps Company or equal. See attached data sheet.

PART 5 - Quality Assurance Requirements

5.1 Quality Assurance Program Requirements

A. The Seller must be regularly engaged in the design and fabrication of similar equipment.

B. The Seller may be required to participate in a preaward evaluation based on their past job performance. The evaluation requires an examination by the Purchaser including a review of other similar projects and a visit to the Seller's facilities.

C. The Purchaser reserves the right to inspection and surveillance at any time during fabrication. For this project inspections will be required to verify the conformance of activities of items to specified requirements. Surveillance of the Seller's work will be monitored by Purchaser's personnel to monitor or observe an activity to verify that the activity conforms to the specified requirements.

5.2 Quality Assurance Submittals

A. Submittals will be required for the quality assurance procedures described below.

B. Sellers list of ten (10) similar operating installations including customer name, contact name, contact telephone, description of equipment installed, date installed, and application information .

C. Sellers documentation of Inspection and Test Results (if any).

D. A Certificate of Conformance Statement indicating that the equipment supplied meets the requirements of the specification.

5.3 Inspection and Test Requirements

A. The Seller will be required to furnish record of inspections of proper surface preparation, proper coating application and functional testing.

B. A final inspection in the presence of the Purchaser's inspector may be required prior to shipping.

5.4 Surveillance

A. The Purchaser may visit the Seller's facility at any time during fabrication without notification.

B. The Seller will be required to provide one week notification prior to the shipment for surveillance by the Purchaser or Purchaser's representative.

PART 6 - Packaging

A. Each pump with components shall be suitably protected against damage or loss during shipment and to facilitate field handling.

B. All equipment shall be clearly marked with project information, and the equipment number.

C. Any special tools and devices required for operation, maintenance and dismantling of any equipment shall be included in the quoted price and

delivered with the equipment, in a new and unused condition. All special tools and devices shall be marked with a metal tag clearly identified with project information and equipment number.

D. Seller will be responsible for loss or damage of merchandise while shipment is in the possession of carrier and until it is delivered and unloaded at the final destination.

PART 7 - Installation, Start-up and Final Acceptance

A. Equipment will be installed and started-up by others.

B. The equipment will be accepted upon completion of the performance test.

PART 8 - Warranties

A. The Seller shall warranty the equipment to be free from defects in equipment, material or design furnished, or workmanship performed by the Seller for a period of one year from the date of final acceptance.

B. Any equipment purchased by the Seller and part of the Seller's equipment package shall be warranted as part of the Seller's equipment.

C. Any corrective measures required during the warranty period will be at the Seller's expense.

Equipment Specification

POSITIVE DISPLACEMENT METERING PUMPS

Bell Aerospace Textron Onsite
Wastewater Treatment Facility
Wheatfield, New York

PART 1 - Scope

1.1 Work included

A. Furnish three positive displacement metering pumps. The pumps shall be in accordance with this specification section, drawings and other referenced information.

1.2 Equipment Identification

A.	**P-6**	Off-Gas Scrubber Sump Neutralization Pump
B.	P-7	TK-5 pH Adjust (caustic) Pump
C.	P-8	TK-5 pH Adjust (acid) Pump

1.3 Description

A. This specification describes, in part, the pumps required for the Bell Aerospace Textron Onsite Wastewater Treatment Facility to be located in Wheatfield, New York. This specification section pertains to the submittal requirements, equipment to be furnished and the quality assurance criteria for this equipment package.

B. This specification describes the requirements of the pumps to be furnished, but does not attempt to enumerate all the details of

accessories and appurtenances required to render the pumps functional. Such details shall be provided in the proposal submitted by the seller, for the approval by the purchaser. The seller is to furnish the pumps complete and capable of performing as specified.

PART 2 - General Provisions

2.1 Applicable Codes, Standard, and Publications

A. ASME - American Society of Mechanical Engineers

B. ANSI - American National Standards Institute

C. Hydraulic Institute Standards

PART 3 - Submittals

A. In addition to those requirements in section 5.2 regarding Quality Assurance, the following submittals shall be submitted by the Seller for the purchaser's review and approval before fabrication:

1. Dimensional Drawings: Equipment dimensions

2. Component Information: Information including materials of construction, coatings(including color selection), and pump curves.

3. Installation Data: Information on installation recommendations.

PART 4 - Technical Provisions

4.1 Performance Requirements

A. The pumps shall be designed to pump the reagents or effluents as specified in section 4.2. The pumps will be located indoors and will be operating with liquids ranging in temperature of 32°F to 90°F.

B. The pumps shall be designed for a minimum plant operating life of 10 years.

C. P-6 Off-Gas Scrubber sump neutralization pump shall feed a high pH caustic at 20 feet of head at a flowrate of 1262 ml/min.

D. P-7 TK-5 pH Adjust Pump shall feed a high pH caustic at 20 feet of head at a flowrate of 1262 ml/min.

E. P-8 TK-5 pH Adjust Pump shall feed a low pH (acid) at 20 feet of head at a flowrate of 1262 ml/min.

4.2 Equipment Description

A. P-6 Off-Gas Scrubber sump neutralization pump shall be positive displacement liquifram type pump as manufactured by Liquid Metronics Incorporated model D741-35P or equal. See attached sheets.

B. P-7 TK-5 pH Adjust (caustic) Pump shall be positive displacement liquifram type pump as manufactured by Liquid Metronics Incorporated model D741-35P or equal. See attached sheets.

C. P-8 pH Adjust (acid) Pump shall be positive displacement liquifram type pump as manufactured by Liquid Metronics Incorporated model D741-35P or equal. See attached sheets.

PART 5 - Quality Assurance Requirements

5.1 Quality Assurance Program Requirements

A. The Seller must be regularly engaged in the design and fabrication of similar equipment.

B. The Seller may be required to participate in a preaward evaluation based on their past job performance. The evaluation requires an examination by the Purchaser including a review of other similar projects and a visit to the Seller's facilities.

C. The Purchaser reserves the right to inspection and surveillance at any time during fabrication. For this project inspections will be required to verify the conformance of activities of items to specified requirements. Surveillance of the Seller's work will be monitored by Purchaser's personnel to monitor or observe an activity to verify that the activity conforms to the specified requirements.

5.2 Quality Assurance Submittals

A. Submittals will be required for the quality assurance procedures described below.

B. Sellers list of ten (10) similar operating installations including customer name, contact name, contact telephone, description of equipment installed, date installed, and application information .

C. Sellers documentation of Inspection and Test Results (if any).

D. A Certificate of Conformance Statement indicating that the equipment supplied meets the requirements of the specification.

5.3 Inspection and Test Requirements

A. The Seller will be required to furnish record of inspections of proper surface preparation, proper coating application and functional testing.

B. A final inspection in the presence of the Purchaser's inspector may be required prior to shipping.

5.4 Surveillance

A. The Purchaser may visit the Seller's facility at any time during fabrication without notification.

B. The Seller will be required to provide one week notification prior to the shipment for surveillance by the Purchaser or Purchaser's representative.

PART 6 - Packaging

A. Each pump with components shall be suitably protected against damage or loss during shipment and to facilitate field handling.

B. All equipment shall be clearly marked with project information, and the equipment number.

C. Any special tools and devices required for operation, maintenance and dismantling of any equipment shall be included in the quoted price and delivered with the equipment, in a new and unused condition. All special tools and devices shall be marked with a metal tag clearly identified with project information and equipment number.

D. Seller will be responsible for loss or damage of merchandise while shipment is in the possession of carrier and until it is delivered and unloaded at the final destination.

PART 7 - Installation, Start-up and Final Acceptance

A. Equipment will be installed and started-up by others.

B. The equipment will be accepted upon completion of the performance test and acceptance by the Government or Government's representative.

PART 8 - Warranties

A. The Seller shall warranty the equipment to be free from defects in equipment, material or design furnished, or workmanship performed by the Seller for a period of one year from the date of final acceptance.

B. Any equipment purchased by the Seller and part of the Seller's equipment package shall be warranted as part of the Seller's equipment.

C. Any corrective measures required during the warranty period will be at the Seller's expense.

Equipment Specification

AIR OPERATED, DOUBLE DIAPHRAGM PUMPS

Bell Aerospace Textron Onsite
Wastewater Treatment Facility
Wheatfield, New York

PART 1 - Scope

1.1 Work included

A. Furnish one (1) air operated, double diaphragm pump. The pump shall be in accordance with this specification section, drawings and other referenced information.

1.2 Equipment Identification

A. SP-1 Phase Separator
B. SP-2 TK-1 Solids Pump

1.3 Description

A. This specification describes, in part, the air operated, double diaphragm pumps required for the Bell Aerospace Textron Onsite Wastewater Treatment Facility to be located in Wheatfield, New York. This specification section pertains to the submittal requirements, equipment to be furnished and the quality assurance criteria for this equipment package.

B. This specification describes the requirements of the pump(s) to be furnished, but does not attempt to enumerate all the details of accessories and appurtenances required to render the pump(s) functional. Such details shall be provided in the proposal submitted by the seller, for the approval by the purchaser. The seller is to furnish the pump(s) complete and capable of performing as specified.

PART 2 - General Provisions

2.1 Applicable Codes, Standard, and Publications

A. ASME - American Society of Mechanical Engineers
B. ANSI - American National Standards Institute
C. Hydraulic Institute Standards

PART 3 - Submittals

A. In addition to those requirements in section 5.2 regarding Quality Assurance, the following submittals shall be submitted by the Seller for the purchaser's review and approval before fabrication:

1. Dimensional Drawings: Equipment dimensions

2. Component Information: Information including materials of construction, coatings(including color selection), and pump curves.

3. Installation Data: Information on installation recommendations.

PART 4 - Technical Provisions

4.1 Performance Requirements

A. The pump(s) shall be designed to pump up to 12% solids effluent streams as specified in section 4.2. The pumps will be located indoors and will be operating with liquids ranging in temperature of 32°F to 90°F.

B. The pumps shall be designed for a minimum plant operating life of 10 years.

C. SP-1 Phase Separator shall feed a slurry at 10 feet of head at a flow rate of 15 gpm.

D. SP-2 TK-1 Solids Pump shall feed a slurry at 10 feet of head at a flow rate of 15 gpm.

4.2 Equipment Description

A. SP-1 Phase Separator Pump shall be foot mounted, compressed air operated, double-diaphragm design with ball check valves. held together with clamp bands for easy maintenance, and quick inspection. Pumping action shall be controlled by an externally serviceable air valve with only one moving part. Pump shall have a one (1) inch suction inlet and a three quarters (3/4) inch discharge port. Pump shall be self-priming, capable of high suction lift and able to run dry without damage.

Material of construction shall be as follows: wetted parts shall be of polypropylene, elastomers shall be neoprene diaphragms, neoprene valve balls and polypropylene valve seats. Non wetted parts shall be constructed of aluminum, polypropylene, and brass.

Pump shall be capable of delivering 15 gpm at 10 feet discharge head and 0 suction lift with 40 psi air pressure and 5 SCFM air supply. Pump shall be a Wilden Model M2/PO/NE/NE/PB or equal.

PART 5 - Quality Assurance Requirements

5.1 Quality Assurance Program Requirements

A. The Seller must be regularly engaged in the design and fabrication of similar equipment.

B. The Seller may be required to participate in a preaward evaluation based on their past job performance. The evaluation requires an examination by the Purchaser including a review of other similar projects and a visit to the Seller's facilities.

C. The Purchaser reserves the right to inspection and surveillance at any time during fabrication. For this project inspections will be required to verify the conformance of activities of items to specified requirements. Surveillance of the Seller's work will be monitored by Purchaser's personnel to monitor or observe an activity to verify that the activity conforms to the specified requirements.

5.2 Quality Assurance Submittals

A. Submittals will be required for the quality assurance procedures described below.

B. Sellers list of ten (10) similar operating installations including customer name, contact name, contact telephone, description of equipment installed, date installed, and application information .

C. Sellers documentation of Inspection and Test Results (if any).

D. A Certificate of Conformance Statement indicating that the equipment supplied meets the requirements of the specification.

5.3 Inspection and Test Requirements

A. The Seller will be required to furnish record of inspections of proper surface preparation and functional testing, if this is done as a normal part of manufacturing.

B. A final inspection in the presence of the Purchaser's inspector may be required prior to shipping.

5.4 Surveillance

A. The Purchaser may visit the Seller's facility at any time during fabrication without notification.

B. The Seller will be required to provide one week notification prior to the testing and shipment for surveillance by the Purchaser or Purchaser's representative.

PART 6 - Packaging

A. Each pump with components shall be suitably protected against damage or loss during shipment and to facilitate field handling.

B. All equipment shall be clearly marked with project information, and the equipment number.

C. Any special tools and devices required for operation, maintenance and dismantling of any equipment shall be included in the quoted price and delivered with the equipment, in a new and unused condition. All special tools and devices shall be marked with a metal tag clearly identified with project information and equipment number.

D. Seller will responsible for loss or damage of merchandise while shipment is in the possession of carrier and until it is delivered and unloaded at the final destination.

PART 7 - Installation, Start-up and Final Acceptance

A. Equipment will be installed and started-up by others.

B. The equipment will be accepted upon completion of the performance test.

PART 8 - Warranties

A. The Seller shall warranty the equipment to be free from defects in equipment, material or design furnished, or workmanship performed by the Seller for a period of one year from the date of final acceptance.

B. Any equipment purchased by the Seller and part of the Seller's equipment package shall be warranted as part of the Seller's equipment.

C. Any corrective measures required during the warranty period will be at the Seller's expense.

Equipment Specification

Phase Separator

Bell Aerospace Textron Onsite
Wastewater Treatment Facility
Wheatfield, New York

PART 1 - Scope

1.1 Work Included

A. Furnish one (1) slant rib coalescing phase separator. The system shall include inlet and diffusion chamber, separation chamber, coalescing media, sludge chamber, and clean water chamber.

1.2 Equipment Identification

A. **TK-2** Coalescing Phase Separator

1.3 Description

A. This specification describes, in part, equipment required for the Bell Aerospace Textron (BAT) onsite Wastewater treatment Facility to be located in Wheatfield, New York. This specification section pertains to the submittal requirements, equipment to be furnished and the quality assurance criteria for this equipment package.

B. This specification describes the requirements of the system to be furnished, but does not attempt to enumerate all details of accessories and appurtenances required to render the system functional. Such details shall be provided in the proposal submitted by the Seller, for

approval by the purchaser. The seller is to furnish a complete system which is capable of performing as specified.

PART 2 - General Provisions

2.1 Applicable Codes, Standard, and Publications

A. ANSI - American National Standards Institute
B. ASTM - American Society for Testing and Materials
C. AWS - American Welding Society
D. NACE - National Association of Corrosion Engineers

2.2 Reference Drawings and Specifications

A. Drawing 300 - General Arrangement
B. Drawing 400 - P&ID

PART 3 - Submittals

A. In addition to those requirements in section 5.2 regarding Quality Assurance, the following submittals shall submitted by the Seller for the Purchaser's review and approval before fabrication:

B. Arrangement Drawings: Drawings showing location and layout of all system components including piping and connection points.

C. Equipment and piping shop fabrication and detail drawings: Drawings should include fit-up tolerances, weld types, weld rod materials, and welding procedures to be used in fabrication.

D. Detailed structural drawings: Information should include load data for equipment and piping, with static and dynamic loads transmitted to the supporting structures. Drawings should be certified by a Professional Engineer.

E. Component Information: Information including materials of construction, coatings (including color selection), and catalog information of major components.

F. Detailed manuals describing the installation, operation, and maintenance of the system are required upon approval of fabrication information.

PART 4 - Technical Provisions

4.1 Performance Requirements

A. The separator shall be designed to handle a normal flow rate of 15 gpm, with a minimum flow of 10 gpm and a maximum flow rate of 20 gpm. The equipment will be located indoors, operating with wastewater temperatures of 32°F to 90°F.

B. The coalescing separator shall be designed to remove non-emulsified oil, DNAPL compounds and settable solids from the wastewater stream. The free oil (LNAPL) will coalesce, rise and be decanted from the unit while the DNAPL and settleable solids shall be removed to a sludge chamber below the coalescing media.

4.2 Equipment Description

A. The equipment shall be designed for a minimum plant operating life of 20 years.

B. The separator shall be equipped with an inlet diffusion nozzle that disperses the flow evenly across the deth and width of the coalescing pack. The separator shall be designed so that heavy solids separate in the inlet chamber and settle into the sludge collection chamber.

C. The separation chamber shall be constructed of stainles steel and shall contain 304 stainless steel oleophilic coalescing media that provides a minimum of 40 ft^2 of coalescing surface area and 10 ft^2 of settling area per cubic foot of media. Coalesced oil shall flow unimpeded along the plate surface to the top of the separation chamber where it shall be automatically decanted. The coalescing plate ribs shall form 55 degree settling shelves to enhance particulate solids or DNAPL product removal.

D. The oil reservoir shall be located at the end of the separation chamber with fixed weir for automatic decant of the separated oil and equipped with two gravity outlet nozzles located on opposite sides of the separator.

E. The sludge chamber for settled solids and DNAPL accumulation shall be distinct and equipped with 45 degree pitched sides, baffles and two outlet ports. The sludge chamber shall be equppped with a 1 inch ID sight glass that will extend to above the operating water level, approximately 6 feet tall. The sight glass shall be open top and shall include all stainless steel mounting hardware, valves and sampling pet cock.

F. The clean water leaving the coalescing packs shall pass under an oil retention baffle then over an adjustable stainless steel weir into the clean water chamber. Liquid level in the separator shall be maintained by the adjustable weir.

G. The separator shall be completely covered with gasketed removable hatches to allow access to the media pack and oil compartments. Each chamber shall be vented for vapor removal.

4.4 Welding

A. All welding shall be performed by certified welders in accordance with AWS standards.

B. Nondestructive testing shall be performed on all welds in accordance with the quality assurance requirements.

PART 5 - Quality Assurance Requirements

5.1 Quality Assurance Program Requirements

A. The Seller must be regularly engaged in the design and fabrication of similar equipment.

B. The Seller may be required to participate in a preaward evaluation based on their past job performance. The evaluation requires an examination by the Purchaser including a review of other similar projects and a visit to the Seller's facilities.

C. The Purchaser reserves the right to inspection and surveillance at any time during fabrication. For this project inspections will be required to verify the conformance of activities of items to specified requirements. Surveillance of the Seller's work will be monitored by Purchaser's personnel to monitor or observe an activity to verify that the activity conforms to the specified requirements.

5.2 Quality Assurance Submittals

A. Submittals will be required for the quality assurance procedures described below.

B. Sellers list of ten (10) similar operating installations including customer name, contact name, contact telephone, description of equipment installed, date installed, and application information.

C. Seller's proposed technique for non-destructive examination of welds, proper surface preparation, and proper coating application.

D. Sellers documentation of Inspection and Test Results.

5.3 Inspection and Test Requirements

A. The Seller will be required to furnish record of inspections of the nondestructive examination of welds, proper surface preparation, proper coating application.

B. The separator shall be filled with water and tested for leaks. All leaks shall be repaired and the piping or equipment retested.

C. A final inspection in the presence of the Purchaser's inspector may be required prior to shipping.

5.4 Surveillance

A. The Purchaser may visit the Seller's facility at any time during fabrication without notification.

B. The Seller will be required to provide two weeks notification prior to the following activities for surveillance by the Purchaser or Purchaser's representative:

- Pack installation
- Shipping

PART 6 - Packaging

A. Before shipment, all pre-assembled unit and components shall be disassembled only to the extent necessary to facilitate field handling and prevent damage during shipment. Each assembly of component shall be suitably protected against damage or loss during shipment and to facilitate field handling. All openings shall be closed with temporary closures to prevent entry of dust, dirt or other foreign matter.

B. All equipment shall be clearly marked with project information, and the equipment number.

C. All water shall be drained from the equipment.

D. Any special tools and devices required for operation, maintenance and dismantling of any equipment shall be included in the quoted price and delivered with the equipment, in a new and unused condition. All special tools and devices shall be marked with a metal tag clearly identified with project information and equipment number.

E. Purchaser will not be responsible for loss or damage of merchandise while shipment is in the possession of carrier and until it is delivered and unloaded at the final destination.

PART 7 - Installation, Start-up and Final Acceptance

A. Equipment will be installed and started-up by others.

B. The equipment will be accepted upon completion of the performance test and acceptance by the Purchaser or Purchaser's representative.

PART 8 - Warranties

A. The Seller shall warranty the equipment to be free from defects in equipment, material or design furnished, or workmanship performed by the Seller for a period of one year from the date of final acceptance.

B. Any equipment purchased by the Seller and part of the Seller's equipment package shall be warranted as part of the Seller's equipment.

C. Any corrective measures required during the warranty period will be at the Seller's expense.

Equipment Specification

Shallow Tray Air Stripper

Bell Aerospace Textron Onsite
Wastewater Treatment Facility
Wheatfield, New York

PART 1 - Scope

1.1 Work Included

A. Furnish a skid mounted shallow tray air stripper system. The system shall include sump tank, shallow trays, blower, demister, spray nozzle, pumps, piping, controls, alarms, and miscellaneous appurtenances.

1.2 Equipment Identification

A.	ST-1	Shallow Tray Air Stripper #1
B.	B-1	Blower #1
C.	ST-2	Shallow Tray Air Stripper #2
D.	B-2	Blower #2
E.	P-2	Shallow Tray Air Stripper #2 Feed Pump
F.	P-3	Carbon Adsorber System Feed Pump

1.3 Description

A. This specification describes, in part, equipment required for the Bell Aerospace Textron (BAT) Onsite Wastewater Treatment Facility to be located in Wheatfield, New York. This specification section pertains to

the submittal requirements, equipment to be furnished and the quality assurance criteria for this equipment package.

B. This specification describes the requirements of the system to be furnished, but does not attempt to enumerate all details of accessories and appurtenances required to render the system functional. Such details shall be provided in the proposal submitted by the Seller, for approval by the purchaser. The seller is to furnish a complete system which is capable of performing as specified.

PART 2 - General Provisions

2.1 Applicable Codes, Standard, and Publications

A. ANSI - American National Standards Institute
B. ASTM - American Society for Testing and Materials
C. AWS - American Welding Society
D. NACE - National Association of Corrosion Engineers
E. NEMA - National Electrical Manufacturers Association

2.2 Reference Drawings and Specifications

A. Drawing 300 - General Arrangement
B. Drawing 400 - P&ID
C. Drawing 401 - P&ID

PART 3 - Submittals

A. In addition to those requirements in section 5.2 regarding Quality Assurance, the following submittals shall submitted by the Seller for the Purchaser's review and approval before fabrication:

B. Arrangement Drawings: Drawings showing location and layout of all system components including piping and connection points.

C. Equipment and piping shop fabrication and detail drawings: Drawings should include fit-up tolerances, weld types, weld rod materials, and welding procedures to be used in fabrication.

D. Detailed structural drawings: Information should include load data for equipment and piping, with static and dynamic loads transmitted to the supporting structures. Drawings should be certified by a Professional Engineer.

E. Component Information: Information including materials of construction, coatings (including color selection), and catalog information of major components.

F. Detailed manuals describing the installation, operation, and maintenance of the system are required upon approval of fabrication information.

PART 4 - Technical Provisions

4.1 Performance Requirements

A. The air stripper system shall be designed to handle a normal flow rate of 30 gpm, with a minimum flow of 15 gpm and a maximum flow rate of 45 gpm. The equipment will be located indoors, operating with wastewater temperatures of 32°F to 90°F.

B. The air stripper system shall be designed to remove volatile organic compounds (VOCs) in the wastewater stream from the phase separator unit. The design basis influent and effluent concentrations of key contaminants are as follows:

Contaminant	Influent, mg/l	Effluent, mg/l
TCE	257	<0.100
T-1,2-DCE	51	<0.100
Vinyl Chloride	51	<0.100
Methylene Chloride	154	<0.100

4.2 Equipment Description

A. The equipment shall be designed for a minimum plant operating life of 20 years.

B. The influent wastewater to the air stripper system shall be introduced into the inlet chamber through a coarse mist spray nozzle. The water shall be introduced onto the aeration tray by flowing over a distribution weir.

C. The aeration tray(s) shall be 304 stainless steel with 3/16 inch holes for the countercurrent flow of air.

D. The air stripper system shall be a two stage unit with 4 trays per unit. Pumps shall be provided by the Seller to pump water from the first unit to the second unit and from the second unit to the downstream processes. In addition separate blowers shall be provided for each air stripper unit capable of providing 900 cfm. The air shall flow countercurrent to the wastewater stream with the offgas from the second air stripper unit fed to the first unit to reduce the number of air discharges requiring off-gas treatment. The off-gas from first unit will go to the off-gas treatment system supplied by others.

E. Interconnecting piping shall be schedule 80 PVC.

F. The skid system shall be complete with control panel, indicators and alarms for pressure and level, flow meters, and temperature gauges.

4.4 Welding

A. All welding shall be performed by certified welders in accordance with AWS standards.

B. Nondestructive testing shall be performed on all welds in accordance with the quality assurance requirements.

PART 5 - Quality Assurance Requirements

5.1 Quality Assurance Program Requirements

A. The Seller must be regularly engaged in the design and fabrication of similar equipment.

B. The Seller may be required to participate in a preaward evaluation based on their past job performance. The evaluation requires an examination by the Purchaser including a review of other similar projects and a visit to the Seller's facilities.

C. The Purchaser reserves the right to inspection and surveillance at any time during fabrication. For this project inspections will be required to verify the conformance of activities of items to specified requirements. Surveillance of the Seller's work will be monitored by Purchaser's personnel to monitor or observe an activity to verify that the activity conforms to the specified requirements.

5.2 Quality Assurance Submittals

A. Submittals will be required for the quality assurance procedures described below.

B. Sellers list of ten (10) similar operating installations including customer name, contact name, contact telephone, description of equipment installed, date installed, and application information.

C. Seller's proposed technique for non-destructive examination of welds, proper surface preparation, and proper coating application.

D. Sellers documentation of Inspection and Test Results.

5.3 Inspection and Test Requirements

A. The Seller will be required to furnish record of inspections of the nondestructive examination of welds, proper surface preparation, proper coating application.

B. The air strip system shall be filled with water and tested for leaks. All leaks shall be repaired and the piping or equipment retested.

C. A final inspection in the presence of the Purchaser's inspector may be required prior to shipping.

5.4 Surveillance

A. The Purchaser may visit the Seller's facility at any time during fabrication without notification.

B. The Seller will be required to provide two weeks notification prior to the following activities for surveillance by the Purchaser or Purchaser's representative:

- Functional Testing
- Shipping

PART 6 - Packaging

A. Before shipment, all pre-assembled unit and components shall be disassembled only to the extent necessary to facilitate field handling and prevent damage during shipment. Each assembly of component shall be suitably protected against damage or loss during shipment and to facilitate field handling. All openings shall be closed with temporary closures to prevent entry of dust, dirt or other foreign matter.

B. All equipment shall be clearly marked with project information, and the equipment number.

C. All water shall be drained from the equipment.

D. Any special tools and devices required for operation, maintenance and dismantling of any equipment shall be included in the quoted price and delivered with the equipment, in a new and unused condition. All special tools and devices shall be marked with a metal tag clearly identified with project information and equipment number.

E. Purchaser will not be responsible for loss or damage of merchandise while shipment is in the possession of carrier and until it is delivered and unloaded at the final destination.

PART 7 - Installation, Start-up and Final Acceptance

A. Equipment will be installed and started-up by others.

B. The equipment will be accepted upon completion of the performance test and acceptance by the Purchaser or Purchaser's representative.

PART 8 - Warranties

A. The Seller shall warranty the equipment to be free from defects in equipment, material or design furnished, or workmanship performed by the Seller for a period of one year from the date of final acceptance.

B. Any equipment purchased by the Seller and part of the Seller's equipment package shall be warranted as part of the Seller's equipment.

C. Any corrective measures required during the warranty period will be at the Seller's expense.

Equipment Specification

Modular Carbon Adsorbers

Bell Aerospace Textron Onsite
Wastewater Treatment Facility
Wheatfield, New York

PART 1 - Scope

1.1 Work Included

A. Furnish a three carbon adsorber system. The system shall include three modular adsorbers. Face piping, valves, interconnecting piping between the units in accordance with this specification section, drawings and other referenced information will be provided by others.

1.2 Equipment Identification

A. CA-1 Carbon Adsorber
B. CA-2 Carbon Adsorber
C. CA-3 Carbon Adsorber

1.3 Description

A. This specification describes, in part, the equipment required for the Bell Aerospace Textron (BAT) Onsite Wastewater Treatment Facility to be located in Wheatfield, New York. This specification section pertains to the submittal requirements, equipment to be furnished and the quality assurance criteria required for this equipment package.

B. This specification describes the requirements of the system to be furnished, but does not attempt to enumerate all details of accessories and appurtenances required to render the system functional. Such details shall be provided in the proposal submitted by the Seller, for approval by the purchaser. The seller is to furnish a complete system which is capable of performing as specified.

PART 2 - General Provisions

2.1 Applicable Codes, Standard, and Publications

A. ANSI - American National Standards Institute
B. ASME - American Society of Mechanical Engineers
C. ASTM - American Society for Testing and Materials
D. AWS - American Welding Society
E. NACE - National Association of Corrosion Engineers

2.2 Reference Drawings and Specifications

A. Drawing 300 - General Arrangement
B. Drawing 400 - Piping and Instrumentation Diagram

PART 3 - Submittals

A. In addition to those requirements in section 5.2 regarding Quality Assurance, the following submittals shall submitted by the Seller for the Purchaser's review and approval before fabrication:

B. Arrangement Drawings: Drawings showing location and layout of all system components including vessels, piping, valving, and connection points.

C. Equipment and piping shop fabrication and detail drawings: Drawings should include fit-up tolerances, weld types, weld rod materials, and welding procedures to be used in fabrication.

D. Detailed structural drawings: Information should include load data for equipment and piping, with static and dynamic loads transmitted to the supporting structures. Drawings should be certified by a Professional Engineer.

G. Component Information: Information including materials of construction, coatings (including color selection), and catalog information of major components.

H. Detailed manuals describing the installation, operation and maintenance of the system are required upon approval of fabrication information.

PART 4 - Technical Provisions

4.1 Performance Requirements

A. The carbon adsorbers shall be designed to handle a normal flow rate of 30 gpm, with a minimum flow of 15 gpm and a maximum flow rate of 75 gpm.

B. The equipment will be located indoors, operating with wastewater temperatures of 32°F to 90°F.

C. The design basis hydraulic loading rate shall be 3 gpm/ft². The units shall be designed for backwash flows of 15 gpm/ft^2.

D. The units shall be designed to hold a minimum of 50 ft^3 of carbon with adequate free volume for backwashing.

4.2 Equipment Description

A. The equipment shall be designed for a minimum plant operating life of 20 years.

B. The columns shall be constructed of seamless, low density polyethylene, encapsulated by, and bonded to steel shells.

C. The columns shall be 57 inches in diameter with an overall height of 91 inches.

D. Each vessel shall be equipped with a 3 inch flanged inlet, a 3 inch flanged outlet, connections and media dumps. An 18 inch manway shall be located on the top of each vessel. A media removal valve, 2 inch NPT, shall be located in the bottom of the vessel for the removal of all media.

E. Each vessel internal piping arrangement shall allow even distribution of flow over the entire cross-sectional area of the vessel.

F. Flanges shall be provided for all piping connections for wastewater. Connections shall be sized as follows:

Inlet	3"
Outlet	3"

The connections for the adsorbent transfer are as follows:

Adsorbent Inlet	18"
Adsorbent Outlet	3" NPT

G. Media shall be provided as follows:

- Each vessel shall contain a minimum of 1600 pounds of granular activated carbon.

- The granular activated carbon shall be U.S. Sieve 90% minimum 12x40 with an approximate bulk density of 27 pounds per cubic foot. The carbon shall have a minimum iodine number of 1000 mg/g.

4.3 Welding

A. All welding shall be performed by certified welders in accordance with AWS standards.

B. Nondestructive testing shall be performed on all pressure vessel welds in accordance with the quality assurance requirements.

PART 5 - Quality Assurance Requirements

5.1 Quality Assurance Program Requirements

A. The Seller must be regularly engaged in the design and fabrication of similar equipment.

B. The Seller may be required to participate in a preaward evaluation based on their past job performance. The evaluation requires an examination by the Purchaser including a review of other similar projects and a visit to the Seller's facilities.

C. The Purchaser reserves the right to inspection and surveillance at any time during fabrication. For this project inspections will be required to verify the conformance of activities of items to specified requirements. Surveillance of the Seller's work will be monitored by Purchaser's personnel to monitor or observe an activity to verify that the activity conforms to the specified requirements.

5.2 Quality Assurance Submittals

A. Submittals will be required for the quality assurance procedures described below.

B. Sellers list of ten (10) similar operating installations including customer name, contact name, contact telephone, description of equipment installed, date installed, and application information.

C. Seller's proposed technique for non-destructive examination of welds, proper surface preparation, proper coating application, and control system check-out.

D. Sellers documentation of Inspection and Test Results.

5.3 Inspection and Test Requirements

A. The Seller will be required to furnish record of inspections of the nondestructive examination of welds, proper surface preparation, proper coating application, and control system check-out.

B. The columns shall be hydrostatically tested at 150% of design pressure. Test pressure shall be maintained for 2 hours. All leaks shall be repaired and the piping or equipment retested.

C. A final inspection in the presence of the Purchaser's inspector may be required prior to shipping.

5.4 Surveillance

A. The Purchaser may visit the Seller's facility at any time during fabrication without notification.

PART 6 - Packaging

A. Before shipment, all pre-assembled unit and components shall be disassembled only to the extent necessary to facilitate field handling and prevent damage during shipment. Each assembly of component shall be

suitably protected against damage or loss during shipment and to facilitate field handling. All openings shall be closed with temporary closures to prevent entry of dust, dirt or other foreign matter.

B. All equipment shall be clearly marked with project information, and the equipment number.

C. All water shall be drained from the equipment.

D. Any special tools and devices required for operation, maintenance and dismantling of any equipment shall be included in the quoted price and delivered with the equipment, in a new and unused condition. All special tools and devices shall be marked with a metal tag clearly identified with project information and equipment number.

E. Seller will be responsible for loss or damage of merchandise while shipment is in the possession of carrier and until it is delivered and unloaded at the final destination.

PART 7 - Installation, Start-up and Final Acceptance

A. Equipment will be installed and started-up by others.

B. The equipment will be accepted upon completion of the performance test and acceptance by the Purchaser or Purchaser's representative.

PART 8 - Warranties

A. The Seller shall warranty the equipment to be free from defects in equipment, material or design furnished, or workmanship performed by the Seller for a period of one year from the date of final acceptance.

B. Any equipment purchased by the Seller and part of the Seller's equipment package shall be warranted as part of the Seller's equipment.

C. Any corrective measures required during the warranty period will be at the Seller's expense.

Equipment Specification

Thermal Oxidizer

Bell Aerospace Textron Onsite
Wastewater Treatment Facility
Wheatfield, New York

PART 1 - Scope

1.1 Work Included

A. Furnish a skid mounted thermal oxidation system for the treatment of off-gases from the air stripper system containing volatile organic compounds (VOC). The system shall include the combustion chamber, natural gas burner, combustion burner, scrubber, exhaust stack, control panel, instrumentation and controls, continuous stack monitor, and interconnecting ducting and piping.

1.2 Equipment Identification

A. OGT-1 Off-gas treatment

1.3 Description

A. This specification describes, in part, equipment required for the Bell Aerospace Textron (BAT) Onsite Wastewater Treatment Facility to be located in Wheatfield, New York. This specification section pertains to the submittal requirements, equipment to be furnished and the quality assurance criteria for this equipment package.

C. Drawing 401 - P&ID

PART 3 - Submittals

A. In addition to those requirements in section 5.2 regarding Quality Assurance, the following submittals shall submitted by the Seller for the Purchaser's review and approval before fabrication:

B. Arrangement Drawings: Drawings showing location and layout of all system components including piping and connection points.

C. Equipment and piping shop fabrication and detail drawings: Drawings should include fit-up tolerances, weld types, weld rod materials, and welding procedures to be used in fabrication.

D. Detailed P&IDs: Drawings should include the piping and instrumentation for the thermal oxidation skid. Drawings should be certified by a Professional Engineer.

E. Wiring Diagram: Drawings should include information sufficient for the installation of the system and estimation of power requirements.

F. Component Information: Information including materials of construction, coatings (including color selection), and catalog information of major components.

G. Detailed manuals describing the installation, operation, and maintenance of the system are required upon approval of fabrication information.

PART 4 - Technical Provisions

4.1 Performance Requirements

A. The thermal oxidation system shall be designed to treat 1000 scfm of exhaust air from the air stripper system. The air is assumed to be saturated and contain the following components:

Contaminant	lbs/hr
TCE	3.10
T-1,2-DCE	0.62
Vinyl Chloride	0.62
Methylene Chloride	1.85

B. The thermal oxidation system shall be designed for a minimum guaranteed destructive removal efficiency of 99%, with a design removal efficiency of 99.9%.

C. The thermal oxidation system must be equipped with a scrubber to remove combustion byproducts such as chlorine and hydrochloric acid from the air effluent stream.

4.2 Equipment Description

A. The equipment shall be designed for a minimum plant operating life of 20 years.

B. The thermal oxidation system shall be designed to operate on natural gas as a fuel source for combustion with the air stripper offgas used as the source of combustion air.

C. The equipment shall be skid mounted and capable of outdoor installation.

D. The stack discharge height shall be a minimum of 20 feet above grade.

E. The continuous stack monitor shall be capable of detecting the contaminants specified in Part 4.1.A. The seller shall specify the detection limit for the specified contaminants in units of $\mu g/m^3$.

4.3 Welding

A. All welding shall be performed by certified welders in accordance with AWS standards.

B. Nondestructive testing shall be performed on all welds in accordance with the quality assurance requirements.

PART 5 - Quality Assurance Requirements

5.1 Quality Assurance Program Requirements

A. The Seller must be regularly engaged in the design and fabrication of similar equipment.

B. The Seller may be required to participate in a preaward evaluation based on their past job performance. The evaluation requires an examination by the Purchaser including a review of other similar projects and a visit to the Seller's facilities.

C. The Purchaser reserves the right to inspection and surveillance at any time during fabrication. For this project inspections will be required to verify the conformance of activities of items to specified requirements. Surveillance of the Seller's work will be monitored by Purchaser's personnel to monitor or observe an activity to verify that the activity conforms to the specified requirements.

5.2 Quality Assurance Submittals

A. Submittals will be required for the quality assurance procedures described below.

B. Sellers list of ten (10) similar operating installations including customer name, contact name, contact telephone, description of equipment installed, date installed, and application information.

C. Seller's proposed technique for non-destructive examination of welds, proper surface preparation, and proper coating application.

D. Sellers documentation of Inspection and Test Results.

5.3 Inspection and Test Requirements

A. The Seller will be required to furnish record of inspections of the nondestructive examination of welds, proper surface preparation, proper coating application.

B. The separator shall be filled with water and tested for leaks. All leaks shall be repaired and the piping or equipment retested.

C. A final inspection in the presence of the Purchaser's inspector will be required prior to shipping.

5.4 Surveillance

A. The Purchaser may visit the Seller's facility at any time during fabrication without notification.

B. The Seller will be required to provide two weeks notification prior to the following activities for surveillance by the Purchaser or Purchaser's representative:

- Functional Testing
- Shipping

PART 6 - Packaging

A. Before shipment, all pre-assembled unit and components shall be disassembled only to the extent necessary to facilitate field handling and prevent damage during shipment. Each assembly of component shall be suitably protected against damage or loss during shipment and to facilitate field handling. All openings shall be closed with temporary closures to prevent entry of dust, dirt or other foreign matter.

B. All equipment shall be clearly marked with project information, and the equipment number.

C. All water shall be drained from the equipment.

D. The seller shall guarantee that a minimum of 99% of the organic compounds specified in Section 4.1.A of this document will be destroyed.

EQUIP. NO. CENTRIFUGAL PUMP	EQUIP. NO. IN-LINE PUMP	EQUIP. NO. EQUIP. NO. HEAT RECLAIMER / EXCHANGER
EQUIP. NO. SUMP PUMP	EQUIP. NO. RECIPROCATING PUMP	EQUIP. NO. METERING PUMP
DIAPHRAGM PUMP		EQUIP. NO. MIXER
EQUIP. NO. FILTER PRESS	EQUIP. NO. MEMBRANE FILTER	EQUIP. NO. FILTER
EQUIP. NO. OPEN TOP TANK	EQUIP. NO. DOME COVERED FLAT BOTTOM TANK	EQUIP. NO. SKIRTED VERTICAL VESSEL
EQUIP. NO. FLAT BOTTOM TANK WITH COVER	EQUIP. NO. BOTTOM DISCHARGE VESSEL	EQUIP. NO. VERTICAL VESSEL
EQUIP. NO. HORIZONTAL VESSEL	EQUIP. NO. CLARIFIER	

MAJOR EQUIPMENT

MAIN PROCESS LINE	SECONDARY PROCESS LINE	FLOW ARROW	COMPRESSED AIR FILTER/LUBE	PINCH VALVE	PNEUMATIC CONTROLLED PINCH VALVE
BALL VALVE	SOLENOID VALVE	H-C VALVE	NEEDLE VALVE	PRESSURE RELIEF VALVE	FLEXIBLE CONNECTION
BUTTERFLY VALVE	PLUG VALVE	GLOBE VALVE	GATE VALVE		PSC PIPE SPECIFICATION CHANGE
CHECK VALVE	CONTROL VALVE	GEMTROL VALVE	CONTROL VALVE	Y-STRAINER	
PADDLE WHEEL METER	TURBINE METER	ORIFICE METER	STATIC MIXER	STRAIGHTENING VANE	

VALVE AND IN-LINE EQUIPMENT

INSTRUMENTATION SUPPLY OR CONNECTION TO PROCESS	PNEUMATIC LINE	ELECTRICAL LINE	HYDRAULIC SIGNAL	HEAT TRACE	
3-WAY VALVE	4-WAY VALVE	ANGLE VALVE			
FIELD MOUNTED	LOCAL BOARD MOUNTED INSTRUMENTATION	REMOTE BOARD MOUNTED INSTRUMENTATION			
DISCRETE INSTRUMENTATION	DISCRETE INSTRUMENTATION	DISCRETE INSTRUMENTATION			
SHARED DISPLAY, SHARED CONTROL	SHARED DISPLAY, SHARED CONTROL	SHARED DISPLAY, SHARED CONTROL			
COMPUTER FUNCTION	COMPUTER FUNCTION	COMPUTER FUNCTION			
PROGRAMMABLE LOGIC CONTROL	PROGRAMMABLE LOGIC CONTROL	PROGRAMMABLE LOGIC CONTROL			

INSTRUMENTATION SYMBOLS

NOTE

1. FOR ITEMS NOT COVERED ON THIS DRAWING PLEASE REFER TO THE AMERICAN NATIONAL STANDARD "INSTRUMENTATION SYMBOLS AND IDENTIFICATION" ISSUED BY THE INSTRUMENTATION SOCIETY OF AMERICA. (ANSI/ISA-S5.1-1984 APPROVED 11/5/86)
2. DRAWING NUMBERS USED IN CONTINUATION FLOW ARROWS ON THE FOLLOWING P & I D DRAWINGS ARE THE LAST 3 DIGETS OF AN EIGHT DIGIT DRAWING NUMBER.

REVISIONS

NO.	DESCRIPTION	BY	DATE	CHK.	DATE	APPR.	DATE

DRAWING STATUS	BY	DATE
PRELIMINARY	K. CONROY /	
FOR COMMENT and/or APPROVAL	K. CONROY /	
APPROVED FOR CONSTRUCTION	K. CONROY /	
REVISED and APPROVED FOR CONSTRUCTION	K. CONROY /	

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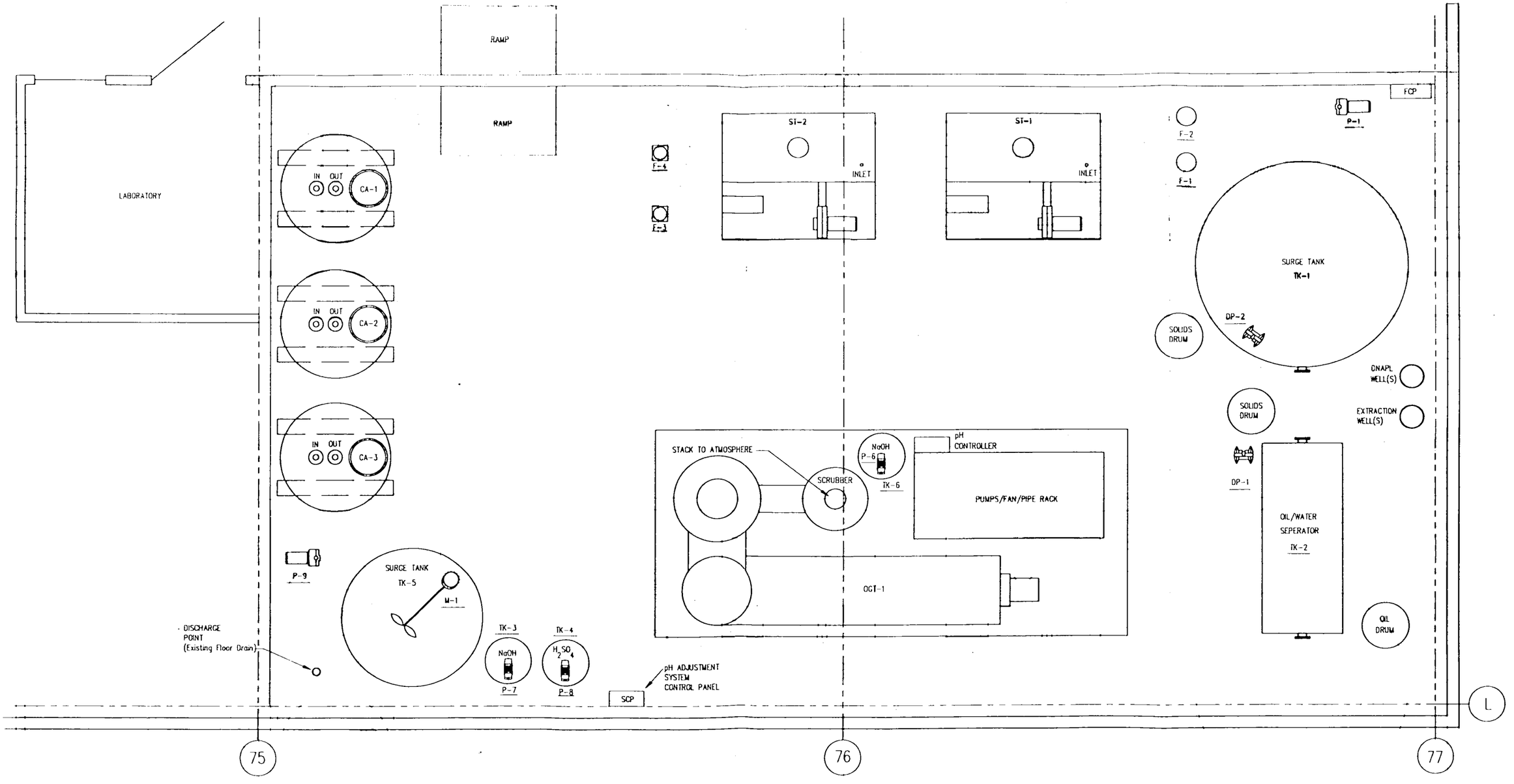
DRAWING INFORMATION	NAME	DATE
DESIGN BY:	J.PAGE /	1/1/93
DRAWN BY:	J.PAGE /	1/1/93
CHECKED BY:	/	
SCALE: 1" = 1"		
PLOT DATE: 3/8/93	PLOT SCALE: 1"=1"	

BAT ONSITE WASTEWATER TREATMENT PLANT
P&D - SYMBOL SHEET

PROJECT LOCATION: WHEATFIELD,NY — PROJECT NO. 910103

RTG RESOURCE TECHNOLOGIES GROUP, INC.

CLIENT: BELL AEROSPACE TEXTRON, WHEATFIELD, NY — REVISION NO. 0 — DRAWING NO.



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FOR COMMENT and/or APPROVAL		
APPROVED FOR CONSTRUCTION		
REVISED and APPROVED FOR CONSTRUCTION		

BAT ONSITE WASTEWATER TREATMENT
GENERAL ARRANGEMENT

SCALE: 1"=' | DRAWN BY: [illegible] 4/23/93 | PROJECT LOCATION: WHEATFIELD,NY | PROJECT # 91010.3

RTG RESOURCE TECHNOLOGIES GROUP, INC.

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CLIENT: BELL AEROSPACE TEXTRON WHEATFIELD, NY

DRAWING NUMBER: 300

COMPRESSED AIR

TK-2
COALESCING OIL/WATER SEPERATOR

P.O.C. 15 GPM

OIL DRUM

DNAPL ZONE WELL(S)

DP-1

SLUDGE DRUM

P.O.C. 15 GPM

TK-1
1800 GAL.

SIGHT GLASS

EXTRACTION WELL(S)

OUTSIDE INSIDE

DP-2

SOLIDS DRUM

P-1

F-1
50 MICRON BAG FILTER

F-2
50 MICRON BAG FILTER

ST-1
SHALLOW TRAY STRIPPER

B-1

P-2

900 CFM
THERMAL OXIDIZER
OGT-1
401

ST-2
SHALLOW TRAY STRIPPER

B-2

AIR
(900 CFM)

LSH
TK-5

P-3

CARBON ABSORPTION MODULE
CA-1
401

OFF-GAS TREATMENT SYSTEM
OGT-1
401

DWG. NO	REFERENCE DRAWINGS

REVISIONS						
NO	DESCRIPTION	BY	DATE	CHK	DATE	APPR	DATE

DRAWING STATUS	BY	DATE
DESIGN		
CHECKED		
PRELIMINARY		
FOR COMMENT and/or APPROVAL		
APPROVED FOR CONSTRUCTION		
REVISED and APPROVED FOR CONSTRUCTION		

BAT ONSITE WASTEWATER TREATMENT
P & ID

SCALE NONE | DRAWN BY RMR 1/13/92 | PROJECT LOCATION WHEATFIELD, NY | PROJECT # 910103

RTG RESOURCE TECHNOLOGIES GROUP, INC.

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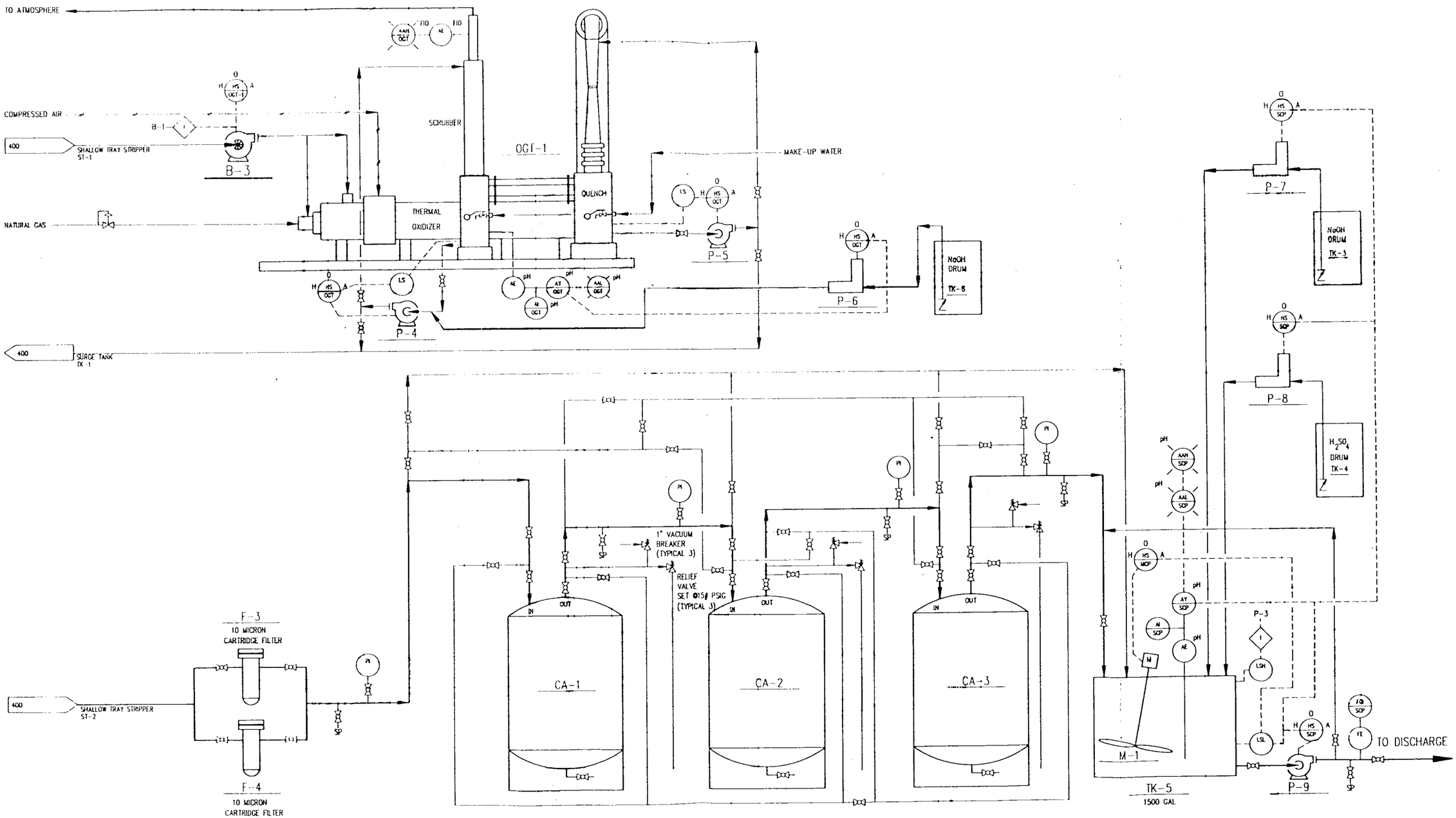
DRAWING NUMBER: 400



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FOR COMMENT and/or APPROVAL		
APPROVED FOR CONSTRUCTION		
REVISED and APPROVED FOR CONSTRUCTION		

BAT ONSITE WASTEWATER TREATMENT
P & ID

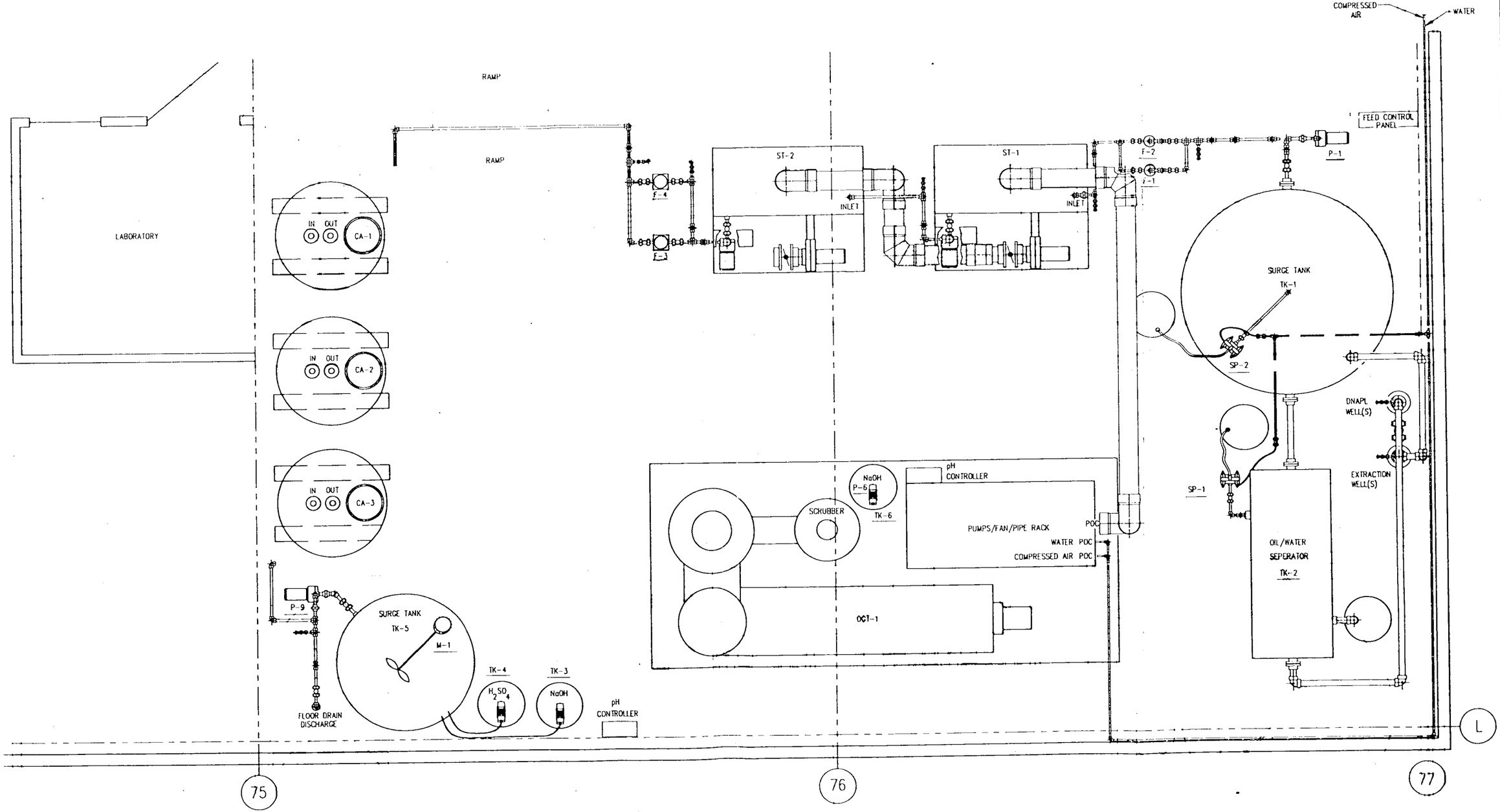
SCALE: NONE | DRAWN BY: [illegible] 4/13/92 | PROJECT LOCATION: WHEATFIELD, NY | PROJECT # 910103

RTG RESOURCE TECHNOLOGIES GROUP, INC.

DRAWING IS NOT APPROVED FOR CONSTRUCTION UNLESS SIGNED AND DATED. ALL PRINTS ARE TO BE DESTROYED HAVING AN EARLIER DATE AND/OR REVISION NUMBER.

CLIENT: BELL AEREOSPACE TEXTRON
WHEATFIELD, NY

DRAWING NUMBER: 401



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FOR COMMENT and/or APPROVAL		
APPROVED FOR CONSTRUCTION		
REVISED and APPROVED FOR CONSTRUCTION		

BAT ONSITE WASTEWATER TREATMENT
PIPING

SCALE: 1/7-4 | DRAWN BY: ABR 4/30/93 | PROJECT LOCATION: WHEATFIELD,NY | PROJECT # 910103

RTG RESOURCE TECHNOLOGIES GROUP, INC.

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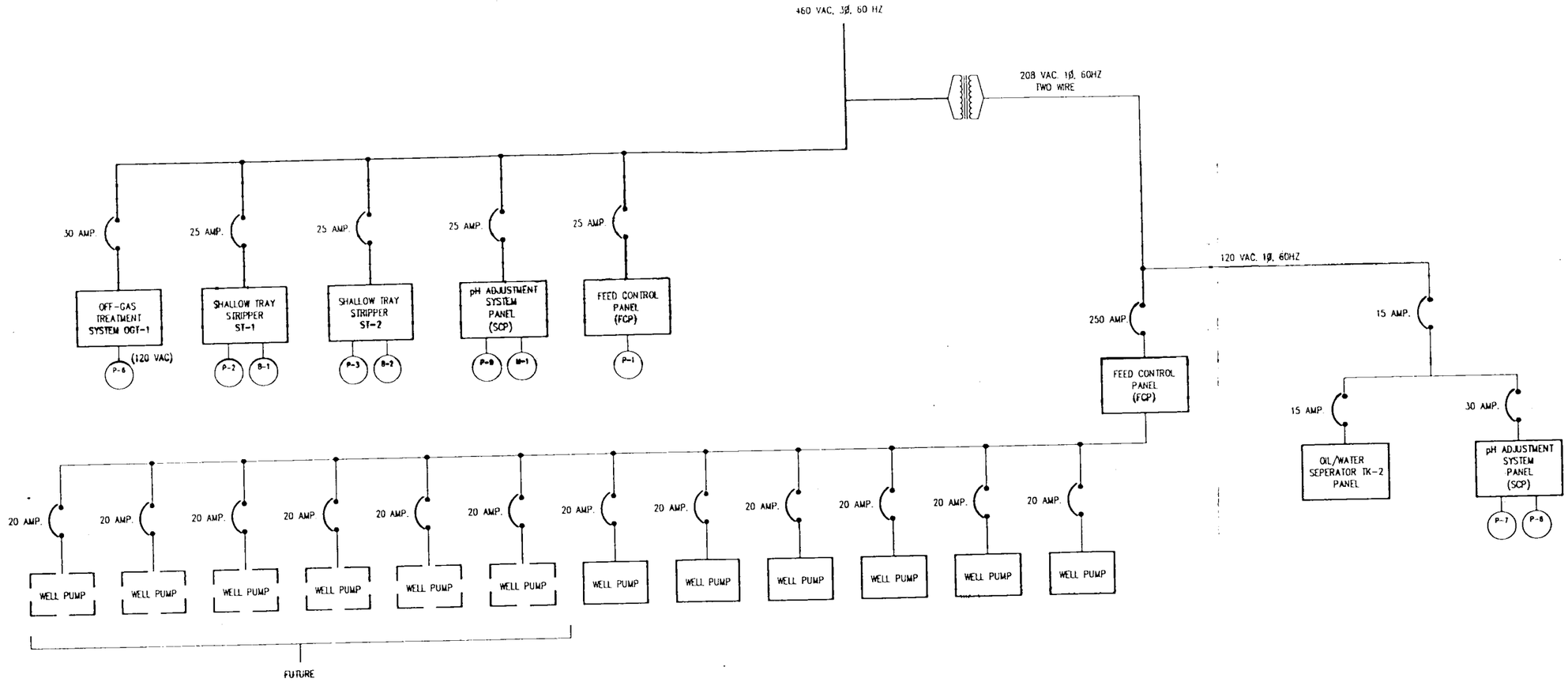

TWG. NO.	REFERENCE DRAWINGS

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DRAWING STATUS	BY	DATE
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PRELIMINARY		
FOR COMMENT and/or APPROVAL		
APPROVED FOR CONSTRUCTION		
REVISED and APPROVED FOR CONSTRUCTION		

BAT ONSITE WASTEWATER TREATMENT
ELECTRICAL POWER DISTRIBUTION

SCALE: NONE DRAWN BY: [illegible] 1/24 PROJECT LOCATION: WHEATFIELD, NY PROJECT # 910103

RTG RESOURCE TECHNOLOGIES GROUP, INC.

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CLIENT: BELL AEROSPACE TEXTRON WHEATFIELD, NY

DRAWING NUMBER: 600

APPENDIX D

HEALTH AND SAFETY PROGRAM

TABLE OF CONTENTS

1.0 GENERAL

This document describes the Health and Safety Program for the Ground Water Monitoring Program at Bell Aerospace Textron's (BAT) Wheatfield Plant. It includes precautionary procedures to be followed during the work, protective equipment to be worn and/or to be available during the work, emergency equipment to be available at the site, and site security. The sampling contractor shall appoint a Safety Officer who will be on-site during all times when sampling is in progress. Sampling contractor personnel who work on the site will have received 40 hours of initial health and safety training and, as appropriate, eight hours of refresher training as required by the Occupational Safety and Health Administration (OSHA) for personnel working on a hazardous waste site.

The sampling contractor will be responsible for all health and safety requirements and practices related to ground water monitoring at the BAT facility. This health and safety program has been prepared by Golder Associates Inc. (Golder Associates) to supplement the Ground Water Monitoring Plan. The sampling contractor may elect to accept this Health and Safety Program or may choose to develop their own program, subject to BAT approval. However, Golder Associates is not responsible for the health and safety of the sampling contractor.

1.1 Safety Officer

The field sampling contractor will provide a qualified individual who will be responsible for carrying out the investigation and will act as the site Safety Officer. He shall have a sound working knowledge of Federal Occupational Safety and Health Regulations. He will be responsible for on-site safety briefings, obtaining acknowledgement of the training and day-to-day implementation, field re-evaluation of and compliance with the Health and Safety Program. He shall assure that sampling personnel are made aware of the provisions of the Health and Safety Program and have been informed of the nature of the risk of chemical exposure associated with the investigation and are trained in the proper use of safety equipment and protective clothing to protect against such exposure. He will be responsible to see that the Health and Safety Program is followed and will liaise with and will be directed by the BAT Health and Safety Officer. He will have the authority to

order work to be suspended in case of imminent threat to the safety of workers or to the environment.

1.2 Emergency Response

All health, fire, or utility emergencies involving on-site BAT or off-site municipal emergency organizations (fire, police, ambulance) experienced during the course of the investigations will be handled in accordance with the BAT Contingency Plan and Emergency Procedures Manual (available from BAT). In the case of such emergencies, the sampling contractor's Safety Officer will immediately contact the BAT Safety Department who will then relay the emergency to the appropriate party. The sampling contractor is expected to be familiar with this Manual.

Telephone numbers of the BAT Emergency Coordinators will be provided by BAT. These numbers should be posted at the work site and in all site vehicles. Figure D-1 presents a proposed route to the nearest hospital. Sampling contractor personnel should be familiar with the location and use of on-site safety equipment.

1.3 Medical Examination

Personnel employed at the site shall receive a medical examination prior to the commencement of the work and on at least an annual basis thereafter. This examination will be in accordance with 29 CFR 1910.120. A registry of medical examination dates shall be established and maintained on site. Information shall include, name of the person, address, age, social security number, and name and address of the examining physician. Copies of this registry shall be available to NYSDEC.

1.4 Description of Site Tasks

The work to be implemented is described in the Ground Water Monitoring Plan, Bell Aerospace Textron Wheatfield Plant, New York (Revision January 1993).

2.0 SITE SECURITY

The BAT plant is a secure facility surrounded by a chain-link fence topped with barbed wire. Thus, all sampling equipment and tools etc. stored at the facility should be secure at all times; provision of any additional security measures should be determined by the sampling contractor in consultation with BAT.

3.0 PROTECTIVE EQUIPMENT AND AIR MONITORING

3.1 General

Previous ground water monitoring programs have shown that volatile organic compounds constitute the major source of ground water contamination at the BAT site. Low levels of PCBs and polycyclicaromatic compounds have also been detected. Based on the results of the September 1989 ground water monitoring investigation, the major contaminants (and maximum concentrations) detected in the ground water below the site were Trichloroethylene (877 ppm), Methylene chloride (2,400 ppm), Trans 1,2-Dichloroethene (68 ppm), Trichlorofluoromethane (7 ppm), Chloroform (1.4 ppm), Vinyl chloride (3.7 ppm), PCBs (12 ppb) and small quantities of several semi-volatile organic compounds. Dense non-aqueous phase liquids (DNAPLs) are known to be present in the subsurface and are composed of up to 95-percent Trichloroethylene, Methylene chloride, PCBs (300 ppm), and small quantities of semi-volatile organic compounds.

Review of available ground water and soil chemistry analytical data indicates that personal protection equipment is necessary during sampling events. Based on the analytical data obtained from the past five quarters of ground water monitoring data (October 1990 - October 1992) the potential for exposure to contaminants during a routine monitoring event of monitoring wells at the BAT facility warrants a level of personal protection of Level D. However, previous monitoring has indicated that some areas of greater hazard may exist; therefore, Level C personal protection should be available. The potential for Level C requirements will be determined from air monitoring.

3.2 Level D Protective Equipment

Previous ground water monitoring experiences at the BAT facility have indicated that Level D personal protective equipment is adequate. Therefore, it is anticipated that field sampling will continue with Level D personal protection only. Level D personal protection includes the following:

- Gray or blue colored Tyvek® coveralls (white or yellow coveralls will not be used);
- Boots/shoes - safety or chemical-resistant; or Boots - outer, chemical-protective heavy rubber throwaway type;

- Safety glasses or safety goggles;
- Gloves (latex); and
- Gloves, outer, chemical resistant (e.g., Nitrile) required only for on-site sampling locations at the BAT facility (not required for off-site sampling).

3.3 Level C Protective Equipment

Level C personal protection will include (in addition to appropriate Level D protection):

- Full-face, air-purifying respirator (MSHA/NIOSH approved) with acid gas/organic vapor cartridges;
- Chemical-resistant clothing;
- Gloves - outer, chemical-protective;
- Tyvek® coveralls;
- Boots - outer, chemical-protective heavy rubber throwaways; and
- Boots - inner, chemical-protective.

3.4 Air Monitoring

3.4.1 General

A log recording air monitoring results will be maintained by the person operating the air monitoring equipment. The log will be reviewed regularly by the Safety Officer who may recommend changes in the air monitoring program and level of protection required. An example "Air Monitoring Data Sheet", which will be used to record the air monitoring readings, is presented as Attachment A.

3.4.2 Air Monitoring during Sampling of Monitoring Wells and Response Action

As previously discussed, it is contemplated that sampling will be performed with only Level D personal protection, although at times Level C personal protection may be required. Air monitoring will be performed at the well using appropriate air monitoring equipment (organic vapor monitor (OVM) or equivalent). Such air monitoring will be performed at the well head immediately after the well cap or plug is opened. Air monitoring should also be performed during sampling if odors are noted by the field

sampling team. The concentration of vapor levels in the breathing zone at the well will be established using the air monitoring equipment. Sampling personnel may then be required to upgrade from Level D to Level C if the air monitoring detector reveals airborne contamination levels that exceed the established upwind background concentration by 5 ppm for more than a brief peak. The following procedures shall be implemented should this condition occurs:

- Work will temporarily cease if readings consistently exceed the background levels by more than 5 ppm or if peak concentrations exceed 25 ppm. The sampling team will move upwind from the well to a distance at which the air concentration is less than 5 ppm above background and upgrade to Level C personal protection. Work will then continue using Level C respirator and dermal protection. If vapor concentrations in the breathing zone subside to below 5 ppm above background, then the sampling team may downgrade to Level D personal protection, otherwise, continue as defined below; and,

- Sampling will continue under Level C respirator and dermal protection while continuously monitoring vapor levels at the breathing zone of the worker(s) with the appropriate air monitoring device. Sampling may continue in this manner if vapor levels remain below 10 ppm at the breathing zone. In the event that vapor levels exceed 10 ppm, all work will be immediately suspended, the conditions will be monitored, and the sampling contractor shall contact the BAT Safety Officer for further instructions.

3.4.3 Air Monitoring during Sampling of Extraction Wells and Response Action

It is contemplated that sampling will be performed with Level D personal protection, although at times Level C personal protection may be required. Entry into the vaults is not anticipated for sampling the extraction wells. Air monitoring at the vault will be required using appropriate air monitoring equipment (OVM or equivalent and MSA 361 or equivalent). Air monitoring will be performed at the vault hatch and in the vault immediately after it is opened. Air monitoring should also be performed during sampling if odors are noted by the field sampling team. The concentration level of organic vapors, percent oxygen, and percent of the lower explosive limit in the vault and breathing zone will be established using the air monitoring equipment. The level of personal protection will be determined from the air monitoring. The following procedures shall be implemented during sampling:

- Lower the MSA 361 and OVM into the vault and record the presence of hydrogen sulfide (H_2S), the percent oxygen, and the percent of the lower explosive limit (%LEL). If the level of H_2S is less than 10 ppm, the percent oxygen is greater than 19.5, the %LEL is less than 20, and the concentration of organic vapors detected is less than 5 ppm above background for a sustained period (approximately one minute) the extraction wells may be sampled. Air monitoring should be continued during sampling;

- If the level of H_2S is greater than 10 ppm, the percent oxygen is less than 19.5, the %LEL is greater than 20, and the concentration of organic vapors detected is greater than 5 ppm above background for a sustained period (approximately one minute), withdraw upwind from area and let the vault ventilate for 15 to 30 minutes and then perform air monitoring again. If air monitoring indicates that the air quality is not sufficient to sample, (as defined by the levels noted above), all work will be immediately suspended, the conditions will be monitored, and contact the BAT Safety Officer for further instructions;

- If after the vault has been ventilated , the level of H_2S is less than 10 ppm, the percent oxygen is greater than 19.5, the %LEL is less than 20, but the concentration of organic vapors detected is greater than 5 ppm but less than 10 ppm above background for a sustained period (approximately one minute), upgrade to Level C respirator and dermal protection and sampling may be performed. Air monitoring should be continued during sampling. If in the event that vapor levels exceed 10 ppm, all work will be immediately suspended; the conditions will be monitored, and contact the BAT Safety Officer for further instructions.

4.0 CONFINED SPACE ENTRY PROCEDURES

The vaults that house the extraction wells for the Off-Site System at the BAT facility are considered a confined space. Situations that are of most concern from a health and safety standpoint with confined space entry are those that are potentially immediately dangerous to life and health (IDLH). IDLH situations are most commonly associated with confined spaces involving oxygen deficient or explosive atmospheres, or acutely toxic chemical asphyxiants, such as hydrogen sulfide (H_2S). The following procedures apply to the entry into the vaults located at the BAT facility.

All personnel entering a vault will at a minimum maintain Level D personal dermal protection. Prior to entering any vault the atmosphere at the bottom of the vault must be tested for the presence of oxygen deficiency, hydrogen sulfide (H_2S), combustible gases, and organic vapors, in that order. The following air monitoring procedures shall be implemented during sampling:

- Lower a MSA 361 and an organic vapor monitor (OVM) or equivalent into the vault and record the presence of hydrogen sulfide (H_2S), the percent oxygen, and the percent of the lower explosive limit (%LEL). If the level of H_2S is less than 10 ppm, the percent oxygen is greater than 19.5, the %LEL is less than 20, and the concentration of organic vapors detected is less than 5 ppm above background for a sustained period (approximately one minute) the vault may be entered. Air monitoring must be conducted on a continuous basis when inside the vault;

- If the level of H_2S is greater than 10 ppm, the percent oxygen is less than 19.5, the %LEL is greater than 20, and/or the concentration of organic vapors detected is greater than 5 ppm above background for a sustained period (approximately one minute), withdraw upwind from area and let the vault ventilate for 15 to 30 minutes and then perform air monitoring again. If air monitoring indicates that the air quality is not sufficient to enter the vault, (as defined by the levels noted above), all work will be immediately suspended, the conditions will be monitored, and contact the BAT Safety Officer for further instructions;

- If after the vault has been ventilated , the level of H_2S is less than 10 ppm, the percent oxygen is greater than 19.5, the %LEL is less than 20, but the concentration of organic vapors detected is greater than 5 ppm but less than 10 ppm above background for a sustained period (approximately one minute), upgrade to Level C respirator and dermal protection and enter the vault. Air monitoring must be conducted on a continuous basis when inside the vault. If in the event that vapor levels exceed 10 ppm, all work

will be immediately suspended; the conditions will be monitored, and contact the BAT Safety Officer for further instructions.

All personnel entering a vault must adhere to confined space entry procedures as defined by OSHA for confined space entry and any BAT procedures for contractors that may be required for confined space entry. Also, any entry into a vault should be performed under the "buddy" system, in which one person enters the vault and a second person is stationed out of the vault to assist with air monitoring and aid in the event of a health and safety problem. This second person shall work under the same level of dermal protection as the worker in the vault and must have a full face respirator on his person in the event of an upgrade to Level C respirator protection.

5.0 PRECAUTIONARY PROCEDURES

In addition to the personal protective equipment, safe operations require responsibility and common sense on the part of everyone. Normal safe working practices should be adhered to and the following special safety procedures will be observed.

- Personnel in the working area, handling sampling equipment or samples shall wear protective gloves and safety boots as described previously as a minimum at all times;

- No smoking, eating, drinking, chewing gum or tobacco is permitted during sampling or handling of samples;

- Upon leaving the work area, coveralls and protective clothing will be removed and sampling personnel will thoroughly wash their face and hands;

- Avoid contact with suspected potentially contaminated materials. Do not unnecessarily walk through puddles, pools or mud. Do not lean, or place equipment on drums of unknown or hazardous substances;

- Beards or mustaches which interfere with satisfactory fitting of respiratory equipment are prohibited;

- Visitors are not allowed within 50 feet of the working area unless they are authorized representatives of BAT, the field sampling contractor, or the regulatory agencies. Any such visitors are responsible for their own personal protective equipment and shall be informed that such equipment is required. Visitor's names and company or agency affiliation shall be noted in the daily records; and

- No gloves or boots worn in the work area shall be removed without being cleaned.

6.0 DECONTAMINATION AND WASTE DISPOSAL

A de-con facility shall be established for equipment used during sampling activities. Adequate water supply shall be available for the decontamination of equipment, tools, personnel footwear, etc. The waste wash water and the rinse water shall be collected and accumulated in a water storage tank for disposition. Used or contaminated personal protective gear and clothing (i.e., disposable items such as Tyvek® and gloves) shall be kept in closed waste containers for future disposition by BAT.

7.0 EMERGENCY SAFETY EQUIPMENT

Emergency safety equipment is available on-site at all times as detailed in the BAT Contingency Plan and Emergency Procedures Manual (available from BAT). However, the sampling contractor shall ensure that the following items are available as a minimum:

1. A first aid kit (e.g., Johnson and Johnson Standard Industrial First Aid Kit) or equivalent;
2. Emergency Eyewash Station;
3. Washing facilities for routine decontamination and emergency showers; and
4. Fully charged Halon fire extinguisher.

Items 1, 2 and 4 shall be stored at the work site. Item 3 is standard emergency safety equipment located at the BAT facility. The sampling contractor should determine where the stations are in relation to the work locations and ensure that the equipment is functioning properly. All safety equipment will be maintained in a clean and workable condition.

8.0 CALIBRATION

When an instrument is used to monitor airborne concentrations of a known substance, the instrument should (ideally) be calibrated to that specific substance at a concentration comparable to the action level(s) or concentrations anticipated in the field. Since this is rarely the case, an instrument is typically calibrated in the field to a gas that is representative of the instrument's response to the widest variety of substances. In the case of photoionization detectors (OVM 580A and HNU PI-101) the calibration gas is typically isobutylene, and for the Foxboro OVA the calibration gas is methane (see Table D-1).

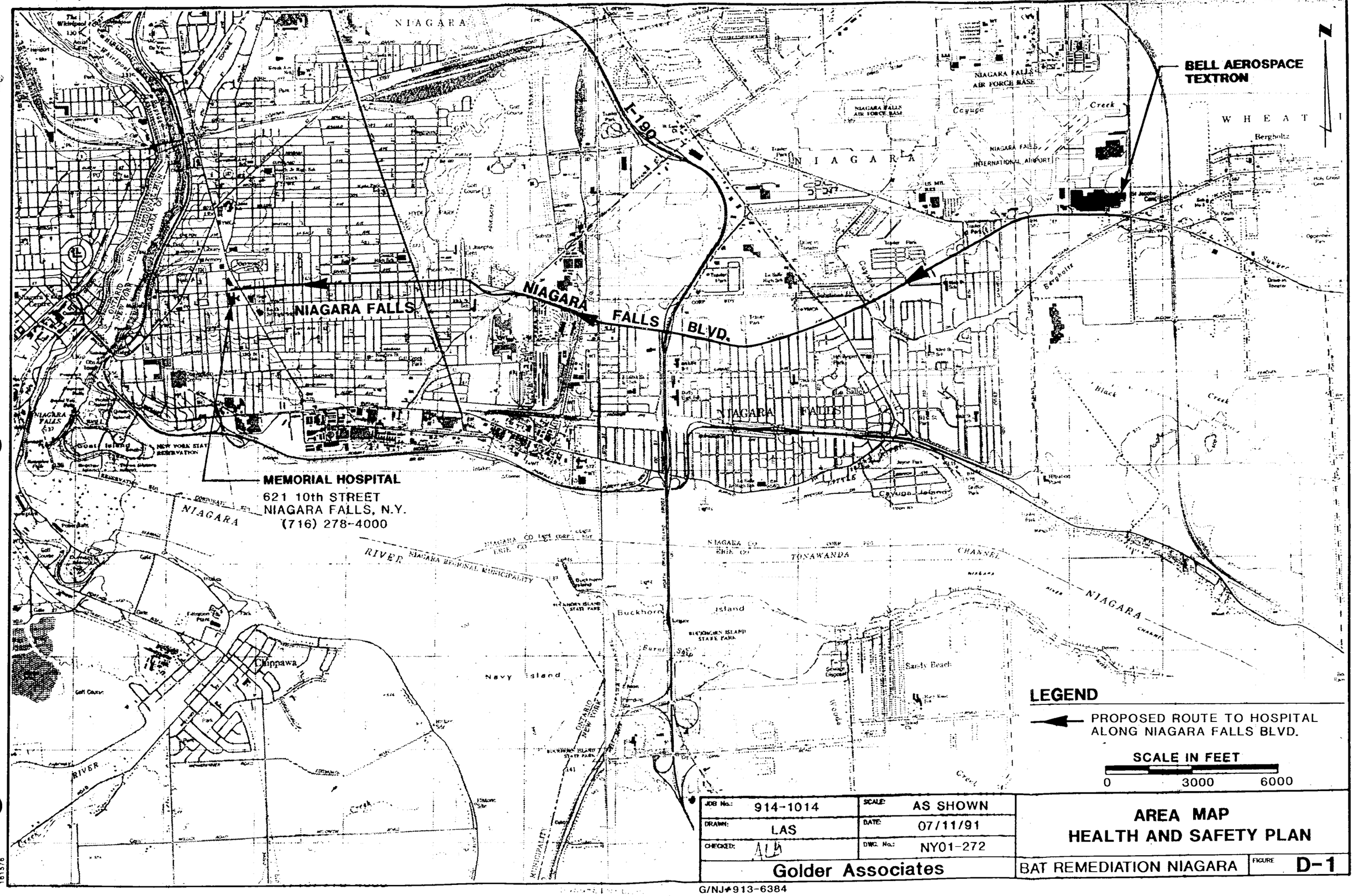
Every direct reading air monitoring instrument must be bench calibrated and checked out in the sampling contractor's laboratory or office at least once every three months. The calibration must be checked in the field daily to establish a frame of reference and to verify that the instrument is working properly. Unless otherwise specified, instruments shall be field calibrated as shown in Table D-1 attached.

F/N: APPENDIX.D

TABLE D-1
FIELD CALIBRATION
HEALTH AND SAFETY PLAN
BELL AEROSPACE TEXTRON
WHEATFIELD, NEW YORK

INSTRUMENT	CONDITIONS	CALIBRATION GAS	SPAN SETTING	INSTRUMENT SHOULD READ
OVM 580A		100 ppm isobutylene	RF-1.0	98 ppm - 102 ppm
HNU PI-101	10.2 eV lamp (re. benzene)	100 ppm isobutylene	9.8	50 ppm - 60 ppm
	11.7 eV lamp (re. benzene)	100 ppm isobutylene	5.0	60 ppm - 70 ppm
	9.5 eV lamp (re. benzene)	100 ppm isobutylene	1.0	50 ppm - 60 ppm
Foxboro OVA		9 ppm methane in air	3.0	8 ppm - 10 ppm
		90 ppm methane in air	3.0	80 ppm - 100 ppm

F/N. TAB0-1 WK1



JOB No.:	914-1014	SCALE:	AS SHOWN
DRAWN:	LAS	DATE:	07/11/91
CHECKED:	ALS	DWG. No.:	NY01-272

Golder Associates

AREA MAP
HEALTH AND SAFETY PLAN

BAT REMEDIATION NIAGARA — FIGURE D-1

G/NJ#913-6384

161576

ATTACHMENT A

Air Monitoring Data Sheet

Golder Associates Inc.

AIR MONITORING DATA SHEET

Date _____ Sheet ____ of ____

Job Name _____ Job Number _____

Location _____

Time In _____ Time Out _____ Weather _____ Temp. _____ Wind D. _____ V _____

Instrument Type _____ Serial No. _____

Calibration Gas and Concentration _____ Instrument Reading _____ Span/Gain/RF Setting _____

** If more than one instrument is used, document calibration procedures and results for each additional instrument in recommendations section below and indicate the instrument used (eg. OVA, 361, OVM, etc.) for each observation.*

Time	Station	Instr.*	Reading	Procedure/Observations/Comments

Recommendations

Printed Name

Signature