REMEDIAL DESIGN/REMEDIAL ACTION WORK PLAN AND OPERATION, MAINTENANCE, AND MONITORING WORK PLAN

FORMER DOWCRAFT CORPORATION
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1.0 INTRODUCTION

The former Dowcraft Corporation facility in Falconer, New York has been demolished and the property sold to Jamestown Container Corporation (JCC). Jamestown Allenco, Inc; (a successor of the Dowcraft Corporation) has retained the responsibility of completing any remedial work at the Site. The Site has been the subject of a number of investigations over the years. The data collected was compiled and assessed in the "Final Supplemental Remedial Investigation Report/Focussed Feasibility Study" (RI/FS) that was prepared by Conestoga-Rovers & Associates (CRA) and submitted to the New York State Department of Environmental Conservation in July 2002.

The net conclusion of that report was that there is a groundwater impact on the Site due to the operation of a vapor degreaser unit that used trichloroethylene (TCE). As a result of that, TCE, cis-1,2-dichloroethene (cis-1,2-DCE) and vinyl chloride (VC) are present in the groundwater at concentrations above the NYSDEC criteria. Interim Remedial Measures initially using pump and treat technologies and then later using in situ chemical oxidation have been implemented at the Site to address this situation. Following the RI/FS process, a Record of Decision (ROD) was issued for the Site recommending that the in situ chemical oxidation continue as the final remedy to address the groundwater impact.

The purpose of this Work Plan is to present the Remedial Design and Operation, Maintenance, and Monitoring Plan for the selected remedy. The only components of the final remedy are:

- Potassium permanganate injection to chemically oxidize the chemicals present in the groundwater;
- groundwater monitoring; and
- surface water monitoring.

The details regarding this remedy have already been submitted and approved by the NYSDEC. This report assembles these details into one document.

2.0 SITE DESCRIPTION/HISTORICAL REVIEW

2.1 PROPERTY LOCATION

The former Dowcraft property, now owned by JCC, is located at 65 South Dow Street, Falconer, New York. The location of the Site is shown on Figure 2.1. The former Dowcraft property covered approximately 2.2 acres.

The property is bounded to the north and east by the JCC property and to the south by property formerly owned by Conrail Railroad. Norfolk Southern Railroad assumed control of this rail line on June 1, 1999. South Dow Street is directly west of the property with Niagara Mohawk property located across South Dow Street to the west. The Site investigation included work conducted on the JCC property and in the Chadakoin River which borders the JCC property on the north. A Site Plan is shown on Figure 2.2.

2.2 HISTORY

Information on the Site history was obtained from the Chautauqua County Department of Planning and Development, Chautauqua County Clerk's Office, Town of Ellicott Historian, historical aerial photographs, and inspection of available historical maps.

The Town of Ellicott Historian, Chautauqua County Department of Planning and Development, and Chautauqua County Clerk's Office reported that the subject property was vacant until the late 1890s. The first form of development on the subject property was a woolen mill that opened in the early 1900s. In 1939, the woolen mill was reportedly converted to a factory which manufactured steel partitions. In 1986 the deed was transferred to Dowcraft Corporation. The manufacture of steel partitions for offices and the telecommunications industry continued until the facility was closed in 1999. Following the closure, the facility was demolished and all of the concrete floors were removed. The area has been covered with gravel.

During the use of the Site by Dowcraft, a TCE vapor degreaser was used to clean the metal products. Some of the TCE used in the cleaning process escaped from the degreaser unit which was located in a concrete vault in the floor within one of the buildings. The TCE released from the vault migrated through the upper soil horizon and entered the shallow groundwater.

It is this release that is the focus of this Remedial Design/Remedial Action Work Plan.

3.0 SUMMARY OF THE REMEDIAL INVESTIGATION/ FEASIBILITY STUDY/ROD

The purpose of the RI was to define the nature and extent of contamination resulting from previous activities at the Site.

The RI was conducted in two phases. The first phase was conducted between August 1991 and April 1993, with an Environmental Investigation and an Interim Remediation Plan. The second phase, or Supplemental Remedial Investigation/Feasibility Study was completed in July 2002. A report entitled "Supplemental Remedial Investigation/Focused Feasibility Study" was prepared which described the field activities and findings of the RI and presented feasible remedial alternatives.

The RI included the following activities:

1) Surface soil sampling at three storage areas to determine if surface contamination was present.
2) Surface soil screening during the removal of the concrete floor at the time of demolition of the facility.
3) Installation of 2l soil borings most of which were ultimately converted to monitoring wells or purge wells. The borings were used to delineate the contaminant plume within the overburden soils and to assist in placement of purge wells.
4) Soil sampling from three dry wells to determine if these were source areas for contamination.
5) Soil sampling from four test pits at the source area, and one new footing location excavation.
6) Screening of excavated soils from the installation of a new waterline and a new sewer line.
7) Physical testing of soil samples from four boreholes, and visual inspection and vapor screening of soils from the bedding of the outfall to the Chadakoin River.
8) Installation, development, and groundwater sampling of 15 monitoring wells and 4 purge wells.
9) Sampling of soil gas from 29 different soil boring points.
10) Hydraulic monitoring of each monitoring and purge well.
11) Aquifer pumping tests at two of the purge wells.

To determine which media (soil, groundwater, etc.) were contaminated at levels of concern, the RI analytical data were compared to environmental Standards, Criteria, and Guidance values (SCGs). Groundwater, drinking water, and surface water SCGs were identified for the former Dowcraft Site based on NYSDEC Ambient Water Quality Standards and Guidance Values and Part 5 of the New York State Sanitary Code. For soils, NYSDEC Technical and Administrative Guidance Memorandum (TAGM) 4046 provides soil cleanup guidelines for the protection of groundwater, background conditions, and health-based exposure scenarios. In addition, for soils, Site specific background concentration levels can be considered for certain classes of contaminants. Guidance values for evaluating contamination in sediments were taken from the NYSDEC "Technical Guidance for Screening Contaminated Sediments".

Based on the RI results, after comparison to the SCGs and potential public health and environmental exposure routes, it was determined that the only media requiring remediation was the groundwater which had been impacted by TCE from the soil vapor degreaser. More complete information can be found in the RI/FS Report.

3.1 SITE GEOLOGY AND HYDROGEOLOGY

The topography across the Site slopes slightly from south-southwest to north-northeast, from an elevation of 1266.4 to an elevation of 1263.0, which is a drop of 3.4 feet. The Chadakoin River, with its southern banks within 100 feet of the northern portion of the Site, is the nearest major natural water body and flows from west to east past the Site.

Characterization of Site geology was limited to the upper 60 feet of the overburden since contamination did not progress down beyond these units. The overburden units identified at the Site included, from top to bottom: fill; sand and gravel; and silt/clay. Bedrock was not encountered.

The fill unit ranges in thickness from 2 to greater than 14 feet, with an average thickness of 8 feet. The observed makeup was cinders, sand, silt, gravel, brick, concrete, coal, slag, and metal.

The sand and gravel unit ranged from 30 to 39 feet in thickness with an average thickness of 35 feet. Its depth below ground surface ranged from about 8 to 43 feet. A lens of silt/clay, approximately 8 feet thick, was encountered at three borings within this sand and gravel unit.

A silt/clay unit underlies the sand and gravel starting at a depth of approximately 43 feet. This unit is estimated to be 60 feet in thickness according to regional geology. This unit was found to contain a 4 foot thick fine sand lens as noted in one deep soil boring at the Site.

The southern edge of the Jamestown Aquifer is located approximately one mile north of the Site and is found at a depth, to the top of the aquifer, of approximately 100 to I25 feet. The Jamestown Well Field is located between one to two miles north of the Site.

Groundwater is found at a depth of approximately 10 feet below ground level across the Site. Review of the regional topography shows that the discharge point for shallow groundwater is the Chadakoin River. Groundwater contours developed for the Site indicate that groundwater flow within the upper sand and gravel unit is to the north-northeast at approximately 2.7 feet per year. However, there appears to be a limited semi-confined aquifer system within the lower sand and gravel unit, as was indicated from a comparison of an on-Site shallow monitoring well and an adjacent deep monitoring well. The gradient appears to have a slight upward movement, with water moving from the deeper zone to the shallow zone in this area.

3.2 NATURE OF CONTAMINATION

As described in the RI/FS report, soil gas samples, soil samples, groundwater samples, surface water samples, and sediment samples were collected at the Site to characterize the nature and extent of contamination. Samples were submitted for Target Compound List (TCL) volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), and Target Analyte List (TAL) metals. The category of contaminants which were found to exceed their SCGs are the VOCs. A list of Chemicals of Concern (COC) were developed for this Site based on the actual sampling data and the number of exceedances of acceptable standards. The COCs for the former Dowcraft Site are:

- TCE;
- 1,2-dichloroethene; and
- vinyl chloride.

The area of concern relative to these organic compounds is the shallow overburden groundwater in the central portion of the Site. This area of concern coincides with the area of the former TCE degreaser unit.

3.3 EXTENT OF CONTAMINATION

Table 1 summarizes the extent of contamination for the COCs in overburden groundwater and compares the data with the SCGs for the Site. The following are the media which were investigated and a summary of the findings of the investigation.

Soil Gas Sampling

A soil gas survey was conducted at the Site to determine if the source of the detected VOC contamination was predominantly in the unsaturated soils. A total of 29 soil gas measurement points were sampled at depths ranging from two feet to six feet below the ground surface. Compounds detected during this survey included TCE and toluene. TCE was detected in six soil gas points at concentrations ranging from 3.3 ppb to 6.9 ppb. Toluene was detected in one sampling point at 0.6 ppb. There are no standard values for comparing these numbers. These soil gas points were used as an aid in determining the magnitude of the problem. The higher readings were limited to the area in the vicinity of the degreaser pit.

Surface Soils

A total of three surface soil samples were collected from three exterior storage areas. The soil sampling locations were determined based on property use, both present and past. The surface soil samples were collected from between 0 and 6 inches below ground surface. Each sample was analyzed for VOCs and for metals. No VOCs were detected in these soils. The three surface soil samples exhibited elevated concentrations of chromium, copper, and zinc (115 ppm, 236 ppm, 1300 ppm, respectively) which were above eastern USA Background levels but are indicative of a typical industrial area such as this.

Subsurface Soil Samples

Subsurface soil samples were collected from test pits TP-l through TP-5 around the historical degreaser area after the building was demolished. The soil samples were collected from the unsaturated zone, at a depth of approximately 9 to 10 feet just above or across the water table and analyzed for VOCs. The compound cis 1,2-dichloroethene was found at TP-3 at 16.5 ppb. TCE was found at each test pit with values ranging from 2.2 to 480 ppb. All of the organic values noted at the test pits were below the Recommended Soil Cleanup Objective Levels as per TAGM 4046. The lack of

appreciable contamination within the unsaturated zone at the source area indicates that contamination likely exited the sump and moved directly into the overburden groundwater system since the bottom of the sump was located at approximately 10 feet of depth, the approximate elevation of the groundwater table.

An additional soil sample was collected from the excavation for a new building foundation east of the old degreaser pit area. The sample was analyzed for volatile organics as per the list of COCs previously determined for the Site. Only TCE was found at a value of 35 ppb. This sample was collected from a depth of 0.5 to 3 feet below the surface.

Drywell Soil Samples

Soil samples were collected from drywells 004, 005, and 007. The drywell soil samples were analyzed for TCL VOCs. Drywell 005 contained 440 ppb of 1,2-dichloroethene while drywell 004 was found to contain 120 ppb of TCE. Each of these values are below the recommended soil cleanup objectives. No VOCs were detected at drywell 007.

Sediments

Three sediment samples were taken from along the south shore of the Chadakoin River. One upstream of Outfall 002; one at the discharge point of Outfall 002; and one downstream the Site. Each sample was analyzed for TCL VOCs. No VOCs were detected in any of the sediment samples.

Surface Water

Three surface water samples were obtained concurrently with the sediment samples as noted above. These samples were collected from along the south shore of the Chadakoin River and were analyzed for TCL VOCs. No VOCs were detected in any of the surface water samples. A sample of the Outfall 002 discharge water was also collected in May 1992. There were no VOCs in the discharge water at the time of sampling. This was a monitored outfall under the State Pollution Discharge Elimination System (SPDES) and is no longer in use or monitored.

Groundwater

A total of twenty monitoring wells and three purge wells are in place at the Site. Two additional boreholes were drilled for stratigraphy verification and one time soil and groundwater sampling.

The monitoring wells and purge wells are installed into the saturated zone of the overburden soils. Seventeen shallow wells are installed to an average depth of 15 feet below ground. Five deep wells are installed to a maximum depth of 60 feet below ground. The purge wells are installed between 22 feet and 42 feet below ground.

All of the monitoring and purge wells were sampled for TCL VOCs and metals and/or general parameters. Four of these wells were additionally sampled for SVOCs and PCBs to determine if these compounds were of concern at this Site. Two wells were sampled for Total Petroleum Hydrocarbons and were found to be non-detect.

VOCs initially found in groundwater at the Site, with their associated maximum concentration in parts per billion (ppb), included TCE (320,000), 1,2-dichloroethene (1,900), vinyl chloride (160), tetrachloroethene (17), 1,1,1-trichloroethane (51), and 1,1-dichloroethane (12). The groundwater standard for these compounds is 5 ppb, except for vinyl chloride which is 2 ppb.

The only SVOC found to exceed groundwater standards was bis(2-ethylhexyl)phthalate (9.1 ppb), which was found at one well, and could have been an artifact from a sampling glove. The standard for this compound is 5 ppb.

Four metals were found in groundwater which exceeded groundwater standards. The maximum concentrations noted, in ppb were, iron (18,500), lead (60), manganese (4,430), and sodium (45.700). Their respective groundwater standards are, 300, 25, 300, and 20,000 ppb. All metals analyses were for total concentrations. A review of the findings of metals at various wells including the deep well ESI-2D, indicate that these metals are naturally occurring and therefore, are not considered to be COCs for the Site. Lead is slightly above standards and may be naturally occurring or a result of area wide industrial activity.

A plume of the COCs originates from the degreaser area and has affected the shallow overburden groundwater. The plume extends from the degreaser area to the north, under the JCC building and up to the area of the Chadakoin River. This is an area of approximately one acre. The rate of movement is approximately2 to 3 feet per year to the north. Sampling in the river has not shown any impact to date.

3.4 INTERIM REMEDIAL MEASURES

Two separate Interim Remedial Measures (IRMs) have been conducted at this Site. From 1994 to 1999, an overburden groundwater extraction system was operated by Dowcraft. The system consisted of two extraction wells (PW-2 and PW-3) and provided on-Site treatment via air stripping with discharge to the local Publicly Owned Treatment Works (POTW). Then in April 2000, after demolition of the building, Dowcraft requested an IRM for the Site which consisted of the application of a potassium permanganate ($KMnO_4$) solution for in situ chemical oxidation of the COC. The IRM was approved by NYSDEC in May 2000 and treatment events were conducted on three separate occasions; May 2000, November 2000, and June 2001. The IRM consisted of the injection of a water solution of between 2.8 and 3.7 percent $KMnO_4$ into the overburden soils in the plume. An approved monitoring program gauged the effectiveness of the program.

In summary, there has been a significant reduction in TCE concentrations as a result of the pumping of groundwater and the $KMnO_4$ treatment. At the termination of groundwater extraction efforts, contaminant values as high as 62,500 ppb (TCE) remained in the source area well (PW-3R) and levels as high as 6,850 ppb existed downgradient of the source area. After the completion of the third $KMnO_4$ injection into the source and contaminant plume areas in June 2001, sampling results from November 2001 indicated that the TCE level at the source area well (PW-3R) dropped 88%, and that two wells immediately downgradient also had reductions in TCE levels of 71% (ESI-2) and 84% (PW-2). An increase in TCE further downgradient in the plume occurred and was expected to have been caused by the movement of groundwater as a result of the injection process at the source area.

Table 2 presents TCE concentrations from December 1999, prior to any $KMnO_4$ injection, and then for September 2001 and November 200l, after the third injection which was completed in June 2001.

3.5 SUMMARY OF HUMAN EXPOSURE PATHWAYS

This section describes the types of human exposures that may present health risks to persons at or around he Site. A more detailed discussion of the health risks can be found in Section 9.0 of the RI report.

An exposure pathway is the manner by which an individual may come in contact with a contaminant. The five elements of an exposure pathway are: 1) the source of

contamination; 2) the environmental media and transport mechanisms; 3) the point of exposure; 4) the route of exposure; and 5) the receptor population. These elements of an exposure pathway may be based on past, present, or future events.

One pathway which potentially exists at this Site is through the inhalation of soil vapors which may migrate into buildings along the northern portion of the Site.

Confined, heated workspaces could accumulate measurable concentrations of volatile contaminants. A soil gas survey conducted early in the investigation and subsequent soil sampling along with soil vapor screening have shown that there are very low or negligible concentrations of COCs in the vadose zone soils except for the immediate area around the old degreaser unit. Potential health risks to industrial workers or trespassers exposed to Site ambient or indoor air are considered insignificant.

In previous discussions with the NYSDEC, it was agreed that no further action was required with regard to soil gas vapors and indoor air quality because:

- a previous soil gas study was performed and the highest TCE concentration in the soil gas was only 6.9 ppb;
- the highest concentration was in the area of the former TCE degreaser unit; and
- these soil gas measurements were taken prior to the implementation of the IRMs when the organic concentrations in the groundwater were orders of magnitude higher.

In the event that the area around the historic elevated COC concentrations are ever developed, the development will include appropriate gas control measures to ensure that indoor air quality will not be affected. Alternatively, the developer can perform an assessment, approvable by NYSDEC, demonstrating that such gas control measures are not needed.

If the contaminants in groundwater were left unattended, there would be a threat to the Jamestown Aquifer which is approximately one mile to the north. The City of Jamestown and surrounding communities depend on this aquifer as a potable water source.

3.6 SUMMARY OF ENVIRONMENTAL EXPOSURE PATHWAY

This section summarizes the types of environmental exposures and ecological risks which may be presented by the Site. The Environmental Risk Assessment included in the RI presents a more detailed discussion of the potential impacts from the Site to fish and wildlife resources.

The terrestrial setting around the Site provides a poor ecological habitat for the vast majority of potential environmental receptors. The Site consists of areas covered by gravel, concrete, asphalt, and buildings, with very little environmentally attractive vegetative areas. There are no known terrestrial species which occupy the Site or use it as a nesting or feeding area. The Chadakoin River, situated to the north of the Site is the only environmental receptor of mention. To date there have been no chemicals detected in sediments or river water. Groundwater flow is toward the Chadakoin River. If the groundwater plume were allowed to enter the Chadakoin River without the implementation of any remedial measures, there could be an adverse impact on aquatic life.

3.7 REMEDIATION GOALS

Goals for the remedial program have been established through the remedy selection process. The overall remedial goal is to meet all SCGs and be protective of human health and the environment. At a minimum, the remedy must eliminate or mitigate all significant threats to public health and/or the environment presented by the hazardous waste disposed at the Site through the proper application of scientific and engineering principles.

The remediation goals selected for this Site are:

- treat the source area of groundwater contamination by oxidation of the contaminants, in place;
- prevent exposure of human receptors to contaminated groundwater in the sand and gravel unit under the Site; and
- prevent or mitigate, to the maximum extent practicable, COC migration via groundwater so that releases from the underlying sand and gravel unit to the Chadakoin River do not exceed applicable SCGs;

3.8 SUMMARY OF THE RECORD OF DECISION

The New York State Department of Environmental Conservation (NYSDEC) in consultation with the New York Department of Health reviewed the RI/FS and selected the injection of $KMnO_4$ to address the threat of human health and the environment created by the presence of hazardous waste at the Site. The threat was created by a TCE vapor degreasing operation which was used within the plant and resulted in the release of TCE into soils and groundwater at the Site. This release has resulted in the following threats:

- an environmental and health threat associated with the impacts of contaminants to the Jamestown Aquifer, the primary drinking water supply for the Jamestown area; and
- an environmental threat to the Chadakoin River situated approximately 100 feet north or downgradient of the Site.

In order to eliminate or mitigate the threats to the public health and the environment that the hazardous waste released at the former Dowcraft Site has caused, the following remedy has been selected:

. injection of a $KMnO_4$ solution into the overburden groundwater contaminant plume. Groundwater monitoring will be performed to monitor groundwater quality and to modify the injection process, if necessary. Additional injections will not be required if the following criteria are met:
  - the COC concentrations in the groundwater monitoring wells remain below 1,000 »ig/L;
  - the COC concentrations in the groundwater monitoring wells are not increasing significantly; and
  - the COC concentrations in the Chadakoin River remain below the surface water quality criteria.

It may be determined that even though all of the above conditions are met, it may still be desirable to perform another injection to further reduce COC concentrations in selected areas. This determination can be made based on mutual consent between the NYSDEC and Jamestown Allenco.

The selected remedy is intended to attain the remediation goals selected for this Site in conformity with applicable standards, criteria, and guidance (SCGs).

3.9 SUMMARY OF THE EVALUATION OF ALTERNATIVES

Six alternatives were evaluated during the Feasibility Study as possible remedies to address the groundwater impact at the Site. The alternatives evaluated were:

1. No Further Action.
2. Institutional Controls and Monitoring.
3. Extraction Well System with On-Site Treatment.
4. In Situ Chemical Oxidation.
5. In Situ Air Sparging/Soil Vapor Extraction.
6. In Situ Steam Sparging.

Based upon the evaluation, Alternative 4 In Situ Chemical Oxidation was selected. This alternative involves:

1. In Situ groundwater treatment through chemical oxidation, by injection of $KMnO_4$ dissolved in water, through existing well points into the shallow overburden groundwater table.
2. Overburden groundwater monitoring to verify the effectiveness of the treatment.
3. Institutional controls will be imposed, in such form as the NYSDEC may approve, that will prevent the use of groundwater as determined by the Local Health Department.
4. Annual certification to NYSDEC to certify that institutional controls remain in place.
5. Gas control measures for future development in the immediate area to insure no adverse risk associated with indoor air quality exists (or an assessment showing no such controls are necessary).

In situ chemical oxidation of the chemicals of concern in groundwater using $KMnO_4$ began in May 2000 and continued through July 2001. During that time, three injections of KMnO4, in solution, were performed. It is estimated that one additional treatment event will be necessary to consume the source area chemical load, by introducing $KMnO_4$ into the overburden groundwater plume. Groundwater monitoring will be performed to verify the remaining chemical mass, evaluate the presence of KMnO4 remaining in groundwater to complete the restoration of the groundwater, and provide for additional applications of the $KMnO_4$, if necessary (if the COCs remain above 1,000 µg/L). Monitoring will be performed during the implementation of the in situ

treatment and following its completion. The monitoring program will consist of semi-annual or annual collection of samples from eleven wells within the downgradient area of the COC plume and from within the Chadakoin River. The monitoring program will also include measurement and evaluation of water table and surface water elevations to track groundwater flow patterns. Institutional controls will be implemented to provide for the long-term protection of Site occupants.

This alternative was deemed to be:

- protective of human health and the environment;
- in compliance with New York State SCGs (Table 3 presents the SCG);
- effective in both the short-term and long-term;
- able to reduce the toxicity, mobility, and volume of chemicals present;
- implementable;
- cost effective; and
- acceptable to the community.

4.0 DETAILED ENGINEERING DESCRIPTION OF REMEDIAL ACTION

4.1 OVERVIEW

The engineering details of this Remedial Action involves two basic components; $KMnO_4$ injection and routine groundwater monitoring. The details of the injections are provided in this section of the report. The monitoring requirements are provided in the Remedial Action Operation, Maintenance, and Monitoring Plan which is attached as Appendix A to this report. This plan has already been approved by the NYSDEC.

The proposed plan for initiating the Remedial Action will be as follows:

- one set of groundwater samples will be collected from wells ESI-2, ESI-3, ESI-7, PW-1, PW-2, and PW-3R for VOC analysis. The last sampling of these wells occurred in 2001 and it is necessary to obtain a current set of data to determine which wells have TCE/1,2-DCE/Vinyl Chloride concentrations above 1,000 µg/L; and
- select the appropriate wells and amounts of $KMnO_4$ for injection.

Expectations are that PW-3R will require injection. If this is the case, IBH-1, IBH-2, IBH-3, and IBH-5 will also receive injections. If an injection is required, any wells with COC concentrations exceeding 100 µg/L will also receive injections. The injection volume will be proportioned to the concentrations of COCs in the individual wells.

This in situ treatment program is intended to introduce $KMnO_4$ into the primary area of chemical presence in Site groundwater and to allow the $KMnO_4$ to come into contact with as much of the groundwater chemical plume as possible. To accomplish this, an aqueous solution of $KMnO_4$ will be injected into the identified areas.

$KMnO_4$ is a strong oxidizing agent that reacts readily with many organic compounds including the VOCs that are present at the Site. The effectiveness of $KMnO_4$ for the oxidation of organic chemicals in environmental media has been demonstrated at the laboratory and pilot scale levels and at this Site. $KMnO_4$ is a stable reagent also used in drinking water treatment. It is commercially available and easy to handle in both solid and aqueous forms.

A detailed description of the procedures to be implemented for the in situ treatment program is presented in the following subsections.

4.2 INJECTION

4.2.1 SOLUTION

An aqueous solution of approximately 4 percent by weight $KMnO_4$ will be injected into the identified wells. The solubility of $KMnO_4$ in water at room temperature is 7 percent. Based on this information, a 4 percent solution has been selected as this is well within the range that will ensure complete dissolution when prepared in bulk in cooler seasonal temperatures. Complete dissolution is necessary to obtain the full effect of the $KMnO_4$ and to prevent clogging of well screens.

In estimating the amount of KMnO4 required to treat the remaining chemical mass present, a conservative ratio of 2 pounds of $KMnO_4$ to 1 pound of chemical mass has been applied. This excess allows for unaccounted oxidation of $KMnO_4$ by other organic matter that is expected to be present. Therefore, to treat the remaining chemical mass, a calculation will be done using the data collected from the initiating sampling event. The concentrations in the groundwater will be used to estimate the COC mass remaining in the groundwater. Based on that estimate, 2 pounds of $KMnO_4$ will be injected into the groundwater for every pound of COC. The minimum injection amount, if required, will be 500 pounds.

The $KMnO_4$ solution will be prepared in batches in a temporary on-Site storage or frac tank. $KMnO_4$ is readily soluble, so mixing will be accomplished using a mixing pump.

4.2.2 INJECTION POINTS

The depth of KMnO4 application will be the full depth of the saturated zone, from approximately 10 feet BGS to the top of the silt/clay unit. The aqueous $KMnO_4$ will be injected directly into the wells.

The injection will be either by gravity feed directly from the mixing tank or a pump may be used to push the injection fluid into the wells. The volume injected into each well will be recorded.

4.3 MONITORING

Monitoring of the in situ treatment will consist of both a hydraulic monitoring program and a groundwater quality monitoring program. The details for both of these programs are presented in Appendix A.

Upon receipt, the analytical data will be reviewed to determine the effectiveness of the in situ treatment and to determine whether additional round(s) of treatment should be performed.

4.4 REMEDIAL ACTION AREA

The area to be remediated is shown on the scaled map shown in Figure 4.1. The treatment area includes the entire area defined to be within the COC plume (TCE, 1,2-DCE, and vinyl chloride); an area of approximately 42,000 square feet.

All of the injection points for the Remedial Action will be within this defined treatment area.

The volume of the environmental medium to be remediated extends over the entire treatment area down to the base of the sand and gravel unit; which is at a depth of about 45 feet below grade. A low permeable silt unit underlies the sand and gravel forming the base of the waterbearing unit that has been impacted by the COCs

The extent of the area to be remediated is confined to within the 42,000 square foot treatment area. The majority of this area will be treated by natural attenuation. The center core of the COC source, the former degreaser pit, is the area where $KMnO_4$ injections will occur if the COC concentrations exceed 1,000 µg/L. Otherwise, the entire area will be treated by natural attenuation.

During the last sampling event in 2001, all of the TCE concentrations were less than 1,000 µg/L with the exception of wells ESI-7, PW-2, and PW-3R. These are the most likely wells to receive the first injections. The proposed initial sampling event will provided the current concentrations and determine whether further injections are necessary. Table 2 and Figure 4.1 provides the most recent chemical data for TCE.

4.5 IMPACTED AREAS

The only area that will potentially be impacted by the Site groundwater and the Remedial Action is the Chadakoin River. A sampling program has been developed to address this possibility. The surface water sampling program will be conducted at the same time as the groundwater sampling program. Further details are provided in the Remedial Action Operation, Maintenance, and Monitoring Plan (Appendix A).

4.6 QUALITY ASSURANCE PROJECT PLAN

A Quality Assurance Project Plan has been developed and approved by the NYSDEC. The plan is presented in Appendix B.

4.7 EROSION CONTROL, STORM WATER MANAGEMENT, OTHER CONTROLS

The Remedial Action designed for this Site involves injection of $KMnO_4$ and monitoring. As there will be no intrusive activities, there is no need for soil and sediment erosion controls; storm water management/monitoring; or dust, odor, or organic vapor controls.

The only material to be handled at the Site is $KMnO_4$s and the safety procedures for that are provided in the Health and Safety Plan which is presented in Appendix C. The only other activity is groundwater and surface water sampling and again the procedures for this are specified in the Health and Safety Plan in Appendix C.

4.6 DISMANTLING REMEDIAL STRUCTURES

Upon completion of the Remedial Action, the groundwater monitoring wells will be decommissioned. Since the wells are shallow in the uppermost portion of the aquifer and do not cross through any impermeable layers, the wells will be decommissioned as follows:

- the wells will be filled with cement grout to the ground surface;
- the upper 2 feet of the well (and associated protective casing) will be removed; and
- the upper 2 feet will be backfilled with material consistent with the surrounding area.

There are no other remedial structures at the Site.

5.0 SCHEDULE

The schedule for Site work is as follows:

- Initiating Groundwater Sampling Event
  - within 30 days of NYSDEC approval of this Work Plan;
- First $KMnO_4$ Injection
  - if needed based on Initiating Groundwater Sampling Event, first injection will occur within 60 days of initiating sampling (allows time for data validation and review and agreement on injection plan between NYSDEC and Jamestown Allenco);
- Groundwater Monitoring
  - semi-annually for 2 years following any treatment event,
  - annually for 3 years thereafter (total of 5 years following the last treatment event), and
  - after 5 years of monitoring is complete, Jamestown Allenco and the NYSDEC will discuss the status of the O&M Plan and whether there is a need for its continuation;
- Surface Water Monitoring
  - same frequency as the groundwater monitoring;
- Subsequent $KMnO_4$ Injections
  - not to exceed once per year to allow all of the previously injected material to fully react; and
- Reporting
  - monitoring reports will be provided after each monitoring event. Information to be included is presented in the O&M Plan, and
  - annual reports will be submitted annually starting 15 months after approval of the Work Plan. Information to be included is presented in the O&M Plan. The first annual report will also include a soil gas assessment using the Johnson-Ettinger model.

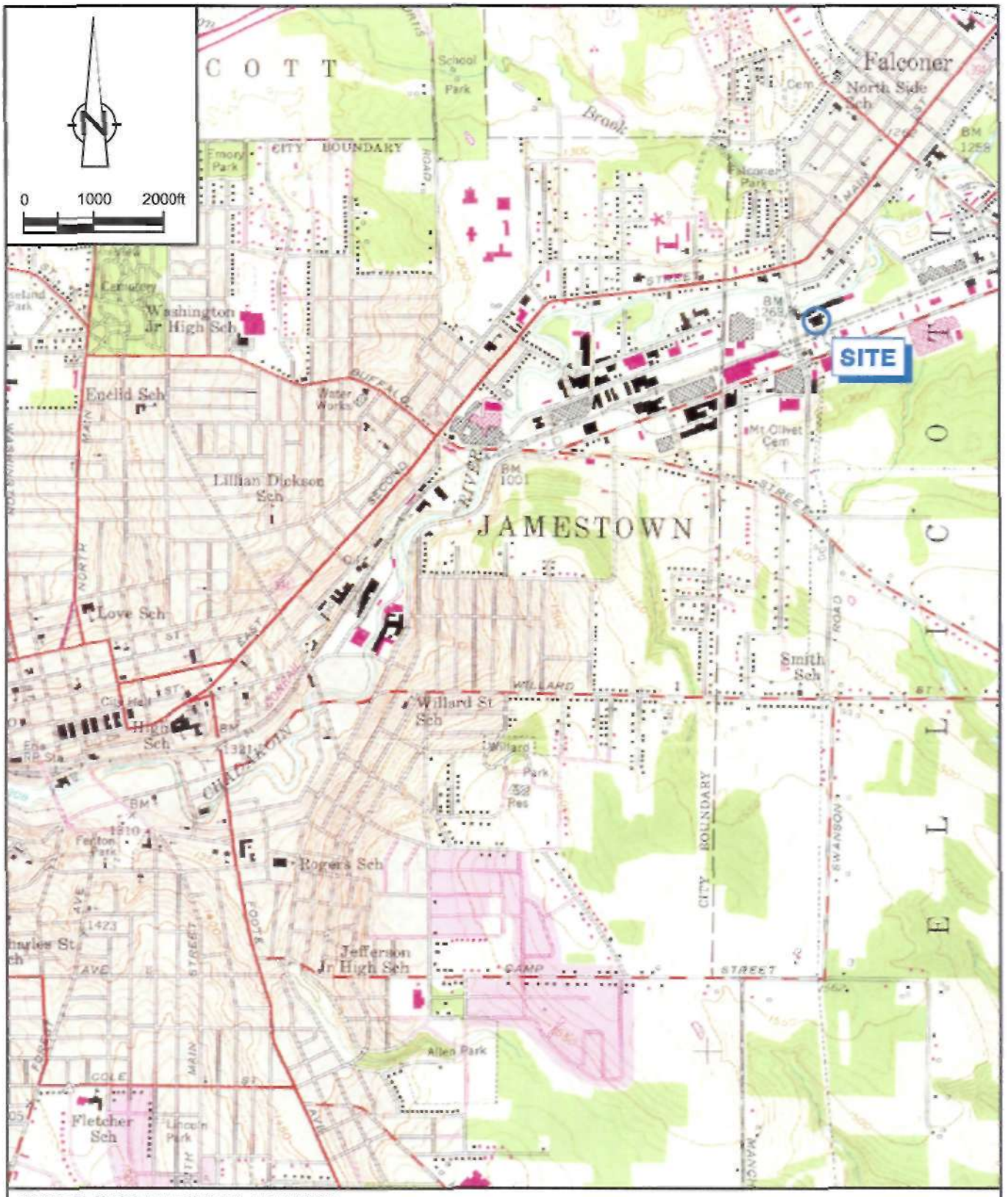
6.0 INSTITUTIONAL CONTROLS

The only institutional control required is the prohibition of use of the groundwater in the impacted area being used as a source of potable or process water. A signed agreement from JCC is included in Appendix D.

Jamestown Allenco will have JCC confirm that it is not using the groundwater on an annual basis.

Future development at the site will include provisions for soil gas controls or an assessment demonstrating that such controls are not needed.

The final close-out report for the Site shall include provisions for creation of a revised environmental easement to address soil vapor migration and monitoring in the buildings if such action is still warranted, at that time.



SOURCE: USGS JAMESTOWN, NEW YORK QUADRANGLE, PHOTOREVISED 1979.

figure 2.1

SITE LOCATION MAP
FORMER DOWCRAFT CORPORATION
Falconer, New York

05020-00(011)GN-NF001 DEC 09/2005

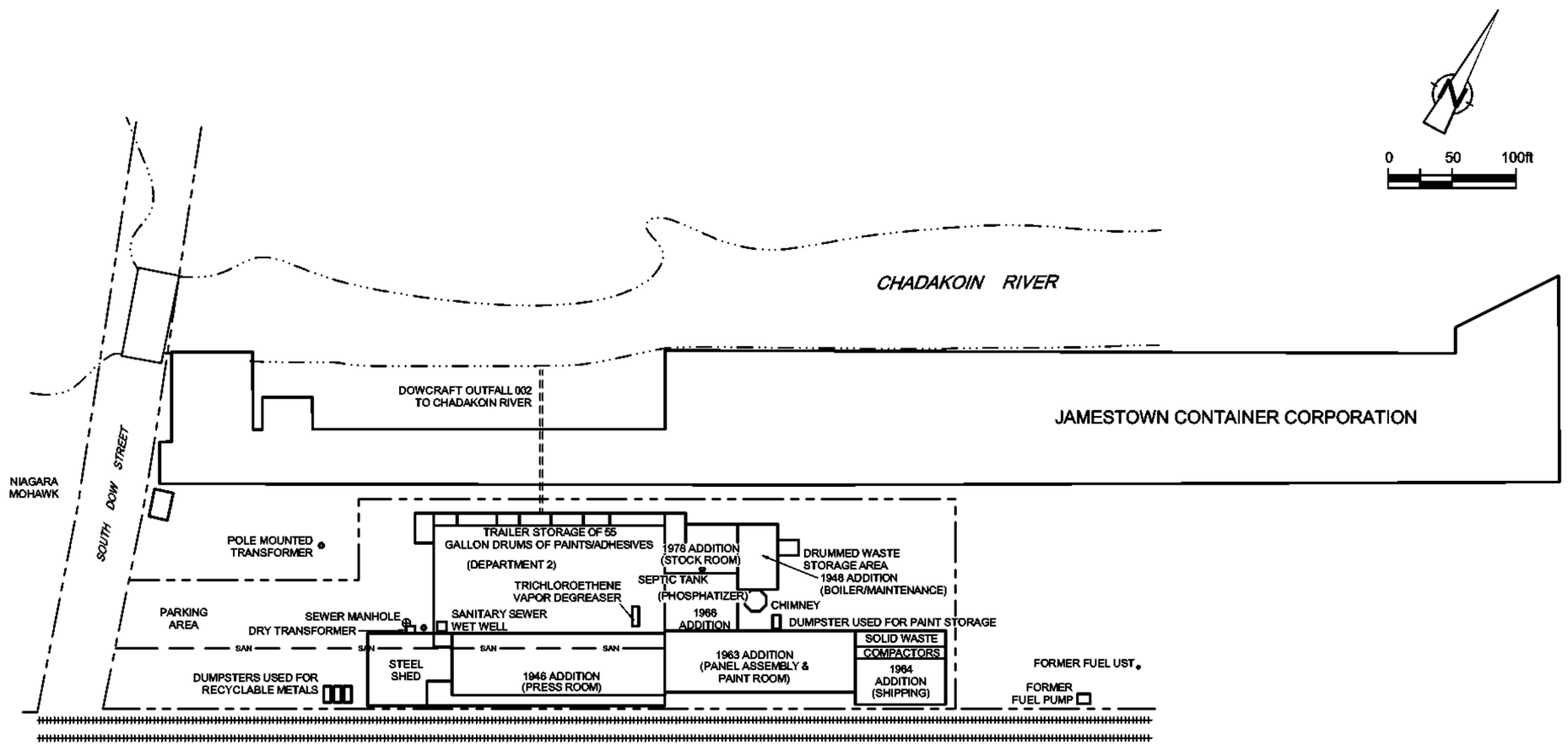
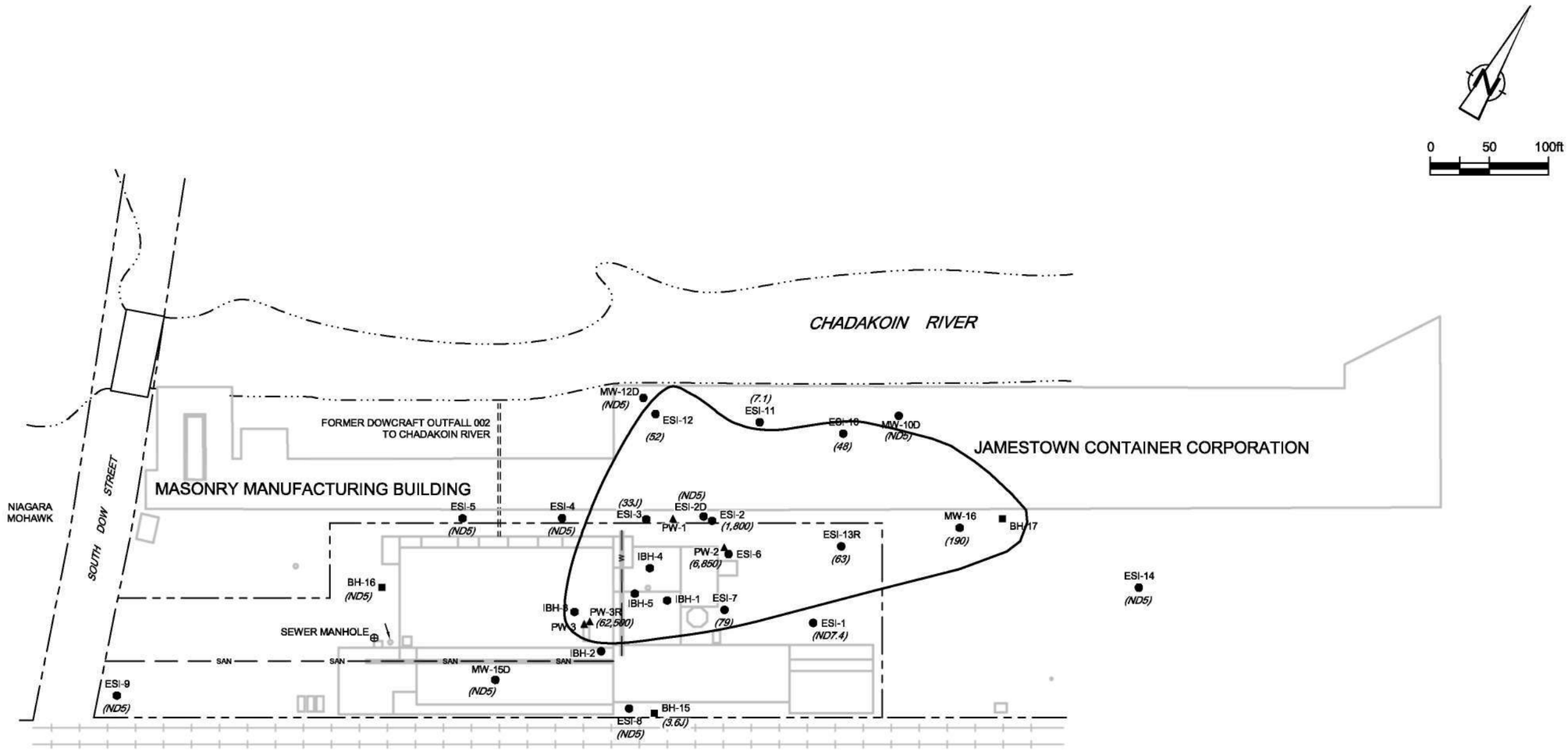


figure 2.2

SITE PLAN AND HISTORIC OPERATIONS
FORMER DOWCRAFT CORPORATION
Falconer, New York



LEGEND

ESI-8 ●	MONITORING WELL
BH-15 ■	BOREHOLE
PW-3 ▲	PURGE WELL
(63)	TCE CONCENTRATION (ug/L),
(NDx)	NOT DETECTED AT SPECIFIED VALUE
J	ESTIMATED VALUE
———	ESTIMATED LIMIT OF TCE CONCENTRATIONS >5 ug/L

NOTE: ANALYTICAL DATA FOR MW-10D, MW-12D, MW-15D AND MW-16, APRIL 2001.
ALL OTHERS, DECEMBER 1999

figure 4.1

ESTIMATED LIMIT OF AREA TO BE REMEDIATED
FORMER DOWCRAFT CORPORATION
Falconer, New York

TABLE 1

NATURE AND EXTENT OF CONTAMINATION
(exceedances shown only)

Medium	*Category*	*Contaminant of Concern*	*Concentration Range (ppb)*	*Frequency of Exceeding SCGs/Background*	*SCG/Background (ppb)*
Overburden Groundwater	Volatile Organic Compounds (VOCs)	Trichloroethene	3.6 - 320,000	34/52	5
		1,2-Dichloroethene	1.4 - 1,900	27/52	5
		Vinyl Chloride	11 - 160	7/52	2

TABLE 2

TCE CONCENTRATIONS (PRE AND POST INJECTIONS)

TCE Concentrations (ppb)

Well #	*Pre Injection Dec.1999*	*Post Injection Sept. 2001*	*Post Injection Nov. 2001*
ESI-1	ND7.4	NA	NA
ESI-2	1800	3800	530
ESI-3	335	150	54
ESI-4	ND5	ND	ND
ESI-6	NA	NA	NA
ESI-7	79	3500	3500
ESI-10	48	750	130
ESI-11	ND7.1	59	11
ESI-12	52	15	71
ESI-13R	63	NA	NA
IBH-1	NA	ND	83
IBH-2	-	250	380
IBH-3	-	ND	ND
IBH-4	NA	ND	ND
IBH-5	NA	ND	100
PW-2	6850	1200	1100
PW-3R	62500	ND	7500

TABLE 3

STANDARDS, CRITERIA, AND GUIDANCE

Regulation/Policy	*Rationale for Use*
NY Air Pollution Control Regulations (6 NYCRR Parts 200-257)	Remedial activities may impact air quality. Air stripping technologies need necessary engineering to meet regulations.
New York Water Classifications and Quazlity Standards. (6 NYCRR Parts 609, 700-704)	Standards impact selection of groundwater remediation goals, as well as treatment goals for re-injection of treated effuent to the aquifer.
New York State Air Guide (1991)	Provides guidance on calculating limits for off-gas emissions.
New York Waste Transport Permit Regulations. (6 NYCRR Part 364)	Off-site transport of treatment residuals will require compliance with these regulations.
Inactive Hazardous Waste Disposal Site Remedial Program (6 NYCRR Part 375)	Regulates permitting of activities at the site; defines uses; public participation, and provides guidance to the hazardous waste clean-up program.
Determination of Soil Cleanup Objectives and Cleanup Levels (TAGM HWR-94-4046)	Guidelines for developing soil cleanup goals.

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(Following Report)

GLOSSARY

COCs	Chemicals of Concern
HASP	Health and Safety Plan
IRMs	Interim Remedial Measures
JCC	Jamestown Container Corporation
NYSDEC	New York State Department of Environmental Conservation
O&M	Operation and Maintenance
POTW	Publicly Owned Treatment Works
PPE	Personal Protective Equipment
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RA	Remedial Action
TCE	Trichloroethene

1.0 INTRODUCTION

This report outlines the Operation, Maintenance, and Monitoring (O&M) Plan for the former Dowcraft Corporation facility located at 65 South Dow Street, Falconer, New York. The purpose of this O&M Plan is to provide the detailed operation, maintenance, and monitoring requirements for the Remedial Action (RA) that will be implemented at the Site.

1.1 SCOPE OF THE O&M FLAN

Th purpose of this O&M Plan is to present detailed procedures for the operation, maintenance, and monitoring of the RA. This report is organized as follows:

- Section 1.0 Introduction
- Section 2.0 Site Description
- Section 3.0 Recommended Remedial Action
- Section 4.0 Remedial Action Monitoring and Reporting
- Section 5.0 Action Criteria
- Section 6.0 Well Inspection and Maintenance
- Section 7.0 Personnel
- Section 8.0 Health and Safety Plan

1.2 REVISIONS TO THE O&M PLAN

This O&M Plan presents the details of the operation, maintenance, and monitoring requirements of the RA components. The O&M Plan may require revisions as necessary after the implementation of the various remedial components. Revisions will be made to reflect the conditions of the final remedy and to provide additional operation and maintenance information and requirements.

All revisions or amendments to the O&M Plan will be submitted to and approved by the New York State Department of Environmental Conservation (NYSDEC) before implementation.

2.0 SITE DESCRIPTION

The former Dowcraft facility (Facility), now owned by Jamestown Container Corporation (JCC), is located at 65 South Dow Street, Falconer, New York. Steel partitions for offices and the telecommunications industry were manufactured at the Facility until it was closed in 1999. At that time, all of the buildings, except for the 1963 addition, were demolished and all of the concrete floors removed. The Site currently is an open parcel of property used for access to the JCC buildings and for the parking of tractor trailers. Jamestown Allenco, the successor of Dowcraft, is performing the Remedial Action for the Sire.

During the manufacturing years, the Facility included a trichloroethene (TCE) vapor degreaser from which TCE escaped into the groundwater environment. Studies have been performed on the Facility property and around its perimeter (collectively referred to as the Site) and have ascertained that the sole environmental concern is the TCE (and its degradation products) which still exist in the groundwater regime. The areal and vertical extent of the Site Compounds of Concern (COCs) have also been delineated through the studies. A list of the COCs is presented in Table A2.1.

3.0 RECOMMENDED REMEDIAL ACTION

The RA recommended for the Site was presented in the ROD.

The major components of the RA will include:

i) monitored natural attenuation of COCs in groundwater;

ii) groundwater monitoring;

iii) surface water monitoring;

iv) injections of chemical oxidation compounds (such as potassium permanganate) into the groundwater regime, if needed; and

v) institutional controls to restrict the use of impacted Site groundwater.

Two Interim Remedial Measures (IRMs) have been conducted at the Site. The first IRM involved the operation of a groundwater pump & treat system between 1994 and 1999. The second IRM involved the injection of a chemical oxidation agent (potassium permanganate) into the groundwater regime to destroy the COCs present. Three injections of potassium permanganate have been completed and have dramatically reduced the concentrations of COCs in groundwater in the area of the former TCE degreaser pit. The TCE degreaser pit was located in the vicinity of well PW-3R. It is believed that natural attenuation will effectively degrade the remaining COCs in on-Site groundwater. Groundwater quality will be monitored and the monitoring data will be used to determine whether additional injections of potassium permanganate (or another oxidizing agent) are required.

The details of the O&M Plan are presented in the following sections of this appendix.

4.0 REMEDIAL ACTION MONITORING AND REPORTING

4.1 MONITORING FLAN

The Remedial Action Monitoring Program will consist of regular monitoring of Site groundwater and surface water in the Chadakoin River adjacent to the Site. The data collected will be used to evaluate the performance of the RA and to meet the monitoring requirements.

The following subsections present the details of the monitoring program including specific sample collection, sample analyses, and reporting tasks.

4.1.1 GROUNDWATER MONITORING

A groundwater monitoring program has been designed to provide the data necessary to:

i) demonstrate the effectiveness of natural attenuation;

ii) protect the Chadakoin River from any detrimental impact from the Site's groundwater discharge;

iii) determine the necessity of implementing additional treatment injections; and

iv) determine at what time the remedy can be considered complete and the O&M Plan discontinued (subject to NYSDEC approval).

The groundwater monitoring program consists of hydraulic and groundwater quality monitoring.

4.1.11 MONITORING NETWORK

Several monitoring wells and a surface water staff gauge have been installed to monitor the performance of the remedy. These monitoring locations have been incorporated into the hydraulic and groundwater quality monitoring programs described in the following subsections. The locations of the wells and the surface water staff gauge that comprise the monitoring network are presented on Figure A4.1.

The monitoring well network will be evaluated annually to assess whether each location provides useful information and to revise the network, as required.

411.2 HYDRAULIC MONITORING

Hydraulic monitoring consists of the measurement of water levels in selected monitoring wells and the Chadakoin River to determine groundwater elevations and subsequently groundwater gradients. Water levels will be monitored to ensure that there has been no significant change in either the typical groundwater flow direction or velocity.

The hydraulic monitoring locations are presented on Figure A4.1 and are listed in Table A4.1. Routine hydraulic monitoring will be performed semi-annually. If additional treatments through injection are performed hydraulic monitoring will be conducted quarterly for two quarters following the injection event.

4.1.1.3 GROUNDWATER QUALITY MONITORING

Groundwater quality monitoring consists of the collection of groundwater samples from a select group of on-Site monitoring wells (ESI-1, ESI-2, ESI-3, ESI-7, ESI-10 through ESI-13R, PW-1 through PW-3R) and the analysis of these samples to determine the concentrations of COCs. The purpose of the groundwater quality monitoring program is to monitor the quality of the overburden groundwater:

i) in the former COC source area;
ii) in the area between the former COC source area and the Chadakoin River; and
iii) along the Chadakoin River.

The groundwater quality monitoring locations are presented on Figure A4.1 and are listed in Table A4.2. Groundwater samples will be collected and analyzed at the following frequency:

i) semi-annually for 2 years following any treatment event; and
ii) annually for 3 years thereafter (5 years following the last treatment event).

After 5 years of monitoring is complete, Jamestown Allenco and the NYSDEC will discuss the status of the O&M Plan and whether there is a need for its continuation.

One initiating groundwater sample set will be collected from six of these select wells (ESI-2, ESI-3, ESI-7, PW-1, PW-2, and PW-3R) to facilitate an understanding of the current conditions.

Groundwater quality monitoring will include field measurements of pH, conductivity, dissolved oxygen, temperature, and turbidity and laboratory analysis of samples for the analytes identified in Table A4.2, Groundwater sampling activities will be conducted in accordance with the Quality Assurance Project Plan (QAPP) presented in Appendix B.

In addition to the routine monitoring described above, on one occasion samples will be collected and analyzed for: arsenic, manganese, nitrate, iron (III), sulfate, and methane. The results of these analyses will be compared to the existing (baseline) data to evaluate the effects of the RA on the concentrations of these analytes. If the concentration of any of these analytes is significantly greater than its baseline value additional monitoring may be required.

The groundwater remedy for the Site includes continued monitoring of the groundwater formation as confirmation that the KMnO4 injections have been successful in reducing the Site chemical concentrations to levels that will not pose an unacceptable risk to the surrounding receptors. The previously defined monitoring program is designed to provide the necessary information. However, it is agreed to supplement that monitoring program with some additional analyses that will also allow evaluation of the natural attenuation pathways available at the Site.

The first set of analyses are already included in the regular monitoring program. The VOC analyses included in the monitoring program provide information concerning TCE breakdown products that can be assessed to determine whether the cleanup is continuing. TCE breaks down into dichloroethene and then vinyl chloride. Both of these parameters are already included in the VOC analyses and their concentrations will be tracked to confirm that degradation is continuing to occur.

In addition, there are a number of field measurement parameters that can be taken to assist in the natural attenuation assessment. These parameters include:

- Iron II;
- Dissolved oxygen;
- Turbidity; and
- ORP.

These field parameters will be checked each time a set of groundwater samples is collected.

There is also a set of general chemical parameters that can be analyzed for to assist in the natural attenuation assessment. These parameters include:

- Chloride;
- Alkalinity;
- Nitrate/nitrite (as N);
- Ammonia (as N);
- Sulfate;
- Sulfide; and
- Ethane/ethane.

Once the concentrations of chemicals in the groundwater have been reduced below the 1,000 ppb range that requires continued KMnQi injections, samples will be collected for this additional set of parameters during every other groundwater sampling event. The data collected will be reviewed along with the other chemical data to assess the effectiveness of the groundwater remedy.

4.1.2 SURFACE WATER MONITORING

To confirm that the Chadakoin River is not being impacted by the groundwater discharge from the Site, a surface water sample will be collected adjacent to the downstream Site boundary. Sample analyses will include the compounds listed in Table A4.3. The sample will be collected at the location shown on Figure A4.1, at the same frequency as the routine groundwater monitoring program.

4.2 SAMPLING FLAN

The field activities associated with the groundwater and surface water monitoring will be performed in accordance with the procedures and protocols described in the following subsections. The Health and Safety Plan (HASP) presented in Appendix C shall be followed for all remedial activities.

4.2.1 WASTE HANDLING

Personal Protective Equipment (PPE) and sampling refuse (i.e., paper towels, used aluminum foil) generated during the sampling activities will be containerized in clear plastic bags and disposed at a sanitary landfill.

Prior to the implementation of the Work Plan, approval for permission to discharge purged groundwater directly to the sanitary sewer system for treatment at the Publicly Owned Treatment Works (POTW) will be requested. If approval for direct discharge is not granted, purged groundwater will be containerized and sent for off-site disposal at an appropriate facility.

4.2.2 EQUIPMENT CLEANING

Clean all equipment used for the collection of samples for chemical analysis including bailers and pumps according to the following protocol:

- wash and scrub with low-phosphate detergent;
- rinse with tap water;
- rinse with methanol followed by hexane (solvents must be pesticide grade or better);
- rinse thoroughly with deionized water. The volume of water used must at least be five times the volume of solvent used in the above step;
- air dry; and
- wrap in aluminum foil.

Dedicated sampling equipment which is left in the well will either be precleaned by the manufacturer or cleaned prior to its first use. Dedicated equipment will not require cleaning between sampling rounds unless the equipment becomes unsafe to handle. The use of dedicated equipment will result in the generation of only minimal volumes of spent solvent and thus is preferred.

Tap water may be used from any municipal water treatment system. The use of an untreated potable water supply is not an acceptable substitute. If metals samples are not being collected, the 10 percent $HN0_3$ rinse will be omitted; and if or gardes samples are not being taken, the solvent rinse may be omitted.

Place all cleaned equipment on clean polyethylene sheeting or aluminum foil in order to avoid contacting a contaminated surface before use.

Before use and between each well, clean the water level measuring device, pH meter, conductivity meter, thermometer, and turbidity meter (nephlometer) by rinsing with detergent solution followed by a deionized water rinse. Solvent rinses must not be used because of their potential to damage the instruments. The equipment manuals will be reviewed prior to use of the instruments to insure that the detergent rinse will not interfere with instrument performance.

Treat/dispose the water washes and spent cleaning solvents using the procedures presented in Section 4.2.1.

4.3 ANALYTICAL PROGRAM

The Analytical Program is detailed in the QAPP and includes analytical schedules and methods, laboratory QC samples, reporting and deliverables, special analytical protocols, laboratory audits, and data audits.

4.4 EVALUATION OF MONITORING RESULTS

Upon receipt, the analytical results will be evaluated to determine if the data are acceptable for use in the monitoring program. All data deemed to be acceptable, including Quality Assurance/Quality Control (QA/QC) results, will be entered into a computer database. The computer database will provide the required listing and summary tables of analyses, including a separate listing of QA/QC results. Raw analytical data packages will be sent to the NYSDEC following independent QA review within 30 days of receipt (upon request).

The procedures for evaluating analytical data resulting from Site monitoring activities are detailed in the QAPP.

Hydraulic data will be converted to elevations and entered into a computer database. The water level data will be listed in tabular form for each round of data collected.

The evaluation of the hydraulic and water quality data will be used to determine if corrective contingency measures such as the initiation of additional treatment are required and when the O&M Plan operations can be terminated.

4.5 REPORTS

Monitoring Reports will be submitted to NYSDEC at the same frequency as sampling events, after QA review, as detailed in Section 4.4.

The Monitoring Reports will include:

- analytical results and appropriate QA/QC data;
- hydraulic monitoring data;
- an evaluation of the effectiveness of the Remedial Action; and
- recommendations for program revisions, if appropriate.

An Annual Report will also be submitted and will include:

- location map;
- Site map;
- groundwater and concentration contours and explanations will be necessary along with any recommendations;
- brief description of applicable standard test methods run;
- all semi-annual data with relevant comments and conclusions; and
- comments, conclusions, and recommendations based on an evaluation of the information included in the report.

The first annual report will include an assessment of indoor air quality for the neighboring Jamestown Container buildings using the Johnson-Ettinger model.

Jamestown Allenco will request a certification from the current property owner regarding the continued effectiveness of any institutional controls and the continued need for same, and whether the public health and the environment are adequately protected. This certification will also be included in the Annual Report.

Copies of all reports will be submitted to NYSDEC at the following offices:

- Ms. Linda Ross
  NYSDEC - Region 9
  270 Michigan Avenue
  Buffalo, New York 14203-2999

46 RECORDS

All records resulting from O&M activities will be stored at CRA's Niagara Falls office and will be available for inspection by NYSDEC personnel after a written request has been received by Jamestown Allenco.

4.7 MATERIAL SAFETY DATA SHEETS

Material Safety Data Sheets (MSDSs) for substances likely to be used during the treatment and monitoring events are presented in Appendix C.

Additional MSDSs will be maintained at the Site during work activities as necessary.

5.0 ACTION CRITERIA

The need for additional chemical oxidation treatment injections will be determined based on review of the groundwater monitoring data collected during the Remedial Action. The data will initially be reviewed by Jamestown Allenco and CRA. If the total COC concentrations in a sample from any of the groundwater monitoring wells exceed 1,000 ug/L, an additional treatment injection will be performed. Similarly, if the measured COC concentrations in the sample collected from the Chadakoin River exceed the New York State surface water criteria, additional injections will be performed. Jamestown Allenco and CRA will make a recommendation to the NYSDEC as to the location, volume, and type of chemical oxidation agent that should be injected. Upon receipt of approval from the NYSDEC, the injection will be performed using the prescribed protocols established during the IRM period. These protocols involve premixing the potassium permanganate into a 4% solution (by weight) with tap water. Following visual confirmation that all of the powder is dissolved, the solution will be gravity fed via tubing and water tight connection into the selected injection wells in the predetermined proportions. Upon completion of the injection, the mix tank will be cleaned with two 25 gallon rinses of tap water which will be gravity fed into one or two of the injections wells.

Additional injections are not required if the following criteria are met:

- The COC concentrations in the groundwater monitoring wells remain below 1,000 ug/L;
- the COC concentrations in the monitored groundwater wells are not increasing significantly; and
- the COC concentrations in the Chadakoin River remain below the surface water quality criteria.

It may be determined that even though all of the above conditions are met, it may still be desirable to perform another injection to further reduce COC concentrations in selected areas. This determination can be made based on mutual consent between the NYSDEC and Jamestown Allenco.

6.0 WELL INSPECTION AND MAINTENANCE

All on-Site wells will be inspected annually in conjunction with a groundwater monitoring event. Wells will be inspected for structural damage to the well cap seal, protective pad, and visible portion of the well casing. The presence and condition of J-plugs and locks also will be noted. In addition, the open depth of the well will be sounded. Deficiencies in or damages to the wells will be corrected or repaired as necessary.

The well inspection and maintenance program will continue until the remedial action (including monitoring) is complete. Once the project has been completed, all wells will be decommissioned as follows:

- the wells will be filled with cement grout to the ground surface;
- the upper 2 feet of the well (and associated protective casing) will be removed; and
- the upper 2 feet will be backfilled with material consistent with the surrounding area.

Well inspection information will be recorded on an inspection log such as that shown on attached Form1.

7.0 PERSONNEL

This section describes the required minimurn experience for key project personnel, responsibilities of the personnel, the organizational structure, and lines of communication and authority for the performance of the O&M Plan at the Site.

7.1 ORGANIZATION

The O&M Plan will be carried out by CRA (or another qualified consultant retained by Jamestown Allenco).

7.2 RESPONSIBILITIES AND DUTIES

O&M Project Manager

CRA will assign an O&M Project Manager who will have overall responsibility for the evaluation of monitoring results, preparation of monitoring reports, design of additional injections, and Site oversight/management. The O&M Project Manager will coordinate communications between the NYSDEC and Jamestown Allenco. The O&M Project Manager will ensure that adequate resources are committed by CRA to properly manage monitoring and construction activities and will have 10 years or more of related experience.

8.0 HEALTH AND SAFETY PLAN

The HASP is presented in Appendix C.

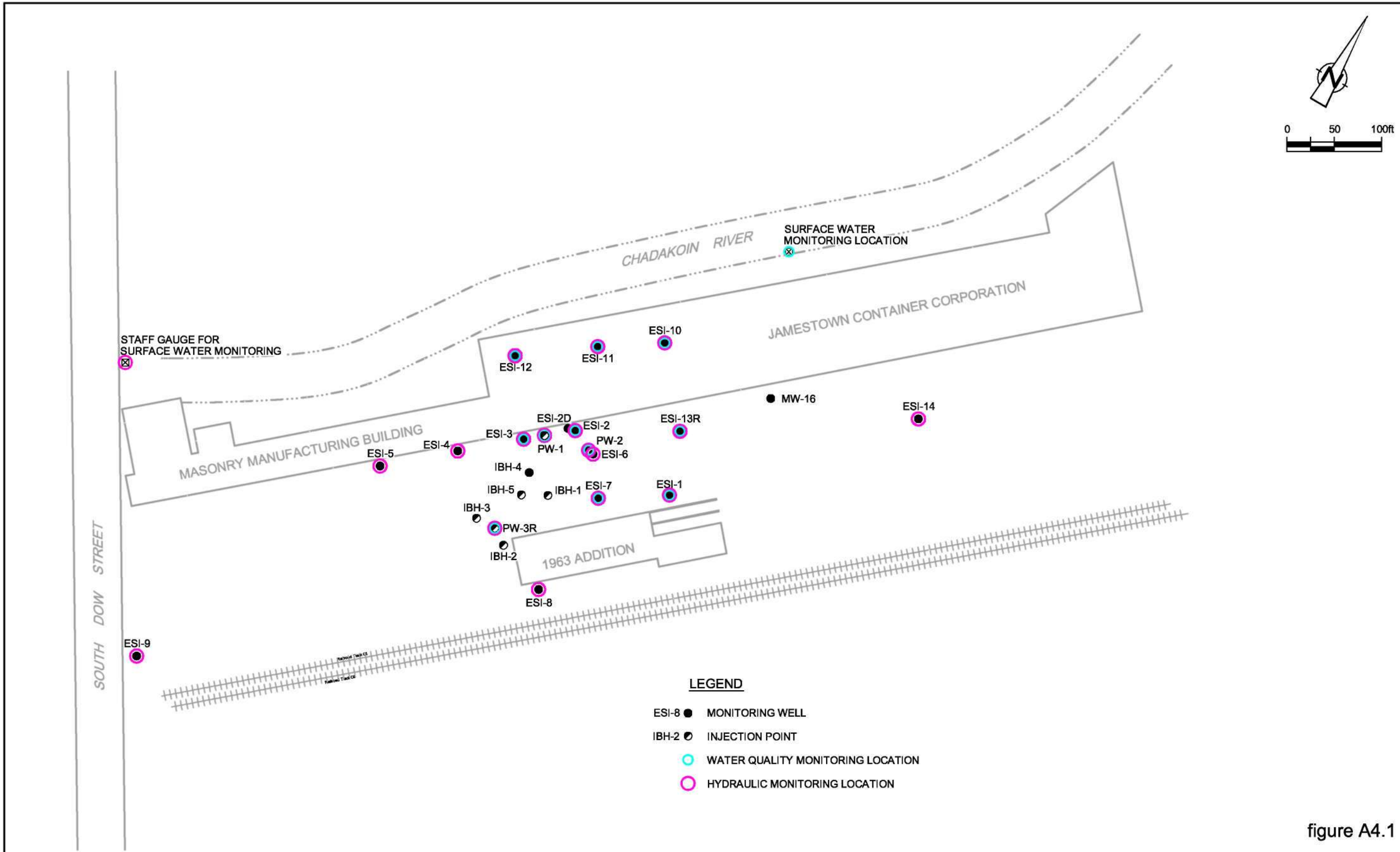

figure A4.1

REMEDIAL ACTION MONITORING NETWORK
FORMER DOWCRAFT CORPORATION
Falconer, New York

05020-00(011)GN-WA004 NOV 22/2005

TABLE A2.1

COMPOUNDS OF CONCERN
OPERATION AND MAINTENANCE PLAN
FORMER DOWCRAFT FACILITY
FALCONER, NEW YORK

Trichloroethene
1,2-Dichloroethene
Vinyl Chloride

TABLE A4.1

HYDRAULIC MONITORING PROGRAM SUMMARY
OPERATION AND MAINTENANCE PLAN
FORMER DOWCRAFT FACILITY
FALCONER, NEW YORK

Hydraulic Monitoring Locations

ESI1	ESI 8	PW1
ESI 2	ESI 9	PW2
ESI 3	ESI 10	PW3R
ESI 4	ESI 11	Chadakoin River
ESI 5	ESI 12	
ESI 6	ESI 13R	
ESI 7	ESI 14	

Frequency

Semi-annually
(Exception - quarterly for 2 quarters, following each treatment injection)

TABLE A4.2

GROUNDWATER SAMPLING AND **ANALYSIS SUMMARY**
OPERATION AND MAINTENANCE **PLAN**
FORMER DOWCRAFT FACILITY
FALCONER, NEW **YORK**

ESI1	ESI 10	PW1
ESI 2	ESI 11	PW2
ESI 3	ESI 12	PW3R
ESI 7	ESI 13R	

Frequency

- Semi-annually for 2 years following a treatment injection.
- Annually thereafter.

Parameters

Target Compound List Volatile Organic Compounds
Conductivity
pH
Temperature
Turbidity
Dissolved oxygen

In addition the following parameters will be tested for on one occasion:

Manganese
Arsenic
Nitrate
Fe (III)
Sulfate

Note:
Historic measurements of dissolved oxygen, chloride, and other natural attenuation parameters have shown no trends and therefore are not considered to have value in the long-term monitoring program.

TABLE A4.3

SURFACE **WATER SAMPLING AND ANALYSIS SUMMARY**
OPERATION AND MAINTENANCE PLAN
FORMER DOWCRAFT FACILITY
FALCONER, NEW YORK

Location

Downstream of discharge area from Site.

Frequency

- Semi-annually for 2 years following a treatment injection.
- Annually thereafter.

Parameters

Target Compound List Volatile Organic Compounds

ATTACHMENT A

STANDARD FORMS

LIST OF STANDARD FORMS

FORM 1 WELL INSPECTION SUMMARY

WELL INSPECTION SUMMARY

PROJECT NAME:

INSPECTION CREW MEMBERS:_____SUPERVISOR:

DATE OF INSPECTION: I I 1 1 1 1 I
(MM DD YY)

Well I.D. Number	*Lock*	*Surface Seal*	*Protective Casing*	*Riser*	*Water Level (ft. BTOC)*	*Well Depth (ft. BTOC)*	

Additional Comments:

FORM1

APPENDIX B

QUALITY ASSURANCE PROJECT PLAN (QAPP)

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1.0 INTRODUCTION

This document is Site-specific and has been prepared for the Operation and Maintenance (O&M) Plan at the former Dowcraft facility (Site) located in Falconer, New York. It has been prepared in accordance with the United States Environmental Protection Agency's (USEPA's) document entitled, "Region II CERCLA Quality Assurance Manual", Revision 1, USEPA Region II, dated October 1989. Prior to deviation from the protocols outlined herein, the New York State Department of Environmental Conservation (NYSDEC) Quality Assurance/Quality Control (QA/QC) representative for the O&M Program will be notified.

The objective of this Quality Assurance Project Plan (QAPP) is to provide sufficiently thorough and concise descriptions of the measures to be applied during the O&M Plan such that the data generated will be of a known and acceptable level of precision and accuracy. This QAPP provides comprehensive information regarding the project personnel responsibilities, and sets forth specific procedures to be used during sampling of relevant environmental matrices and analyses of data.

The following QA topics are addressed in this Plan:

i) data quality objectives (DQOs) for measurement of data, including precision, accuracy, completeness, representativeness, and comparability;

ii) project organization and responsibility;

iii) sampling procedures;

iv) sample custody;

v) analytical procedures;

vi) calibration procedures, references, and frequency;

vii) internal QC checks and frequency;

viii) QA performance audits, system audits, and frequency;

ix) QA reports to management;

x) preventative maintenance procedures and scheduling;

xi) specific procedures to be used to routinely assess data precision, representativeness, comparability, accuracy, and completeness

xii) data validation; and

xiii) corrective action.

2.0 PROTECT DESCRIPTION

2.1 GENERAL

This QAPP provides QA/QC criteria for work efforts associated with groundwater and surface water sampling as described in the O&M Plan. Methods for sample analysis have been selected to evaluate the performance of the Site Remedial Action and to meet monitoring requirements.

22 SITE HISTORY AND BACKGROUND

A detailed summary of the Site history and background is presented in the text of the RD/RA Work Plan and O&M Work Plan.

2.3 PROTECT DESCRIPTION

The O&M Program for the Site will involve the collection and analysis of groundwater and River surface water samples during O&M monitoring activities. The O&M monitoring plan meets monitoring requirements and the resultant data will be used to determine if the Site Remedial Action was performed as required or if additional Site Remedial Action is necessary. Sample collection will be performed in accordance with the O&M Plan and the Health and Safety Plan (HASP).

PROTECT ORGANIZATION AND RESPONSIBILITY

The O&M activities will be conducted by CRA and various subcontractors. The project management structure for QA/QC activities associated with the O&M program is discussed below along with a brief description of the duties of the key personnel.

Project Manager

- provides overall project management/oversight;
- evaluates monitoring results;
- coordinates communications between NYSDEC and Jamestown Allenco;
- prepares monitoring reports;
- ensures adequate resources are committed by CRA to properly manage O&M activities; and
- has 10 years or more of related experience.

QA/QC Officer - Analytical and Field Activities

- oversees and reviews laboratory activities;
- determines laboratory data corrective action;
- performs analytical data validation and assessment;
- reviews laboratory QA/QC;
- assists in preparation and review of final report;
- provides technical representation for field and analytical activities; and
- provides field management of sample collection and field QA/QC.

Laboratory - Project Manager, Analytical Contractor

- ensures resources of laboratory are available on an as-required basis;
- coordinates laboratory analyses;
- supervises laboratory's in-house chain of custody;
- schedules analyses of samples;
- oversees review of data;
- oversees preparation of analytical reports; and

- approves final analytical reports.

Laboratory - Quality Assurance/Quality Control Officer, Analytical Contractor

- overviews laboratory QA/QC;
- overviews QA/QC documentation;
- conducts detailed data review;
- decides laboratory corrective actions, if required; and
- provides technical representation for laboratory QA/QC procedures.

Laboratory - Sample Custodian - Analytical Contractor

- receives and inspects the sample containers;
- records the condition of the sample containers;
- signs appropriate documents;
- verifies chain of custody and their correctness;
- notifies laboratory Project Manager and laboratory QA/QC Officer of sample receipt and inspection;
- assigns a unique laboratory identification number correlated to the field sample identification number, and enters each into the sample receiving log;
- initiates transfer of samples to the appropriate lab sections with assistance from the laboratory project manager; and
- controls and monitors access to and storage of samples and extracts.

The analytical laboratory chosen to perform the analyses will be certified by the New York State Department of Health (NYSDOH) through the environmental laboratory approval program for the appropriate categories of analysis. The name of the analytical laboratory will be submitted to NYSDEC for review and approval prior to use of the laboratory for the O&M Program.

4.0 QUALITY ASSURANCE OBTECTIVES FOR MEASUREMENT DATA

The overall QA objective is to develop and implement procedures for **sample collection** and analyses which will provide data with an acceptable level of **accuracy, and** precision.

Quality assurance measures for this project will begin with sample **containers. Sample** containers will be purchased from a USEPA-certified manufacturer **and will be** precleaned (I-Chem Series 200 or equivalent).

The purpose of this Section is to define the QA goals required to meet **the DQOs** of **the** project. QA goals for accuracy, precision, and sensitivity of analyses; and **completeness,** representativeness, and comparability of measurement data are **established in the** following sections.

The sampling and analysis program is summarized in Table B4.1.

4.1 LABORATORY QUALITY ASSURANCE

4.1.1 ACCURACY, PRECISION, AND SENSITIVITY OF ANALYSES

The fundamental QA objective with respect to the accuracy, precision, **and sensitivity** of analytical data is to achieve the QC acceptance criteria of each **analytical protocol.** Analytical methods and targeted detection limits have been specified **to meet the** objectives of each sampling activity as follows:

- for the groundwater and surface water sample analyses, the **detection limits** specified in the NYSDEC Division of Water's Technical and Operational **Guidance** Series (TOGS) will be used. Detection limits for those parameters **not included in the** TOGS will be per the analytical methods.

A summary of the targeted detection limits is provided in Table B4.2. **It should be noted** that these limits are targeted detection limits only; lower detection limits, if **achieved by** the laboratory, will be substituted for the targeted detection limits in the final **analytical** report.

The method accuracy (percent recovery) for water samples will be determined by spiking selected samples (matrix spikes) with all spiking compounds specified in the analytical methods. Accuracy will be reported as the percent recovery of the spiking compound(s) and will compare with the criteria given in the appropriate methods, as identified in Section 8.0.

The method (s) precision (reproducibility between duplicate analyses) will be determined from the duplicate analysis of matrix spike samples for organic parameters and duplicate sample analyses for inorganic parameters. Precision will be reported as RPDs between duplicate analyses; acceptance criteria will be as specified in the appropriate methods identified in Section 8.0.

4.1.2 COMPLETENESS, REPRESENTATIVENESS, AND COMPARABILITY

A completeness requirement of 90 percent will be targeted for the O&M Program (see Section 13.1.3 for definition of completeness).

The quantity of samples to be collected has been determined in an effort to effectively represent the population being studied.

Analytical methods used for this study are similar to those used for previous studies to assure comparability of the data. All standards used by the laboratory will be traceable to reliable sources.

4.2 FIELD **MEASUREMENT QUALITY ASSURANCE**

Measurement data will be generated during field activities. These activities include, **but** are not limited to, the following:

i) documenting time and weather conditions;

ii) determining pH, specific conductivity, turbidity, dissolved oxygen, iron II, and temperature of water samples;

iii) observation of sample appearance and other conditions; and

iv) measuring groundwater elevations in wells.

The general QA objective for measurement data is to obtain reproducible and comparable measurements to a degree of accuracy consistent with the use of standardized procedures.

5.0 SAMPLING PROCEDURES

The sampling procedures for the samples are presented in Section 4.0 of the O&M Plan. The sample container, preservative, shipping, and packaging requirements are identified in Table B5.1.

6.0 SAMPLE CUSTODY AND DOCUMENT CONTROL

The following documentation procedures will be used during sampling and analysis to provide Chain-of-Custody control during transfer of samples from collection through storage. Recordkeeping documentation will include use of the following:

- field log book (bound with numbered pages) to document sampling activities in the field;
- labels to identify individual samples;
- Chain-of-Custody forms to document analyses to be performed; and
- laboratory sample custody log book.

6.1 FIELD LOG BOOK

In the field, the sampler will record the following information in the field log book (bound) for each sample collected:

- project number;
- sample matrix;
- name of sampler;
- sample source;
- time and date;
- pertinent data (i.e., depth, water surface elevation, pumping method);
- analysis to be conducted;
- sampling method (i.e., pump type);
- appearance of each sample (i.e., color, turbidity);
- preservative added, if any;
- number of sample bottles collected;
- analyses performed in the field (temperature, pH, specific conductance); and
- pertinent weather data.

Each field log book page will be signed by the sampler.

A unique sample numbering system will be used to identify each collected sample. This system will provide a tracking number to allow retrieval and cross-referencing of sample information. The sample numbering system to be used is described as follows:

Example: G-092398 - AA-XXX where:

G	-	Designates sample type, (G-Groundwater, S-Surface Water)
092398	-	date of collection (mm,dd,yy)
AA	-	sampler initials
XXX	-	unique sample number

QC samples will also be numbered with a unique sample number.

6.2 CHAIN-OF-CUSTODY RECORDS

Chain-of-Custody forms will be completed for all samples collected during O&M activities.

A Chain-of-Custody form will be completed to document the transfer of sample containers. Custody seals will be placed around each cooler. The cooler will then be sealed with packing tape. Sample container labels will include sample number, place of collection, and date and time of collection. All samples will be refrigerated using wet ice at 4°C (+2°C) and delivered to the analytical laboratory within 24 to 48 hours of collection. All samples will be delivered to the laboratory by commercial courier or contractor personnel. All samples will be iced at 4°C (+2°C) at the laboratory.

The Chain-of-Custody forms completed at the time of sampling, will contain, but not be limited to, the sample number, date and time of sampling, and the name of the sampler. The Chain-of-Custody forms will be signed, timed, and dated by the sampler when transferring the samples.

Each sample cooler being shipped to the laboratory will contain a Chain-of-Custody form. The Chain-of-Custody form will consist of four copies, which will be distributed to the shipper, the receiving laboratory, and two copies to the QA/QC Officer. The shipper will maintain his copy while the other three copies will be enclosed in a waterproof envelope within the cooler with the samples. The sample number of each sample shipped will be recorded on the sheet. The cooler will then be sealed properly for shipment. The laboratory, upon receiving the samples, will complete the three remaining copies. The laboratory will maintain one copy for their records. One copy

will be returned to the QA/QC Officer upon receipt of the samples by the laboratory. One copy will be returned to the QA/QC Officer with the data deliverables package.

Upon receipt of the cooler at the laboratory, the shipping cooler and the custody seal will be inspected by the designated sample custodian. The condition of the cooler and the custody seal will be noted on the Chain-of-Custody forms by the sample custodian. The sample custodian will record the temperature of one sample (or temperature blank) from each cooler and the temperature will be noted on the Chain-of-Custody forms. If the shipping cooler seal is intact, the sample containers will be accepted for analyses. The sample custodian will document the date and time of receipt of the container, and sign the form.

If damage or discrepancies are noticed (including sample temperature exceedences), they will be recorded in the remarks column of the record sheet, dated and signed. Any damage or discrepancies will be reported to the lab supervisor who will inform the lab manager and the QA/QC Officer before samples are processed.

6.3 SAMPLE DOCUMENTATION IN THE **LABORATORY**

Each sample or group of samples shipped to the laboratory for analysis will be given a unique identification number. The laboratory Sample Custodian will record the client name, number of samples, and date of receipt of samples in the Sample Control Log Book. Samples removed from storage for analyses will be documented in the Sample Control Log Book.

The laboratory will be responsible for maintaining analytical log books and laboratory data as well as a sample (on hand) inventory for submittal to the QA/QC Officer on an "as-required" basis. Raw laboratory data produced from the analysis of samples submitted for this program will be inventoried and maintained by the laboratory for a period of 5 years at which time the QA/QC Officer will advise the laboratory regarding the need for additional storage.

6.4 STORAGE OF SAMPLES

After the Sample Custodian has completed the Chain-of-Custody forms and the incoming sample log, the Chain-of-Custody forms will be checked to ensure that all samples are stored in the appropriate locations. All samples will be stored within an

access controlled custody room and will be maintained at 4°C(±2°C) until all analytical work is complete.

6-5 SAMPLE DOCUMENTATION

Evidentiary files for the entire project shall be inventoried and maintained by the QA/QC Officer and shall consist of the following:

i) project-related plans;

ii) project log books;

iii) field data records;

iv) sample identification documents;

v) Chain-of-Custody forms;

vi) report notes, calculations, etc.;

vii) lab data, etc.;

viii) references, copies of pertinent literature;

ix) miscellaneous - photos, maps, drawings, etc.; and

x) copies of all final reports pertaining to the project.

The evidentiary file materials shall be the responsibility of the project manager with respect to maintenance and document removal.

7-0 CALIBRATION PROCEDURES AND FREQUENCY

Calibration of instrumentation is required to ensure that the analytical system is operating correctly and functioning at the proper sensitivity to meet established reporting limits. Each instrument is calibrated with standard solutions appropriate to the type of instrument and the linear range established for the analytical method. The frequency of calibration and the concentration of calibration standards is determined by the manufacturers guidelines, the analytical method, or the requirements of special contracts.

A bound notebook will be kept with each instrument requiring calibration in which will be recorded activities associated with QA monitoring and repairs program. These records will be checked during periodic equipment review and internal and external QA/QC audits.

7.1 GAS CHROMATOGRAPHY/MASS SPECTROMETRY (GC/MS)

It is necessary to establish that a given GC/MS meets the standard mass spectral abundance criteria prior to initiating any ongoing data collection. This is accomplished through the analyses of tuning compounds as specified in the analytical methods.

Calibration of the GC/MS system will be performed daily at the beginning of the day or after each 12 hours of instrument operating time. All method-specified calibration criteria must be met prior to sample analyses. All calibrations must be performed using either average response factors or first-order linear regression (with a correlation coefficient requirement of >0.995). Higher order fits will not be allowed.

7.2 GAS CHROMATOGRAPHY (GO

Quantitation for samples that are analyzed by GC with element selective detectors shall be performed by external standard calibration. Standards containing the compounds of interest will be analyzed at a minimum of three concentrations to establish the linear range of the detector. Single point calibration will be performed at the beginning of each day and after every tenth injection. The response factors from the single point calibration will be checked against the average response factors from multi-level calibration. If deviations in response factors are greater than those allowed by the

analytical method protocols, then system recalibration will be performed. Alternatively, fresh calibration standards will be prepared and analyzed to verify instrument calibration.

All method-specified calibration criteria must be met prior to sample analyses. All calibrations must be performed using either average response factors or first-order linear regression (with a correlation coefficient requirement of >0.995). Higher order fits will not be allowed.

7.3 INSTRUMENTATION FOR INORGANIC ANALYSES

All method-specified calibration procedures will be performed and acceptance criteria will be met prior to sample analyses.

7.4 FIELD INSTRUMENTATION

Field equipment used during this investigation will be calibrated both prior to and following the day's surveys in accordance with the manufacturer's instructions. The equipment will also be operated in accordance with the manufacturer's instructions. Records of calibrations of field equipment will be recorded in a bound field notebook.

80 ANALYTICAL PROCEDURES

All samples collected for laboratory chemical analyses will be analyzed for the parameters listed in Table B4.2, using the methods cited in Table B4.1. These methods have been selected to meet the DQOs for each sampling activity. All reporting and deliverables for this RA include analytical results for the investigative samples, method blanks, blank spikes, duplicates, matrix spike/matrix spike duplicate samples, and all pertinent QA/QC information required by the analytical methods (see Section 9.2).

All sample results will be calculated using external standards with the exception of the samples analyzed by GC/MS; these methods employ the use of internal standards for analyte quantitation. The specific procedures for target analyte quantitation are detailed in the appropriate analytical methods. Non-target analytes detected during GC/MS analyses will be quantitated using the nearest internal standard response, assuming a relative response factor of one.

Targeted method detection limits will be consistent with those presented in Table B4.2. When matrix interferences are noted during sample analysis, actions will be taken by the laboratory to try to achieve the specified detection limits. Samples will not be diluted by more than a factor of five to reduce matrix effects. (Samples may be diluted to a greater extent if analytes of concern generate responses in excess of the linear response of the instrument.) The laboratory will re-extract, resonicate, and/or use any of the cleanup techniques presented in the analytical methods to eliminate matrix interferences. In such cases, the laboratory QA/QC Officer will assure that the laboratory demonstrates good analytical practices and that such practices are documented in order to achieve the specified detection limits.

9.0 DATA REDUCTION, VALIDATION, ASSESSMENT, AND REPORTING

9.1 GENERAL

The contract laboratory will perform analytical data reduction and validation in-house under the direction of the laboratory QA/QC Officer. The laboratory's QA/QC Officer will be responsible for assessing data quality and advising of any data which were rated "preliminary" or "unacceptable" or other qualifications based on the QC criteria outlined in the relevant methods, which would caution the data user of possible unreliability. Data reduction, validation, and reporting by the laboratory will be conducted as detailed in the following:

i) Raw data produced and checked by the responsible analysts is turned over for independent review by another analyst;

ii) The area supervisor reviews the data for attainment of quality control criteria presented in the referenced analytical methods;

iii) Upon completion of all reviews and acceptance of the raw data by the laboratory operations manager, a computerized report will be generated and sent to the laboratory QA/QC Officer;

iv) The laboratory QA/QC Officer will complete a thorough inspection of all reports;

v) The laboratory QA/QC Officer and area supervisor will decide whether any sample re-analysis is required; and

vi) Upon acceptance of the preliminary reports by the laboratory QA/QC Officer, final reports will be generated and signed by the laboratory manager.

Validation of the analytical data will be performed by the QA/QC Officer for analytical activities and for field activities. The data validation will be performed in accordance with the following documents: "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review", EPA 540/R-94-012, February 1994; and "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review", EPA 540/R-94-013, February 1994. Data analyzed using methods not covered in these documents will be validated using the general principles used in these documents, and the analytical requirements specified in the methods.

Assessment of analytical and in-house data will include checks on data consistency by looking for comparability of duplicate analyses, comparability to previous data from the same sampling location (if available), adherence to accuracy and precision control

criteria detailed in this QAPP and anomalously high or low parameter values. The results of these data validations will be reported to the project manager and the contract laboratory, noting any discrepancies and their effect upon acceptability of the data. Additionally, the results of these data validations will be included in the applicable reports to NYSDEC.

Raw data from field measurements and sample collection activities that are used in project reports will be appropriately identified and appended to the report. Where data have been reduced or summarized, the method of reduction will be documented in the report. Field data will be audited for anomalously high or low values that may appear to be inconsistent with other data.

9.2 LABORATORY REPORTING, DATA PRESENTATION, AND FINAL REPORT

Reporting and deliverables shall include, but not be limited to, all items listed in Table B9.1.

All sample data and corresponding QA/QC data as specified in the analytical methods, shall be maintained accessible to CRA either in hard copy or on magnetic tape or disc (computer data files).

The laboratory will submit one copy of the final analytical report and electronic deliverables within 15 working days of receipt of the final samples from the remedial design activities.

9.3 DOCUMENT CONTROL SYSTEM

A document control system ensures that all documents are accounted for when the project is complete. CRA will assign a project number to the O&M program. This number will appear on sample identification tags, log books, data sheets, control charts, project memos and analytical reports, document control logs, corrective action forms and logs, QA plans, and other project analytical records.

9.4 QC CHECK POINTS AND DATA FLOW

The following specific QC check points will be common to all GC and GC/MS analyses. They are presented with the decision points:

Chemist - Bench Level Checks

- systems check: sensitivity, linearity and reproducibility within specified limits;
- duplicate analyses within control limits;
- surrogate spike results within control limits; and
- calculation/data reduction checks: calculations cross-checked; any discrepancies between forms and results evident, results tabulated sequentially on the correct forms.

Supervisor

- systems operating within limits;
- data transcription correct;
- data complete; and
- data acceptable.

Sample Control

- samples returned to sample control following analysis.

QA/QC Manager

- QA objectives met;
- QC checks are completed; and
- final data and report package is complete.

10.0 INTERNAL QUALITY CONTROL CHECKS, AND FREQUENCY

10.1 QC FOR FIELD MEASUREMENTS

Quality control procedures for field measurements will be limited to checking the reproducibility of the measurement in the field by obtaining multiple readings and by calibrating the instruments (where appropriate).

Quality control of field sampling will involve collecting field duplicates, trip blanks, and rinsate blanks (where appropriate) in accordance with the applicable procedures described in Section 4.1.

102 QC FOR LABORATORY ANALYSES

Specific procedures related to internal laboratory QC samples are described in the following subsections.

102.1 REAGENT BLANKS

A reagent blank will be analyzed by the laboratory at a frequency of one blank per analytical batch. The reagent blank, an aliquot of analyte-free water or solvent, will be carried through the entire analytical procedure.

10.2.2 MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD)/DUPLICATE ANALYSES

An MS/MSD sample will be analyzed for organic parameters and a duplicate and matrix spike will be analyzed for inorganic parameters at a minimum frequency of one per analytical batch. Acceptable criteria and analytes that will be used for matrix spikes are identified in the appropriate methods (see Section 8.0). Percent spike recoveries will be used to evaluate analytical accuracy while percent relative standard deviation or the relative percent difference (RPD) between duplicate analyses will be used to assess analytical precision.

10.2.3 SURROGATE ANALYSES

Surrogates are organic compounds which are similar to the analytes of interest, but which are not normally found in environmental samples. Surrogates are added to samples to monitor the effect of the matrix on the accuracy of the analysis. Every blank, standard and environmental sample analyzed by GC or GC/MS, including MS/MSD samples, will be spiked with surrogate compounds prior to sample preparation.

The compounds that will be used as surrogates and the levels of recommended spiking are specified in the methods. Surrogate spike recoveries must fall within the laboratory control limits as specified in the methods. If surrogate recoveries are excessively low (<10 percent), the laboratory will contact the Project Manager for further instructions. Dilution of samples to bring the analyte concentration into the linear range of calibration may dilute the surrogates out of the quantification limit. Re-analysis of these samples is not required. Assessment of analytical quality in these cases will be based on the MS/MSD sample analysis results.

103 QCFOR SAMPLING PROTOCOL

To assess the quality of data resulting from the field sampling program, field duplicate and field blank samples will be taken and submitted to the analytical laboratory as samples.

10.3.1 TRIP BLANKS AND FIELD (RINSE) BLANKS

Trip blanks and field blanks will be used during the sampling programs to detect contamination introduced through sample collection procedures and equipment, external field conditions, sample transport, sample container preparation, sample storage, and/or the analytical process.

Trip blanks for Volatile Organic Compounds (VOCs) will be prepared by the laboratory at the same time and location as the containers for a particular sampling event. Trip blanks will accompany these containers to and from that event, but are at no time opened or exposed. Trip blanks shall be included with each cooler containing water samples for VOC analysis.

10.3.2 FIELD DUPLICATE SAMPLES

Field duplicate samples will be collected and used to assess the aggregate precision of sampling techniques and laboratory analysis. For every 20 investigative samples, a field duplicate sample will be collected using standard sampling procedures. This duplicate will be packed and shipped to the laboratory for analysis.

11.0 PERFORMANCE AND SYSTEM AUDITS

11.1 LABORATORY

For the purpose of external evaluation, performance evaluation check samples are analyzed periodically by the laboratory. Internally, the evaluation of data from these samples is done on a continuing basis over the duration of a given project.

The QA/QC Officer may carry out performance and/or systems audits to insure that data of known and defensible quality are consistently produced during this program.

Systems audits are qualitative evaluations of all components of field and laboratory quality control measurement systems. They determine if the measurement systems are being used appropriately. The audits may be carried out before all systems are operational, during the program, or after completion of the program. Such audits typically involve a comparison of the activities given in the QA/QC plan described herein, with activities actually scheduled or performed. A special type of systems audit is the data management audit. This audit addresses only data collection and management activities.

The performance audit is a quantitative evaluation of the measurement systems used for a monitoring program. It requires testing the measurement systems with samples of known composition or behavior to quantitatively evaluate precision and accuracy. A performance audit may be carried out by or under the auspices of the QA/QC Officer without the knowledge of the analyst during each sampling event for this program.

It should be noted, however, that any additional external QA audits will only be performed if deemed necessary.

12.0 PREVENTIVE MAINTENANCE

12.1 LABORATORY PREVENTIVE MAINTENANCE

This section applies to both field and laboratory equipment. Specific preventive maintenance procedures for field equipment will be consistent with the manufacturer's guidelines. Specific preventive maintenance protocols for laboratory equipment will be consistent with the contract laboratory's standard operating procedures.

All analytical instruments to be used in this project will be serviced by laboratory personnel at regularly scheduled intervals in accordance with the manufacturers' recommendations. Instruments may also be serviced at other times due to failure. Requisite servicing beyond the abilities of laboratory personnel will be performed by the equipment manufacturer or their designated representative.

Routine maintenance of the GC/MS instruments will be performed as per manufacturers' recommendations. The GC/MS Operations Manager is responsible for the preventive maintenance of the GC/MS instruments.

13.0 SPECIFIC ROUTINE PROCEDURES USED TO ASSESS DATA PRECISION, ACCURACY, AND COMPLETENESS

13.1 QA MEASUREMENT QUALITY INDICATORS

13.2 PRECISION

Precision will be assessed by comparing the analytical results between duplicate spike analyses. Precision as percent relative difference will be calculated as follows for values significantly greater than the associated detection limit:

$$\text{Precision} \quad \frac{(D2-D1)}{D1 + D2/2} \quad \text{xlOO}$$

D1 = matrix spike recovery

D2 = matrix spike duplicate spike recovery

w

For results near the associated detection limits, precision will be assessed based on the following criteria:

Precision original result - duplicate result <CRDL

13.1.2 **ACCURACY**

Accuracy will be assessed by comparing a set of analytical results to the accepted or "true" values that would be expected. In general, MS/MSD and check sample recoveries will be used to assess accuracy. Accuracy as percent recovery will be calculated as follows:

$$\text{Accuracy} \quad \frac{A-B}{} \quad x \ 100$$

A = The analyte determined experimentally from the spike sample

B = The background level determined by a separate analysis of the unspiked sample

C = The amount of spike added

13.1.3 COMPLETENESS

Completeness is a measure of the amount of valid data obtained from a measurement system compared with the amount that was expected to be obtained under normal conditions.

To be considered complete, the data set must contain all QC check analyses verifying precision and accuracy for the analytical protocol. In addition, all data are reviewed in terms of stated goals in order to determine if the database is sufficient.

When possible, the percent completeness for each set of samples will be calculated as follows:

$$\text{Completeness} = \frac{\text{valid data obtained}}{\text{total data planned}} \times 100 \text{ percent}$$

13.1.4 OUTLIERS

Procedures discussed previously will be followed for documenting deviations. In the event that a result deviates significantly from method established control limits, this deviation will be noted and its effect on the quality of the remaining data assessed and documented.

14.0 CORRECTIVE ACTION

The need for corrective action may be identified by system or performance audits or by standard QC procedures. The essential steps in the corrective actions system will be:

- checking the predetermined limits for data acceptability beyond which corrective action is required;
- identifying and defining problems;
- assigning responsibility for investigating the problem;
- investigating and determining the cause of the problem;
- determination of a corrective action to eliminate the problem (this may include reanalysis or resampling and analyses);
- assigning and accepting responsibility for implementing the corrective action;
- implementing the corrective action and evaluating the effectiveness;
- verifying that the corrective action has eliminated the problem; and
- documenting the corrective action taken.

For each measurement system, the laboratory QA/QC Officer will be responsible for initiating the corrective action and the laboratory supervisor will be responsible for implementing the corrective action.

15.0 QUALITY ASSURANCE REPORTS

Final reports will contain a discussion on QA/QC summarizing the quality of the data collected and/or used as appropriate for each phase of the project. The project coordinator, who has responsibility for these summaries, will rely on written reports/memoranda documenting the data assessment activities, performance and systems audits and footnotes identifying qualifications to the data, it any.

Each summary of sampling activities will include a tabulation of the data including:

- field blank and field duplicate sample results;
- maps showing well locations; and
- an explanation of any sampling conditions or quality assurance problems and their effect on data quality.

QA reports will be prepared by the QA/QC Officer following receipt of all analytical data. These reports will include discussions of the following and their effects on the quality of the data reported:

- sample holding times;
- laboratory/reagent blank data;
- surrogate spike, matrix spike, and matrix spike duplicate data;
- field QA/QC data;
- pertinent instrument performance per method protocols; and
- audit results.

In addition, the QA reports will summarize all QA problems, and give a general assessment of QA results versus control criteria for such parameters as accuracy, precision, etc.

The QA reports will be submitted to NYSDEC with data packages.

TABLES

TABLE B4.1

SAMPLING AND ANALYSIS SUMMARY
O&M ACTIVITIES
FORMER DOWCRAFT FACILITY
FALCONER, NEW YORK

Investigative Samples

Sampling Activity	*Sample Matrix*	*Analytical Parameters*	*Analytical Method*	*Initiating Event*	*1st Semi Annual Event*	*All Subsequent Events*	*Additional Parameters*	*F Dup*
water Sampling	Groundwater	TCL Volatiles	SW-846 8260(1>	6	11	11	-	
		pH	Field	6	11	11	-	
		Conductivity	Field	6	11	11	-	
		Dissolved Oxygen	Field	6	11	11	-	
		Temperature	Field	6	11	11	-	
		Turbidity	Field	6	11	11	-	
		ORP	Field	0	11	11	-	
		Arsenic, Manganese, Iron	SW-846 6010(1>	0	11	0	-	1
		Iron (II)	Field	0	11	11	-	1
		Nitrate	EPA353<2>	0	11	0	11	1
		Sulfate	EPA 375 (2)	0	11	0	11	1
		Iron (III)	(3)	0	11	0	-	1
		Chloride	EPA 300.00	0	0	0	11	1
		Alkalinity	EPA 310.0	0	0	0	11	1
		Nitrite	EPA 354.1	0	0	0	11	1
		Ammonia	EPA 350.1	0	0	0	11	1
		Sulfide	EPA 376.1	0	0	0	11	j
		Ethane/ethene	RSK175	0	0	0	11	!
Water Sampling	Surface Water	TCL Volatiles	SW-846 8260m	0	11	0		

Notes:
Methods referenced from:
1, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, Nov. 86 with updates.
(2) "Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater", EPA-600/4-82-057, July 1982.
"Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, March 1983.
(3) Iron (III) is calculated as the difference between total iron and iron (II).
<4> 1 duplicate will be collected on those sampling events where these parameters are included in the sampling.
(5) These additional parameters are to be included in every other sampling event after the final $KM_{,,}0_4$ injection is completed.
TCL Target Compound List
MS Matrix Spike.
MSD Matrix Spike Duplicate.
Dup Duplicate.

TABLE B4.2

TARGET QUANTITATION LIMITS
O&M ACTIVITIES
FORMER DOWCRAFT FACILITY
FALCONER, NEW YORK

	Vola tiles	*CAS Number*	*Groundwater and Surface Water Quantitation Limits* [m] *Water (vg/L)*
1.	Chloromethane	74-87-3	10
2.	Bromomethane	74-83-9	10
3.	Vinyl chloride	75-01-4	10
4.	Chloroethane	75-00-3	10
5.	Methylene chloride	75-09-2	10
6.	Acetone	67-64-1	10
7.	Carbon disulfide	75-15-0	10
8.	1,1,-Dichloroethvlene	75-35-4	10
9.	1,1-Dichloroethane	75-35-3	10
10.	1,2-Dichloroethylene (total)	540-59-0	10
11.	Chloroform	67-66-3	10
12.	1,2-Dichloroethane	107-06-2	10
13.	2-Butanone	78-93-3	10
14.	1,1/1-Trichloroethane	71-55-6	10
15.	Carbon tetrachloride	56-23-5	10
16.	Bromodichloromethane	75-27-4	10
17.	1,2-Dichloropropane	78-87-5	10
18.	cis-l,3-Dichloropropene	10061-01-5	10
19.	Trichloroethene	79-01-6	10
20.	Dibromochloromethane	124-48-1	10
21.	1,1/2-Trichloroethane	79-00-5	10
22.	Benzene	71-43-2	10
23.	trans-1,3-DichIoropropene	10061-02-6	10
24.	Bromoform	75-25-2	10
25.	4-Methvl-2-pentanone	108-10-1	10
26.	2-Hexanone	591-78-6	10
27.	Tetrachloroethene	127-18-4	10
28.	Toluene	108-88-3	10
29.	1,1,2,2-Tetrachloroethane	79-34-5	10
30.	Chlorobenzene	108-90-7	10
31.	Ethyl benzene	100-41-4	10
32.	Styrene	100-42-5	10
33.	Total Xylenes	1330-20-7	10

TABLE B4.2

TARGET QUANTITATION LIMITS
O&M ACTIVITIES
FORMER DOWCRAFT FACILITY
FALCONER, NEW YORK

Parameter	*Groundwater and Surface Water Quantitation Limits* [(1)] ***Water (Ug/L)***
Arsenic	**10**
Manganese	**15**
Nitrate	**100**
Sulfate	**1000**
Fe (II)	**100**
Methane	**10**

Notes:

(1) **Specific** quantitation limits are highly matrix dependent. The **quantitation limits listed herein** are in accordance with the analytical methods presented **in Table B4.1. They are provided** for guidance only and may not always be achieved.
Not applicable

TABLE B5.1

SAMPLE CONTAINER, PRESERVATION, AND HOLDING TIME PERIODS
O&M ACTIVITIES
FORMER DOWCRAFT FACILITY
FALCONER, NEW YORK

Analyses	*Sample Containers*	*Preservation*	*Maximum Holding Time*	*Notes*
Water				
VOCs	Four 40-mL teflon lined septum vials	Cool 4°C HC1 to pH <2	14 days from collection to analyses	Fill completely, no air bubbles
Arsenic, Manganese, Iron	One 1-liter plastic bottle	HN03 to pH <2, Cool 4°C	6 months from collection to analysis	Fill to shoulder of bottle
Nitrate/Nitrite	One 250-ml plastic bottle	Cool 4°C	48 hours from collection to analysis	Fill to shoulder of bottle
Sulfate/ Chloride/ Alkalinity	One 125-ml plastic bottle	Cool 4°C	28 days from collection to analysis	Fill to shoulder of bottle
Methane	Two 40-mL teflon lined septum vials	Cool 4°C HC1 to pH <2	14 days from collection to analyses	Fill completely, no air bubbles
Ammonia	One 125-ml plastic bottle	Cool 4°C H_2S0_4 to pH <2	28 days from collection to analyses	Fill to shoulder of bottle
Sulfide	One 125-ml plastic bottle	Cool 4°C N_aOH to pH >9	7 days from collection to analyses	Fill to shoulder of bottle
Ethane/Ethene	One 40-mL teflon lined septum vial	Cool 4°C HC1 to pH <2	14 days from collection to analyses	Fill completely, no air bubbles

Notes:
VOCs Volatile Organic Compounds.

TABLE B9.1

LABORATORY REPORTING DELIVERABLES
O&M ACTIVITIES
FORMER DOWCRAFT FACILITY
FALCONER, NEW YORK

A detailed report narrative should accompany each submission, **summarizing the contents, results and all relevant** circumstances of the work.

A. **Parameter** Requested

B. Sample Number, Matrix
- i) date collected
- ii) date extracted
- iii) date analyzed
- iv) Chain-of-Custody report form, including confirmation of **unbroken Chain-of-Custody**

C. Results (including CLP-Iike summary forms and all associated raw data)
- i) sample results
- ii) duplicate
- iii) blanks (a)
- iv) spike; spike duplicate
- v) surrogate recoveries
- vi) instrument calibration **data**

D. **Supporting** QA/QC
- i) methodology
- ii) method detection limits
- iii) percent solids

All sample data and its corresponding QA/QC data shall be maintained accessible **to CRA either in hard copy or** on magnetic tape or disc (computer data files).

APPENDIX C

HEALTH AND SAFETY PLAN

TABLE OF CONTENTS

LIST OF FIGURES
(Following Text)

LIST OF TABLES

LIST OF ATTACHMENTS

1.0 INTRODUCTION

The Health and Safety Plan (HASP) presented herein has been developed for the Remedial Action (RA) activities at the Former Dowcraft Corporation Facility (Site), now owned by the Jamestown Container Corporation, located in Falconer, New York. Figure C1.l presents the Site Location and Figure C1.2 presents the layout of the Site.

11 PURPOSE

The purpose of this Site-specific HASP is to provide specific guidelines and establish procedures for the protection of personnel performing project activities as described in Section 2.0, (Site Operations) of this HASP. The information in this HASP has been developed in accordance with applicable standards and is, to the extent possible, based on information available to date. This HASP is intended to be a living document in that it must continually evolve as Site conditions and knowledge of the Site work activities develop further. Continual updating of the HASP, based upon consistent monitoring and implementation of the HASP adjustments, will provide for the required results.

A vital element of the Conestoga-Rovers & Associates (CRA) Health and Safety Program is the implementation of a Site-specific HASP for our projects. This HASP, as applicable to this project, includes the following measures:

- Communicate the contents of this HASP to Site personnel;
- Eliminate unsafe conditions. Efforts must be initiated to identify conditions that can contribute to an accident and to remove exposure to these conditions;
- Reduce unsafe acts. Personnel shall make a conscious effort to work safely. A high degree of safety awareness must be maintained so that safety factors involved in a task become an integral part of the task; and
- Inspect frequently. Regular safety inspections of the work Site, materials, and equipment by qualified persons ensures early detection of unsafe conditions. Safety and health deficiencies shall be corrected as soon as possible, or project activities shall be suspended.

The discovery of any condition that would suggest the existence of a situation more hazardous than anticipated shall result in the removal of Site personnel from that area and reevaluation of the hazard and the levels of protection.

1.2 PERSONNEL REQUIREMENTS

All personnel conducting activities on Site for which a reasonable potential exposure exists must be in compliance with all applicable Occupational Safety and Health Administration (OSHA) to include but not limited to 29 CFR 1910, 29 CFR 1926 and CRA polices and procedures. Project personnel must also be familiar with the procedures and requirements of this HASP. In the event of conflicting safety procedures/requirements, personnel must implement those safety practices which afford the highest level of safety and protection.

1.3 PROTECT MANAGEMENT AND SAFETY ORGANIZATION

Project Manager CRA - (Jim Kay)

The project manager will provide support to the project with respect to all operations on this project. The project manager shall be responsible for the overall implementation of the HASP, and for ensuring that all health and safety responsibilities are carried out in conjunction with this project. This shall include, but is not limited to, review and approval of the HASP and consultation with the Client/Owner regarding appropriate changes to the HASP.

Site Supervisor (SS)/Site Safety Officer (SSO) CRA - (To Be Determined)

The SS/SSO is the person who, under the supervision of the project manager, shall be responsible for the communication of the Site requirements to Site project personnel and subcontractors and is responsible for carrying out the health and safety responsibilities by making sure that:

i) all necessary clean-up and maintenance of safety equipment is conducted by project personnel;

ii) emergency services are contacted;

iii) forms attached to the HASP are completed, filed and submitted correctly; and

iv) a pre-entry briefing is conducted which will serve to familiarize on-Site personnel with the procedures, requirements, and provisions of this HASP.

In the case of the former Dowcraft facility, the SS/SSO will likely also be the Site project person performing the work.

The SS/SSO also has the responsibility of enforcing safe work practices for project employees. The SS/SSO oversees the safety of any visitors who enter the Site. The SS/SSO maintains communication with the Jamestown AUenco and Jamestown Container Corporation Representative(s).

Other specific duties of the SS/SSO include:

i) orders the immediate shutdown of Site activities in the case of a medical emergency, unsafe condition, or unsafe practice;

ii) designate work areas and define minimum PPE requirements;

iii) provide the safety equipment, personal protective equipment, and other items necessary for employees;

iv) enforce the use of required safety equipment, personal protective equipment, and other items necessary for employee or community safety;

v) conduct job Site inspections as a part of quality assurance for safety and health;

vi) report safety and health concerns to CRA management as necessary;

vii) maintain the on-Site Hazard Communication Program, including maintaining copies of all Material Safety Data Sheets (MSDSs) for products that are brought to the Site for use;

viii) ensure that the air sampling program requirements have been conducted; and

ix) issue confined space entry and/or hot work permits as necessary.

Emergency Coordinator (EC)

The SSO and/or his or her designee will act as the EC. The EC shall be able to implement the emergency procedures and is responsible for the following in the event of an emergency:

i) the EC, or his designee, shall immediately respond to all imminent or actual emergency situations. The EC shall notify all personnel and emergency response agencies, identify the problem, assess the health or environmental hazards, and take all reasonable measures to stabilize the situation;

ii) the EC must take all reasonable measures necessary to ensure that fire, explosion, emission or discharge does not occur, reoccur, or spread. These measures may include stopping operations, collecting and containing released materials, and /or removing or isolating containers; and

iii) the EC shall also be responsible for follow-up activities after the incident such as cleanup of the affected area, maintenance and decontamination of the emergency equipment, and submission of any reports.

Employee Safety Responsibility

CRA employees are responsible for their own safety as well as the safety of those around them. CRA employees shall use any equipment provided in a safe and responsible manner, as directed by their supervisor. CRA personnel will follow the policies set forth in the HASP.

Employees are directed to take the following actions when appropriate:

i) suspend any operations which may cause an imminent health hazard to employees, subcontractors, or others;

ii) correct job Site hazards when possible to do so, without endangering life or health; and

iii) report safety and health concerns to the CRA SS/SSO.

Authorized Visitors

Authorized Visitors shall be provided with all known information with respect to the Site operations and hazards as applicable to the purpose of their visit.

1-4 TRAINING AND MEDICAL SURVEILLANCE REQUIREMENTS

All personnel conducting work at this Site with a reasonable potential for exposure to Site contaminants shall have completed the appropriate health and safety training as applicable to their job tasks/duties. The required training is referenced throughout the HASP and identified within the activity hazard analysis information sheets that are found in Attachment A.

At a minimum, these personnel shall have completed 40 hours of OSHA training and be current with their 8-hour refreshers in accordance with 29 CFR 1926.65(e). CRA personnel engaging in field activities shall participate in a medical monitoring program in accordance with 29 CFR 1926.65(f).

1-4.1 SITE-SPECIFIC TRAINING

An initial Site-specific training session or briefing shall be conducted by the SSO prior to commencement of work activities. During this initial training session, employees shall be instructed on the following topics:

i) personnel responsibilities;

ii) content and implementation of the HASP;

iii) Site hazards and controls;

iv) Site-specific hazardous procedures (e.g., chemical process, etc.);

v) training requirements;

vi) personnel protective equipment requirements;

vii) emergency information, including local emergency response team phone numbers, route to nearest hospital, accident reporting procedures and emergency response procedures;

viii) Site-specific Hazard Communication Program, including the review of MSDSs for materials that are brought to the Site for use (e.g., potassium permanganate) (see Attachment E);

ix) instruction in the completion of required inspections and forms; and

x) location of safety equipment (e.g., portable eyewash, first aid kit, fire extinguishers, etc.).

At the conclusion of this training/briefing, CRA employees will be required to sign an acknowledgement form (located in Attachment B) identifying that they attended the briefing.

In addition to the initial Site briefing conducted at the commencement of the project, supplemental brief safety meetings shall be conducted by the SSO to discuss potential health and safety hazards associated With each new task, and necessary precautions to be taken. These meetings will be documented on the Safety Meetings form located in Attachment C.

2.0 SITE OPERATIONS

2.1 SCOPE OF WORK

This HASP covers the specific Site activities to be conducted by CRA personnel as part of the RA activities at this Site. These activities are as follows:

i) mobilization and demobilization of equipment to and from the Site;

ii) groundwater sampling activities;

iii) mixing and injection of a potassium permanganate solution into various groundwater monitoring wells;

iv) surface water sampling in the Chadakoin River; and

v) decontamination activities.

If Site operations are altered or if additional tasks are assigned, then this HASP shall be updated to address the specific hazards associated with these changes.

2.2 SITE CONTROL MEASURES

Designated work areas will be set up as required. The purpose for this is to limit access to areas with potentially elevated chemical presence and prevent the migration of potentially hazardous substances into adjacent clean areas. These work areas are described as follows:

The Temporary Exclusion Zone (TEZ) is the area immediately surrounding the active work area. Sufficient area will be provided for efficient movement of personnel and equipment. Boundaries are modifiable depending on operational requirements. The SSO will be responsible for maintaining the boundaries of this area. All individuals entering this area will be required to wear the designated PPE. A wind direction indicator (i.e., flagging, windsock, etc.) will be mounted in the area of the TEZ.

The Contaminant Reduction Zone (CRZ) will provide a location for personnel decontamination to take plus such as the removal of PPE which has contacted potentially contaminated soils or other waste materials. It will also be the area where equipment is cleaned or decontaminated. Supplementary safety equipment such as fire extinguishers, portable eyewash units, and extra quantities of PPE may be stored.

The Support Zone (SZ) is defined as any clean area outside of the TEZs or CRZs where personnel will not come into contact with potential areas of contamination or other health and safety hazards.

3.0 HAZARD EVALUATION

This section identifies and evaluates the potential chemical, physical, and biological hazards which may be encountered while conducting project activities. Specific activity hazard analysis information sheets (located in Attachment A) have been developed to address the hazards associated with the Site operations which are outlined in Section 2.0 of this HASP.

A detailed Site Characterization can be found in the Work Plan, however, previous investigations conducted at the Site have determined the Contaminants of Concern to be Trichloroethene (TCE), 1,2-Dichloroethene (DCE), and vinyl chloride. The maximum concentration found in the groundwater at the Site for each contaminant is as follows: TCE-62,500 micrograms per liter (/ig/L), 1-2 DCE-1,600 Mg/L, and vinyl chloride-87 jttg/L. The wells with the highest concentration of these contaminants are PW-1, PW-2, and PW-3R.

31 CHEMICAL HAZARDS

The chemical hazards associated with conducting Site operations include the potential contact with on-Site contaminants including groundwater and potentially raw product that is mixed into a solution and injected into various groundwater monitoring wells, products used in decontamination of equipment, and support products such as fuel. The potential routes of exposure from these products during normal use may occur through inhalation of vapors or potassium permanganate in its dry powdered form or direct contact with or absorption of the materials. The chemical hazards of concern that may be encountered during project activities and their associated exposure levels in air are presented in Table C3.1.

The physical properties of these Site contaminants are similar in nature. Most of them are insoluble and heavier than water. Vinyl chloride is a known human carcinogen. Repeated exposure to chlorinated solvents such as these can cause nausea, headaches, dizziness, irritation to the eyes, nose, and throat, and drying of the skin. Additional information regarding these chemical contaminants are presented in Table C3.1.

3.1.1 CHEMICAL HAZARD CONTROLS

Airborne exposure or contact with the on Site contaminants as listed above shall be controlled by:

i) skin contact with chemicals may be controlled by use of the proper personnel protective equipment (PPE) and good housekeeping procedures. The proper PPE (e.g., Tyvek®, gloves) as described in Section 4.0 of this HASP shall be worn for all activities where contact with potentially harmful media or materials is anticipated;

ii) monitoring air concentrations for volatile organic contaminants shall be conducted in the breathing zone with a Photoionization Detector (PID) with a 10.6 eV lamp or greater, as discussed in Section 5.1; and

iii) using respiratory protection as appropriate, in areas known to have concentrations above the specified action level for each contaminant or during the potassium permanganate solution mixing and injection process.

3-1-2 HAZARD COMMUNICATION

Personnel required to handle or use hazardous materials as part of their job duties will be trained and educated in accordance with the Hazard Communication standard. The training shall include instruction on the safe usage, and handling procedures of hazardous materials, how to read and access MSDSs, and the proper labeling requirements.

The MSDSs for those chemicals in use at the Site will be maintained by the SSO and made available to project personnel. The MSDS for potassium permanganate is provided in Attachment E.

3.1.3 FLAMMABLE AND COMBUSTIBLE LIQUIDS

The storage, dispensing, and handling of flammable and combustible liquids must be in accordance with OSHA 29 CFR 1910.106. The specific flammable or combustible liquids used at the Site may include gasoline, diesel, kerosene, oils, and solvents.

Flammable and combustible liquids are classified according to flash point. This is the temperature at which the liquid gives off sufficient vapors to readily ignite. Flammable liquids have flash points below 100°F. Combustible liquids have flash points above 100°F and below 200°F.

Flammable Liquid Classes

Flammable liquids are known as Class I liquids, and divided into three classes:

i) Class 1A, liquids having a flash point below 73°F (22.8°C), and having a boiling point below 100°F (37.8°C) (ethyl ether, isoprene, pentane, petroleum ether);

ii) Class IB, liquids having a flash point below 73°F 22.8°C), and a boiling point at or above 100°F (37.8°C) (acetone, benzene, denatured alcohol, gasoline, methyl ethyl ketone, octane); and

iii) Class 1C, liquids having a flash point at or above 73°F (22.8°C) and below 100°F (37.8°C) (amyl acetate, turpentine).

Combustible Liquid Classes

Combustible liquids are known as Class II and III liquids, and divided into three classes:

i) Class **II,** liquids include those with a flash point at or above 100°F (37.8°C), and below 140°F (60°C) (diesel, fuel oils, kerosene, mineral spirits);

ii) Class **III,** liquids are those with a flash point above 140°F. Class III liquids are further divided into two subclasses:

- **Class IIIA,** liquids with a flash point above 140°F and below 200°F (93.3°C); and
- **Class IIIB,** liquids with a flash point at or above 200°F (93.3°C).

Note: When a combustible liquid is heated for use to within 30°F (16.7°C) of its flash point, it must be handled in accordance with the requirements for the next lower class of liquids.

Storage

Many flammables can ignite at temperatures at or below room temperature. They are far more dangerous than combustibles when they are heated. As a result, these products must be handled very carefully. At normal temperatures, these liquids can release vapors that are explosive and hazardous to employee health. Exposure to heat can cause some of these liquids to break down into acids, corrosives, or toxic gases.

For this reason, flammable/combustible liquids should be stored in cool, well ventilated areas away from any source of ignition. Always consult the MSDS of the product for specific information.

Transferring Flammable/Combustible Liquids

- This seemingly routine task can be hazardous if certain precautions are not followed. Grounding and bonding must be observed at all times to prevent the accumulation of static electricity when transferring containers/barrels one to another:
- Drums should be grounded (#4 copper conductor) to a grounding rod.
- Bonding is necessary between conductive containers; (e.g., a barrel and a 5 gallon container).

3-2 PHYSICAL HAZARDS

Physical hazards that may be present during project activities include use of hand and power tools, slip/trip/fall injuries, heat stress/cold stress, energy hazards, use of material handling devices and heavy lifting, use of flammables and combustibles, and potential adverse weather conditions. In addition, personnel must be aware that the protective equipment worn may limit dexterity and visibility and may increase the difficulty of performing some tasks.

3-2.1 ELECTRICAL HAZARDS

No employee shall be permitted to work in the proximity of any part of an electrical power circuit unless the person is protected against electric shock by de-energizing the circuit and grounding it, or has been locked and tagged out:

- All electrical wiring and equipment shall be a type listed by United Laboratories (UL) or Factory Mutual (FM) for the specific application;
- All installations shall comply with the National Electric Code (NEC) and the National Electric Safety Code (NESC); and
- All electrical circuits shall be grounded according to NEC and NESC Code. Ground fault circuit interrupters shall be used in the absence of properly grounded circuitry or when portable tools must be used around wet areas.

3.2.2 MATERIAL HANDLING

Material handling operations to be conducted at the project Site include manual lifting of materials to and from trucks and storage areas.

General Storage Practices

The basic safety requirement for storage areas is that the storage of materials and supplies shall not create a hazard. Additional general storage area practices include the following:

i) bags, containers, bundles, etc. stored in tiers shall be stacked, blocked, interlocked, and limited in height so that they are stable and secure against sliding or collapse;

ii) all stacked materials, cargo, etc. shall be examined for sharp edges, protrusions, signs of damage, or other factors likely to cause injury to persons handling these objects. Defects should be corrected as they are detected;

iii) storage areas shall be kept free from accumulation of materials that constitute hazards from tripping, fire, explosion, or pest harborage;

iv) storage areas shall have provisions to minimize manual lifting and carrying. Aisles and passageways shall provide for the movement of mechanical lifting and conveyance devices;

v) stored materials shall not block or obstruct access to emergency exits, fire extinguishers, alarm boxes, first aid equipment, lights, electrical control panels, or other control boxes;

vi) "NO SMOKING" signs shall be conspicuously posted, as needed, in areas where combustible or flammable materials are stored and handled; and

vii) cylindrical materials such as pipes and poles shall be stored in racks, or stacked on the ground and blocked.

Special Precautions for Hazardous or Incompatible Materials Storage

Generally, materials are considered hazardous if they are ignitable, corrosive, reactive, or toxic. Manufacturers and suppliers of these materials must provide the recipient with MSDSs, which describe their hazardous characteristics, and give instructions for their safe handling and storage.

Many hazardous materials are incompatible, which means they form mixtures that may have hazardous characteristics not described on the individual MSDSs. The following special precautions shall be followed regarding the storage of hazardous materials:

i) based on the information available on the MSDSs, incompatible materials shall be kept in separate storage areas; and

ii) warning signs shall be conspicuously posted, as needed, in areas where hazardous materials are stored.

Heavy Lifting Method

When lifting objects, use the following proper lifting techniques:

i) feet must be parted, with one foot alongside the object being lifted and one foot behind. When the feet are comfortably spread a more stable lift can occur and the rear foot is in a better position for the upward thrust of the lift;

ii) use the squat position and keep the back straight - but remember that straight does not mean vertical. A straight back keeps the spine, back muscles, and organs of the body in correct alignment. It minimizes the compression of the guts that can cause a hernia;

iii) grip is one of the most important elements of correct lifting. The fingers and the hand are extended around the object you're going to lift - using the full palm. Fingers have very little power - use the strength of your entire hand; and

iv) the load must be drawn close, and the arms and elbows must be tucked into the side of the body. Holding the arms away from the body increases the strain on the arms and elbows. Keeping the arms tucked in helps keep the body weight centered.

The body must be positioned so that the weight of the body is centered over the feet. This provides a more powerful line of thrust and also ensures better balance. Start the lift with a thrust of the rear foot. Do not twist.

3.2.3 HAND AND POWER TOOLS

Hand and Power Tool Guidelines include the following:

Hand Tools

i) hand tools must meet the manufacturer's safety standards;

ii) hand tools must not be altered in any way;

iii) at a minimum, eye protection must be used when working with hand tools;

iv) wrenches (including adjustable, pipe, end, and socket wrenches) must not be used when jaws are sprung to the point that slippage occurs;

v) impact tools (such as drift pins, wedges, and chisels) must be kept free of mushroom heads; and

vi) wooden handles must be free of splinters or cracks and secured tightly to the tool.

Power Tools

i) all power tools must be inspected regularly and used in accordance with the manufacturer's instructions and the tool's capabilities;

ii) electric tools must not be used in areas subject to fire or explosion hazards, unless they are approved for that purpose;

iii) portable electric tools must be connected to a ground fault circuit interrupter (GFCI) when working in wet areas;

iv) proper eye protection must be used when working with power tools;

v) personnel must be trained in the proper use of each specific tool; and

vi) any defective power tools must be immediately tagged and removed from service.

3.2.4 SLIP/TRIP/HIT/FALL

Slip/trip/hit/fall (S/T/H/F) injuries are the most frequent of all injuries to workers. They occur for a wide variety of reasons, but can be minimized by the following prudent practices:

i) spot check the work area to identify hazards;

ii) establish and utilize a pathway which is most free of slip and trip hazards;

iii) beware of slipping hazards such as wet, slippery, and uneven surfaces or terrain;

iv) carry only loads which you can see over;

v) keep work areas clean and free of clutter, especially in storage rooms and walkways; and

vi) communicate hazards to on-Site personnel.

3.2.5 HEAT STRESS

Recognition and Symptoms

Temperature stress is one of the most common illnesses at hazardous waste sites. Acclimatization and frequent rest periods must be established for conducting activities where temperature stress may occur. Below are listed signs and symptoms of heat stress. Personnel should follow appropriate guidelines if any personnel exhibit these symptoms:

i) Heat Rash — Redness of skin. Frequent rest and change of clothing;

ii) Heat Cramps — Painful muscle spasms in hands, feet, and/or abdomen. Administer lightly-salted water by mouth, unless there are medical restrictions;

iii) Heat Exhaustion — Clammy, moist, pale skin, along with dizziness, nausea, rapid pulse, fainting. Remove to cooler area and administer fluids; and

iv) Heat Stroke — Hot dry skin; red, spotted or bluish; high body temperature of 104°F, mental confusion, loss of consciousness, convulsions or coma. Immediately cool victim by immersion in cool water. Wrap with wet sheet while fanning, sponge with cool liquid while fanning; treat for shock. DO NOT DELAY TREATMENT. COOL BODY WHILE AWAITING AMBULANCE.

Work Practices

The following procedures will be carried out to reduce heat stress:

i) acclimatization;

ii) work/rest regimes;

iii) liquids that replace electrolytes/salty foods available during rest; and

iv) use of buddy system.

Acclimatization

The level of heat stress at which excessive heat strain will result depends on the heat tolerance capabilities of the worker. Each worker has an upper limit for heat stress beyond which the resulting heat strain can cause the worker to become a heat casualty. In most workers, appropriate repeated exposure to elevated heat stress causes a series of physiologic adaptations called acclimatization, whereby the body becomes more efficient in coping with the heat stress. Work/rest regimes will be partially determined by the degree of acclimatization provided.

Worker Information and Training

All new and current employees who work in areas where there is a reasonable likelihood of heat injury or illness should be kept informed, through continuing education programs:

i) heat stress hazards;

ii) predisposing factors and relevant signs and symptoms of heat injury and illness;

iii) potential health effects of excessive heat stress and first aid procedures;

iv) proper precautions for work in heat stress areas;

v) worker responsibilities for following proper work practices and control procedures to help protect the health and safety of themselves and their fellow workers, including instruction to immediately report to the employer the development of signs or symptoms of heat stress overexposure; and

vi) the effects of therapeutic drugs, over-the-counter medications, or social drugs may increase the risk of heat injury or illness by reducing heat tolerance.

3.2.6 COLD STRESS

When decreased ambient air temperatures and/or wind are present during work activities , potential cold stress situations may exist for on-Site workers. Cold stress can range from minor frostbite to hypothermia.

3.2.6.1 RECOGNITION AND SYMPTOMS

Below are listed the signs and symptoms of cold stress. Personnel should follow the appropriate guidelines if any personnel exhibit these symptoms:

i) **Frostbite** — Pain in the extremities and loss of manual dexterity. "Frostnip" or reddening of the tissue, accompanied by a tingling or loss of sensation in the extremities. Continuous shivering.

ii) **Hypothermia** — Pain in the extremities and loss of manual dexterity. Severe, uncontrollable shivering. Inability to maintain level of activity. Excessive fatigue, drowsiness, irritability, or euphoria.

iii) **Severe Hypothermia:** clouded consciousness, low blood pressure, pupil dilation, cease of shivering, unconsciousness, and possible death.

Remove the patient to a warm, dry place. If clothing is wet, remove and replace with dry clothing. Keep patient warm. Re-warming of patient should be gradual to avoid stroke symptoms. Dehydration of the loss of body fluids may result in cold injury due to a significant change in blood flow to the extremities. If patient is conscious and alert, warm sweet liquids should be provided. Coffee and other caffeinated liquids should be avoided because of diuretic and circulatory effects. Extremities affected by frostbite should be gradually warmed up and returned to normal temperature. Moist compresses should be applied; begin with lukewarm compresses and slowly increase the temperature as changes in skin temperature are detected. Keep patient warm and calm, remove to a medical facility as soon as possible.

32.6.2 WORK PRACTICES

The reduction of adverse heath effects from cold exposure is achieved by adopting the following work practices:

i) providing adequate insulating dry clothing to maintain core temperature above 98.6°F to workers if work is performed in air temperature below 40°F. Wind chill cooling rates and the cooling power of air are critical factors. The higher the wind speed and the lower the temperature in the work area, the greater the insulation value of the protective clothing required;

ii) if the air temperature is of 32°F or less, hands should be protected;

iii) if only light work is involved and if the clothing on the worker may become wet on the job Site, the outer layer of the clothing in use should be impermeable to

water. With more severe work under such conditions, the outer layer should be water repellent, and the outer wear should be changed as it becomes wetted. The outer garments should include provisions for easy ventilation in order to prevent wetting of inner layer by sweat;

iv) if available clothing does not give adequate protection to prevent cold injury, work should be modified or suspended until adequate clothing is made available, or until weather conditions improve;

v) heated warming shelters should be available nearby (e.g., use of on-Site trailer). The workers should be encouraged to use these at regular intervals, the frequency depending on the severity of the environmental exposure. When entering the heated shelter, the outer layer of clothing should be removed and the remainder of the clothing loosened to permit heat evaporation or a change of dry work clothing provided;

vi) warm sweet drinks and soups should be provided at the work Site to provide caloric intake and fluid volume. The intake of coffee should be limited because of the diuretic and circulatory effect;

vii) the weight and bulk of clothing should be included in estimating the required work performance and weights to be lifted by the worker;

viii) implementing a buddy system in which workers are responsible for observing fellow workers for early signs and symptoms of cold stress; and

ix) unacclimatized employees should not be required to work full-time in cold until they become accustomed to the working conditions and required protective clothing.

3.2.7 ADVERSE WEATHER CONDITIONS

The SSO shall decide on the continuation or discontinuation of work based on current and pending weather conditions. Electrical storms, tornado warnings, and strong winds are examples of conditions that would call for the discontinuation of work and evacuation of Site.

33 BIOLOGICAL HAZARDS

Biological hazards can include unfortunate contact with insects, poisonous plants, and reptiles. The following information provides the foundation for prevention and care during the potential contact with these hazards.

33.1 TICK-BORNE DISEASES

Lyme disease is caused by a bacterial parasite called spirochete, and is spread by infected ticks that live in and near wooded areas, tall grass, and brush. Once the tick deposits the spirochete, it must feed on the host blood for 12 to 24 hours before it can transmit the disease. The ticks that cause the disease in the Northeast and Midwest are often no bigger than a poppy seed or a comma in a newsprint. The peak months for human infection are June through October. There are many other tick borne diseases such as Rocky Mountain Spotted Fever which can be carried by a variety of ticks. The prevention and treatment of these diseases are similar to those of Lyme disease.

Prevention

Ticks hang on blades of grass or shrub waiting for a host to come by. When a host brushes against the vegetation, the tick grabs on. They usually first climb onto a persons legs and then crawl up looking for a place to attach. Preventative measures include wearing light-colored clothing, keeping clothing buttoned, tucking pant legs in socks, and keeping shirt tails tucked in. Periodic checks for ticks should be made during the day, and especially at night. Hair should also be checked by parting it and combing through it to make sure that no ticks have attached to the scalp. Also, check clothing when it is first removed, before ticks have a chance to crawl off.

The most common repellent recommended for ticks is N,N-dimethyl-m-toluamide, or DEET. It is important to follow the manufacturer's instructions found on the container for use with all insecticides especially those containing DEET.

In general, DEET insect repellent should only be applied to clothing, not directly on the skin. Do not apply to sunburns, cuts or abrasions. Use soap and water to remove DEET once indoors.

Removal

The best way to remove a tick is removal by tweezers. If tweezers are not available, cover your fingers (tissue paper) while grasping the tick. It is important to grasp the tick as close as possible to the Site of attachment and use a firm steady pull to remove it. When removing the tick, be certain to remove all the mouth parts from your skin so as not to cause irritation or infection. Wash hands immediately after with soap and water, and apply antiseptic to the area where tick was removed.

Testing and Symptoms of Lyme Disease

A variety of tests exist for determining Lyme Disease infection. However, most of these tests are not exact. The first symptoms of Lyme Disease usually appear from 2 days to a few weeks after a person is bitten by an infected tick. Symptoms usually consist of a ring-like red rash on the skin where the tick attached. The rash is often bull's eye-like with red on the outside and clear in the center. The rash may be warm, itchy, tender, and/or "doughy". Unfortunately, this rash appears in only 60 to 80 percent of infected persons. An infected person also has flu-like symptoms of fever, fatigue, chills, headaches, a stiff neck, and muscle aches and pains (especially knees). Rashes may be found some distance away from original rash. These symptoms often disappear after a few weeks.

3.3.2 POISONOUS PLANTS

Common Poison Ivy (Rhus radicans) grows as a small plant, a vine, and a shrub. Poison Ivy occurs in every state. The leaves always consist of three glossy leaflets. Poison Sumac (Rhus vernix) grows as a woody shrub or small tree 5 to 25 feet tall. It usually contains nine leaves, with eight paired leaves and one on top, and is common in swampy areas. The plants are potent sensitizers and can cause a mild to severe allergic reaction. This reaction is called contact dermatitis.

Dermatitis, in Rhus-sensitive persons, can result from contact with the milky sap found in the roots, stems, leaves, and fruit. The sap may retain its potency for months or years in a dry atmosphere, and can occur during any time of the year. The sap may also be carried by animals, equipment, or apparel.

The best form of prevention is to avoid contact. This can occur by wearing long sleeves and gloves if necessary. Disposal clothing, such as Tyvek, is recommended in high risk areas to avoid exposure from contaminated apparel. Barrier creams and cleaners are also recommended.

4.0 PERSONAL PROTECTIVE EQUIPMENT (PPE)

4.1 GENERAL

This section shall cover the applicable PPE requirements which shall include eye, face, head, foot, and respiratory protection. The purpose of PPE is to shield or isolate individuals from the chemical and physical hazards that may be encountered during work activities.

Delivery personnel, messengers, and other non-maintenance type personnel who have access only to the parking lot, immediate grounds or the office area shall not be required to use PPE. The minimum PPE requirements for working at the Site are as follows:

i) hard hat;

ii) long pants;

iii) safety glasses; and

iv) steel-toed boots or shoes.

Additional PPE may be required based on the specific tasks to be performed as outlined on the activity hazard analysis information sheets found in Attachment A.

4-2 TYPES OF PERSONAL PROTECTIVE EQUIPMENT

The following types of PPE will be available for use at the project Site:

i) **Hard Hats** - Regulated by 29 CFR Part 1910.135; specified in the American National Standards Institute, Inc. (ANSI) Z89.1, Safety Requirements for Industrial Head Protection;

ii) **Face Shields, Safety Glasses, and Safety Goggles** - Regulated by 29 CFR Part 1910.133(a); specified in ANSI Z87.1, Eye and Face Protection;

iii) **Foot Protection** - Regulated by 29 CFR Part 1910.136; specified in ANSI Z41.1, Safety Toe Footwear;

iv) **Hand Protection;**

v) **Respiratory Protection** - Regulated by 29 CFR Part 1910.134; specified in ANSI Z88.2, Standards for Respiratory Protection; and

vi) **Protective Clothing.**

42.1 TYPES OF PROTECTIVE MATERIAL

Protective clothing is constructed of a variety of different materials for protection against exposure to specific chemicals. No universal protective material exists. All will decompose, be permeated, or otherwise fail to protect under certain circumstances.

Fortunately most manufacturers list guidelines for the use of their products. These guidelines usually concern gloves or coveralls and, generally, only measure rate of degradation (failure to maintain structure). It should be noted that a protective material may not necessarily degrade but may allow a particular chemical to permeate its surface. For this reason, guidelines must be used with caution. When permeation tables are available, they should be used in conjunction with degradation tables.

The following is a partial list of protective materials that may be used during this project:

- Tyvek® Product of duPont Company. Spun-bonded, non-woven polyolefinfibers. It has reasonable tear, puncture, and abrasion resistance. Provides protection against particulate contaminants. Inexpensive and suitable for disposable garments.
- Polyethylene. Used as a coating on polyolefin material such as Tyvek®, increasing resistance to acids, bases, and salts. Good general purpose disposable product.
- Neoprene. Resists degradation by caustics, acids, and alcohols. Used in boots, gloves, splash suits, and fully encapsulating suits. Considered to be a good all-around protective material.

4.3 RESPIRATORY PROTECTION

Respiratory protection will be required during the potassium permanganate solution mixing and injection process activities. Personnel will follow the procedures and guidelines as described below and follow the CRA Respiratory Protection Program.

The air-purifying respirator cartridges selected for use during work at this Site are a combination organic vapor/acid gas cartridge with a P-100 particulate filter, and have the ability to protect against total organic vapor concentration up to 1,000 ppm. The P-100 filter protects against dust mist and fumes having a TWA greater than 0.05 mg/m^3, asbestos-containing dusts and mists, and radionuclides.

4.3.1 RESPIRATOR FIT TEST

All personnel who may be required to wear a negative-pressure, air-purifying respirator shall be fitted properly and tested. Employees shall have the opportunity to handle the respirators, and wear them in normal air for a long familiarity period. Following the familiarity period, employees shall test the piece-to-face seal by use of the positive and negative pressure tests:

- **Positive Pressure Test**-with the exhaust port(s) blocked, the positive pressure of slight exhalation should remain consistent for several seconds.
- **Negative Pressure Test** - with the intake ports blocked, the negative pressure of slight inhalation should remain constant for several seconds.

Air-purifying respirators shall not be worn when conditions prevent a seal of the respirator to the wearer. Such conditions may be the growth of a beard, sideburns, a skull cap that projects under the face-piece, or temple pieces on glasses. No employee may wear a beard if it interferes with the fit of the respirator. Also, the absence of one or both dentures can seriously affect the fit of a face-piece, and should be worn at all times that respirators are being used. The worker's diligence in observing these factors shall be evaluated by periodic checks.

43.2 CARTRIDGE CHANGES

When air purifying respirators are in use for 8 hours of continuous use, all cartridges will be changed at a minimum of twice a day. Changes will also be made when personnel begin to experience increased inhalation resistance and prior to breakthrough.

4.3.3 RESPIRATOR CLEANING, MAINTENANCE, AND INSPECTION

All respirators used on Site shall be cleaned and maintained in the following manner:

i) remove filters and cartridges;

ii) visually inspect face piece and parts, discard faulty items;

iii) remove all elastic headbands;

iv) remove exhalation cover and inhalation valves;

v) wash, sanitize, and rinse face piece. Wash any parts that were removed separately;

vi) dry the mask. Wipe face pieces and valves;

vii) disassemble and clean the exhalation valve;

viii) visually inspect face piece and all parts for deterioration, distortion, or other faults that might affect the performance of the respirator;

ix) replace any questionable or faulty parts;

x) reassemble mask and visually inspect completed assembly; and

xi) seal mask in plastic bag.

All personnel required to use this apparatus are instructed in how to properly fit a respirator to achieve the required face-piece-to-face seal for respiratory protective purposes. Conditions which could affect this face seal are the presence of beards, sideburns, eyeglasses, and the absence of upper or lower dentures. All employees are subjected to a preliminary fit test with annual fit tests thereafter in accordance with OSHA regulations 29 CFR Part 1910.134. In addition employees are also required to be medically fit to wear a respirator as determined by a licensed physician.

4.4 LEVELS OF PROTECTION

The level of protection must correspond to the level of hazard known, or suspected, in the specific work area. PPE has been selected with specific considerations to the hazards associated with Site activities. The specific PPE to be used for each activity is outlined in each activity hazard analysis information sheet located in Attachment A.

All PPE will be disposed of and/or decontaminated at the conclusion of each workday as described below. Decontamination procedures will follow the concept of decontaminating the most contaminated PPE first.

All disposable equipment shall be removed before meal breaks and at the conclusion of the workday and replaced with new equipment prior to commencing work.

Eating, drinking, chewing gum or tobacco, and smoking are prohibited while working in area where the potential for chemical and/or explosive hazards may be present. Personnel must wash thoroughly before initiating any of the aforementioned activities.

50 AIR MONITORING

During the progress of groundwater monitoring activities, monitoring for organic vapors will be taken by the SSO as necessary using a PID, equipped with a 10.6 eV lamp.

All monitoring equipment will be calibrated on a daily basis in accordance with the manufacturer's guidelines, and such calibrations will be recorded in the Site daily log book. Due to the potential for the use of different manufacturers instrumentation these instructions, which will include maintenance and calibration details, will be maintained at the Site for the instrumentation. Results of all daily air monitoring also will be recorded in the Site daily log book.

Real-time air monitoring for organic vapors will be conducted continuously during project activities that have the potential for worker exposure to chemicals of concern. Whenever sustained readings greater than 1 ppm are present, the SSO will use color metric tubes to determine if vinyl chloride is present. Although this condition is not expected to present itself, this procedure is being built in as a safeguard

5.1- MONITORING FREQUENCY

A summary of the monitoring equipment and frequency for each work activity is presented in the activity hazard analysis information sheets. As noted on each sheet, the monitoring equipment listed per work activity relates to the initial level of protection. The monitoring frequency may be decreased if the work areas and activities are unchanging, the results from the first hour of monitoring indicates that contaminant concentrations are non-detect, and no differing conditions are observed.

5.2 HEALTH AND SAFETY ACTION LEVELS

An action level is a point at which increased protection or cessation of activities is required due to the concentration of contaminants in the work area. Each task-specific hazard analysis information sheet identifies the appropriate actions to be taken at designated action levels.

6.0 DECONTAMINATION

It is the responsibility of the SS/SSO to ensure that all personnel and pieces of equipment are properly decontaminated according to the procedures outlined below. A suitable temporary decontamination facility will be set up at the Site. Used PPE will be placed in a covered container provided by Jamestown Container Corporation and will be left on Site.

Any washwaters that are generated will be collected and disposed of in the local sewer system of the Publically Owned Treatment Works (POTW) upon proper approval.

6.1 CONTAMINATION PREVENTION

One of the most important aspects of decontamination is the prevention of the spread of contamination. Good contamination prevention will rninimize employee and public exposure. Proper decontamination procedures and the following procedures of contamination avoidance shall reduce the potential spread of contamination include:

i) do not walk through areas of obvious or known contamination;

ii) do not handle or touch contaminated materials directly;

iii) fasten all closures on suits, covering with tape if necessary;

iv) take particular care to protect any skin injuries; and

v) stay upwind of airborne contaminants, when possible.

6.2 PERSONAL DECONTAMINATION

All PPE will be disposed of and/or decontaminated at the conclusion of each work day as described below. Decontamination procedures will follow the concept of deconning the most contaminated PPE first.

All disposable equipment shall be removed before meal breaks and at the conclusion of the work day and replaced with new equipment prior to commencing work. In addition, respirator cartridges will be changed as breakthrough is obtained, as directed by the SS. Respiratory equipment and other non-disposables will be fully decontaminated and then placed in a clean storage area. Respirator decontamination will be conducted daily. Taken from the drop area, the face pieces will be disassembled, the cartridges set aside, and all other parts placed in a cleansing solution. After an

appropriate time in the solution, the parts will be removed and rinsed with tap water. Face pieces will be allowed to air dry before placing in sanitized bags. Personnel will inspect their respirator on a daily basis to ensure its proper operation.

6.2.1 LEVEL D DECONTAMINATION

Level D decontamination procedures are as follows:

- *Step 1* - Remove all visible contamination and loose debris by washing with clean, water.
- *Step* 2-Remove all outer clothing that came in contact with the contamination (i.e., boot covers and outer gloves) and either dispose of in disposable container or wash in detergent solution and rinse.
- *Step 3* - Remove protective clothing; dispose of in disposable container.
- *Step* 4 - Wash and rinse hands.

6-2.2 LEVEL C DECONTAMINATION

Level C decontamination procedures to be utilized as follows:

- *Step 1* - Remove all visible contamination and loose debris by washing with clean water.
- *Step 2* - Remove all outer clothing that came in contact with the contamination (i.e., boot covers and outer gloves) and either dispose of in disposable container or wash in detergent solution and rinse.
- *Step 3* - Remove protective clothing; dispose of in disposable container.
- *Step* 4 - Remove respirator, sanitize prior to reuse.
- *Step 5* - Remove inner gloves; dispose of in disposable container.
- *Step 6* - Wash and rinse hands with soap and water.

7.0 EMERGENCY RESPONSE

7.1 ON-SITE EMERGENCIES

It is essential that Site personnel be prepared in the event of an emergency. Emergencies can take many forms: illnesses or injuries, chemical exposure, fires, explosions, spills, leaks, releases of harmful contaminants, or sudden changes in the weather. The following sections outline the general procedures for emergencies. Emergency information will be posted as appropriate. All emergencies will be reported to the Jamestown Allenco and Jamestown Container Corporation Representatives who will give CRA further direction as to the responsibilities during any emergency situation. In the absence of direction from the Representative, the procedures identified in the following sections will apply.

7.2 EMERGENCY CONTACTS

Fire:	911
Police:	911
Ambulance:	911
WCA Hospital:	(716)487-0141
CRA Accident Reporting	(866)529-4886

Hospital Information
WCA Hospital
207 Foote Avenue
Jamestown, New York
716-487-0141

Directions to the Hospital:

See Figure 7.1. Directions will be available on Site whenever CRA personnel are working.

Directions and maps will be posted in all Site vehicles.

7.3 ADDITIONAL EMERGENCY NUMBERS

National Response Center (NRC)	800-424-8802
National Poison Center	800-722-7112
New York State Department of Environmental Conservation (Linda Ross)	716-851-7220
CRA Project Manager 0im Kay)	519-884-5010
CRA Regional Safety and Health Manager (Craig Gebhardt)	716-297-6150
CRA Site Supervisor (to be determined)	
CRA On-Site Safety Officer (to be determined)	

7-3.1 SITE COMMUNICATION

Walkie-Talkies - Hand held units will be utilized as needed by project personnel for communication around the facility.

Telephones - Site personnel will have a cell phone available for use while working on Site.

7-4 EMERGENCY EQUIPMENT AVAILABLE ON SITE

Safety equipment will be available for use by project personnel and will be located and maintained in the CRZ. The safety equipment will include, but is not limited to, the following:

Communication Equipment	*Location*
Emergency Alarms/Horns	CRZ
Medical Equipment	
OSHA Approved First Aid Kit	CRZ
Sized for a Minimum of 10 people	
Emergency Eyewash	CRZ
Fire Fighting and Rescue Equipment	
One 20-Pound ABC Type Dry Chemical Fire Extinguishers	CRZ

7.5 ACCIDENT, INJURY, AND ILLNESS REPORTING, AND INVESTIGATION

Any work-related incident, accident, injury, illness, exposure, or property loss must be reported to your supervisor and the SSO. Report all accidents by calling (866) 529-4886. Motor vehicle accidents must also be reported to the SSO. The Accident Reporting Form, located in Attachment D, must also be filled out and provided to the SSO. The report must be filed for the following circumstances:

i) accident, injury, illness, or exposure of an employee;

ii) injury of a subcontractor;

iii) damage, loss or theft of property; and

iv) any motor vehicle accident regardless of fault, which involves a company vehicle, rental vehicle, or personal vehicle while the employee is acting in the course of employment.

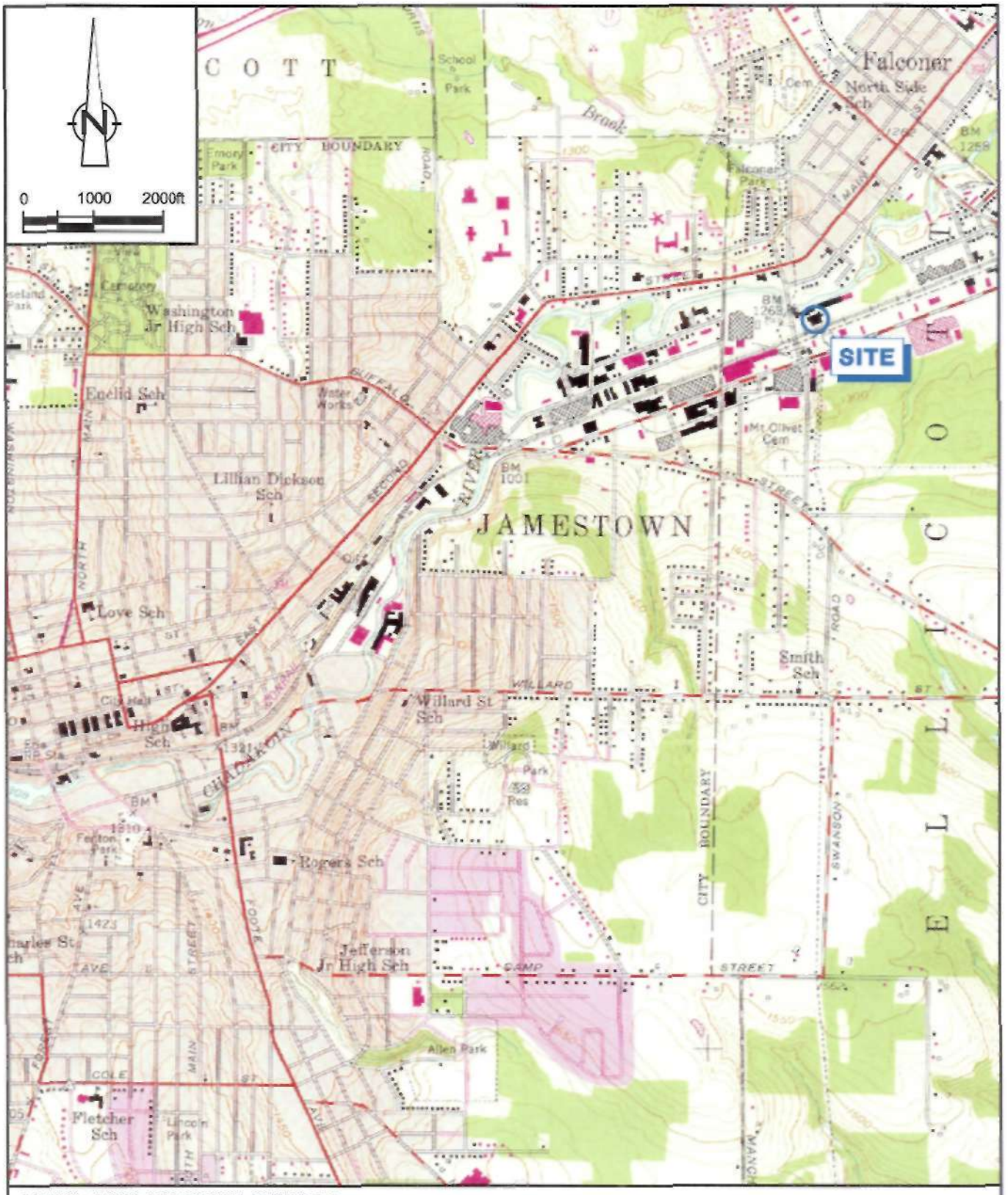
Occupational accidents resulting in employee injury or illness will be investigated by the SSO. This investigation will focus on determining the cause of the accident and modifying future work activities to eliminate the hazard.

All employees have the obligation and right to report near misses and unsafe work conditions, previously unrecognized safety hazards, or safety violations of others. If you wish to make such a report, it should be submitted in writing, using the CRA reporting form.

7-6 EMERGENCY EQUIPMENT/FIRST AID

Basic first aid supplies (bandages, gauze, tape) will be located in the first aid kit. At a minimum, a 10-unit first aid kit will be located on Site. The first aid kits will be inspected weekly to ensure that expended items are replaced. Other on-Site emergency equipment including an emergency alarm (i.e., air horn), emergency eyewash, and fire extinguisher will also be located in the CRZ.

FIGURES

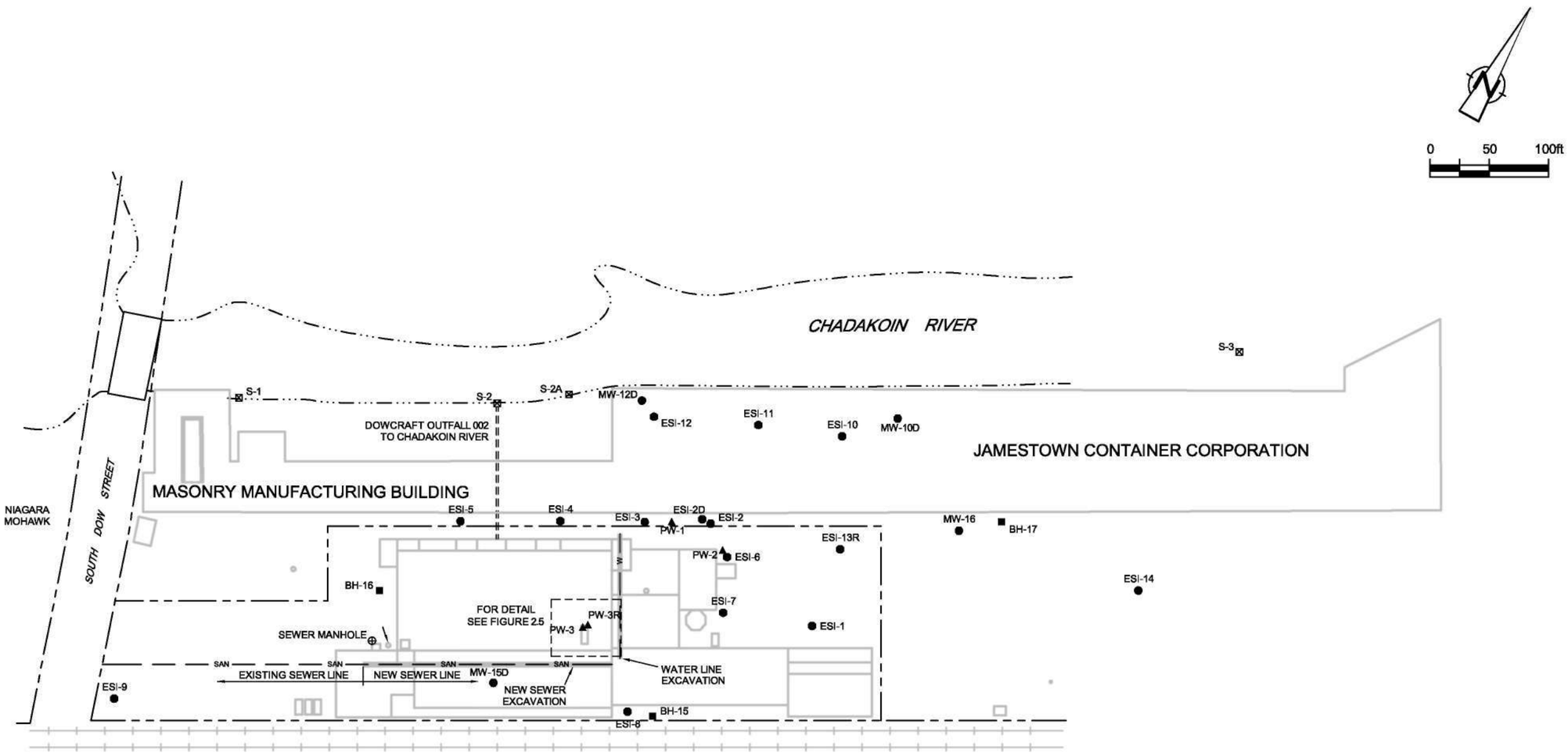


SOURCE: USGS JAMESTOWN, NEW YORK QUADRANGLE, PHOTOREVISED 1979.

figure C1.1

SITE LOCATION MAP
FORMER DOWCRAFT CORPORATION
Falconer, New York

05020-00(011)GN-WA001 DEC 09/2005



NOTE: ANALYTICAL DATA FOR MW-10D, MW-12D, MW-15D AND MW-16, APRIL 2001.
ALL OTHERS, DECEMBER 1999

figure C1.2

SITE LOCATION MAP
FORMER DOWCRAFT CORPORATION
Falconer, New York

SOURCE: USGS JAMESTOWN, NEW YORK QUADRANGLE, PHOTOREVISED 1979.

figure C7.1

EMERGENCY HOSPITAL ROUTE
FORMER DOWCRAFT CORPORATION
Falconer, New York

05020-00(011)GN-NF003 DEC 09/2005

TABLES

TABLE C3.1

EXPOSURE ROUTES AND EXPOSURE LIMITS
FOR THE CHEMICAL COMPOUNDS OF CONCERN
REMEDIAL ACTION ACTIVITIES
FORMER DOWCRAFT SITE

FALCONER, NEW YORK

Chemical Compound	*Ionization Potential*	*Exposure Routes*	*Acceptable Exposure Levels in Air*
Trichloroethene (TCE)	9.45	Inhalation, Ingestion	50 ppm [1] 100 ppm [2] 300 ppm [4] 1000 ppm [3]
1,2-Dichloroethene	9.8	Inhalation, Ingestion	200 ppm [1][2] 1000 ppm [3]
Vinyl Chloride	9.9	Inhalation, Ingestion, Human Carcinogen	1 ppm [1][2]
Potassium Permanganate	NA	Inhalation, Ingestion	0.2 mg/m^3 [1] 5 mg/m^3 [2]

Notes:

[1]	2005 Values, American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs).
[2]	Federal Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit (PEL).
[3]	Immediately Dangerous to Life and Health (IDLH).
[4]	Federal OSHA 5-Minute Exposure Limit.
mg/m^3	Milligrams per Cubic Meter.
ppm	Parts per Million.
NA	Not Applicable.

ATTACHMENT A

ACTIVITY HAZARD ANALYSIS INFORMATION SHEETS

ACTIVITY: DECONTAMINATION OF PERSONNEL AND EQUIPMENT

Description of Task	*Potential Hazards*	*Preventative Measures and Controls*	*PPE and Action Levels*
Personnel/equipment decontamination activities	Slip, Trip, Falls	Use three points of contact to mount and dismount equipment. Continuously inspect work areas for slip, trip, and fall hazards. Be aware of surroundings. Practice good housekeeping.	Modified D: Hard hat, safety glasses or faceshield, steel-toed boots, Tyvek® or polycoated Tyvek coveralls (as needed), nitrile inner and neoprene or nitrile outer gloves; and rubber overboots. Contingency: Level C (not expected): >500 ppm Modified Level D plus full-face air purifying respirator equipped with cartridges for organic vapors and particulates (P-100).
	Noise	Wear appropriate hearing protection if noise levels exceed 85 dBA.	
	Pinch Points	Keep hands, feet, and clothing away from moving parts/devices.	
	Heavy Lifting	Follow safe lifting practices in the HASP. Lift items within your capabilities. Ask for assistance if necessary.	
	Heat/Cold Stress	Dress appropriately, and follow guidelines in the HASP.	
	Dangerous Weather Conditions	Consult local weather reports daily, watch for signs of severe weather, etc. Suspend or reduce work during severe weather.	
	Fueling Equipment	No smoking; allow device to cool before refueling; and follow storage requirements. Bond metal containers when refueling.	
	Biological Hazards	Survey area for potential biological hazards that might impact the project. Use appropriate measures to remove hazard or evacuate area until rendered safe.	
	Chemical Hazards	PID will be used where potential for exposure to contaminated materials exists. Air monitoring will be conducted at regular intervals.	

Training Requirements

- Inspect Site daily to recognize and correct hazards (inspect equipment before using);
- Hazard Communication;
- 40-hour/ 8-hour OSHA HAZWOPER training;
- Personal Protective Equipment;
- Site-specific training on specific site tasks (i.e., use of pressure washer);
- Decontamination; and
- First Aid/CPR.

ACTIVITY: MOBILIZATION AND DEMOBILIZATION ACTIVITIES

Description of Task	*Potential Hazards*	*Preventative Measures and Controls*	*PPE and Action Levels*
Mobilization and Demobilization	Slip, Trip, Falls	Continuously inspect work areas for slip, trip, and fall hazards. Be aware of surroundings	Level D: Hard hat; safety glasses; hearing protection (as necessary); work gloves; safety vest (as necessary); and steel-toed boots. There are no action levels required for this activity.
	Noise	Wear appropriate hearing protection if noise levels exceed 85 dBA.	
	Utilities	Maintain proper utility clearances. All utilities will be located prior to conducting work.	
	Pinch Points	Keep hands, feet, and clothing away from moving parts/ devices. Provide barriers and/or signage indicating swing radius of equipment, according to CRA's SOPs.	
	Heavy Lifting	Follow safe lifting practices found in the HASP. Lift items within your capabilities. Ask for assistance.	
	Use of Hand and Power Tools	Follow manufacturer's safety precautions, inspect tools daily prior to use, replace defective tools, and wear the appropriate eye and foot protection.	
	Heat/Cold Stress	Dress appropriately, and follow guidelines found in the HASP.	
	Dangerous Weather Conditions	Consult local weather reports daily, watch for signs of severe weather, etc. Suspend or reduce operations during severe weather.	
	Biological Hazards	Survey area for potential biological hazards that might impact the project. Use appropriate measures to remove hazard or evacuate area until rendered safe.	
	Fueling Equipment	No smoking; allow device to cool before refueling; and follow proper storage requirements. Bond metal containers when refueling.	
	Electrical Hazards	GFCIs will be used to reduce electric shock. All electrical equipment will be inspected prior to use and according to CRA SOPs.	

Training Requirements

- Inspect Site daily to recognize and correct hazards (inspect equipment and hand/power tools daily/before use);
- Hazard Communication;
- Personal Protective Equipment;
- Site-specific training on specific site tasks; and
- First Aid/CPR.

ACTIVITY: GROUNDWATER SAMPLING AND MONITORING

Description of Task	*Potential Hazards*	*Preventative Measures and Controls*	*PPE and Action Levels*
Collect monitoring well water elevations, water samples, and other relevant data	Heat/Cold Stress	Dress appropriately, and follow guidelines found in the HASP.	Modified D/Level C: Standard PPE for Level D (safety glasses, hard hat, steel-toed boots plus inner nitrile gloves, and overgloves. Upgrade to Level C if PID reads >1 ppm in worker breathing zones and if vinyl chloride is not present. (Note: Use Colormetric tubes to determine if vinyl chloride is present). Cease operations, and call the Project Manager if vinyl chloride is present or if PID readings exceed 500 ppm.
	Fueling Equipment	No smoking; allow device to cool before refueling, and follow proper storage requirements. Bond metal containers when refueling.	
	Heavy Lifting	Follow safe lifting practices in the HASP. Life items within your capabilities. Ask for assistance if necessary.	
	Slips, Trips, Falls	Use three points of contact to mount/dismount machinery. Continuously inspect work areas for slip, trip, and fall hazards. Be aware of surroundings.	
	Chemical Hazards	Wear proper PPE. Follow air-monitoring program.	
	Dangerous Weather Conditions	Consult local weather reports daily, watch for signs of severe weather, etc. Suspend or reduce operations during severe weather.	
	Electrical Hazards	GFCIs will be used to reduce electric shock. All electrical equipment will be inspected prior to use and according to CRA SOPs.	
	Biological Hazards	Inspect work areas carefully; avoid contact with insects and poisonous plants.	
	Use of Hand and Power Tools	Follow manufacturers' safety precautions, inspect tools regularly, replace defective tools, and wear appropriate eye and foot protection.	

Training Requirements

- Inspect Site daily to recognize and correct hazards (inspect equipment before using);
- Hazard Communication;
- 40-hour/8-hour OSHA HAZWOPER training;
- Personal Protective Equipment;
- Site-specific training on specific site tasks (i.e., use of sampling equipment);
- Decontamination; and
- First Aid/CPR.

ACTIVITY: MIXING AND INJECTION OF POTASSIUM PERMANGANATE

Description of Task	*Potential Hazards*	*Preventative Measures and Controls*	*PPE and Action Levels*
Mixing and injection of Potassium Permanganate	Heat/ Cold Stress	Dress appropriately, and follow guidelines found in the HASP.	Level C: PPE shall be worn for mixing operations. Wear full-face air purifying respirator equipped with cartridges for organic vapors and particulates (P-100), polycoated Tyvek® suit, inner nitrile gloves, neoprene or nitrile outer gloves, steel-toed work boots, and hard hat. Modified Level D: May be worn for injection activities only, including hard hat with full-face shield or safety goggles, polycoated Tyvek, nitrile or neoprene gloves, steel-toed work boots. Air monitoring is not required, therefore, there are no action levels.
	Fueling Equipment	No smoking; allow device to cool before refueling, and follow proper storage requirements. Bond metal containers when refueling.	
	Heavy Lifting	Follow safe lifting practices in the HASP. Life items within your capabilities. Ask for assistance if necessary.	
	Slips, Trips, Falls	Use three points of contact to mount/dismount machinery. Continuously inspect work areas for slip, trip, and fall hazards. Be aware of surroundings.	
	Chemical Hazards - Powdered Form of Potassium Permanganate	Wear proper PPE, including full-face air purifying respirator.	
	Dangerous Weather Conditions	Consult local weather reports daily, watch for signs of severe weather, etc. Suspend or reduce operations during severe weather.	
	Electrical Hazards	GFCIs will be used to reduce electric shock. All electrical equipment will be inspected prior to use and according to CRA SOPs.	
	Biological Hazards	Inspect work areas carefully; avoid contact with insects and poisonous plants.	
	Use of Hand and Power Tools	Follow manufacturers' safety precautions, inspect tools regularly, replace defective tools, and wear appropriate eye and foot protection.	

Training Requirements

- Inspect Site daily to recognize and correct hazards (inspect equipment before using);
- Hazard Communication;
- 40-hour/8-hour OSHA HAZWOPER training;
- Personal Protective Equipment;
- Site-specific training on specific site tasks (i.e., use of sampling equipment);
- Decontamination; and
- First Aid/CPR.

ACTIVITY: SURFACE WATER SAMPLING

Description of Task	*Potential Hazards*	*Preventative Measures and Controls*	*PPE and Action Levels*
Collection of surface water samples from the Chadakoin River	Dangerous Weather Conditions	Consult local weather reports daily, watch for signs of severe weather, etc. Suspend or reduce operations during severe weather.	Modified D: Safety glasses, hard hat, approved flotation device, nitrile gloves, and steel-toed boots. Air monitoring is not required, therefore, there are no action levels.
	Drowning	Continuously evaluate river flow and depth. Be aware of surroundings. Wear an approved personal flotation device and have an additional person on Site while performing this activity.	
	Slip, Trip, Falls	Continuously inspect work areas for slip, trip, and fall hazards. Be aware of surroundings	
	Heat/Cold Stress	Dress appropriately and follow guidelines found in the HASP.	
	Biological Hazards	Survey area for potential biological hazards that might impact the project. Use appropriate measures to remove hazard or evacuate area until rendered safe.	

Training Requirements

- Surface Water Sampling;
- 40-Hour Hazardous Waste Operations and Emergency Response;
- First Aid/CPR;
- Hazard Communication; and
- Personal Protective Equipment.

ATTACHMENT B

TRAINING ACKNOWLEDGEMENT FORM

TRAINING ACKNOWLEDGEMENT FORM

I have received and been instructed in and understand the Site Safety Plan. I have been informed whom to contact if I have any questions and know where to report any additional health and safety hazards. I agree to work to the safety plan guidelines and understand that failure to do so could result in removal from the Site.

Date	*Printed Name*	*Signature*	*Company*

ATTACHMENT C

DAILY SAFETY MEETING FORM

SAFETY (TAILGATE) MEETING FORM

Date: Time:

Site Location:

Site Personnel in Attendance:

Name (Print)	*Signature*	*Company*

Safety Topics/Items Discussed:

Site Safety Officer:

Name: _____ Date:

ATTACHMENT D

ACCIDENT REPORTING FORM

CONESTOGA-ROVERS & ASSOCIATES (CRA) ACCIDENT REPORTING FORM

Report all accidents immediately by calling 1-866-529-4886

Instructions: For Personal Injuries, Property Damage, and Near Miss Reports, Complete Sections 1 and 2. For Vehicle Accidents, Complete Sections 1, 2, and 4. Form must be completed within 24 hours.

SECTION 1

A. Employee Identification ( ) CRA Employee ( ) Temporary Employee ( ) Subcontractor

Employee No.	Last Name	First Name	Middle Name/Initial	M or F

Area Code ( )	Telephone Number	Address (Street, City, State, Province, Zip Code)

Date of Hire / /	Position/Title	Supervisor	Employee's Company/Office Location

B. General Information

Where did the accident occur?
( ) Office ( ) Project Site
( ) Canada ( ) United States

Type of Occurrence
( ) Near Miss ( ) Employee Injury ( ) Vehicle Accident ( ) Property Damage Only

Date and Hour of Accident		Date and Hour Reported to Employer		Date and Hour Last Worked		Time Employee Began Work
Month Day Year	a.m. p.m.	Month Day Year	a.m. p.m.	Month Day Year	a.m. p.m.	a.m. p.m.

Normal Work Hours on Last Day Worked		Witnesses?	Witness Name and Telephone Number
From: To:	a.m. p.m.	( ) Yes ( ) No	

C. Project Information (Project Related Accidents/Near Misses Only)

Project #	Project Name	Project Manager	Site Telephone Number ( )	Employee Cell Number ( )

Was the Client Advised of the Accident?
( ) Yes ( ) No
Name:

Project Address (Street, City, State, Province, Zip Code)

Specific Location of Accident

SECTION 2

A. Details of the Accident/Near Miss

1. What job/task was being performed when the accident occurred? (Example: collecting groundwater samples).

2. Describe the employee's specific activities at the time of the accident. Include details of equipment/materials being used, including the size and weights of objects being handled.

3. For injuries, identify the part of body injured, and specify left or right side.

4. Identify the object or substance that directly injured employee and how.

5. Identify Property Damaged (include owner of property, nature and source of damage, model and serial number, if appropriate).

B. Health Care/Medical Treatment

Employee received health care?
( ) Yes ( ) No

Identify the type of health care provided and where it was performed. (Check all that apply).
( ) First Aid ( ) Medical treatment other than first aid (sutures, etc.) ( ) Hospitalized
( ) Clinic ( ) Hospital emergency room ( ) On location by self or CRA employee) ( ) On site by EMT

Name of Health Care Provider, Physician's Name, Address (Street, City, Province/State, and Postal/Zip Code)

Section 2 (Continued)

C. Accident Investigation	
H&S plan prepared and on site? ( ) Yes ( ) Not applicable	Did the safety plan identify and provide safety procedures for the specific tasks the employee was conducting when injured? ( ) Yes ( ) No If no, why not? (Explain).
Did the employee have the proper safety training to conduct these tasks or use the equipment? ( ) Yes ( ) No If not, why not?	
Identify all of the potential contributing factors and how they led to the occurrence of the accident. (Lack of attention, wrong use of equipment, lack of training, etc.)	
What contributing factor above was the underlying root cause of the accident.	
Is any training or retraining recommended? If yes, describe.	
What actions have been or will be taken to correct this accident from reoccurring?	
Additional information: Attach photos, accident diagrams, as applicable.	

Report Date Month Day Year	Report Prepared by: (please print)	Report Prepared by: (signature)

Fax Completed Form to CRA's Accident Reporting Fax: (716) 297-3389
Send Original to CRA's Accident Reporting Department, Niagara Falls, New York

SECTION 3

D. Agency Reporting and Recording Information (To be completed by the Regional Safety and Health Manager)			
CANADA			
Form 7 Sent to WSIB? ( ) Yes ( ) Not required	Employee Injury Information (Injury met the following criteria) ( ) First Aid ( ) Medical Treatment ( ) Critical Injury ( ) Modified Duty ( ) Lost Time Injury If medical treatment, what?		
Joint Safety and Health Committee Notified? ( ) Yes ( ) No	Total days of modified duty If exceeds 7 days, report to WSIB.	Total days of lost time (if any)	Date employee returned to work Month Day Year
UNITED STATES			
OSHA Recordable Injury? ( ) Yes ( ) No	Employee Injury Information (Injury met the following OSHA 300 Log criteria) ( ) First Aid ( ) Medical Treatment ( ) Restricted Duty ( ) Lost Time Injury If medical treatment, what?		
Total days of restricted duty	Total days of lost time (if any)		Date employee returned to work Month Day Year

VEHICLE ACCIDENT SECTION

(Complete this Section for all Vehicle Accidents)

SECTION 4

A. CRA Vehicle

License Plate No.	State/Province	Police Department	City	State/Province

Vehicle Year/Make/Model	Odometer Reading at Time of Accident	Police Report Number	Weather Conditions

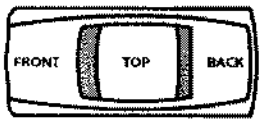
Name of Person Operating Vehicle

Address

City State/Province Zip Code

Telephone: Area Code ( )

"X" IN AREA OF VEHICLE DAMAGE



CIRCLE
0 No Damage
1 Light
2 Moderate
3 Heavy
4 Rolled
5 Burned

Vehicle Type: ( ) Personal ( ) Rental ( ) CRA-Own

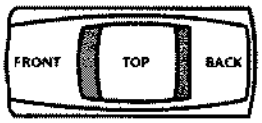
Description of Vehicle Damage:

B. Other Vehicles Involved

Name of Owner	Address	City/State/Prov./Zip	Area Code and Telephone Number
			( )
Operator's Name (if different from above)	Address	City/State/Prov./Zip	Area Code and Telephone Number
			( )

Year/Make/Model	Description of Property Damage:
Insurance Co. Name & Telephone	
License Plate No./State/Province	

"x" IN AREA OF VEHICLE DAMAGE



CIRCLE
0 No Damage
1 Light
2 Moderate
3 Heavy
4 Rolled
5 Burned

C. Injured Persons

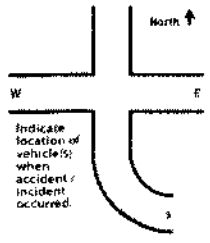
Name	Address Street, City, State/Prov./Zip Code	Phone Number	Nature of Injury	Indicate if Injured was a Vehicle Driver/ Passenger, CRA Employee, Other, or Pedestrian
1.				
2.				
3.				

D. Witnesses

Name	Address Street, City, State/Prov./Zip Code	Area Code and Telephone Number
1.		( )
2.		( )

E. Description of Accident

PLEASE COMPLETE OR ATTACH SEPARATE DIAGRAM



Was Ticket Issued:
Other Operator ☐
CRA Operator ☐

Reason: _____

Report Date Month Day Year	Report Prepared by: (please print)	Report Prepared by: (signature)

Note: If Additional Space is Required to Complete this Report, Use Separate Sheet of Paper and Attach.

Fax Completed form to CRA's Accident Reporting Fax: (716) 297-3389

Send Original to CRA's Accident Reporting Department, Niagara Falls, New York

ATTACHMENT E

MATERIAL SAFETY DATA SHEET FOR POTASSIUM PERMANGANATE

MSDS Number: **P6005** * * * * * *Effective Date:* ***08/10/04*** * * * * *
Supercedes: ***11/02/01***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS | J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

POTASSIUM PERMANGANATE

1. Product Identification

Synonyms: Permanganic acid, potassium salt; Condy's crystals
CAS No.: 7722-64-7
Molecular Weight: 158.03
Chemical Formula: KMnO4
Product Codes:
J.T. Baker: 3227, 3228, 3232
Mallinckrodt: 7056, 7068

2. Composition/Information on Ingredients

Ingredient	CAS No	P
Potassium Permanganate	7722-64-7	

3. Hazards Identification

Emergency Overview

DANGER! STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE. CORROSIVE. CAUSES BURNS TO ANY AREA OF CONTACT. HARMFUL IF SWALLOWED OR INHALED.

J.T. Baker SAF-T-DATA Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate
Flammability Rating: 0 - None
Reactivity Rating: 3 - Severe (Oxidizer)
Contact Rating: 2 - Moderate
Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES
Storage Color Code: Yellow (Reactive)

Potential Health Effects

Inhalation:
Causes irritation to the respiratory tract. Symptoms may include coughing, shortness of breath. High concentrations can cause pulmonary edema.
Ingestion:
Ingestion of solid or high concentrations causes severe distress of gastro-intestinal system with possible burns and edema; slow pulse; shock with fall of blood pressure. May be fatal. Ingestion of concentrations up to 1% causes burning of the throat, nausea, vomiting, and abdominal pain; 2-3% causes anemia and swelling of

the throat with possible suffocation; 4-5% may cause kidney damage.

Skin Contact:

Dry crystals and concentrated solutions are caustic causing redness, pain, severe burns, brown stains in the contact area and possible hardening of outer skin layer. Diluted solutions are only mildly irritating to the skin.

Eye Contact:

Eye contact with crystals (dusts) and concentrated solutions causes severe irritation, redness, blurred vision and can cause severe damage, possibly permanent.

Chronic Exposure:

Prolonged skin contact may cause irritation, defatting, and dermatitis. Chronic manganese poisoning can result from excessive inhalation exposure to manganese dust and involves impairment of the central nervous system. Early symptoms include sluggishness, sleepiness, and weakness in the legs. Advanced cases have shown symptoms of fixed facial expression, emotional disturbances, spastic gait, and falling.

Aggravation of Pre-existing Conditions:

No information found.

4. First Aid Measures

Inhalation:

Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Ingestion:

If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Skin Contact:

Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:
Not combustible, but substance is a strong oxidizer and its heat of reaction with reducing agents or combustibles may cause ignition. Contact with oxidizable substances may cause extremely violent combustion.
Explosion:
Strong oxidants may explode when shocked, or if exposed to heat, flame, or friction. Also may act as initiation source for dust or vapor explosions. Contact with oxidizable substances may cause extremely violent combustion. Sealed containers may rupture when heated. Sensitive to mechanical impact.
Fire Extinguishing Media:
Use water spray to blanket fire, cool fire exposed containers, and to flush non-ignited spills or vapors away from fire. Suffocating type extinguishers are not as effective as water. Do not allow water runoff to enter sewers or waterways.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Remove all sources of ignition. Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Clean up spills in a manner that does not disperse dust into the air. Use non-sparking tools and equipment. Reduce airborne dust and prevent scattering by moistening with water. Pick up spill for

recovery or disposal and place in a closed container. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage and moisture. Isolate from any source of heat or ignition. Avoid storage on wood floors. Separate from incompatibles, combustibles, organic or other readily oxidizable materials. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
- OSHA Permissible Exposure Limit (PEL):
5 mg/m3 Ceiling for manganese compounds as Mn

- ACGIH Threshold Limit Value (TLV):
0.2 mg/m3 (TWA) for manganese, elemental and inorganic compounds as Mn

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices,* most recent edition, for details.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded and engineering controls are not

feasible, a half facepiece particulate respirator (NIOSH type N95 or better filters) may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest.. A full-face piece particulate respirator (NIOSH type N100 filters) may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency, or respirator supplier, whichever is lowest. If oil particles (e.g. lubricants, cutting fluids, glycerine, etc.) are present, use a NIOSH type R or P filter. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:

Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:

Purple-bronze crystals.

Odor:

Odorless.

Solubility:

7 g in 100 g of water.

Density:

2.7

pH:

No information found.

% **Volatiles by volume @ 21C (70F):**

0

Boiling Point:

Not applicable.

Melting Point:
ca. 240C (ca. 464F)
Vapor Density (Air=l):
5.40
Vapor Pressure (mm Hg):
No information found.
Evaporation Rate (BuAe=l):
No information found.

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
Toxic metal fumes may form when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Powdered metals, alcohol, arsenites, bromides, iodides, phosphorous, sulfuric acid, organic compounds, sulfur, activated carbon, hydrides, strong hydrogen peroxide, ferrous or mercurous salts, hypophosphites, hyposulfites, sulfites, peroxides, and oxalates.
Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Investigated as a mutagen, reproductive effector. Oral rat LD50: 1090 mg/kg.

\Cancer Lists\

Ingredient	NTP Carcinogen--Known	Anticipate
Potassium Permanganate (7722-64-7)	No	No

12. Ecological Information

Environmental Fate:
No information found.
Environmental Toxicity:
This material may be toxic to aquatic life.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: RQ, POTASSIUM PERMANGANATE
Hazard Class: 5.1
UN/NA: UN1490
Packing Group: **II**
Information reported for product/size: 110LB

International (Water, I.M.O.)

Proper Shipping Name: POTASSIUM PERMANGANATE
Hazard Class: 5.1
UN/NA: UN1490
Packing Group: II

Information reported for product/size: 110LB

15. Regulatory Information

\Chemical Inventory Status - Part 1\

Ingredient	TSCA	EC
Potassium Permanganate (7722-64-7)	Yes	Yes

\Chemical Inventory Status - Part 2\

Ingredient	Korea	DS
Potassium Permanganate (7722-64-7)	Yes	Ye

\Federal, State & International Regulations - Part

Ingredient	-SARA 302- RQ	TPQ	L
Potassium Permanganate (7722-64-7)	No	No	N

\Federal, State & International Regulations - Part

Ingredient	CERCLA	-RCR 261.
Potassium Permanganate (7722-64-7)	100	No

Chemical Weapons Convention: No TSCA 12(b): No CDT
SARA 311/312: Acute: Yes Chronic: Yes Fire: Yes Press
Reactivity: No (Pure / Solid)

Australian Hazchem Code: 2Y
Poison Schedule: S6
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all

of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: 1 Flammability: 0 Reactivity: 0 Other: **Oxidizer**

Label Hazard Warning:

DANGER! STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE. CORROSIVE. CAUSES BURNS TO ANY AREA OF CONTACT. HARMFUL IF SWALLOWED OR INHALED.

Label Precautions:

Keep from contact with clothing and other combustible materials.
Store in a tightly closed container.
Do not store near combustible materials.
Remove and wash contaminated clothing promptly.
Do not get in eyes, on skin, or on clothing.
Do not breathe dust.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.

Label First Aid:

In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. In all cases get medical attention immediately.

Product Use:

Laboratory Reagent.

Revision Information:

No Changes.

Disclaimer:

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Prepared by: Environmental Health & Safety
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