Entered

REMOVAL ACTION PLAN
VOLUME I OF III

Frontier Chemical - Royal Avenue Site
Niagara Falls, New York

September 1994

BLASLAND, BOUCK & LEE, INC.
ENGINEERS & SCIENTISTS

BLASLAND, BOUCK & LEE, INC.
ENGINEERS & SCIENTISTS
30 Corporate Woods, Suite 160, Rochester, New York 14623-1477
(716) 292-6740 FAX: (716) 292-6715

September 22, 1994

Mr. Kevin Matheis/OSC
Response and Prevention Branch
Emergency and Remedial Response Division
United States Environmental Protection Agency
2890 Woodbridge Avenue
Building 209 (MS-211)
Edison, New Jersey 08837

Re: Phase II Removal Action
Frontier Chemical - Royal Avenue Site
Niagara Falls, New York

File: 257.15 #2

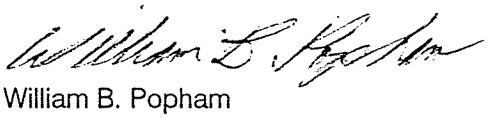
Dear Mr. Matheis:

On behalf of the Frontier Chemical - Royal Avenue Potentially Responsible Parties (PRP) Group, enclosed are three copies of the document entitled "Phase II Removal Action Plan" (RAP) for the Phase II Removal Action to be conducted at the Frontier Chemical Royal Avenue Site. This RAP, which was prepared by Blasland, Bouck & Lee, Inc. (BB&L), is being submitted to satisfy the remaining requirements of paragraph 34 of the Administrative Order on Consent, Index No. II-CERCLA-94-0205 (AOC) that were not included in the approved "Sampling and Analysis/Site Security and Maintenance (SA/SSM) Plan, dated July 1994.

If you have any questions or comments regarding the RAP, please contact me at (716) 292-6740.

Very truly yours,

BLASLAND, BOUCK & LEE, INC.



William B. Popham
Vice President

DSM/lap
4941029N

cc: Frontier Chemical - Royal Avenue Technical Committee
Frontier Chemical Site Attorney - Chief, New York/Caribbean Superfund Branch, Office of Regional Counsel, USEPA
Mr. Michael O'Toole, P.E., NYSDEC

Removal Action Plan
Volume I of III

Frontier Chemical - Royal Avenue Site
Niagara Falls, New York

September 1994

BLASLAND, BOUCK & LEE, INC.
ENGINEERS & SCIENTISTS

30 Corporate Woods, Suite 160
Rochester, New York 14623
(716) 292-6740

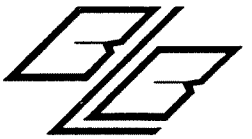
Table of Contents

Tables

Figures

Appendices

Volume II of III



1.0 INTRODUCTION

1.0 Introduction

1.1 General

Blasland, Bouck, and Lee, Inc. (BB&L) has been retained by Cranbury Remediation, Inc. (Cranbury) to provide the engineering and environmental consulting services required to perform a Phase II Removal Action at the Frontier Chemical - Royal Avenue Site, located at 4626 Royal Avenue, Niagara Falls, Niagara County, New York (Site). This work will be performed in accordance with the United States Environmental Protection Agency (USEPA) Administrative Order on Consent (AOC) for Removal Action, Index Number II-CERCLA-94-0205, issued to the Frontier Chemical - Royal Avenue Potentially Responsible Parties (PRP) Group. A copy of the AOC is provided in Appendix A.

On behalf of the PRP Group, BB&L has prepared this Removal Action Plan (RAP) to meet the requirements set forth in the AOC. This RAP presents a detailed description of the procedures and methods that will be employed to remove and dispose of the contents in the tank systems specified in the AOC, including cleaning tank interiors/exteriors and secondary containment areas. To characterize the contents of the tanks addressed in the AOC, BB&L prepared a Sampling and Analysis/Site Security and Maintenance (SA/SSM) Plan, dated July 1994, which was submitted to and approved by the USEPA on August 4, 1994 and implemented during August 1994. Analytical data generated from the implementation of the SA/SSM Plan was evaluated to determine appropriate treatment/disposal and tank cleaning methods for each waste stream at the Site. The RAP includes descriptions of the responsibilities of project team members; a Quality Assurance/Quality Control (QA/QC) Plan; a Health and Safety Plan (HASP); and procedures for controlling site access and conducting ongoing maintenance activities at the Site throughout the term of the AOC.

1.2 Background

Background information, including site location, site history, waste-processing operations, and current conditions, was derived from the following sources:

- USEPA AOC for Removal Action, Index No. II-CERCLA-94-0205;
- Frontier Chemical's 6NYCRR Part 373 Permit Application;

- Selected USEPA correspondence; and
- The SA/SSM Plan.

1.2.1 Site Location

The Site, located at 4626 Royal Avenue in Niagara Falls, Niagara County, New York (Figure 1-1), occupies 9.7 acres situated in an area zoned for heavy industrial use. The Site is bounded by 47th Street and Stratcor Corporation on the east; Royal Avenue and Elkem Metals on the south; Cascades Paper Corporation and Frank's Vac Service, Inc. on the west; and Sentry Metal Blast, Inc. on the north. The main entrance to the Site is located on Royal Avenue. While there are no residences within 1,000 feet of the boundaries of the Site, approximately 100,000 people reside within a 3-mile radius.

The latitude and longitude for the approximate center of the Site are 43° 05' 22" N and 79° 00' 35" W, respectively. The topography at the Site is flat, with a very gradual slope to the Niagara River, which is located 4,800 feet to the south. Most of the ground surfaces on the Site are paved with asphalt or concrete.

1.2.2 Site History

Frontier Chemical Waste Process, Inc. (Frontier), formerly a commercial hazardous waste treatment, storage, and disposal facility (TSDF), was founded in 1958 to provide hazardous and non-hazardous chemical treatment to customers in the eastern United States and southeastern Canada. The Site, currently occupied by Frontier, was originally owned and developed by International Minerals and Chemicals Corporation as a chlorine-caustic plant. Frontier moved to the site from Pendelton, New York in 1974 and occupied only a small portion of the Site; gradually, Frontier expanded its operation until it occupied the entire Site. In February 1985, Frontier and a sister company, BLT Services, Inc., became wholly owned subsidiaries of Environmental Services Associates, Inc. In October 1985, Environmental Services Associates merged with Envirosure Management Corporation. On February 2, 1990, ROE Consolidated Holdings (ROE) obtained 39 percent of the stock of Environmental Services Associates. As part of the stock sale agreement, ROE also assumed operational control of Environmental Services

Associates, Inc., which, in turn, had operational control of the Frontier facility. In August 1991, the facility came under new management by Eagle Vision Environmental, Inc. (Eagle Vision). Subsequently, Eagle Vision experienced severe financial difficulties and looked for new investors to purchase or take over the facility. Because of the financial crisis, most of the Frontier staff was terminated in August 1992. As a result of inadequate staffing, several reported releases from storage drums occurred at the Site, causing the discharge of Comprehensive Environmental Response Compensation and Liability Act (CERCLA) hazardous substances. Because the Site was not properly operated and maintained, the containers (drums and tanks) at the facility continued to deteriorate, leading to additional discharges and an increased threat to public health and the environment.

In light of the conditions at the Site, on December 4, 1992, the New York State Department of Environmental Conservation (NYSDEC) executed a "Modification to Summary Abatement and Notice of Hearing" order requiring closure of the facility, enabling the NYSDEC to initiate an emergency Removal Action. This order required Frontier and Eagle Vision to remove wastes from the site at a minimum rate of 250 drums per week until no wastes that had been on site in excess of six months remained. In the event that Frontier and Eagle Vision could not meet these conditions, the facility would have to cease operations, in accordance with the closure plan detailed in the order.

After Frontier and Eagle did not meet these conditions, a "right to invoke" action was issued by the NYSDEC, allowing the NYSDEC and USEPA to enter the facility and begin Removal Action activities. On December 22, 1992, the USEPA mobilized an Emergency Response Cleanup Services (ERCS) contractor and initiated 24-hour security at the Site. New locks were installed throughout the Site, and custody seals were placed on all personnel files and potentially sensitive enforcement files. With the former head of maintenance, the USEPA conducted a thorough inspection of the facility to assess the integrity of tanks and boilers, and to locate any immediate hazards. A fencing subcontractor was hired by the USEPA to secure the facility, which included repairing existing fences, installing gates, and refastening barbed wire.

Since its initial mobilization to the Site, the USEPA has acted on a number of occasions to address releases from drums at the Site. These discharges were confined by the USEPA within the boundaries of the facility.

On September 30, 1993, the PRP Group initiated Phase I of a Removal Action to address the 4,092 drums on site, many of which contained hazardous substances as defined by Section 101(14) of CERCLA. These Phase I removal activities, conducted under a separate AOC, were completed in May 1994. During August 1994, BB&L implemented the USEPA-approved SA/SSM Plan to characterize the contents of the tanks addressed by the AOC. Section 1.2.5 of this RAP summarizes the results of this sampling and characterization task. Phase II of this Removal Action will address the removal of materials contained in the 49 storage tanks, containment vessels, associated piping, and ancillary equipment at the Site, and the decontamination of these items. In addition, this RAP will address the removal/disposal of approximately 40 cubic yards (yd^3) of dewatered sludge from the cyanide wastewater treatment system, and the removal of material and decontamination of an open basin formerly used in drum-washing operations. This basin was identified in a Site walk-through conducted by BB&L personnel and the USEPA on September 2, 1994.

1.2.3 Frontier Waste Processing Operations

The Frontier facility organized its wastes into three general process groups, according to anticipated treatment options:

- Blended fuels processing system;
- Wastewater treatment and chemical oxidation processing system; and
- Bulking and warehousing for off-site disposal.

In addition, the Frontier facility maintained bulk chemical tanks for use in wastewater treatment.

Frontier's fuels processing system blended halogenated and non-halogenated waste solvents, sludges, and

solids into synthetic fuels, which were shipped to cement kilns. (The components of the blended fuels system at Frontier, which consisted of tanks, containment areas, pumps, and related equipment, are identified with 200-series numerical designations on Figures 1-2 and 1-3.)

Frontier's oxidation system process pretreated various "special" wastes, such as cyanides and sulfides, prior to treatment in the wastewater treatment system or shipment off site for further treatment. (The components of the cyanide/sulfide oxidation system are identified with 300-series numbers on Figure 1-2 and 1-4.)

The wastewater treatment system received aqueous wastes and acids from off site in drums, and treated cyanide wastes from on-site operations. The wastes were first acidified, chemically reduced (if necessary), and then neutralized with lime and/or magnesium hydroxide to form a slurry, which was filtered to remove the heavy metal hydroxides and calcium sulfate. The filtrate was pH-adjusted and passed through an activated carbon bed prior to discharge to the City of Niagara Falls sewage treatment system under a sewer discharge permit. The filtered solids were sent off site for landfill disposal, and the spent activated carbon was returned to the supplier for regeneration. (The components of the wastewater treatment system are identified with 100-series numbers on Figure 1-2 and 1-5.) Tank 112 was employed as a bulking tank for non-hazardous wastewaters from non-hazardous sludge consolidation. Tanks 106 (bisulfate storage), 119 (lime slurry storage), 108 (magnesium hydroxide), 114 (hydrochloric acid), and S101 (dry lime storage) were used to store raw materials used in the treatment process and were not regulated as hazardous waste storage units. Tanks 106, 108, 114, and 119 were used for the storage of waste bisulfate and waste lime slurry as processing materials.

The tanks employed for storage and treatment of wastes were tank numbers 301, 302, 303, 307, R-301, and R-302. Tank Numbers 304 and 305 contained hypochlorite, and tank number 306 contained caustic, both of which were used in the treatment process.

1.2.4 Current Conditions

The Frontier facility includes 20 major structures, most of which are storage and/or process buildings. Two of these buildings have been condemned due to structural instability; however, none of the tanks addressed by the AOC is contained in either structure. The Frontier facility has 26 containment and/or drum storage areas consisting of either concrete or asphalt berms, secondary containment for storage tanks constructed of masonry block, or below-grade retention basins. The facility also includes 49 tanks and/or vessels that were used for the storage and treatment of various wastes and treatment chemicals, as well as associated piping and ancillary equipment. The Phase II Removal Action addresses the contents of these 49 tanks and/or vessels (depicted in Table 1-1 "Tank Specifications and Content Descriptions"), as well as associated piping, ancillary equipment, secondary containment structures, and dewatered wastewater treatment sludge.

Activities currently performed at the Site include: maintaining boilers that supply steam to the steam tracer lines and process lines, and heat to the drum storage buildings (weather dependent); maintaining the compressors that are essential to the fire control system on site; maintaining site transformers; pumping storm water from containment areas into storage tanks pending analytical results and approval for discharge; and inspecting drums and tanks at regular intervals.

1.2.5 Characterization of Tank Contents

During August and September of 1994, BB&L implemented the USEPA-approved Sampling and Analysis portion of the SA/SSM Plan in order to characterize the contents of the tanks addressed by the AOC for treatment and/or disposal. Table 1-2 "Sampling and Analysis Summary" summarizes the sampling and lists the tank number, tank capacity, date sampled, number of discrete phases, thickness and volume of phases, phases sampled, the facility responsible for the analysis of each sample, and general waste description. Based upon our knowledge of past treatment processes, BB&L identified four TSDFs that were capable of treating/disposing of the tank contents. Samples collected from each tank were sent to the appropriate USEPA-approved TSDF for analysis. General Testing Corporation (GTC), which served as the QA/QC laboratory for this project, performed QA/QC analyses on one sample that went to each different facility.

The analytical data for the anticipated fuels-blending wastes prepared by Petro-Chem, located in Detroit, Michigan, are exhibited in Appendix B1. Chemical Waste Management, located in Niagara Falls, New York, performed analyses of the samples anticipated to be secure-landfilled, and the results are included in Appendix B2. Samples from potentially cyanide-contaminated waste tanks and raw product tanks were analyzed by CyanoKem, of Detroit, Michigan, and the results are summarized in Appendix B3. LWD, Inc., of Clavert City, Kentucky, performed analyses on samples obtained from tanks T101, F-A, and F-B; a summary of these analyses in included is Appendix B4.

The QA/QC analyses prepared by GTC reflect the corresponding analyses performed by each of the TSDFs. There are no discrepancies between GTC and the TSDF analytical data that impact the acceptance criteria and/or the Waste Analysis Plans (WAPs) of the TSDFs with regard to these waste streams. The QA/QC analytical data prepared by GTC are included in Appendix B5.

1.3 Report Organization

After this introductory section, Section 2.0 discusses the organization of the project team for this Removal Action and each team member's responsibilities. Section 3.0, Tank Cleaning and Removal of Contents, defines the general procedures and methods that will be employed to remove the contents and clean the tanks addressed by the AOC. The proposed procedures, which have been prepared to maximize health and safety concerns, and incorporate maximum efficiency for tank contents removal based on the chemical characteristics/compositions of the waste materials, were developed using current industry standard procedures, as well as information gathered during past removal activities at Frontier Chemical. Section 3.1, Removal of Tank Contents, addresses the tanks based upon the general waste/materials anticipated: fuels blending wastes, cyanide wastes, product tanks, wastewater tanks, and waste acid tanks. Section 3.2, Cleaning Tanks, Piping, and Containment Areas, outlines a variety of different cleaning procedures, which are based on the chemical/physical characteristics of the waste materials and consider all potential health and safety concerns. This section also describes procedures for cleaning tank and piping interiors/exteriors, and secondary containment areas and floors. In addition, Section 3.2 addresses tank and piping removal, and the clean-up criteria upon which the procedures were based.

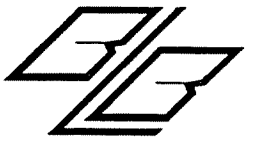
Section 4.0, Waste Transportation, Treatment, and Disposal, discusses the treatment and disposal options available for the tank contents and defines the anticipated bulking and combining of various waste streams found in the tanks, and the probable disposal facilities to be used for each waste stream. Section 4.0 also addresses the disposal of tanks, piping, ancillary equipment, personal protective equipment (PPE), and decontamination waters. In addition, Section 4.0 lists the requirements associated with the off-site transport of hazardous wastes removed from the Site.

Section 5.0 includes the QA/QC Plan, which identifies all procedures to be employed to ensure that clean-up criteria for tank, piping, and secondary containment are consistently achieved. This section also outlines the responsibility for post-cleaning inspections and includes field inspection checklists.

Section 6.0, the Site Security and Maintenance Plan, describes the responsibilities of the security contractor to control site access, in accordance with paragraph 34e of the AOC. This section also outlines the routine and non-routine maintenance activities necessary to fulfill the requirements of paragraph 34e of the AOC. The procedures outlined in this section were also included and approved by the USEPA in the SA/SSM Plan. These detailed procedures have been in force since the effective date of the AOC and will continue to be in effect through the completion of the on-site Phase II Removal Action.

Section 7.0 depicts the anticipated schedule of events for Removal Action activities.

Section 8.0 consists of the HASP, which outlines the procedures, methods, and requirements that will be followed by all on-site personnel during waste removal and tank cleaning, site security, and maintenance activities. The HASP identifies potential hazards anticipated during implementation of the RAP and defines PPE, site control measures, and emergency response procedures, in accordance with Occupational Safety and Health Administration (OSHA) Regulation 1910.120, as well as applicable USEPA, NYSDEC, and New York State Department of Health (NYSDOH) requirements.



2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

2.0 Project Organization and Responsibilities

2.1 Project Organization

The Phase II Removal Action for the Frontier Chemical - Royal Avenue Site will involve the close interaction of personnel from the various organizations identified below, collectively referred to as the project team.

Project Title	Name	Organization	Phone
On-Scene Coordinator	Mr. Kevin Matheis	USEPA	(716) 284-4396
Project Coordinator	Mr. Richard Marx	PRP Group	(716) 546-8000
Corporate Officer	Mr. William B. Popham	Cranbury/BB&L	(716) 292-6740
Project Manager	Mr. Thomas P. Hasek	Cranbury/BB&L	(716) 292-6740
OSS	Mr. Richard W. Gahagan	Cranbury/BB&L	(716) 292-6740
Health and Safety Supervisor	Mr. Derek S. Meuse	Cranbury/BB&L	(716) 292-6740
Engineering Services	Mr. Derek S. Meuse	Cranbury/BB&L	(716) 292-6740
Removal Contractor Supervisor	To be determined		

A project organizational chart, which depicts the project team, is included as Figure 2-1. General descriptions of each team member's responsibilities are presented in Section 2.2.

2.1.1 Overall Project Management

On behalf of the PRP Group, Cranbury/BB&L have responsibility for implementing the RAP, in accordance with the requirements of the AOC. Cranbury/BB&L personnel will prepare and implement the RAP, as well as coordinate between the PRP Group, USEPA, TSDFs, the removal contractor, maintenance personnel, and security personnel.

2.1.2 Removal Contractor Services

The name of the removal contractor, when identified, will be submitted for approval to the USEPA prior to commencement of work, in accordance with paragraph 30 of the AOC. The removal contractor will be a subcontractor to Cranbury and will be responsible for removal of the identified waste streams from

the tanks and associated piping addressed by the AOC, and loading of these wastes into appropriate containers and/or transportation vehicles for shipment to the appropriate TSDF. The removal contractor will also be responsible for cleaning the interiors/exteriors of tanks and piping, containment areas, and floors to the criteria defined by Section 4.6. The removal contractor will provide an on-site supervisor to direct its personnel to accomplish the removal and cleaning tasks. This supervisor will discuss methods and procedures with the Cranbury/BB&L on-site coordinator and the appropriate Cranbury maintenance staff (former Frontier employees) prior to implementation to ensure maximum efficiency and worker safety.

2.1.3 Transportation Contractors

The TSDFs will contract for transportation services with permitted hazardous waste transporters and provide the PRP Group with USDOT and USEPA transporter identification numbers. The PRP Group will request USEPA approval for hazardous waste transporter(s) five days prior to the expected transportation of wastes, in accordance with paragraph 67 of the AOC.

2.1.4 TSDF Services

Selection of the proposed TSDFs to be utilized for disposal has been made by the PRP Group, and approved by the USEPA, as specified in paragraph 37 of the AOC. The PRP Group has contracted (through Cranbury/BB&L) with various USEPA- and CERCLA-approved TSDFs to dispose of the waste materials contained within the tanks. The PRP Group provided waste samples to the TSDFs, who have conducted the analyses required and profiled the waste streams in accordance with the conditions/requirements specified in their WAPs and operating permits, to ensure that they are in compliance and that they can adequately treat and/or dispose of each waste stream at their site.

2.1.5 Cranbury Remediation, Inc.

As stated in Section 1.0, Cranbury, the general contractor retained by the PRP Group to implement the requirements of the AOC, will provide site security and maintenance. Cranbury has retained BB&L to provide engineering and environmental consulting services, as outlined in Section 2.1.1. The Doyle Group

has been retained by Cranbury to provide 24-hour site security. In addition, Cranbury has retained three former Frontier Chemical maintenance employees to perform ongoing site maintenance activities on a temporary basis through the term of the AOC, due to their familiarity with site maintenance operations. These personnel include:

Cranbury Maintenance	Name
Maintenance Leader	Mr. Kevin Gunther
Maintenance Operator	Mr. Gordie Hapeman
Chemical Operator	Mr. Douglas Clark

These three Cranbury employees will also be involved with the on-site removal action activities on an as-needed basis, to ensure worker safety and the efficiency of procedures. Involvement of the Cranbury employees with the removal action will not affect the ongoing maintenance activities at the Site.

2.2 Team Member Responsibilities

This section describes the responsibilities of each member of the Removal Action team.

2.2.1 USEPA

On-Site Coordinator

Responsibilities and duties include:

- Providing USEPA approval of Removal Action Work Plans and documents; and
- Providing oversight during the Removal Action.

2.2.2 PRP Group

Project Coordinator

Responsibilities and duties include:

- Maintaining overall responsibility for the implementation of the AOC; and
- Providing a representative to be present on site or readily available during site work.

2.2.3 Cranbury/BB&L

Corporate Officer

Responsibilities and duties include:

- Providing technical input on an as-needed basis;
- Assisting in regulatory/public meetings and client relations, and providing final review and internal approval of all documents and work products developed; and
- Overseeing financial and contractual matters.

Project Manager

Responsibilities and duties include:

- Providing coordination between site personnel, the USEPA, PRP Group, and TSDFs;
- Managing and coordinating all aspects of the project, as defined in the AOC; and
- Providing QA/QC of documents prepared by BB&L.

On-Site Coordinator

Responsibilities and duties include:

- Managing day-to-day on-site activities;
- Developing, establishing, and maintaining files on relevant site activities;
- Ensuring corrective actions are taken when deficiencies are cited;
- Providing QA/QC of the relevant portions of the RAP;
- Reviewing all field records and logs;
- Instructing personnel working on RAP activities;
- Reviewing the field instrumentation, maintenance, and calibration to meet quality objectives; and
- Maintaining field documentation and logs, making calculations, and transmitting originals to the BB&L Project Manager.

Engineering Services

Responsibilities and duties include:

- Developing, establishing, and maintaining project files;
- Managing the development and preparation of the RAP;
- Reviewing analytical data;
- Ensuring corrective actions are taken when deficiencies are cited;
- Reviewing field records and logs; and
- Preparing project documents and reports.

Health and Safety Supervisor (HSS) Roles and Responsibilities

Responsibilities and duties of the HSS and designated alternate include:

- Maintaining a daily logbook for recording all significant health-and-safety activities and incidents;
- Suspending work due to health-and-safety-related concerns, as necessary;
- Providing on-site technical assistance pertaining to health-and-safety issues;
- Conducting site and personal air monitoring, including equipment maintenance and calibration. Where necessary, submitting samples to an American Industrial Hygiene Association-accredited (AIHA-accredited) laboratory;
- Issuing or obtaining required work permits;
- Conducting periodic health-and-safety audits;
- Ensuring that personnel have received the required training, including instructions for proper use of safety equipment and personal protective equipment;
- Providing regular pre-task health-and-safety briefings;
- Ensuring that personnel have received the required physical examinations and medical certifications;
- Providing routine negative-pressure respirator fit checks;
- Reviewing the adequacy of the HASP;
- Drafting necessary amendments to the HASP for review;
- Ensuring that all authorized personnel are made aware of the provisions of the HASP and have been informed of the nature of any physical and chemical hazards associated with the site activities; and
- Maintaining required documents for recordkeeping purposes.

2.2.4 Removal Contractor

Removal Contractor Supervisor

Responsibilities and duties of the Removal Contractor Supervisor include:

- Directing removal contractor personnel during removal and cleaning activities;
- Communicating progress and difficulties to the BB&L OSS;
- Ensuring that equipment, vehicles, etc. necessary for the completion of the removal action arrive on site in a timely manner; and
- Ensuring that a task-by-task risk analysis for each applicable task has been completed, and health-and-safety oversight is provided on-site.

2.2.5 TSDF

Responsibilities and duties of the TSDFs include:

- Contracting DOT- and USEPA-certified hazardous waste transporters;
- Providing on-site personnel, as necessary, to aid in waste bulking and transport; and
- Designating a project manager who will be the primary point of contact. The designated Project Manager will be responsible for all communications with Cranbury/BB&L and overall performance of analysis, in accordance with the TSDF's operating permit requirements and WAPs.

2.2.6 General Testing Corporation

Responsibilities and duties of GTC include:

- Providing analysis of selected quality assurance samples;
- Performing specified sample analysis and associated laboratory QA/QC procedures;
- Supplying sampling containers;
- Maintaining laboratory custody of samples, in accordance with all QA/QC protocols; and
- Designating a Project Manager. GTC's project manager will be the primary point of contact and will be responsible for all communications with BB&L and overall performance of the analysis, in accordance with the approved SA/SSM and QA/QC Plan.

2.2.7 Site Maintenance

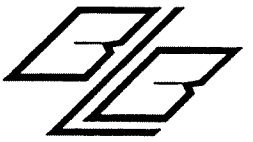
Cranbury will be responsible for maintaining the Site in accordance with Paragraph 34e of the AOC, through the term of the AOC. Maintenance activities are expected to include:

- Visually inspecting all tanks, pumping, sumps, and dikes;
- Inspecting the monitoring station, including: sampling; maintaining 24-, 48-, and 72-hour composite samples; ensuring the ISCO sampler is in working order; obtaining readings from the integrator station; and calibrating the flow meter;
- Inspecting buildings for signs of forced entry, broken or leaking piping, flooding or electrical problems, broken windows, and areas that need repair;
- Charging and rotating battery surge protectors;
- Performing maintenance activities based on the results of inspections;
- Providing routine maintenance of on-site equipment; and
- Providing non-routine maintenance activities, including: repair of tanks; process piping; pumps; electrical equipment; site vehicles; air compressors; heating equipment; and monitoring station (as required).

2.2.8 Site Security

The Doyle Group will be retained to perform 24-hour site security, with responsibilities including:

- Manning the command post located on Royal Avenue during normal working hours;
- Maintaining two-way radio communication between security personnel during normal working hours;
- Performing rounds through the plant every 1/2 hour after normal working hours; and
- Notifying on-call personnel if any problems arise.



3.0 TANK CLEANING AND REMOVAL OF CONTENTS

3.0 Tank Cleaning and Removal of Contents

3.1 Removal of Contents

It is anticipated that the majority of all tank contents at the Site are pumpable and will be removed using either on-site stationary or portable pumps, or by vacuum trucks supplied by the removal contractor. Tank contents that cannot be pumped (e.g., carbon, lime, or fuels blending sludge, which may have hardened over time) will be physically removed. Where deemed appropriate, similar wastes will be bulked and combined, in accordance with Table 2-3 and Section 4.1.2, and transported off site for treatment and/or disposal. This section provides procedures for pumping and vacuuming wastes from the on-site tanks addressed in the AOC, and for the interior cleaning and exterior decontamination of tanks, associated piping, ancillary equipment, floors, collection sumps, and containment areas.

Prior to removal of tank contents, the interior of the tanks will be monitored with a combustible gas indicator to determine if the vapors in the tank are greater than 10 percent of the lower explosive limit. All fuels blending tanks (Figure 1-2) and any tanks that contain vapors that are greater than 10 percent of the lower explosive limit will be considered an explosive hazard, and appropriate safety measures, as defined in Section 8.0, will be implemented.

Tank contents removal will be accomplished by pumping wastes with both stationary and portable pumps available on site, as well as using vacuum trucks provided by the removal contractor. Bulking and off-site transportation/disposal of tank contents are discussed in Section 4.0.

3.1.1 Fuels Blending Tanks

Fuels blending waste tanks at the Site are located in containment areas C-301 and C-302 (Figure 1-2) and include tanks identified as follows: T201, T202, T203, T204, T205, T206, T207, T209, and T210. As a result of our sampling activities and as indicated on Table 1-2, tanks T201, T203, T204, T205, T206, and T209 each exhibit layering with three phases: non-aqueous liquid, aqueous liquid, and sludge. Tanks T202 and T207 contain only aqueous liquid and sludge layers, while Tank T210 contains only a sludge layer. Tank T102, while not located in the fuel farm containment areas, will be treated as a fuels blending tank, based on historical usage and analytical results.

Based upon analytical results generated during the implementation of the SA/SSM Plan, the non-aqueous liquid layers and the sludge layers in each of the tanks have shown adequate energy potential (BTU content) to be treated and disposed of by off-site fuels blending operations (Section 4.1.1.1). The aqueous layers identified will be combined with other similar waste streams removed from the non-aqueous and sludge layers for fuels blending wastes. These segregated aqueous layers are composed mostly of water and will require an alternate treatment/disposal option (Section 4.1.1.6).

3.1.1.1 Liquids

Removal of liquids and solids from the fuels blending tanks will require vapor emissions controls when contents are removed via pumping or vacuuming. Vapor emissions controls could include but are not limited to portable carbon filtration packs in series with the exhaust system of a vacuum truck.

The liquids in the fuels blending tanks generally have a non-aqueous layer and an aqueous layer. The non-aqueous layer has an adequate BTU content for fuels blending, while the aqueous layer does not. Therefore, it will be necessary to draw off these two liquid layers independently. The non-aqueous layer, having a lower specific gravity, resides above the aqueous layer. This being the case, it may be advantageous to draw off the non-aqueous layer first, taking care not to agitate or mix the two layers in the tank. The non-aqueous liquids will be pumped from the fuels blending tanks into a tanker trailer. When a tanker trailer has been filled, it will be manifested, in accordance with Section 4.5, and delivered to the identified and USEPA-approved off-site TSDF (Petro-Chem), or other approved off-site TSDF, as appropriate (Section 4.1.1.1).

Once the non-aqueous layer has been removed, it will be pumped into a tanker truck, bulked with similar aqueous phases, and stored on site until the tanker has been filled. Due to the variability in contaminant concentrations, several different treatment/disposal options exist for the aqueous phases. These alternatives are listed below, in order of preference:

- On-site or off-site wastewater treatment;

- Agitation/mixing with the non-aqueous phase(s) for fuels blending (Section 4.1.1.1);and
- Incineration (Section 4.1.1.4).

In general, selection of the appropriate treatment/disposal option for the aqueous wastes will be handled on a case-by-case basis. Selection of an option will require assurance that any specific requirements (i.e., compliance with TSDF WAP requirements) are met.

3.1.1.2 Sludges/Solids

Once all liquids are removed, a small temporary containment area constructed of concrete blocks and lined with three layers of polyethylene (greater than 10 ml thick), or equivalent will be placed around the manway of each tank. Next, each manway bolt will be removed and replaced with a "T-nut" to hold the manway in place. This will allow quick and complete closure of the manway in the event that waste starts to escape too quickly. The bolts will be loosened separately until the waste starts to flow out around the sides of the manway. The flow of waste can be easily regulated by controlling the tension on the bolts. An airgun and appropriate hand tools will be present near the manway in case the bolts have to be tightened quickly to stop waste seepage.

A vacuum truck with a 6-inch-diameter vacuum hose will be used to remove the waste from the portable containment area around the manway. As this containment area is emptied with the vacuum truck, the bolts of the manway will be loosened to allow more waste to flow into the containment area. When waste flow from the tank ceases due to the level or consistency of the waste, the manway will be completely removed. Next, a removal contractor employee will enter the tank (in the appropriate PPE, as specified in Section 8.0) with a vacuum hose to remove the remainder of the sludges and solids. Vacuuming will continue until all sludges and solids are removed, and solids that are too large to fit in the 6-inch-diameter hose will be broken up with a brass or spark-resistant shovel. Necessary precautions (i.e., grounding or bonding) will be taken by the removal contractor to ensure that a static charge does not build up either on the vacuum truck or hose, as specified in Section 8.0.

3.1.2 Cyanide Waste and Wastewater Tanks

Sixteen tanks have been identified which were related to the cyanide wastewater treatment system. They are R101, R102, R301, R302, T1, T101, T110, T111, T113, T115, T116, T2, T301, T302, T303, and T307. In addition, the contents of a former drum wash basin shall be removed.

3.1.2.1 Liquids

Prior to pumping liquids from tanks, tank contents will be blended/mixed to fully homogenize the wastes, bringing most solids into solution. Next, the contents of these cyanide/cyanate tanks will be pumped into tanker trailer(s) using existing on-site equipment (tank pumps or portable diaphragm pumps) or, if necessary, using off site equipment, such as vacuum tanks. In the event that blending cannot suspend all solids, they will be vacuumed or physically removed subsequent to removal of liquids.

3.1.2.2 Sludges

The sludges and solids in most cyanide waste tanks can be brought into solution and removed along with the liquid phase. In cases where this cannot be accomplished, removal contractor personnel will enter the tank via the manways at the bottom of the tanks and shovel the sludge/solids into drums or (if the quantity warrants) remove the sludge with a vacuum truck. If a tank does not have a manway at the bottom, an access port will be cut into the side of the tank with a reciprocating saw. It is not anticipated that there will be any scaling or lime deposits on the sidewalls of these cyanide waste tanks, as they are all constructed of fiberglass-reinforced plastic (FRP).

Approximately 30 yd^3 of de-watered sludges (filter cake) from the filter press used for cyanide treatment systems will be removed from the site. This waste is currently in 30 one-yd^3, fiber boxes. In addition, approximately 10 yd^3 of filter cake will be removed from the filter press.

3.1.3 Product Tanks

Ten tanks identified on site contain raw product materials (liquid and solids) used in the facility's treatment operations. Tanks that contain raw materials include those containing liquids (T70, T72, T73,

T105, T106, T108, T114, and T119) and solids (S101 and T117).

3.1.3.1 Liquids

Prior to pumping liquids from tanks, tank contents will be blended using existing equipment (i.e., tank mixers or aerators) to fully homogenize the contents bringing most solids into solution. Next, the contents of these tanks will be pumped into tanker trailer(s) using the on-site equipment (tank pumps or portable diaphragm pumps) or, if necessary, using off site equipment, such as vacuum tanks. In the event that blending cannot suspend all solids, they will be vacuumed or physically removed subsequent to removal of liquids. To prevent mixing of incompatible materials (i.e., caustics and acids), each separate product will be removed, bulked, and disposed of separately.

3.1.3.2 Sludges/Solids

Most liquid product tanks do not contain sludge or solids to the extent where they can not be brought into solution and removed along with the liquids phase. In cases where this cannot be accomplished, removal contractor personnel will enter the tank in accordance with the requirements outlined in Section 8.0. Entry will preferably be via the manways at the bottom of the tanks. Sludge/solids will either be shoveled into drums/containers or (if the quantity warrants) removed with a vacuum truck. If a tank does not have a manway at the bottom, an alternative access method will be explored. This may include cutting into the side of the tank with an reciprocating saw or entry from the top of the tank. Figures 3-1 through 3-46 illustrate tank configurations, including manways or access points.

Removal of materials from solid raw product tanks will be accomplished by allowing contents to flow out of the bottom opening and into containers. However, the use of vacuum trucks and/or physical removal may be required, depending upon the workability of the material.

3.1.4 Wastewater Treatment Vessels

The vessels associated with the on-site wastewater treatment operations involve the carbon treatment unit (V-1, V-2, and F-D), which contains spent granular-activated carbon (GAC), and sand/sludge filter unit

(F-A and F-B). Removal of the spent GAC will be dependent upon its condition. Ideally, the GAC can be removed by fluidization of the bed, followed by forced removal by pressurizing the vessel. However, if this procedure is not feasible, physical removal may be required. If tank entry is required, care must be taken to ensure that workers are adequately protected from a potentially oxygen deficient atmosphere (Section 8.0).

Removal of the sand/sludge from the sand filter vessels will require either vacuuming or physical removal.

Care will be taken during the removal of these waste streams to prevent damage to these units because they are potentially site assets.

3.1.5 Acid Waste Tanks

Tanks T103 and T105 contain spent acids from the on-site wastewater treatment process.

3.1.5.1 Liquids

Prior to pumping liquids from tanks, tank contents will be blended using existing equipment to fully homogenize the contents, bringing most solids into solution. Next, the contents of these acid tanks will be pumped into tanker trailer(s) using the on-site equipment (tank pumps or portable diaphragm pumps). The use of other cleaning techniques (e.g., introducing a USEPA-approved degreasing agent) will be evaluated by BB&L engineers on a case-by-case basis once more information is available relative to the condition of piping. To prevent mixing of incompatible materials (i.e., caustics and acids), each separate product will be removed, bulked, and disposed of separately.

3.1.5.2 Sludges/Solids

The sludge or solids in most acid waste tanks can be brought into solution and removed along with the liquids phase. In cases where this cannot be accomplished, removal contractor personnel will enter the tank in appropriate PPE, as specified in Section 8.0, via the manways at the bottom of the tanks, and

will shovel the sludge/solids into drums or (if the quantity warrants) remove the sludge with a vacuum truck. If a tank does not have a manway at the bottom, an access port can be cut into the side of the tank with an reciprocating saw. It is not anticipated that there will be any scaling or lime deposits on the sidewalls of these acid waste tanks, as they are all constructed of FRP.

3.2 Cleaning of Tanks, Piping, and Containment Areas

Upon complete removal of the contents of a tank, the removal contractor will clean the tank interior/exteriors, piping interiors/exteriors, containment areas, and floors addressed by the AOC in accordance with the procedures and clean-up criteria specified in this section. A representative from BB&L and USEPA representatives will be on site throughout the removal action to direct cleaning and decontamination activities, and to visually inspect tanks to ensure they are free of waste, in accordance with Section 3.2.4 and Section 5.0.

3.2.1 Tanks

3.2.1.1 Tank Interiors

The interiors of tanks that contained non-aqueous materials, such as the fuels blending tanks and T112, will be cleaned using high-pressure, low-volume steam and/or water, in accordance with health-and-safety guidelines specified in Section 8.0. If instances arise where high-pressure steam and/or water are not adequate to clean waste from tank surfaces, a USEPA-approved degreasing agent will be utilized to assist in the cleaning process. It is anticipated that removal contractor employees will need to enter the tanks and work on tank staging/scaffolding to effectively clean the tanker.

The interior of a tank will be cleaned until it is visually free of waste, in accordance with Section 3.2.4 and Section 5.0. Wastewaters will be pumped into appropriate storage containers, sampled, and analyzed for appropriate treatment/disposal.

Tanks that contained non-aqueous materials will also be cleaned by high- and/or low-pressure water rinses. Tanks will be thoroughly sprayed from the manway at the top, and these cleaning waters will

be removed before personnel enter the tanks. Tanks will be entered by removal contractor personnel, as necessary, to hydroblast or physically remove any waste from tank surfaces. All tanks that contained aqueous materials will be triple-rinsed to ensure complete cleaning. Tank entry and cutting of tanks will be performed only when necessary, in accordance with the guidelines specified in Section 8.0. Appropriate precautions will be taken and levels of PPE will be worn by the removal contractor when cleaning all tanks, particularly tanks that contained acids or caustics, as specified in Section 8.0.

3.2.1.2 Tank Exteriors

A visual inspection of tank exteriors conducted during the implementation of the SA/SSM Plan revealed that tank exteriors are generally free of waste residues and do not require decontamination. However, it is anticipated that tank exteriors may become contaminated during waste removal. Therefore, it may be necessary to decontaminate tank exteriors using high-pressure water and/or steam. Tank exteriors will be inspected by a BB&L representative upon completion of any necessary cleaning, in accordance with Section 3.2.4 and Section 5.0 of this RAP. The USEPA will also have the opportunity to inspect the tank exteriors at this time.

3.2.2 Piping

All piping and ancillary equipment (i.e., pumps, process equipment, etc.) associated with the tank systems, designated in the AOC, will be flushed with a volume of water equal to or exceeding three times the volume of the piping. The use of other cleaning techniques (e.g., introducing a USEPA-approved degreasing agent) will be evaluated by BB&L engineers on a case-by-case basis once more information is available relative to the condition of piping. In instances where piping contains waste that cannot be removed by cleaning, it will be removed and disposed of by macroencapsulation (Section 4.1.1.6). Piping will be inspected by a BB&L representative upon completion of cleaning, in accordance with Section 3.2.4 and Section 5.0 of this RAP. The USEPA will also have the opportunity to inspect the tank exteriors at this time.

Following removal of the filter cake from the filter press, the filter cloths will be cut and disposed of with

the filter cake. The interior mechanisms of the filter press which may have contacted wastes will be cleaned using high-pressure/low-volume water or steam.

3.2.3 Secondary Containment Areas And Floors

All tank secondary containment areas, and certain building floors and sump areas addressed in the AOC will be cleaned with high-pressure water upon completion of all other cleaning activities. In the event that this method proves to be ineffective, a USEPA-approved solvent will be utilized to remove any residuals. Secondary containment areas and floors will be inspected by BB&L representative upon completion of cleaning, in accordance with Section 3.2.4 and Section 5.0 of this RAP. The USEPA will also have the opportunity to inspect the containment areas and floors at this time. After a secondary containment area has been deemed "clean," the removal contractor will breach the containment walls to prevent the collection of stormwater. Once all tanks, piping, ancillary equipment, floors, and secondary containment areas have been deemed "clean", and the containment walls have been breached, the Wastewater Discharge Permit with the City of Niagara Falls POTW (Permit No. 43) will be terminated, and site maintenance and security will be discontinued, including all utilities (i.e., gas, electric, etc.).

3.2.4 Clean-Up Standards

Tanks, associated piping, and secondary containment areas must be visually clean (no evidence of waste or residuals), and all aqueous waste tanks and piping will be triple-rinsed with water. A BB&L representative will inspect all tanks, piping, and secondary containment areas/floors upon completion of the specified cleaning procedures, and document that they are visually free of waste. The USEPA will also have the opportunity to inspect these items at this time.

The BB&L representative will also monitor the tank interior with a combustible gas indicator to ensure that the atmosphere inside the tank is not above 10 percent of the lower explosive limit. The results of this inspection will be recorded on the inspection log detailed in Section 5.0.

3.2.5 Decontamination Plan

3.2.5.1 Work Zones

To minimize the possibility of exposing unprotected personnel and to prevent the movement of contaminants, several measures have been and will be taken, including:

- The setting up of security and/or of physical barriers to exclude unauthorized personnel from the Site;
- Minimizing the number of personnel and equipment on site, consistent with effective operations;
- Establishing work zones within the Site;
- Establishing control points to regulate access to work zones;
- Conducting operations in a manner that reduces the potential for personnel and equipment to be exposed to hazardous materials;
- Minimizing the airborne dispersion of contaminants; and
- Implementing appropriate decontamination procedures.

3.2.5.2 Field Operations Work Areas

Once the removal action activities have commenced, work areas (zones) will be established and marked based on anticipated levels of contamination. Within these zones, proscribed operations will occur utilizing appropriate personal protective equipment (PPE). Movement between areas will be controlled at checkpoints. The planned zones are discussed below.

Exclusion Zones

The Exclusion Zone is the innermost area of three concentric rings and is considered contaminated, or "hot." An entry checkpoint will be established at the periphery of the Exclusion Zone to control the flow of personnel and equipment between zones, and to ascertain that the procedures established to enter and exit the zones are followed. Subsequent to initial entry, and as excavation and backfilling proceeds, the boundary will be re-adjusted based on field observations and/or measurements. The boundary will by physically secured and posted. Exclusion Zones are discussed in greater detail in Section 8.0.

Contamination Reduction Zone

Outside the Exclusion Zone lies the Contamination Reduction Zone (CRZ). The purpose of the CRZ is to provide an area to prevent or reduce the transfer of contaminants that may have been picked up by personnel or equipment working in the Exclusion Zone. All personnel and equipment decontamination will occur in the Contamination Reduction Zone.

The boundary between the Support Zone and the Contamination Reduction Zone is the "contamination control line." This boundary separates the potentially contaminated area from the clean zone. Entry into the CRZ from the Exclusion Zone will be through an access control point.

Personnel entering this station will be wearing the prescribed PPE for activities in the CRZ. Exiting the Contamination Reduction Zone to the Support Zone mandates the removal of any suspected, or known, contaminated PPE, and compliance with all decontamination procedures. At the boundary between the CRZ and the Exclusion Zone is the "hot line" and access control station. Entrance into the Exclusion Zone requires the wearing of the proscribed PPE.

Support Zone

The Support Zone is the outermost of the three rings and is considered a non-contaminated, or "clean" area. It contains the command post and/or field headquarters trailer for field operations and other elements necessary to support Site activities. Normal street work clothes are the appropriate apparel within this zone. The Support Area will also contain parking facilities and a materials receiving area.

3.2.6 Decontamination Procedures

To prevent or reduce the physical transfer of contaminants by personnel and/or equipment from on site, procedures will be instituted for decontaminating all personnel and field equipment leaving the Exclusion Zone and CRZ. These procedures include the decontamination of personnel, protective equipment, monitoring equipment, clean-up equipment, etc. Everything leaving the Exclusion Zone should be considered contaminated, and therefore, will be decontaminated.

In general, decontamination at the Site consists of rinsing equipment, personnel, etc., with a solvent/detergent/water solution. The spent solution, contaminated clothing, brushes, sponges, containers, stands, etc., used in the decontamination process will be considered contaminated and must be properly disposed of. Disposal will involve placing all contaminated articles in Department of Transportation (DOT)-specified drums or other containers and affixing proper labels for disposal, as required.

3.2.6.1 Personal Decontamination

At the end of a shift and whenever leaving the Exclusion Zone, all personnel will be required to remove their PPE and discard the disposable garments. Equipment will be pressure-washed and remain in the CRZ. All wash water generated from this process will be containerized for proper handling and disposal. At the end of the shift, all personnel will shower and change into clean clothes before leaving the Site. BB&L is currently evaluating the use of either the existing on-site shower facilities and/or the use of temporary trailer facilities. Personal decontamination is discussed in greater detail in Section 8.0.

3.2.6.2 Equipment Decontamination

All vehicles and equipment will be inspected prior to leaving the Site, to ensure it has not contacted contaminated materials. Any equipment or vehicles that show visible signs of contamination originating from the Site, will be decontaminated using high-pressure steam and/or water prior to leaving the Site. To minimize the potential for the spread of contamination at the Site, equipment decontamination will be conducted as close as possible to the work location. At the Site, there are several existing vehicle unloading areas/containment pads, which will serve as equipment decontamination pads. These areas have a base constructed of high density concrete, are bermed on three sides, and slope to a collection sump, which is not connected to any sanitary or storm sewers. Water is available at each of these pads. The decontamination pads are adequate to accommodate heavy truck traffic and provide sufficient surface area for decontaminating the large equipment. The following loading/unloading areas have been identified as potential decontamination pads (Figure 4-3):

- C-102
- C-111
- C-113
- C-204
- C-205
- C-206
- C-303

The number of pads to be used over the course of the work will be minimized. All Site vehicles and equipment shall be pressure-washed with a high-pressure, low-volume water/steam cleaner. After decontamination, all vehicles will be inspected before they leave the Site. Following completion of equipment decontamination activities on the site, high-pressure/low-volume water/steam cleaning will be used to decontaminate the surfaces for any pad utilized in the project. Each decontamination pad will be inspected for residual contamination resulting from decontamination activities, such as staining, discoloration, visible sheen, etc.

Most small equipment used in this work will be disposable; however, when disposable equipment cannot be used, the equipment will be decontaminated when it leaves the Exclusion Zone. The following decontamination procedures are recommended:

- Removing gross contamination;
- Washing in a detergent solution;
- Rinsing with tap water; and
- Allowing to air dry.

Wastewaters generated from decontamination activities will be stored in the existing 100,000-gallon wastewater storage tanks. These wastewaters will be pretreated, if necessary, and eventually discharged to the POTW, in accordance with Section 4.4.

4.0 WASTE TRANSPORTATION, TREATMENT, AND DISPOSAL

4.0 Waste Transportation, Treatment, and Disposal

Both hazardous and non-hazardous solid and liquid wastes will be generated by several activities associated with this project. Wastes that will be generated as part of this removal include tank contents; possible tanks and some ancillary equipment and piping; decontamination wastewater; and contaminated PPE. All waste generated at the Site will be transported to approved off-site treatment, storage, or disposal facilities (TSDFs) for proper treatment and/or disposal, based upon its waste characterization. These wastes will be properly managed to minimize environmental impacts and to comply with all applicable regulations. All TSDFs that will receive wastes associated with this removal action have been tentatively identified and presented to the USEPA; the specific TSDFs that will tentatively receive each waste stream have been listed in Table 3-1.

All uncontaminated debris and waste generated during "clean" operations will be recycled or disposed of in an approved manner at a permitted industrial waste landfill. All identified disposal/recycling facilities will be identified to the USEPA prior to shipment of wastes from the Site.

Raw materials currently stored on site include those used in the former wastewater treatment process. These identified materials are tentatively being investigated for reuse or recovery in lieu of off-site treatment or disposal.

4.1 Tank Contents

The characterization of tank contents has been completed, based upon the analysis of representative samples collected from each tank under the SA/SSM Plan. All solid and hazardous waste tank contents will be removed as described in Section 3.0. Similar tank contents will be confirmed and sent to a USEPA/CERCLA-approved TSDF for ultimate treatment/disposal. Based upon the results of the characterization of the tank contents, various TSDF facilities have been tentatively identified for the treatment/disposal of the tank contents. The following treatment/disposal options have been selected:

- Fuels blending;
- Recovery as raw product;

- Cyanide-bearing wastes treatment;
- Incineration;
- Secure-landfilling;
- Wastewater treatment; and
- Macroencapsulation/microencapsulation.

4.1.1 Treatment/Disposal Options

4.1.1.1 Fuels Blending

The fuels blending option has been selected for high-BTU (greater than 5,000 BTU/#), non-aqueous-phase tank contents from the former fuels blending operations. Recovery of these wastes as fuel offers a more cost-effective treatment option than incineration. The Petro-Chem Processing Group of Nortru Inc., located in Detroit, Michigan (EPA ID# MID 980 615 298), has been identified as the potential TSDF to blend and recover these tank contents for recycling or reclamation as supplemental fuels (SF) in industrial furnaces (primarily cement kilns). The Petro-Chem facility is capable of producing SF from both liquid and solid hazardous wastes. In addition, spent GAC removed from Tanks V-1 and V-2 may be sent to the Petro-Chem facility for treatment if regeneration of the carbon is not feasible and the carbon BTU content is sufficient. Table 3-1 depicts the waste streams tentatively identified for treatment/disposal at Petro-Chem.

4.1.1.2 Recovery

Several of the tanks at the site contain (uncontaminated) raw materials used in the former wastewater treatment process. Many of the raw product tanks (sodium hypochlorite, hydrochloric acid, magnesium hydroxide, etc.) at the Site have been identified as having the potential for reuse or recycling. These waste streams will be sent to appropriate facilities (e.g., CECOS International, Inc.) or to CyanoKEM for this purpose, if deemed acceptable.

4.1.1.3 Cyanide-Bearing Wastes

Wastes removed from tanks used for the former cyanide treatment system will be removed from the

tanks and sent for off-site treatment and disposal. CyanoKEM, located in Detroit, Michigan (EPA ID# MID098011992), has been identified as the potential TSDF to treat these wastes. Table 3-1 depicts the waste streams tentatively identified for treatment/disposal at CyanoKEM.

4.1.1.4 Incineration

Solid wastes that cannot otherwise be recovered, treated or disposed of properly will be sent off site for incineration. Material removed from the sand filters (Tanks F-A and F-B) will require off-site incineration. Wastes that may require incineration include bottom sludges, aqueous phases, and spent GAC that cannot otherwise be treated at one of the TSDFs. LWD, Inc., located in Calvert City, Kentucky (EPA ID# KYD 088438817), has been tentatively identified as the most probable off-site incineration facility. Table 3-1 depicts the waste streams tentatively identified for treatment/disposal at LWD, Inc.

4.1.1.5 Aqueous Phase Treatment

The aqueous phases of tank contents will be sent off-site for treatment. CECOS International, Inc., located in Niagara Falls, New York (EPA ID# NYD080336241), has been identified as the potential treatment facility for these wastewaters. Effluent from the CECOS wastewater treatment system is discharged into the City of Niagara Falls Publicly Owned Treatment Works (POTW) under a Wastewater Discharge Permit. The contents of Tank No. 101 (low TOC waste) may also be sent to the CECOS facility for treatment, pending acceptance by CECOS. Other aqueous phases that may be sent to the CECOS facility include tank/piping rinse waters and decontamination waters that cannot be discharged to the Niagara Falls POTW. Table 3-1 depicts the waste streams tentatively identified for treatment/disposal at CECOS.

4.1.1.6 Secure-Landfilling

Approximately 40 yd^3 of cyanide-bearing, dewatered solids generated from the filter press will be containerized for shipment to an approved off-site landfill. The Chemical Waste Management (CWM) - Model City Landfill has been identified as the potential TSDF for these wastes. Approximately 30 yd^3

of these wastes are currently containerized in one-yd^3 boxes, with an estimated 5 to 10 yd^3 remaining within the filter press. It is anticipated that all of these wastes will be bulked together in roll-off containers prior to shipment to the off-site TSDF. Table 3-1 depicts the waste streams tentatively identified for treatment/disposal at the CWM-Model City site.

4.1.1.7 Carbon Recovery

The most probable and economically sound treatment option for the spent GAC in Tanks V-1 and V-2 is off site regeneration of the spent carbon at Calgon Carbon Corporation, located in Pittsburgh, PA. However, if it is determined that the GAC wastes cannot be regenerated, these wastes will be incinerated off-site, as specified in Section 4.1.1.4, or sent to the Petro-Chem facility (Section 4.1.1.1) for recovery as fuel.

4.1.2 Bulking of Tank Contents

4.1.2.1 Liquid Phases

Tank contents will be bulked together based upon the intended treatment/disposal option. Liquid phases will most probably be removed using a vacuum truck. Following the removal of a phase from a tank, the tank contents will be discharged from the vacuum truck into a tanker truck. The tanker truck will serve as the bulking vessel for similar tank waste combined for the designated TSDF. Before tank contents are removed and bulked, the disposition of the contents will be verified by the On-Site Coordinator.

4.1.2.2 Sludge Bottoms/Scale

Similar materials slated for treatment/disposal at the same TSDF will be bulked together. Sludge bottoms will be removed both manually and via vacuum truck. Sludge removed manually will be drummed at the tank location. Sludge removed via vacuum truck will be discharged into 55-gallon drums at the former drum staging area, C-205 (Figure 5-3). Solids generated from tank/piping cleaning (scale) will be combined together following the same protocol as the sludge bottoms.

4.2 Tanks, Piping, and Ancillary Equipment

Tanks, piping, and ancillary equipment that cannot be decontaminated will be dismantled and transported/disposed of at an off-site secure landfill. The CWM - Model City Secure Landfill has been identified as the potential TSDF facility to accept these materials. Disposal of the contaminated metals will require macroencapsulation, which will be performed at the CWM facility.

4.3 Personal Protective Equipment/Other Wastes

Disposable PPE will be discarded and containerized during personnel decontamination. The PPE will be placed into sealable, lined, labeled, 55-gallon drums. At the end of each work day, the waste PPE drums will be capped, sealed, and/or emptied into a bulk container for future disposal. All PPE to be disposed of will be sealed in plastic bags prior to its aggregation and will be profiled prior to disposal off site.

Expendable construction materials may include items such as polyethylene plastic, equipment, hand tools, and other disposable materials. Any contractor materials that come into contact with contaminated materials that are not decontaminated will be stored in drums or other containers. These wastes will be staged in a designated area on the Site until decontaminated.

All staged wastes will be protected from accidental vehicle contact in a designated and labeled area. The wastes will be protected from the elements, high wind, rain, sleet, etc., and all precipitation that may contact the wastes will be collected and containerized. Minimal quantities of these wastes will be stored/staged on site to limit the possibilities for implementation of emergency/contingency plans to react to a release.

4.4 Decontamination Waters

The decontamination waters generated from these activities will be collected and stored in the existing 100,000-gallon wastewater storage tanks. These wastewaters will be pretreated through a portable carbon scrubber, if necessary, and eventually discharged to the POTW. The PRP Group has secured from the City of Niagara Falls, a wastewater discharge permit (#43) for this Site.

4.5 Non-Hazardous and Hazardous Waste Transportation

All waste will be shipped by a licensed hauler, in accordance with the DOT guidelines as stated in 49 CFR, Parts 171 through 179, 6NYCRR Part 364, and any other applicable state and local regulations.

Waste Transportation Preparation

Each shipment of waste generated during remediation, whether liquid or solid, must be properly characterized, containerized, loaded, and manifested prior to exiting the Site. In addition, a copy of all applicable permits will be obtained prior to the shipment of these wastes off site. Each transport vehicle will be decontaminated after loading is complete prior to leaving the Site. These activities are discussed in detail in the following sections.

Hazardous Waste Manifest/Bill of Lading

A hazardous waste manifest will be prepared and completed for each shipment of hazardous waste before to that shipment exits the Site. The hazardous waste manifest will be accompanied by additional information that will:

- Communicate all of the information that handlers of the waste will need to know to do their job safely and lawfully;
- Declare that the generator has prepared the waste before asking the transporter to haul the waste; and
- Serve as an important source of information for emergency response personnel who would respond to an incident or spill involving the hazardous waste.

The transporter will sign the form and record the date the shipment was received and accepted. It is the responsibility of the transporter to:

- Accept the hazardous waste only when the manifest has been fully and correctly completed by the generator;
- Have the manifest in possession when transporting the hazardous waste;
- Comply with the rules and regulations concerning hazardous waste;

- Transfer a copy of the manifest to the TSDF; and
- Possess a copy of a related applicable waste transporter's permit.

Waste Transport Vehicles

The transport vehicle utilized will be designed for hauling the appropriate types of waste. The vehicle will not be used beyond its design capabilities or in such a manner that spillage of wastes onto roadways or highways might occur. All roll-off containers that will transport bulk solid wastes will be lined with a 4- to 6-mil plastic liner.

Decontamination

Before the transport vehicle exits the Site, the sides, undercarriage, and wheels will be pressure steam-washed on the equipment decontamination pad and will be visually inspected to ensure the effectiveness of the wash.

Transportation Route

After exiting the Site, the licensed waste transporter will be weighed at an approved truck scale, prior to departure to its final destination. The scale facility at Juniors (Niagara Falls Boulevard), has been tentatively identified for weighing outgoing loads. The vehicle will also be weighed at the approved TSDF prior to disposal. These two weights will be provided to the USEPA in the weekly report, and any significant discrepancy (greater than 10 percent) will be immediately reported. It is anticipated that all waste loads will be manifested based on volume estimated as they depart from the project Site.

5.0 QUALITY ASSURANCE/ QUALITY CONTROL (QA/QC) PLAN

5.0 Quality Assurance/Quality Control Plan

5.1 Introduction

The Quality Assurance/Quality Control (QA/QC) Plan presents the procedures to be used during implementation of the RAP to ensure the quality and integrity of the implementation of the field procedures. This QA/QC Plan was prepared in a manner consistent with the following documents:

- "National Enforcement Investigations Center Policies and Procedures Manual," revised November 1984;
- "National Enforcement Investigations Center Manual for the Evidence Audit," September 1981;
- "Guidelines for Preparation of Combined "Work/Quality Assurance Project Plans for Environmental Monitoring," USEPA Office of Water Regulations and Standards, May 1984; and
- "Test Methods for Evaluating Solid Waste (SW-846)," USEPA (1990).

5.2 Quality Assurance Objectives

The overall quality assurance objectives for this RAP are to develop and implement procedures for removal and bulking of tank contents; cleaning of tanks, ancillary equipment, floors and sumps; personnel and equipment decontamination; verification and tracking of transport and disposition of wastes; internal quality control; audits; preventive maintenance; and corrective action. Because no verification of analytical data is anticipated to be collected during this removal action, the quality assurance objectives do not include those associated with sampling and analysis of any waste materials or tank contents. QA/QC protocols and procedures for the characterization of tank contents and related wastes generated during this work were presented in Section 4.0 of the SA/SSM Plan for this Site. The clean-up criteria for the various tanks and their system components are presented in Section 3.0 of this RAP.

5.3 Field Procedures

Procedures for the removal of tank contents and tank/ancillary equipment cleaning are detailed in Section 3.0. Decontamination procedures are outlined in the HASP. To ensure that the tanks are cleaned and all wastes are disposed of in accordance with applicable regulations, proper QA/QC for all field procedures to

be implemented will be followed. Detailed QA/QC procedures associated with the removal action include the following:

- Removal and bulking of tank contents;
- Transporting of wastes;
- Proper decontamination of tank interiors and ancillary equipment;
- Personnel and equipment decontamination; and
- Visual inspections/observations.

The following documentation will be collected as part of the implementation of the RAP.

Field Notebooks

The field notebook serves as a daily record of events, observations, and measurements taken during field activities. Information pertinent to field activities will be recorded in the notebooks. The notebooks are bound, and the pages sequentially numbered.

Tank Inspection Forms

The tank inspection forms serve as verification that cleaning of the tanks was completed as outlined in this RAP. Any changes to field procedures will be included in these forms. Figure 5-1 presents an example of a Tank Inspection Form.

5.3.1 Removal and Bulking of Tank Contents

The BB&L On-Site Supervisor (OSS) will ensure that the required performance standard for the tank contents are removed in accordance with the procedures outlined in Section 3.0. Each tank will have associated with it a Tank Inspection Sheet, to be completed by the OSS; an example of the Tank Inspection Sheet is presented in Figure 4-1. The information to be recorded includes the type and estimated volume of material removed (non-aqueous-phase, sludge, etc.), the date and time of removal, method of removal, and the drum(s) and/or transport vessel into which the material was discharged.

5.3.2 Transport of Wastes

Following bulking of tank contents, waste manifests will be prepared in accordance with the requirements outlined in Section 4.5. Completion of the proper manifesting will be the responsibility of the BB&L OSS before the shipment leaves the Site. Copies of manifests will be provided to the USEPA in the weekly report.

5.3.3 Tank and Ancillary Equipment Decontamination

The BB&L OSS will be responsible for ensuring that tank and ancillary equipment cleaning procedures were followed. It is anticipated that the actual method of cleaning may often be modified on site; any alterations to the proposed procedures will be noted and approved by the BB&L OSS and the USEPA OSC. The date(s) and associated procedures for tank cleaning will be recorded in the applicable Tank Inspection Form, along with any changes in the procedures.

Verification that the tank and ancillary equipment were properly cleaned will be the responsibility of the BB&L OSS. If possible, the tank interior will be visually inspected for cleanliness and overall condition. Items to be noted include the presence of heavy staining or discolorations, sludge, scale, and corrosion. Following the inspection, the applicable tank inspection form (Figure 5-1) will be completed.

Verification of decontamination of the ancillary equipment will be conducted by the BB&L OSS. Any piping/ancillary equipment that cannot be decontaminated will be dismantled and placed in the appropriate storage containers for off-site disposal.

5.4 Performance and Systems Audits

Performance Audits

BB&L's OSS will monitor field performance to ensure that field procedures and performance standards are implemented in accordance with the RAP and established protocols. The BB&L OSS will review all field reports and communicate concerns to the BB&L Project Manager, as appropriate.

Internal Audits

A field internal systems audit is an evaluation of all components of field QA/QC. The systems audit compares scheduled QA/QC activities from this document with actual QA/QC activities completed. BB&L's OSS will periodically confirm that work is being performed using methods consistent with the QA/QC Plan, as well as the RAP and HASP.

External Audits

The USEPA representatives may conduct audits of field operations if determined necessary.

5.5 Corrective Action

Corrective actions are required when field procedures are not within the objectives specified in this QA/QC Plan or RAP. Corrective actions include procedures to promptly investigate, document, evaluate, and correct field procedures.

Project personnel will continuously monitor ongoing work performance in the normal course of daily responsibilities. When implementing the RAP, if a condition is noted that would have an adverse effect on the project, corrective action will be taken to prevent repetition of this condition. The conditions, cause, and corrective action implemented will be documented in the field notebook and reported to the BB&L OSS.

6.0 SITE SECURITY AND MAINTENANCE PLAN

6.0 Site Security and Maintenance Plan

6.1 Site Security and Maintenance Plan

The implementation of the RAP will be conducted under strict site control and security to prevent unauthorized personnel from entering the Site throughout the term of the project, in accordance with Paragraph 34 of the AOC. Access to the Site will be limited by the perimeter fencing surrounding the Site. Site security will be provided 24 hours per day throughout the duration of the project.

Site security will consist of a minimum of one watchman per shift, 24 hours per day, seven days per week, throughout the duration of the project. Security will be evaluated periodically to ensure adequate security coverage is being provided on the Site. If necessary, additional security staffing will be provided.

The Site security agency will be responsible for the control of all persons and vehicles entering and leaving the Site. Security personnel will:

- Require proper identification by each person;
- Require personnel to sign in upon entering the Site and sign out when leaving;
- Maintain a log of all vehicles and equipment entering and leaving the Site;
- Not allow visitors without the approval of the PRP Group or its representatives. Approved visitors will not be permitted to enter the Exclusion Zone or the CRZ without proper health and safety training documentation; and
- Maintain a log of all visitors.

The main entrance gate will be controlled and locked at all times when there is no Site activity except for the passage of authorized personnel and vehicles. A Site log will be maintained for detailing all security incidents. The on-site security staff will also be in radio communication with each other, as well as the USEPA OSC, BB&L's OSS, and any other on-site contractors. If any emergency situation occurs, the security agency, the PRP Group, BB&L, the USEPA, and/or any other on-site contractors will contact law enforcement officials, emergency medical care units, local fire departments, and utility emergency teams to ascertain the type of response required and to coordinate the responses of the various units. A list of

emergency numbers will be posted at the Site.

6.2 Site Maintenance Plan

Routine maintenance of the Site will be performed throughout the project, as required by paragraph 34 of the AOC. Scheduled maintenance and maintenance in response to particular events, as described in this section, will be performed.

6.2.1 Routine Maintenance

Each morning, a walkover of the Site will be performed to visually inspect particular areas of the Site. During daily rounds, the following areas will be checked:

Tank Farms - All tanks, piping, sumps, and dikes will be visually inspected for evidence of leaks, cracks or other issues that may cause future hazards to human health and the environment. If deteriorations are identified, provisions for repair will be implemented within 24 hours.

Fencing - Since security personnel cannot maintain visual awareness of all portions of the Site, the Site perimeter fence will be inspected every morning. The fence will be inspected for damage to the fence fabric and barbed wire. If damage to the fence is observed, provisions will be made to prevent site access until the fence can be repaired. Provisions for repair of the fence will be made within 48 hours of discovery.

Buildings - During the site walkover, security personnel will visually inspect all Site buildings for signs of forced entry, broken windows, broken or leaking piping, electrical problems, flooding, or any other visually identifiable anomalies. If damage is identified, the area will be marked with caution tape, and provisions for repair will be made within 48 hours.

Monitoring Station - The conditions specified in the City of Niagara Falls POTW discharge permit (#43) will be strictly followed, including all the required sampling, flow monitoring, and reporting. The

station will be inspected daily to determine if instruments are functioning properly. If malfunctions are identified, provisions for repair will be implemented prior to the following sampling event.

Additional routine maintenance will be performed on all site equipment (e.g. pumps, site vehicles, etc.), to keep the equipment in proper working condition. All maintenance will be performed in accordance with the manufacturers' specifications.

6.2.2 Non-Routine Maintenance

Based upon the results of the daily site walkover, non-routine maintenance will be performed at the Site. Any area that is not functioning or shows signs of deterioration, flooding, malfunction, or vandalism will be repaired. Non-routine maintenance may include but not be limited to the following:

- Pumping of sumps and dikes (if rain water has accumulated), treatment as necessary, and discharge to the POTW;
- Repair of tanks and process piping (by either patching or replacing affected areas);
- Repair of air-operated pumps;
- Repair of electrical equipment;
- Repair of site vehicles (forklifts, load-all, truck, and trailer);
- Repair of air compressors;
- Repair of heating equipment; and
- Repair of the ISCO sampler and other elements of the monitoring station.

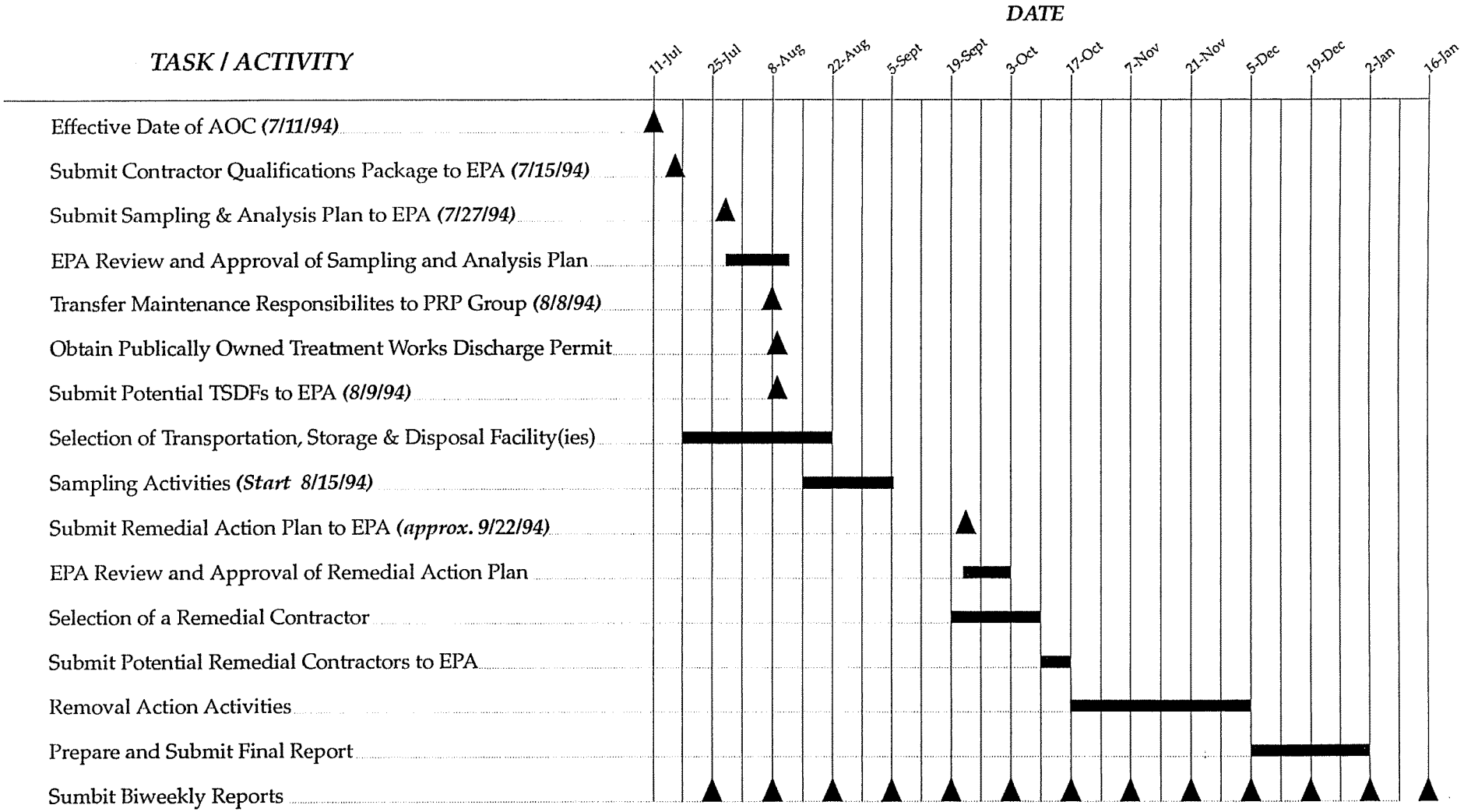
Maintenance personnel will make any necessary repairs in a timely manner, based upon the nature and relative urgency of the specific conditions.

6.3 *Termination of Activities*

Upon completion of the Removal Action, and after the containment areas have been breached, the site security and maintenance will be discontinued.

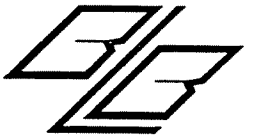
7.0 SCHEDULE

PHASE II REMOVAL ACTION
FRONTIER CHEMICAL-ROYAL AVENUE SITE
NIAGARA FALLS, NEW YORK
PROPOSED PROJECT SCHEDULE



7/94 DJC/ROCH
CDR118.CDR Rev. 6

BLASLAND, BOUCK & LEE, INC.
ENGINEERS & SCIENTISTS



TABLES

TABLE 1-1

FRONTIER CEMICAL SITE
Niagara Falls, New York

TANK SPECIFICATIONS AND CONTENT DESCRIPTIONS

TANK ID	TANK TYPE	TANK CAPACITY GALLONS	LIQUID VOLUME IN TANK/GALLONS	SOLIDS VOLUME IN TANK/GALLONS	TOTAL VOLUME IN TANK/GALLONS	TANK CONTENT DESCRIPTION	PLANT PROCESS
T-70	STEEL	10000	3600	0	3600	CAUSTIC LIQUIDS	RAW PRODUCT
T-72	STEEL	10000	50	800	850	SODIUM BISULFATE	RAW PRODUCT
T-73	STEEL	10000	50	900	950	SODIUM BISULFATE	RAW PRODUCT
T113	FRP	5083	0	0	0	EFFLUENT FROM DEWATERING (VOLUME VARIES)	WWTT ONSITE
T116	FRP	1570	0	0	0	SURGE TANK FROM GAC TO T-1 & T-2 (VOLUME VARIES)	WWTT ONSITE
BOXES	FIBER	30	0	30	30	FILTER CAKE	FILTER PRESS
F-A	STEEL	0	0	940	940	SAND FILTER TREATMENT	WWTT ONSITE
F-B	STEEL	0	0	940	940	SAND FILTER TREATMENT	WWTT ONSITE
F-D	FRP	0	0	250	250	PORTABLE SAND FILTER (GAC)	WWTT ONSITE
R101	FRP	13800	13445	355	13800	NEUTRALIZED CYANIDE WASTES	WASTEWATER
R102	FRP	13750	10535	1465	12000	NEUTRALIZED CYANIDE WASTES	WASTEWATER
R301	FRP	5943	5000	0	5000	CYANIDE WASTES	CN/S OXIDATION
R302	FRP	5943	5500	155	5655	CYANIDE WASTES	CN/S OXIDATION
S101	STEEL	12200	0	6000	6000	DRY LIME	RAW PRODUCT
T-1	STEEL	105200	0	2645	2645	POST GAC AQUEOUS	WWTT ONSITE
T-2	STEEL	102950	0	2645	2645	POST GAC AQUEOUS	WWTT ONSITE
T101	STEEL	51700	31530	6070	37600	LOW TOC FOR ON-SITE TREATMENT	WWTT ONSITE
T102	STEEL	51700	31325	8625	39950	HIGH TOC FOR OFF-SITE TREATMENT	FUELS BLENDING
T103	FRP	20300	16710	210	16920	ACID WASTES-NEUTRALIZED	WASTEWATER
T105	POLY	3354	1900	0	1900	INORGANIC ACIDS	WASTEWATER
T106	STEEL	5860	4085	195	4280	SODIUM BISULFITE	RAW PRODUCT
T108	STEEL	6290	2620	1835	4455	LIME SLURRY	RAW PRODUCT
T110	STEEL	17032	10010	4795	14805	NEUTRALIZED FILTER FEED	WASTEWATER
T111	STEEL	17032	15230	0	15230	NEUTRALIZED FILTER FEED	WASTEWATER
T112	STEEL	12267	140	1695	1835	NON-HAZ LIQUID	WWTT ONSITE
T114	FRP	4888	2975	30	3005	HYDROCHLORIC ACID	RAW PRODUCT
T115	FRP	7460	3295	835	4130	OFF SPEC FILTER CAKE	WASTEWATER
T117	POLY	201	0	20	20	MAGNESIUM HYDROXIDE OR LIME SLURRY	RAW PRODUCT
T119	STEEL	5480	625	0	625	MAGNESIUM HYDROXIDE OR LIME SLURRY	RAW PRODUCT
T201	STEEL	18190	11000	5500	16500	SOLVENT HALOGENATED/NON-HALOGENATED, OIL MIXTURE, OR HIGH TOC	FUELS BLENDING
T202	STEEL	18190	11000	2115	13115	SOLVENT HALOGENATED/NON-HALOGENATED, OIL MIXTURE, OR HIGH TOC	FUELS BLENDING

FRONTIER CEMICAL SITE
Niagara Falls, New York

TANK SPECIFICATIONS AND CONTENT DESCRIPTIONS

TANK ID	TANK TYPE	TANK CAPACITY GALLONS	LIQUID VOLUME IN TANK/GALLONS	SOLIDS VOLUME IN TANK/GALLONS	TOTAL VOLUME IN TANK/GALLONS	TANK CONTENT DESCRIPTION	PLANT PROCESS
T203	STEEL	18190	8460	8035	16495	SOLVENT HALOGENATED/NON-HALOGENATED, OIL MIXTURE, OR HIGH TOC	FUELS BLENDING
T204	STEEL	18190	4440	1480	5920	SOLVENT HALOGENATED/NON-HALOGENATED, OIL MIXTURE, OR HIGH TOC	FUELS BLENDING
T205	S.S.	31695	6790	20375	27165	BLENDED FUELS	FUELS BLENDING
T206	S.S.	31695	18680	8490	27170	BLENDED FUELS	FUELS BLENDING
T207	STEEL	48365	34140	8445	42585	CHLORINATED SOLVENTS	FUELS BLENDING
T209	STEEL	20304	15225	2960	18185	NON-HAZ HIGH TOC OIL/WATER	FUELS BLENDING
T210	STEEL	1100	1000	100	1100	SLUDGE/SOLVENT MIXTURES	FUELS BLENDING
T215	STEEL	16920	0	1060	1060	RAIN H2O/SPILLED FUEL FROM SUMPS	WWTT ONSITE
T301	FRP	7500	6760	470	7230	CYANIDE WASTES	CN/S OXIDATION
T302	FRP	7700	7700	0	7700	CYANIDE WASTES	CN/S OXIDATION
T303	FRP	10000	8790	295	9085	CYANIDE WASTES FOR	CN/S OXIDATION
T304	FRP	11980	1805	0	1805	SODIUM HYPOCHLORITE	RAW PRODUCT
T305	FRP	11980	2830	0	2830	SODIUM HYPOCHLORITE	RAW PRODUCT
T306	FRP	10000	2245	490	2735	SODIUM HYPOCHLORITE	RAW PRODUCT
T307	FRP	13950	7425	1565	8990	CYANIDE WASTES	CN/S OXIDATION
TT249	STEEL	6000	6000	0	6000	OFF SPEC FUEL	FUELS BLENDING
TT256	FRP	5234	5200	0	5200	OFF SPEC FUEL	FUELS BLENDING
V-1	STEEL	20000	0	7833	7833	GRANULAR ACTIVATED CARBON UNITS (GAC)	WWTT ONSITE
V-2	STEEL	20000	0	7833	7833	GRANULAR ACTIVATED CARBON UNITS (GAC)	WWTT ONSITE
*** Total ***			318115	118481	436596		

TABLE 1-2
SAMPLING AND ANALYSIS SUMMARY

PHASE II REMOVAL ACTION
FRONTIER CHEMICAL - ROYAL AVENUE SITE
NIAGARA FALLS, NEW YORK

Tank ID No.	Tank Contents	Nominal Tank Capacity (gal)	Date Sampled	No. of Samples	Phase Descriptions Thickness (ft.)/Vol. (gal.)/ Matrix	Analysis Performed by	Analytical Data (Appendix #)
T-70	Caustic Liquid	10,000	8/22/94	1	6' (6,600) gal. Aqueous liquid	CyanoKEM	B3
T-72	Sodium Bisulfate	10,000	8/22/94	1	1' (1,000) Sludge	CyanoKEM	B3
T-73	Sodium Bisulfate	10,000	8/22/94	1	<1" (80) Aqueous liquid 7" (580) Sludge	N/A * CyanoKEM	B3
T-113	Empty	5,083	Empty	Empty	Empty	Empty	
T-116	Empty	1,570	Empty	Empty	Empty	Empty	
Fiber boxes and Filter Press	Filtercake from F006/F007 Processing	~40 yd^3	8/19/94	1 Composite	N/A	Chemical Waste Management	B2
F-A	Sand filter material	1,000	8/23/94	1	2' (120) Solid	LWD, Inc.	B4
F-B	Sand filter material	1,000	8/23/94	1	2' (120) Solid	LWD, Inc.	B4
F-D	Granular Acitivated Carbon	250	8/23/94	1	2' (80) Solid	N/A *	

* Insufficient sample volume.

Tank ID No.	Tank Contents	Nominal Tank Capacity (gal)	Date Sampled	No. of Samples	Phase Descriptions Thickness (ft.)/Vol. (gal.)/ Matrix	Analysis Performed by	Analytical Data (Appendix #)
R101	Cyanide/Sulfide WWT Solutions	13,800	8/20/94	1	16' (13,000) Aqueous liquid 4" (270) Sludge	CyanoKEM (sludge/liquid composite)	B3
R102	Cyanide/Sulfide WWT Sludges	13,750	8/20/94	2	14' (11,300) Aqueous liquid 1'2" (940) Sludge	CyanoKEM CyanoKEM	B3 B3
R301	Cyanide/Sulfide WWT Solutions	5,943	8/17/94	1	15'6" (5,600) Aqueous liquid	CyanoKEM	B3
R302	Cyanide/Sulfide Waste	5,943	8/17/94	1	15'6" (5,600) Aqueous liquid	CyanoKEM	B3
S101	Raw product, dry lime	12,200	8/22/94	1	(6,000) Solid	CyanoKEM	B3
T-1	Storm/Process water holding tank, prior to POTW discharge	105,200	Not Sampled	1	1" (440) Solid	N/A *	
T-2	Storm/Process water holding tank, prior to POTW discharge	102,950	Not Sampled	1	1" (440) Solid	N/A *	
T101	Storm Water/ WWT Process	51,700	8/23/94	2	17' (40,000) Aqueous liquid 2'0" (5,000) Sludge	LWD, Inc. LWD, Inc.	B4 & B5 B4
T102	Fuels Blending Wastes	51,700	8/23/94	2	0.25" (590) Non-aqueous 17'3" (40,600) Aqueous liquid 3' (7050) Sludge	N/A * Petro-Chem Petro-Chem	 B1 B1
T103	Waste Acids	20,300	8/20/94	2	20' (17,200) Aqueous liquid 1'6" (1300) Sludge	CyanoKEM CyanoKEM	B3 B3
T105	Waste Acids	3,354	8/20/94	1	5'0" (1900) Aqueous liquid	CyanoKEM	B3

* Insufficient sample volume.

Tank ID No.	Tank Contents	Nominal Tank Capacity (gal)	Date Sampled	No. of Samples	Phase Descriptions Thickness (ft.)/Vol. (gal.)/ Matrix	Analysis Performed by	Analytical Data (Appendix #)
T106	Raw product-sodium bisulfate solution	5,860	8/20/94	1	7' (3730) Aqueous liquid 2'0" (1050) Sludge	CyanoKEM (solid/liquid composite)	B3
T108	Raw-product - lime slurry	6290	8/22/94		1'4" (550) Aqueous liquid	CyanoKEM	B3
T110	Cyanide/Sulfide WWT Solutions	17,032	8/19/94	1	17' (14,500) Aqueous liquid Note: Tank mixed prior to sampling	CyanoKEM	B3
T111	Cyanide/Sulfide WWT Solutions	17,032	8/19/94	1	17' (14,500) Aqueous liquid	CyanoKEM	B3
T112	Unknown Wastes	12,267	8/19/94	2	7'2" (5860) Aqueous liquid 3'1" (2860) Sludge	PetroChem PetroChem	B1 B1
T114	Raw Product - HCL	4,888	8/19/94	1	8' (3000) Aqueous liquid	CyanoKEM	B3
T115	Cyanide/Sulfide WWT Solutions	7,460	8/19/94	2	2'6" (1200) Aqueous liquid 6" (242) Sludge	CyanoKEM CyanoKEM	B3 B3
T117	Raw Product,- Dry Lime	200	8/22/94	1	4" (20) Sludge	CyanoKEM	B3
T119	Raw product - Caustic liquid Raw product - Lime Slurry	5,480	8/22/94	2	2' (900) Aqueous liquid 2'6" (1,140) Sludge	CyanoKEM CyanoKEM	B3 B3

* Insufficient sample volume.

Tank ID No.	Tank Contents	Nominal Tank Capacity (gal)	Date Sampled	No. of Samples	Phase Descriptions Thickness (ft.)/Vol. (gal.)/ Matrix	Analysis Performed by	Analytical Data (Appendix #)
T201	Fuels blending waste	18,190	8/16/94	3	11" (900) Non-Aqueous liquid 11' (10,000) Aqueous liquid 6' (5500) Sludge	Petro-Chem Petro-Chem Petro-Chem	B1 B1 B1
T202	Fuels blending waste	18,190	8/16/94	2	1" (70) Non-Aqueous liquid 13'6" (10,900) Aqueous liquid 2'6" (2000) Sludge	N/A * Petro-Chem Petro-Chem	 B1 B1
T203	Fuels blending waste	18,190	8/16/94	3	2'6" (2200) Non-Aqueous liquid 8' (7100) Aqueous liquid 7'6" (6650) Sludge	Petro-Chem Petro-Chem Petro-Chem	B1 B1 B1
T204	Fuels blending waste	18,190	8/16/94	3	4'4" (3600) Non-Aqueous liquid 1'4" (1100) Aqueous liquid 1'6" (1250) Sludge	Petro-Chem N/A * Petro-Chem	B1 B1
T205	Fuels blending waste	31,695	8/17/94	3	3'5" (6200) Non-Aqueous liquid 1'5" (2600) Aqueous liquid 11'6" (20,250) sludge	Petro-Chem Petro-Chem Petro-Chem	B1 B1 B1
T206	Fuels blending waste	31,695	8/16/94	3	6'10" (12,000) Non-Aqueous liquid 8' (14,000) aqueous liquid 1' (1700) sludge	Petro-Chem Petro-Chem Petro-Chem	B1 B1 B1
T207	Fuels blending waste	48,365	8/15/94	2	12' (24,200) Aqueous liquid 3' (8100) Sludge	Petro-Chem Petro-Chem	B1 B1
T209	Fuels blending waste	20,304	8/15/94	3	8' (6800) Non-Aqueous liquid 9' (7600) Aqueous liquid 2' (1700) Sludge	Petro-Chem Petro-Chem Petro-Chem	B1 B1 B1

* Insufficient sample volume.

Tank ID No.	Tank Contents	Nominal Tank Capacity (gal)	Date Sampled	No. of Samples	Phase Descriptions Thickness (ft.)/Vol. (gal.)/ Matrix	Analysis Performed by	Analytical Data (Appendix #)
T210	Fuels blending waste	1,100	8/18/94	1	1" (18) Non-Aqueous liquid 1" (18) Aqueous liquid 1'6" (330) Sludge	N/A * N/A * Petro-Chem	 B1
T215	Fuels blending waste	16,920	8/17/94	2	5" (325) Non-Aqueous liquid 14'8" (11,450) Rain Water storage 2'6" (2000) Sludge	Petro-Chem N/A * Petro-Chem	B1 B1
T301	Cyanide/Sulfide Waste	7,500	8/17/94	1	10' (6670) Aqueous liquid	Petro-Chem	B3
T302	Cyanide/Sulfide Waste	7,500	8/17/94	1	10' (6670) Aqueous liquid	CyanoKEM	B3
T303	Cyanide/Sulfide Waste	10,000	8/17/94	1	16'2" (8760) Aqueous liquid	CyanoKEM	B3
T304	Sodium Hypochlorite	11,980	8/17/94	1	16'10" (1805) Aqueous liquid	CyanoKEM	B3
T305	Sodium Hypochlorite	11,980	8/17/94	1	5' (2830) Aqueous liquid	CyanoKEM	B3
T306	Sodium Hypochlorite	10,000	8/17/94	1	5' (2730) Aqueous liquid	CyanoKEM	B3
T307	Cyanide/Sulfide WWT Solutions	13,950	8/19/94	1	12'4" (10,424) Aqueous liquid 1'5" (1268) Sludge	CyanoKEM CyanoKEM	B3 B3
TT249	Fuels blending waste	6,000	8/22/94	2	1' (3200) Non-Aqueous liquid 1' (1,200) Aqueous liquid 1' (1800) Sludge	Petro-Chem Petro-Chem Petro-Chem	B1 B1 B1
TT256	Fuels blending waste	5,200	8/22/94	1	4' (4500) Aqueous liquid	Petro-Chem	B1
V-1	Spent GAC	20,000	8/24/94	1	(7833) Solid/Aqueous liquid	Calgon/Petro-Chem	Not yet received
V-2	Spent GAC	20,000	8/24/94	1	(7833) Solid/Aqueous liquid	Petro-Chem	Not yet received

* Insufficient sample volume.

Tank ID No.	Tank Contents	Nominal Tank Capacity (gal)	Date Sampled	No. of Samples	Phase Descriptions Thickness (ft.)/Vol. (gal.)/ Matrix	Analysis Performed by	Analytical Data (Appendix #)
Fiber Packs/ Filter Press	F006/F007 Filter Cake	N/A *	8/15/94	1	40 yd^3 Dewatered sludge	Chemical Waste Management	B2
Drum Wash	Drum Wash Water	1,000	N/A	N/A	(400) Aqueous liquid	N/A *	N/A

* Insufficient sample volume.

TABLE 3-1
PROBABLE WASTE CODES AND TSDFs

PHASE II REMOVAL ACTION
FRONTIER CHEMICAL - ROYAL AVENUE SITE
NIAGARA FALLS, NEW YORK

Tank ID No.	Tank Contents	Phase Distribution Depth (ft.)/Vol (gal)/Matrix	Waste Code(s)	TSDF	Notes
T-70	Caustic Liquid	6' (6,600) Aqueous liquid	Non-Hazardous	CECOS	DOT Non-Regulated
T-72	Sodium Bisulfate	1' (1,000 gal.) Sludge	D006, D007, D008	CyanoKEM	Hazardous Waste liquid Nos. 9, NA 3082, PG III
T-73	Sodium Bisulfate	<1" (80) Aqueous liquid 7" (580) Sludge	D006, D007, D008	CyanoKEM CyanoKEM	Hazardous Waste Liquid Nos. 9, NA 3082, PG III Hazardous Waste liquid Nos. 9, NA 3082 PG II
T-113	Empty	N/A	N/A		
T-116	Empty	N/A	N/A		
Fiber boxes and Filter Press	Filtercake from F006/F007 Processing	N/A	F006, F007	Chemical Waste Management	Approved by CWM for secure landfilling
F-A	Sand filter material	2' (120) Solid	F001-F009 D003 D007, D008, D010	LWD, Inc.	
F-B	Sand filter material	2' (120) Solid	F001-F009 D003 D007, D008, D010	LWD, Inc.	
F-D	Carbon	2' (80) Solid	F001-F009 D003 D007, D008, D010	Calgon Carbon Corp.	

Tank ID No.	Tank Contents	Phase Distribution Depth (ft.)/Vol (gal)/Matrix	Waste Code(s)	TSDF	Notes
R101	Cyanide/Sulfide Wastewater Treatment Solutions	16' (13,000) Aqueous liquid 4" (270) Sludge	F006, F007, F008, F009	CynoKEM CynoKEM	Hazardous Waste Liquid Nos. 9, NA 3082, PG III Hazardous Waste Liquid Nos. 9, NA 3082, PG III
R102	Cyanide/Sulfide Wastewater Treatment Sludges	14' (11,300) Aqueous liquid 1'2" (940) Sludge	F006, F007, F008, F009, D001, D003	CyanoKEM	Poisonous liquid, nos 6.1, UN2810
R301	Cyanide/Sulfide Wastewater Treatment Solutions	15'6" (5,600) Aqueous liquid	F006, F007, F008, F009	CyanoKEM	Hazardous Waste Liquid Nos. 9, NA 3082, PG III
R302	Cyanide/Sulfide Waste	15'6" (5,600) Aqueous liquid	D001, D002, D003, F006, F007, F008, F009	CyanoKEM	Poisonous liquid corrosive Nos. 6.1, UN2927
S101	Raw product, dry lime	(6,000) Solid	N/A	CECOS or other for reuse	Corrosive solids Nos. 8, UN1759
T-1	Storm/Process water holding tank, prior to POTW discharge	1" (440) Solid	F006, F007	Chemical Waste Management	
T-2	Storm/Process water holding tank, prior to POTW discharge	1" (440) Solid	F006, F007	CWM	CWM
T101	Low TOC for on-Site treatment	17' (40,000) Aqueous liquid 2'0" (5,000) Sludge		CECOS LWD	

Tank ID No.	Tank Contents	Phase Distribution Depth (ft.)/Vol (gal)/Matrix	Waste Code(s)	TSDF	Notes
T102	High TOC for off-Site treatment	0.25" (590) Non-Aqueous liquid 17'3" (40,600) Aqueous liquid 3' (7050) Sludge	F001, F002, F003, F004, F005	LWD/PetroChem/ CECOS	
T103	Waste Acids	20' (17,200) Aqueous liquid 1'6" (1300) Sludge	D001, D002, D006, D007, D008	CyanoKEM CyanoKEM	Corrosive liquids Nos. 8, UN1760 Corrosive liquids Nos. 8, UN1760
T105	Waste Acids	5'0" (1900) Aqueous liquid	D001, D002, D006, D007, D008	CyanoKEM	Corrosive liquids Nos. 8, UN1760
T106	Raw product-sodium bisulfate solution	7' (3730) Aqueous liquid 2'0" (1050) Sludge	N/A	CyanoKEM/CECOS CyanoKEM/CECOS	Bisulfates, inorganics, aqueous solution, Nos. 8, UN2193, PGIII Bisulfates, inorganics, aqueous solution, Nos. 8, UN2193, PGIII
T108	Raw-product - lime slurry	1'4" (550) Aqueous liquid	D002	CECOS	Caustic Alkal: liquids, Nos. 8, UN 1719
T110	Cyanide/Sulfide Wastewater Treatment Solutions	17' (14,500) Aqueous liquid Note: Tank mixed prior to sampling	F006, F007, F008, F009	CyanoKEM	Hazardous Waste, Liquid Nos. 9, NA3082, PGIII
T111	Cyanide/Sulfide Wastewater Treatment Solutions	17' (14,500) Aqueous liquid	F006, F007, F008, F009	CyanoKEM	Hazardous Waste, Liquid Nos. 9, NA3082, PGIII

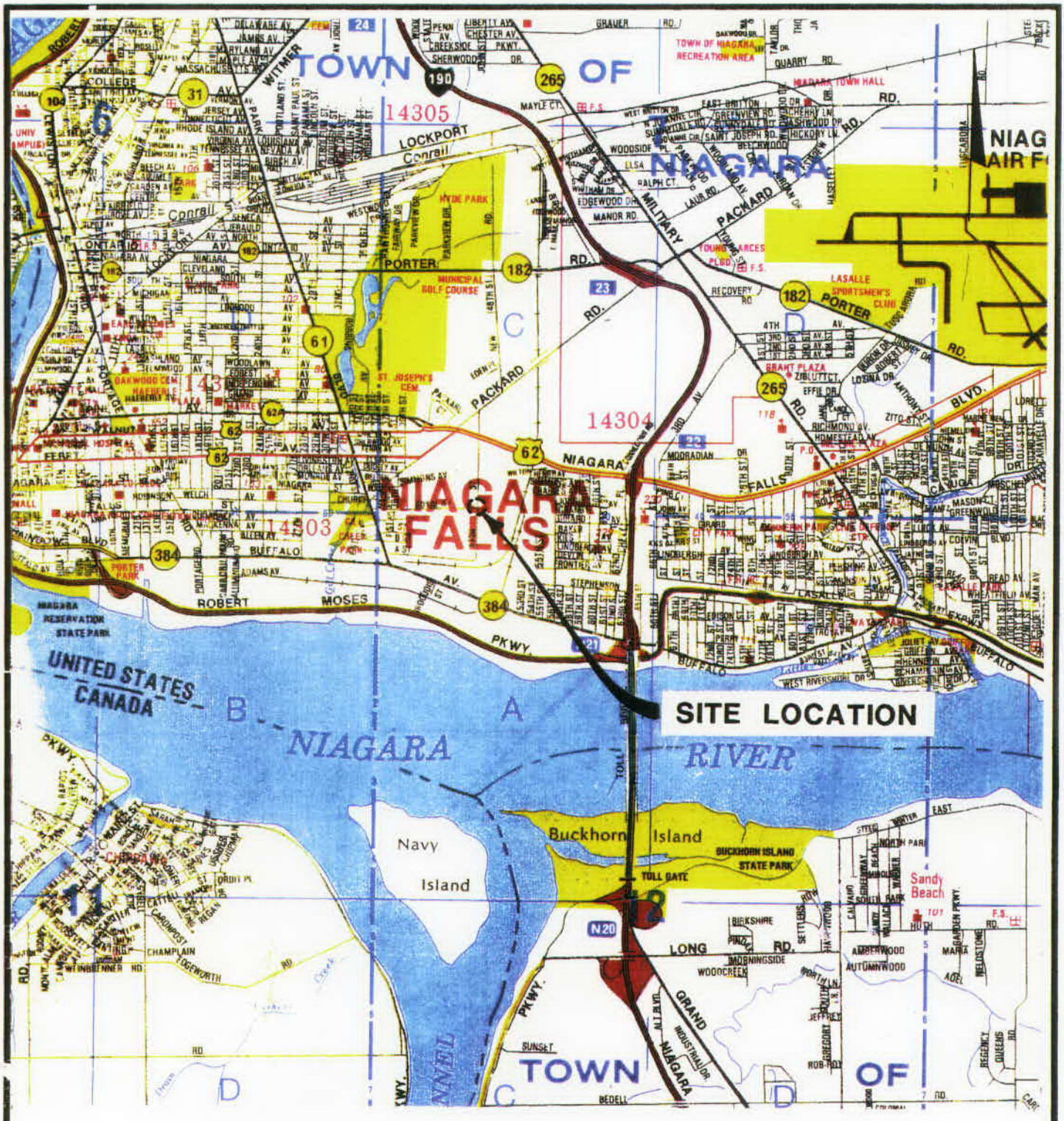
Tank ID No.	Tank Contents	Phase Distribution Depth (ft.)/Vol (gal)/Matrix	Waste Code(s)	TSDF	Notes
T112	Unknown	7'2" (5860) Aqueous liquid 3'1" (2860) Sludge	F001, F002, F003, F004, F005	LWD, Inc.	Syringes found in sludge sample; potential medical waste.
T114	Raw Product - HCL	8' (3000) Aqueous liquid	N/A	Intended for recycle/reuse	Hydrochloric acid, solution 8, UN1789, PGII
T115	Cyanide/Sulfide Wastewater Treatment Solutions	2'6" (1200) Aqueous liquid 6" (242) Sludge	F006, F007, F008, F009	CyanoKEM CyanoKEM	Hazardous Waste, Liquid Nos. 9, NA3082, PGIII Hazardous Waste, Liquid Nos. 9, NA3082, PGIII
T117	Raw Product, Dry Lime	4" (20) Sludge	N/A	CECOS, or other reuse	Corrosive solids, n.o.s. 8, UN1759
T119	Raw product - Caustic liquid Raw product - Lime Slurry	2' (900) Aqueous liquid 2'6" (1,140) Sludge	Non-Hazardous D002	CECOS CECOS/CyanoKEM	DOT Non-Regulated Caustic Alkal: liquids, Nos. 8, UN1759
T201	Fuels blending waste	11" (900) Non-Aqueous liquid 11' (10,000) Aqueous liquid 6' (5500) Sludge	F001, F002, F003, F004, F005	Petro-Chem Petro-Chem/ CECOS/LWD Petro-Chem	BTU = 18,800 BTU = 0 BTU = 8,600

Tank ID No.	Tank Contents	Phase Distribution Depth (ft.)/Vol (gal)/Matrix	Waste Code(s)	TSDF	Notes
T202	Fuels blending waste	1" (70) Non-Aqueous liquid 13'6" (10,900) Aqueous liquid 2'6" (2000) Sludge	F001, F002, F003, F004, F005	Petro-Chem Petro-Chem/ CECOS/LWD Petro-Chem	BTU = 6,500 BTU = 0
T203	Fuels blending waste	2'6" (2200) Non-Aqueous liquid 8' (7100) Aqueous liquid 7'6" (6650) Sludge	F001, F002, F003, F004, F005	Petro-Chem Petro-Chem/ CECOS/LWD Petro-Chem	BTU = 19,200 BTU = 0 BTU = 6,000
T204	Fuels blending waste	4'4" (3600) Non-Aqueous liquid 1'4" (1100) Aqueous liquid 1'6" (1250) Sludge	F001, F002, F003, F004, F005	Petro-Chem Petro-Chem/ CECOS/LWD Petro-Chem	BTU = 12,200 BTU = 7,900
T205	Fuels blending waste	3'5" (6200) Non-Aqueous liquid 1'5" (2600) Aqueous liquid 11'6" (20,250) Sludge	F001, F002, F003, F004, F005	Petro-Chem Petro-Chem/ CECOS/LWD Petro-Chem	BTU = 18,000 BTU = 0 BTU = 11,800
T206	Fuels blending waste	6'10" (12,000) Non-Aqueous liquid 8' (14,000) Aqueous liquid 1' (1700) Sludge	F001, F002, F003, F004, F005	Petro-Chem Petro-Chem/ CECOS/LWD Petro-Chem	BTU = 16,600 BTU = 6,900 BTU = 8,500
T207	Fuels blending waste	12' (24,200) Aqueous liquid 3' (8100) Sludge	F001, F002, F003, F004, F005	Petro-Chem/ CECOS/LWD Petro-Chem	BTU = 0 BTU = 8,800

Tank ID No.	Tank Contents	Phase Distribution Depth (ft.)/Vol (gal)/Matrix	Waste Code(s)	TSDF	Notes
T209	Fuels blending waste	8' (6800) Non-Aqueous liquid 9' (7600) Aqueous liquid 2' (1700) Sludge	F001, F002, F003, F004, F005	Petro-Chem Petro-Chem/ CECOS/LWD Petro-Chem	BTU = 16,400 BTU = 0 BTU = 5,900
T210	Fuels blending waste	1" (18) Non-Aqueous liquid 1" (18) Aqueous liquid 1'6" (330) Sludge	F001, F002, F003, F004, F005	Petro-Chem Petro-Chem/ CECOS/LWD Petro-Chem	BTU = 13,500
T215	Fuels blending waste	5" (325) Non-aqueous liquid 14'8" (11,450) Rain Water storage 2'6" (2000) Sludge	F001, F002, F003, F004, F005	Petro-Chem Petro-Chem/ CECOS/LWD Petro-Chem	BTU = 19,300 BTU = 5,600
T301	Cyanide/Sulfide Waste	10' (6670) Aqueous liquids	D001, D002, D003, F006, F007, F008, F009	CyanoKEM	Poisonous liquids corrosive Nos. 6.1, UN2927
T302	Cyanide/Sulfide Waste	10' (6670) Aqueous liquid	D003, F006, F007, F008, F009	CyanoKEM	Poisonous liquids corrosive Nos. 6.1, UN2810
T303	Cyanide/Sulfide Waste	16'2" (8760) Aqueous liquid	D001, D002, D003, F006, F007, F008, F009	CyanoKEM	Poisonous liquids corrosive Nos. 6.1, UN2927

Tank ID No.	Tank Contents	Phase Distribution Depth (ft.)/Vol (gal)/Matrix	Waste Code(s)	TSDF	Notes
T304	Sodium Hypochlorite	16'10" (1805) Aqueous liquid	N/A	N/A	Hypochlorite Solutions 8, UN1791, PGIII
T305	Sodium Hypochlorite	5' (2830) Aqueous liquid	N/A	N/A	Hypochlorite Solutions 8, UN1791, PGIII
T306	Sodium Hypochlorite	5' (2730) Aqueous liquid	N/A	N/A	Hypochlorite Solutions 8, UN1791, PGIII
T307	Cyanide/Sulfide Wastewater Treatment Solutions	12'4" (10,424) Aqueous liquid 1'5" (1268) Sludge	F006, F007, F008, F009	CyanoKEM CyanoKEM	Hazardous Waste, liquid, Nos. 9, NA 3082, PGIII Poisonous liquids, Nos. 6.1 UN2810
TT249	Fuels blending waste	1' (3200) Non-Aqueous liquid 1' (1,200) Aqueous liquid 1' (1800) Sludge	F001, F002, F003, F004, F005	Petro-Chem Petro-Chem Petro-Chem	BTU = 17,000 BTU = 0 BTU = 7,500
TT256	Fuels blending waste	4' (4500) Aqueous liquid	F001, F002, F003, F004, F005		BTU = 0
V-1	Spent GAC	(7833) carbon (solid)	Intended carbon regeneration	Calgon Carbon for regeneration	
V-2	Spent GAC	(7833) carbon (solid)	Intended carbon regeneration	Calgon Carbon for regeneration	
Fiber Packs/ Filter Press	F006/F007 Filter Cake	40 yd^3 Dewatered sludge	F006/F007	Chemical Waste Management	
Drum Wash	Drum Wash Water	(400) Aqueous liquid	F001, F002, F003, F004, F005, F006, F008, F009	CECOS/LWD	

FIGURES



SCALE

6000' 0' 6000'

NOTE: LOCATION MAP PREPARED FROM MOBIL TRAVEL GUIDE: BUFFALO – NIAGARA FALLS

L:\63 OFF
7/94 54- PQL
\2571540\2571540A.DGN

BLASLAND, BOUCK & LEE, INC.
ENGINEERS & SCIENTISTS

PHASE II REMOVAL ACTION
FRONTIER CHEMICAL ROYAL AVENUE SITE
NIAGARA FALLS, NEW YORK

REMOVAL ACTION PLAN

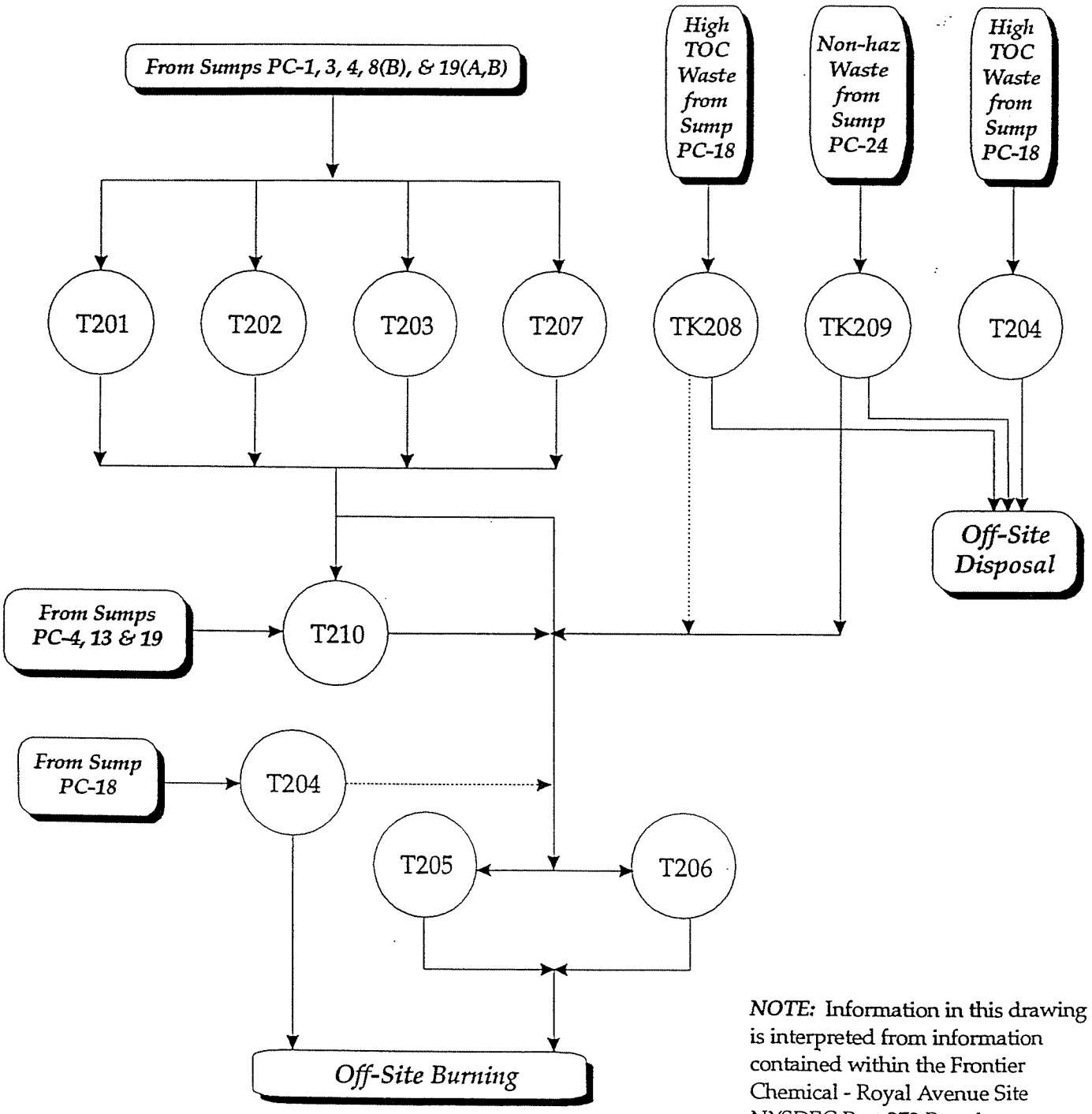
SITE LOCATION MAP

FIGURE 1-1

FIGURE 1-3

SAMPLING AND ANALYSIS / SITE SECURITY AND MAINTENANCE PLAN
PHASE II REMOVAL ACTION
FRONTIER CHEMICAL - ROYAL AVENUE SITE

FUELS PREPARATION SCHEMATIC



NOTE: Information in this drawing is interpreted from information contained within the Frontier Chemical - Royal Avenue Site NYSDEC Part 373 Permit.

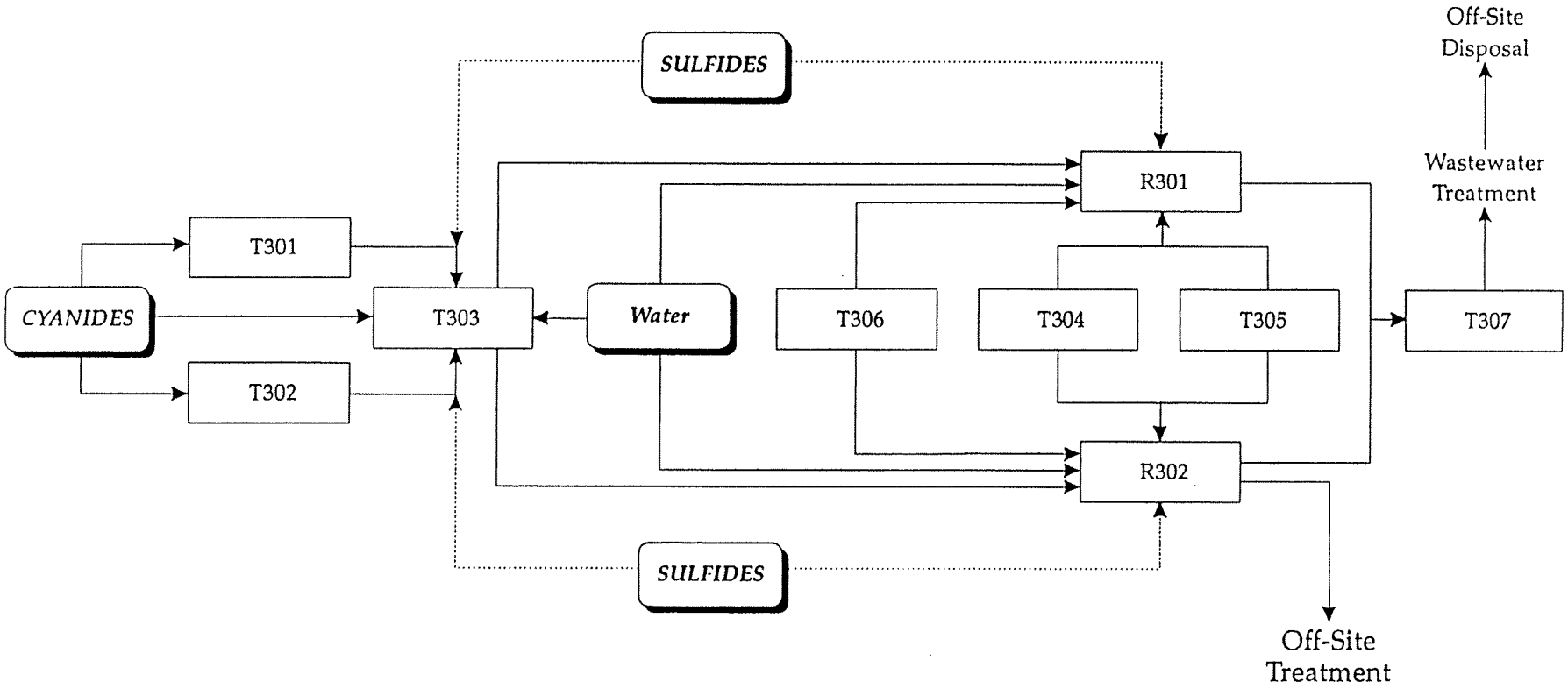
7/94 DJC/ROCH
CDR120.CDR

BLASLAND, BOUCK & LEE, INC.
ENGINEERS & SCIENTISTS

FIGURE 1-4

SAMPLING AND ANALYSIS / SITE SECURITY AND MAINTENANCE PLAN
PHASE II REMOVAL ACTION
FRONTIER CHEMICAL - ROYAL AVENUE SITE

OXIDATION PROCESS SCHEMATIC



NOTE: Information in this drawing is interpreted from information contained within the Frontier Chemical - Royal Avenue Site NYSDEC Part 373 Permit.

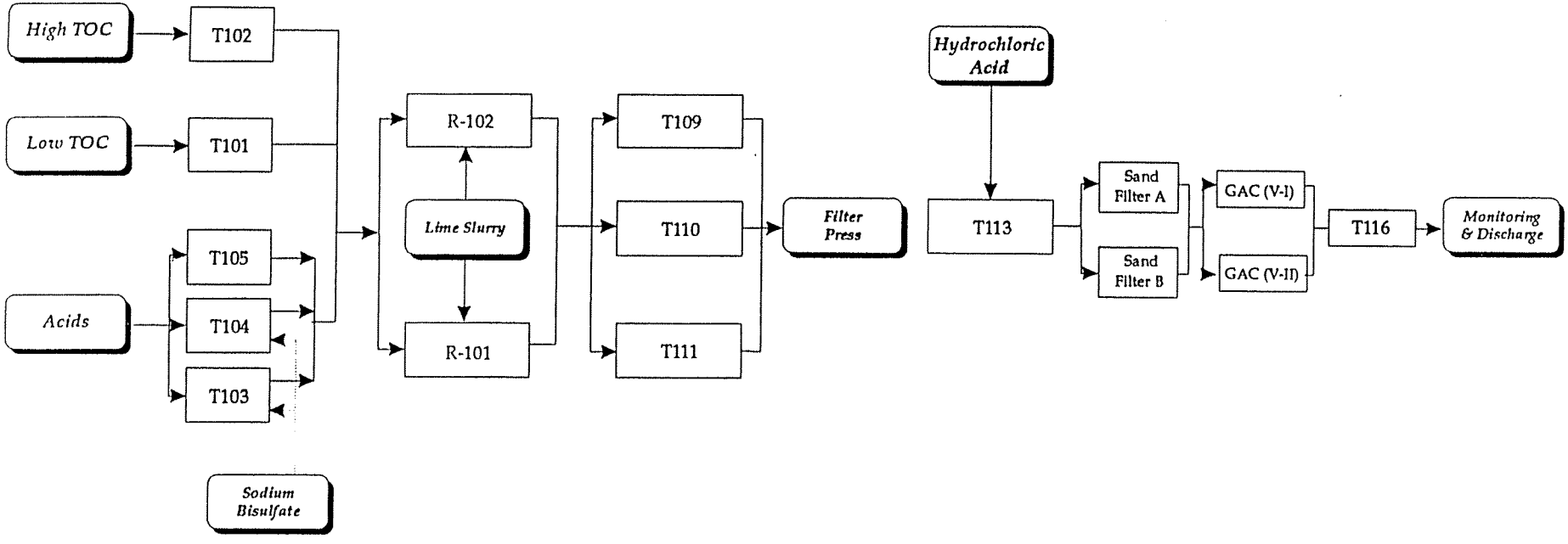
7/94 DJC/ROCH
CDR121.CDR rev. 1

BLASLAND, BOUCK & LEE, INC.
ENGINEERS & SCIENTISTS

FIGURE 1-5

SAMPLING AND ANALYSIS / SITE SECURITY AND MAINTENANCE PLAN
PHASE II REMOVAL ACTION
FRONTIER CHEMICAL - ROYAL AVENUE SITE

WASTEWATER TREATMENT PROCESS SCHEMATIC

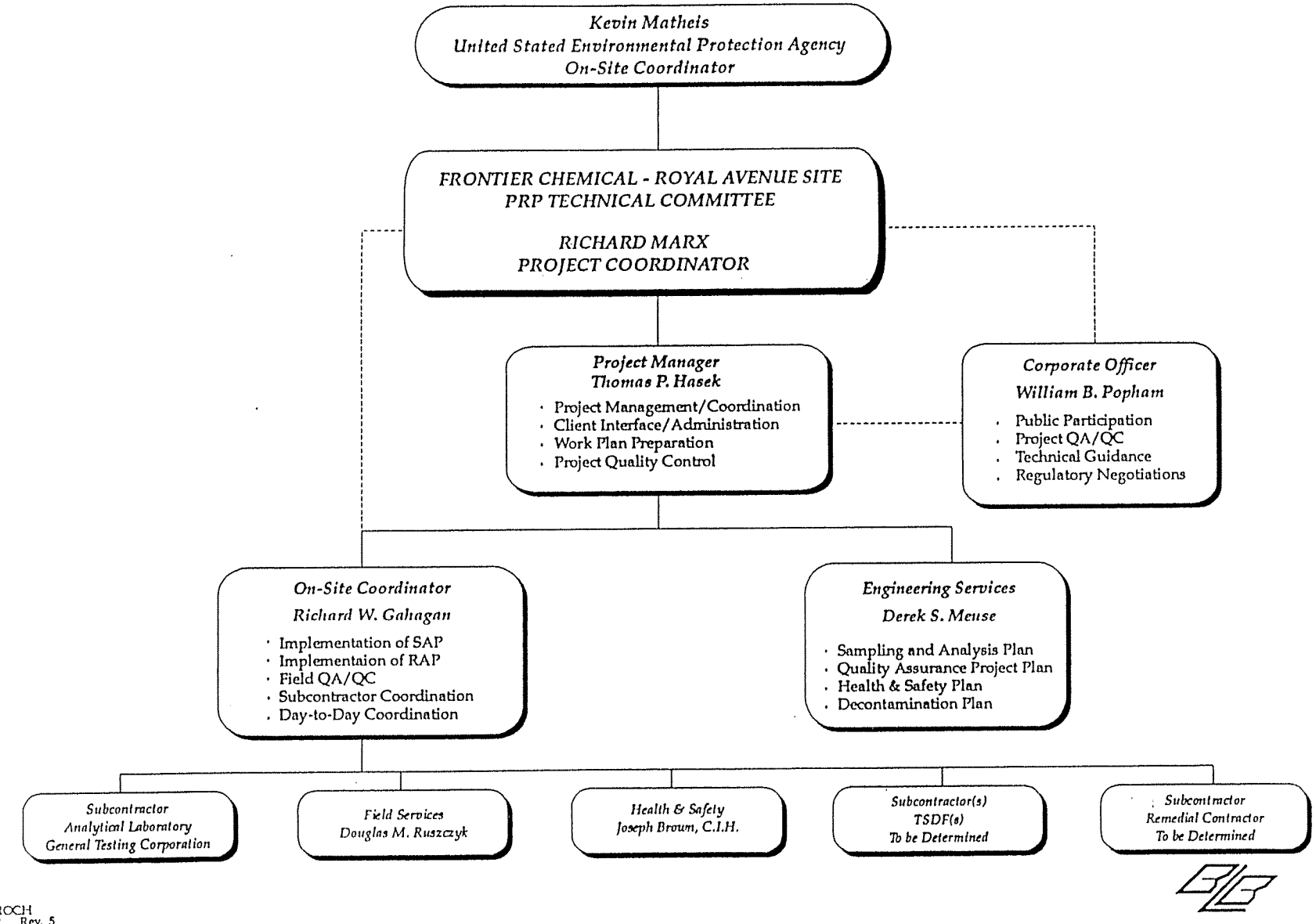


NOTE: Information in this drawing is interpreted from information contained within the Frontier Chemical - Royal Avenue Site NYSDEC Part 373 Permit.

FRONTIER CHEMICAL - ROYAL AVENUE SITE
PHASE II REMOVAL ACTION

FIGURE 2-1

PROJECT ORGANIZATION CHART

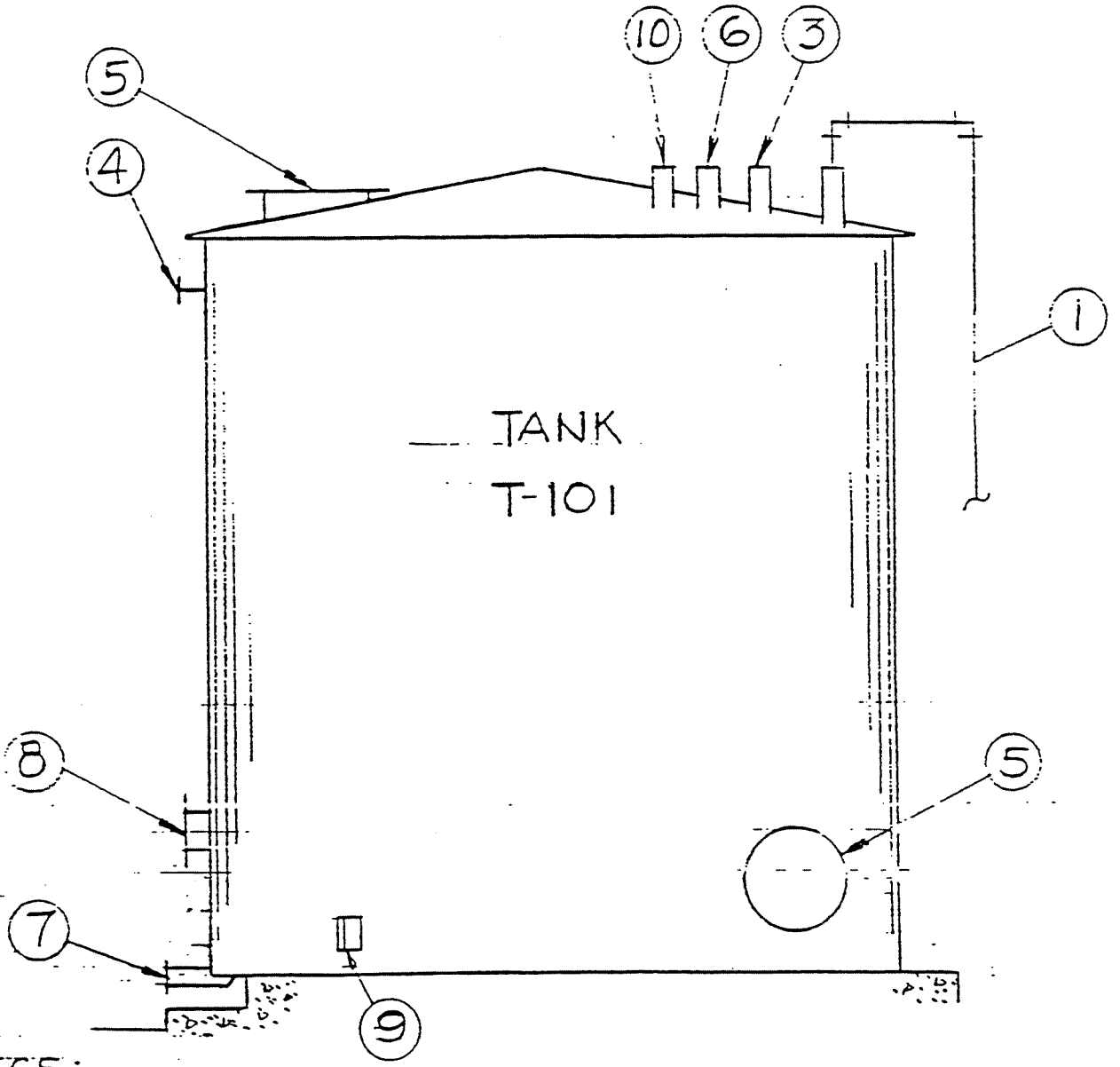


7/94 DJC/ROCH
CDR108.CDR Rev. 5

BLASLAND, BOUCK & LEE, INC.
ENGINEERS & SCIENTISTS

LEGEND:

1 - PRODUCT FEED
2 - VOID
3 - SPARE
4 - HI LEVEL ALARM/ INDICATOR
5 - MANHOLE
6 SPARE
7 - PRODUCT DISCHARGE
8 - SIDE ENTRY MIXER NO
9 - GROUNDING TERMINAL
10 - VENT



SPECS:
STEEL - 20' Ø x 22'-0"
51,700 GALS.

FIGURE 3-1: TANK T-101

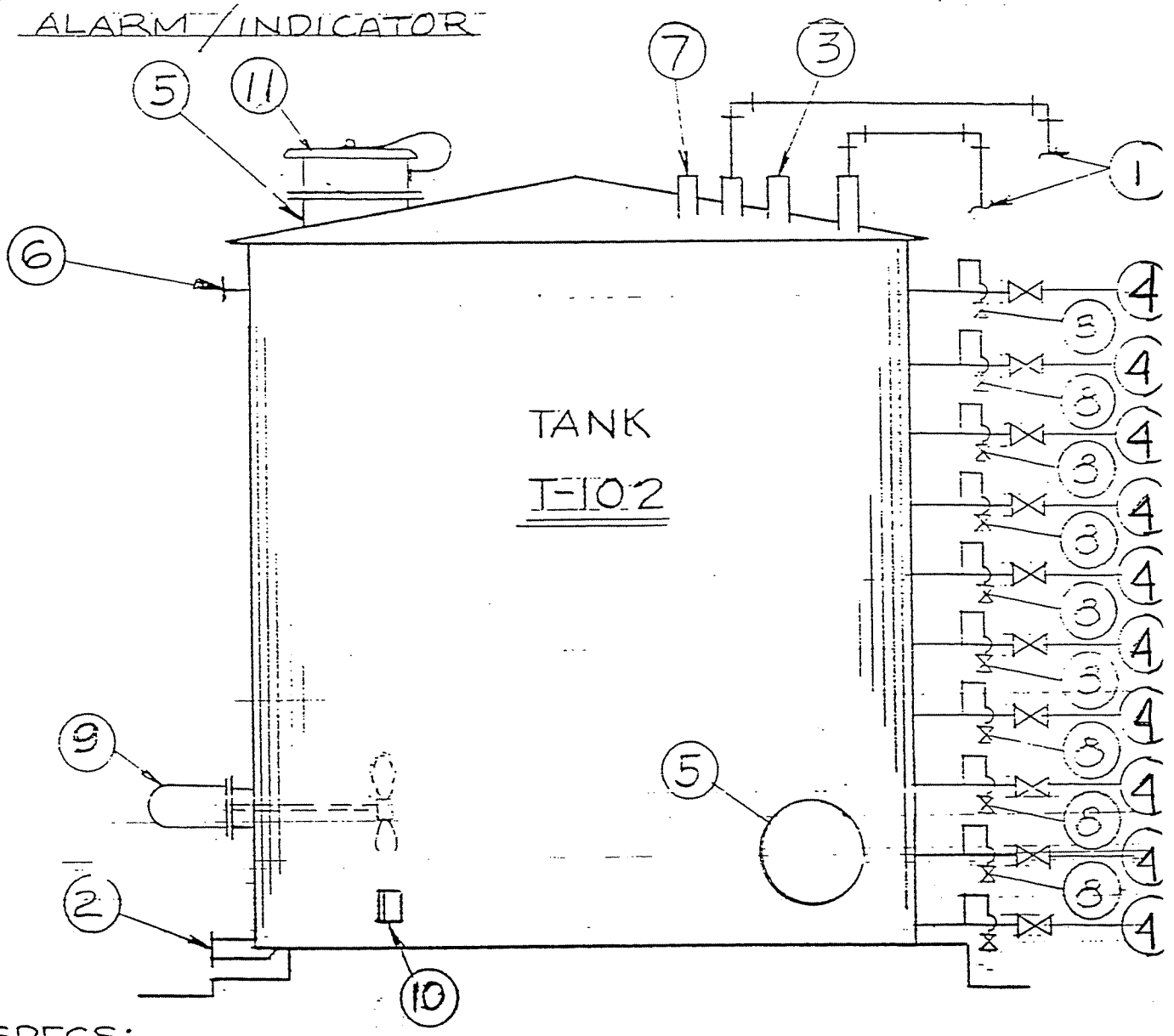
PHASE II REMOVAL ACTION
FRONTIER CHEMICAL-ROYAL AVENUE SITE
NIAGARA FALLS, NEW YORK

REMOVAL ACTION PLAN

SOURCE: FRONTIER CHEMICAL WASTE PROCESS, INC.

LEGEND:

1- PRODUCT RECEIPTS
2- PRODUCT DISCH
3- HI LEVEL INDICATOR
4- DISCHARGE (CASCADE)
5- MANHOLE
6- HI LEVEL ALARM/INDICATOR
7- FLAME ARRESTER
8- SAMPLE PORT
9- SIDE ENTRY MIXER
10- GROUNDING TERMINAL
11- EMERGENCY PRESSURE RELIEF COVER VENT



SPECS:
STEEL - 20' ϕ x 22'-0"
51,700 GALS.

FIGURE 3-2: TANK T-102

PHASE II REMOVAL ACTION
FRONTIER CHEMICAL-ROYAL AVENUE SITE
NIAGARA FALLS, NEW YORK

REMOVAL ACTION PLAN

SOURCE: FRONTIER CHEMICAL WASTE PROCESS, INC.

LEGEND:

1 - PRODUCT FEED (BULK ACID RECEIPTS)

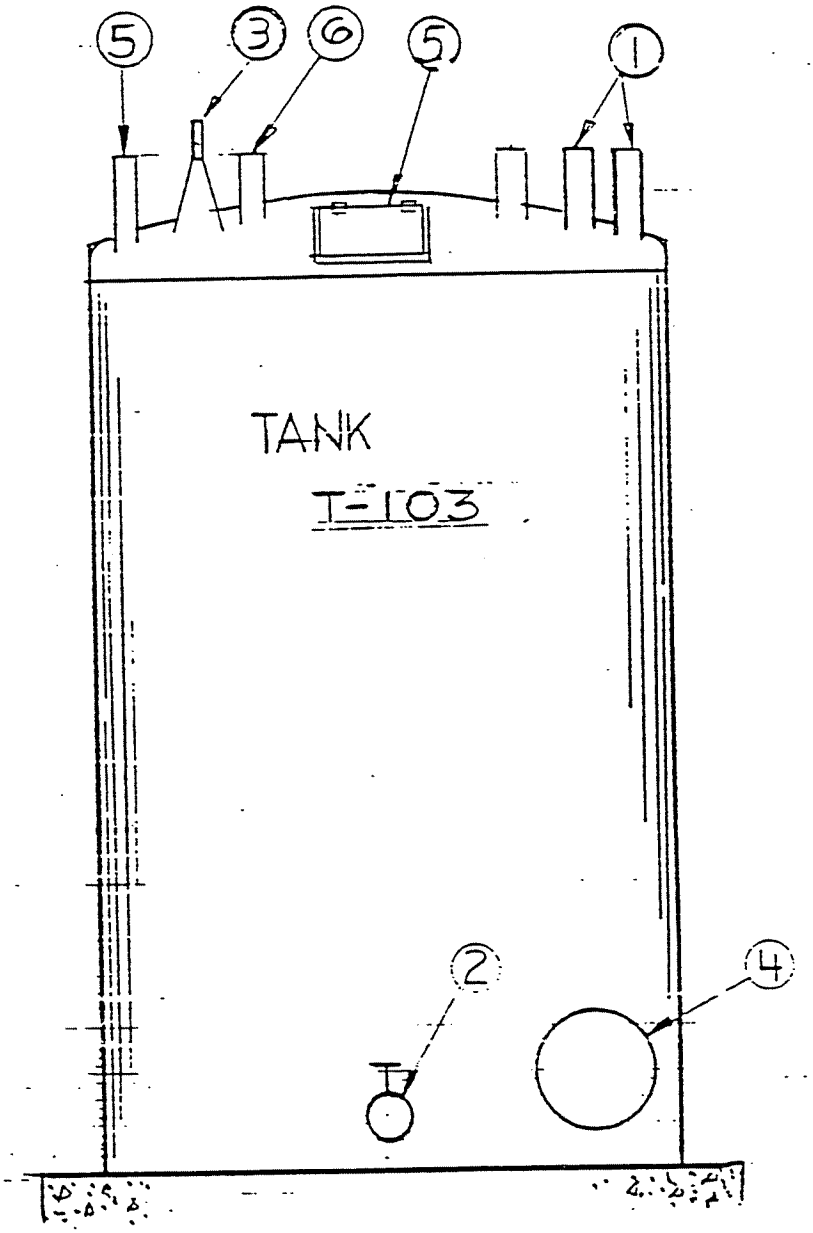
2 - PRODUCT DISCH.

3 - VENT

4 - MANHOLE

5 - MANWAY WITH LEVEL INDICATOR

6 - STRONG ACID (DRUM RECEIPTS)



SPECS:

E.R.P. - 12'ØX24'-0"

20,300 GALS.

FIGURE 3-3: TANK T-103

PHASE II REMOVAL ACTION
FRONTIER CHEMICAL-ROYAL AVENUE SITE
NIAGARA FALLS, NEW YORK

REMOVAL ACTION PLAN

SOURCE: FRONTIER CHEMICAL WASTE PROCESS, INC.

LEGEND:

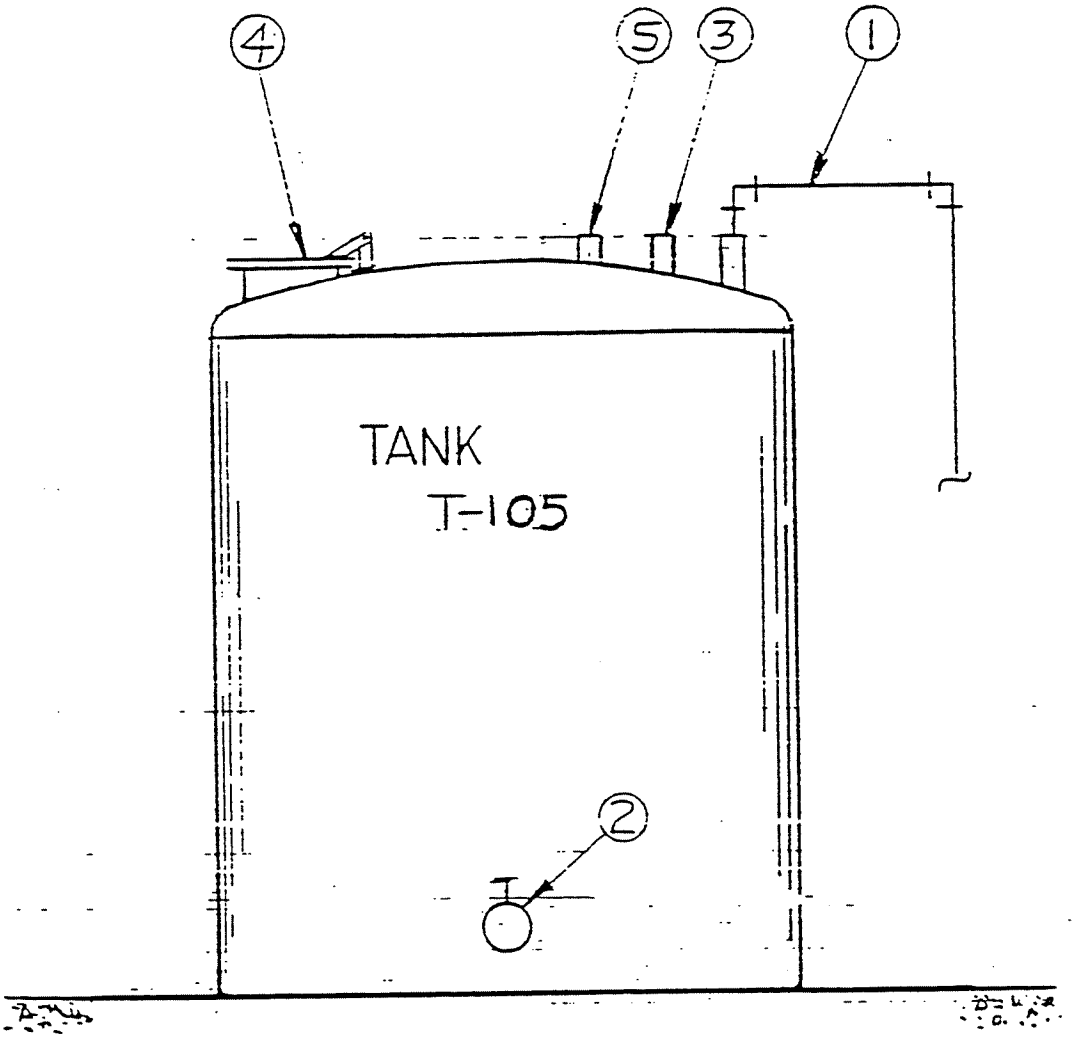
1- PRODUCT FEED (STRONG ACID)

2- PRODUCT DISCH.

3- VENT

4- MANHOLE (HINGED COVER)

5- SPARE



SPECS:

8'Ø X 8'-11"

3,354 GALS.

POLYPROPYLENE

FIGURE 3-4: TANK T-105

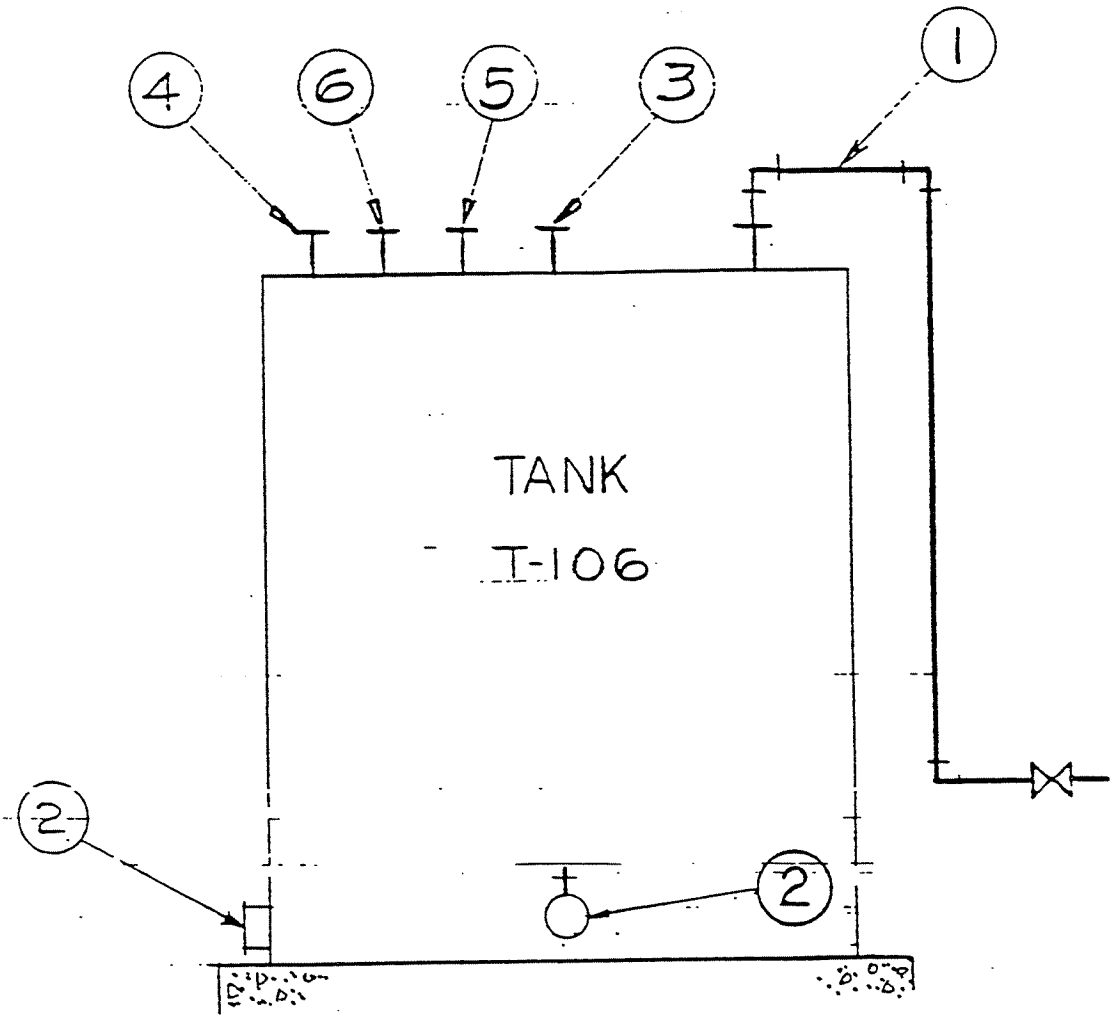
PHASE II REMOVAL ACTION
FRONTIER CHEMICAL-ROYAL AVENUE SITE
NIAGARA FALLS, NEW YORK

REMOVAL ACTION PLAN

SOURCE: FRONTIER CHEMICAL WASTE PROCESS, INC.

LEGEND :

1-BISULFITE FEED
2-DISCHARGES
3-VENT
4- LEVEL INDICATOR (FLOA
5- RECYCLE
6- SPARE



SPECS:

STEEL-10'Ø X 10'-0"
5,860 GALS.

FIGURE 3-5: TANK T-106

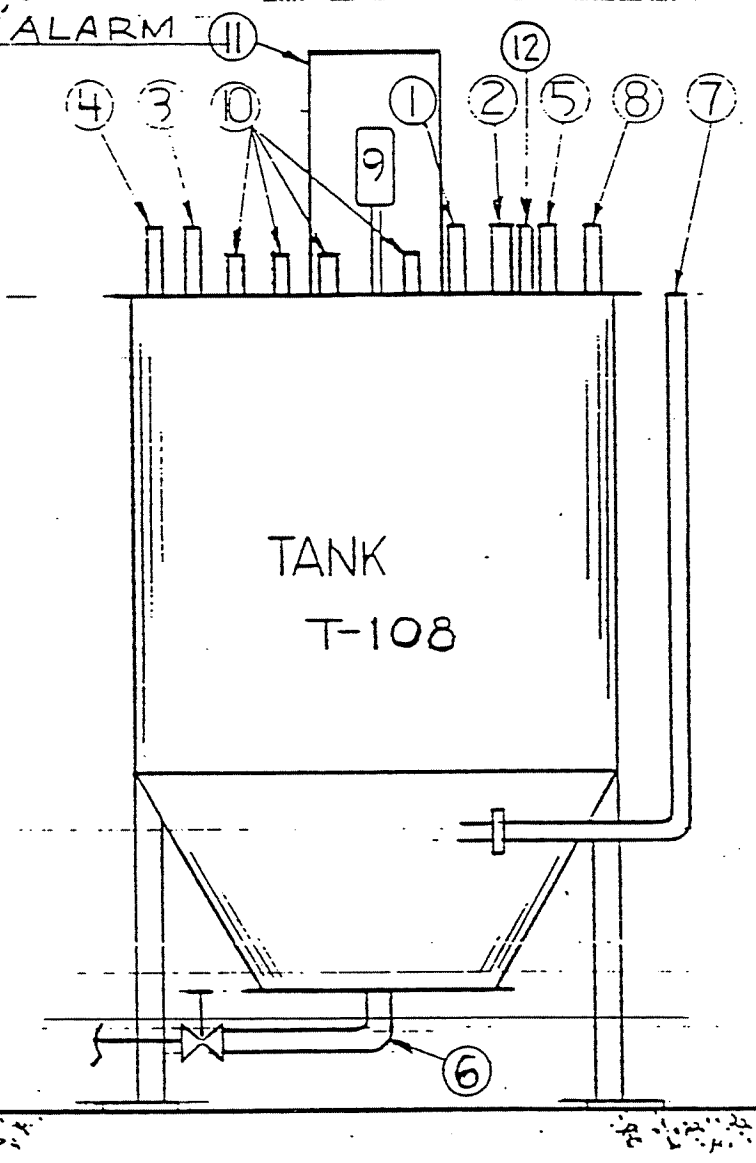
PHASE II REMOVAL ACTION
FRONTIER CHEMICAL-ROYAL AVENUE SITE
NIAGARA FALLS, NEW YORK

REMOVAL ACTION PLAN

SOURCE: FRONTIER CHEMICAL WASTE PROCESS, INC

LEGEND:

1- SPARE
2- BLDG. #50 SUMP WATER
3- LIME (HYDRATED)
4- WATER (MAKE-UP)
5- SLURRY RECYCLE
6- PRODUCT DISCH.
7- SIGHT GLASS
8- VENT
9- MIXER
10- SPARES
11- SCRUBBER
12- HIGH LEVEL (FLOAT) INDICATOR/ALARM



SPECS:

STEEL-10'-4"Ø X 10'

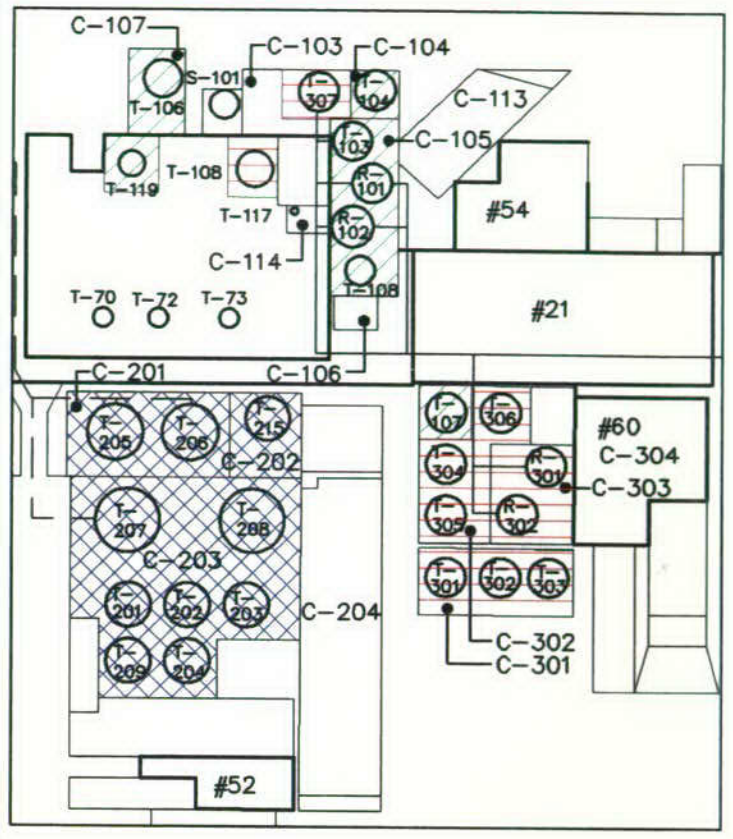
6,290 GALS.

FIGURE 3-6: TANK T-108

PHASE II REMOVAL ACTION
FRONTIER CHEMICAL-ROYAL AVENUE SITE
NIAGARA FALLS, NEW YORK

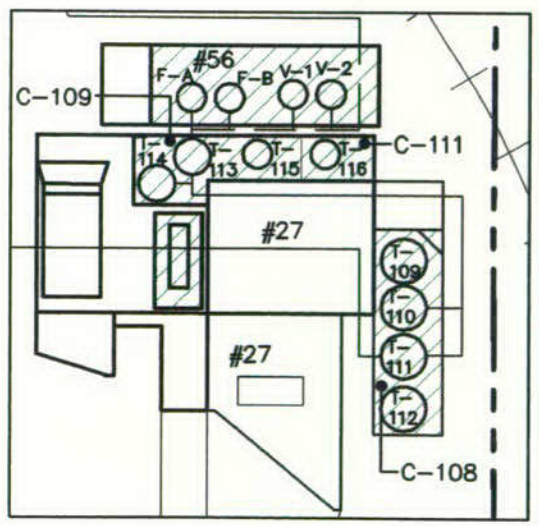
REMOVAL ACTION PLAN

SOURCE: FRONTIER CHEMICAL WASTE PROCESS, INC.



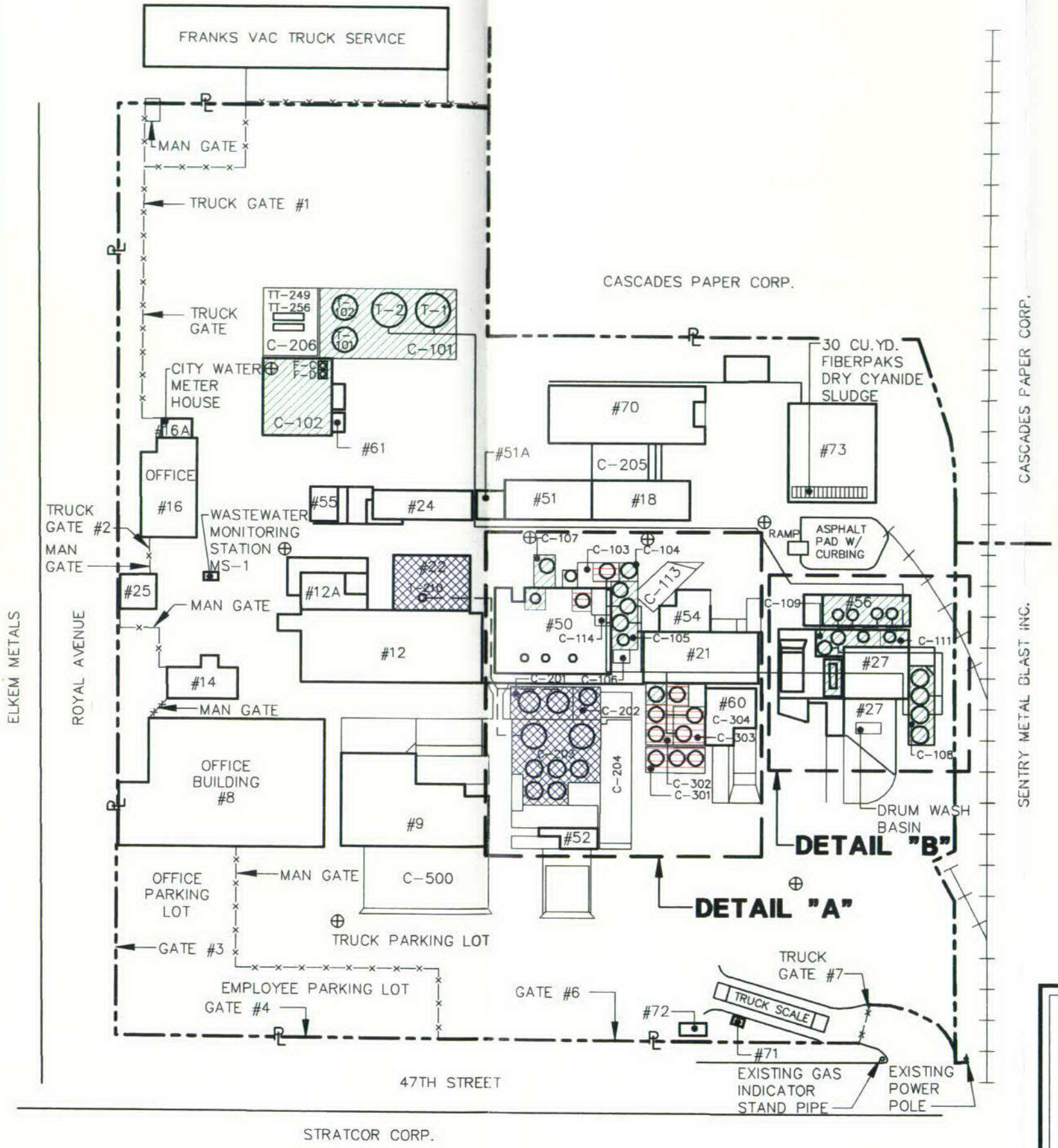
DETAIL "A"

APPROX. SCALE: 1"=60'



DETAIL "B"

APPROX. SCALE: 1"=60'



LEGEND

- FENCE
- PROPERTY LINE
- RAILROAD TRUCKS
- T-1 — TANK DESIGNATION
- TANK ASSOCIATED W/ WASTEWATER TREATMENT PROCESS
- TANK ASSOCIATED W/ FUELS BLENDING PROCESS
- TANK ASSOCIATED W/ OXIDATION PROCESS
- PIPING ASSOCIATED W/ FUELS BLENDING
- PIPING ASSOCIATED W/ WASTEWATER TREATMENT PROCESS
- ⊕ SEWER ACCESS POINT

100' 0 100'

APPROXIMATE SCALE: 1"=100'

NOTE:
BASE MAP PREPARED FROM FRONTIER CHEMICAL WASTE PROCESS, INC., NIAGARA FALLS, NY, GENERAL PLOT PLAN, OCTOBER, 1991

BLASLAND, BOUCK & LEE, INC.
ENGINEERS & SCIENTISTS

FRONTIER CHEMICAL– ROYAL AVENUE SITE
NIAGARA FALLS, NEW YORK

PHASE II REMOVAL ACTION

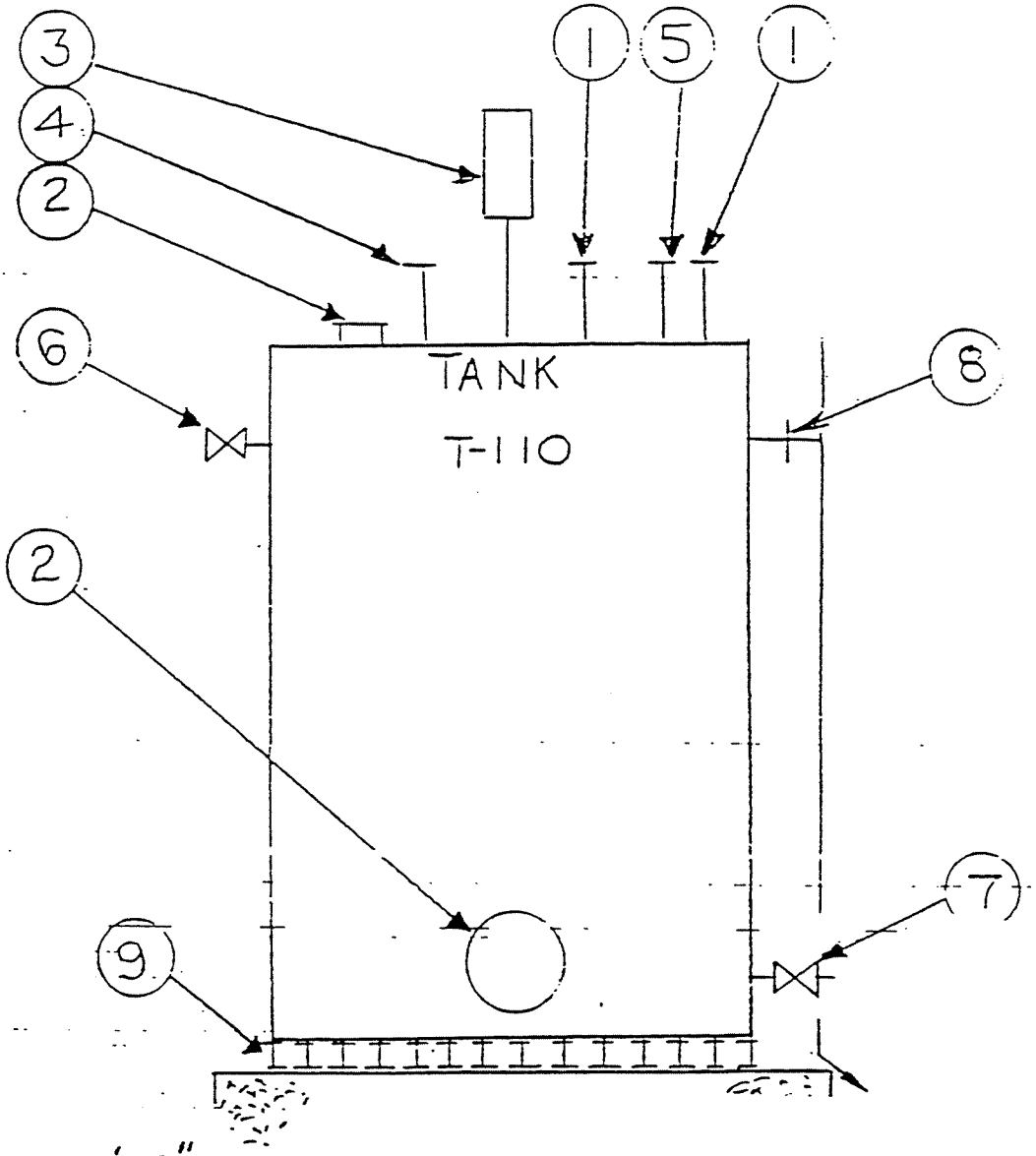
SITE PLAN

FIGURE **1-2**

OPTIONAL L: OR X:
9/94 54-YCC NES
\2571540R\25715G01.DWG

LEGEND:

1 - PRODUCT FEED
2 - MANHOLE
3 - MIXER
4 - LEVEL INDICATOR (FLOAT)
5 - VENT
6 - SPARE
7 - DISCH./DRAIN
8 - OVERFLOW
9 - 6" BM. GRILLAGE



SPECS:
STL. 12'ϕ x 20'-3"
17,132 GAL.

FIGURE 3-7: TANK T-110

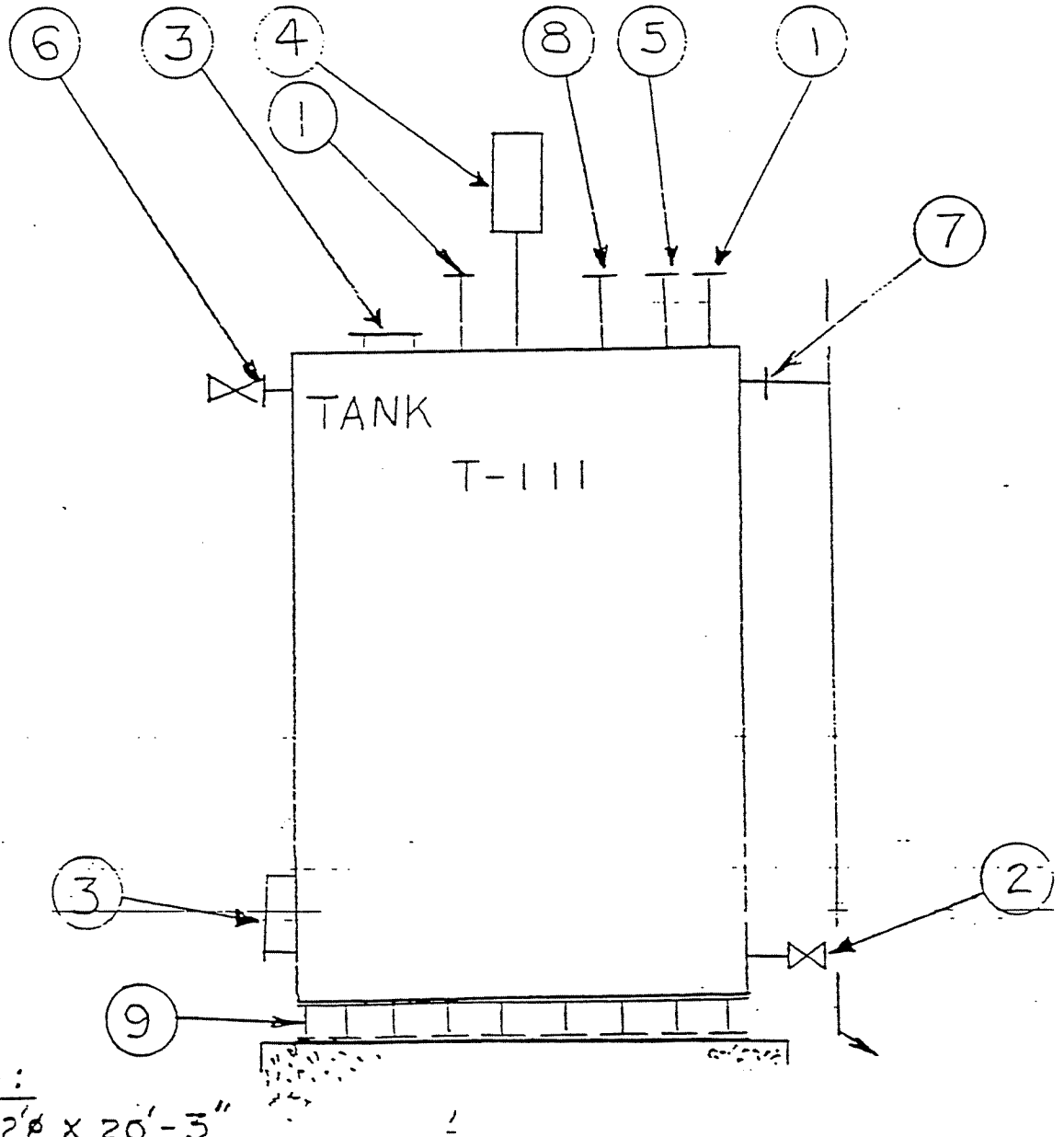
PHASE II REMOVAL ACTION
FRONTIER CHEMICAL-ROYAL AVENUE SITE
NIAGARA FALLS, NEW YORK

REMOVAL ACTION PLAN

SOURCE: FRONTIER CHEMICAL WASTE PROCESS, INC

LEGEND:

1 – PROD. FEED
2 – DISCH./DRAIN
3 – MANHOLE
4 – MIXER
5 – VENT
6 – SPARE
7 – OVERFLOW
8 – LEVEL INDICATOR
9 – 6" BM. GRILLAGE



SPECS:
STL., 12'ø x 20'-3"
17,132 GAL.

FIGURE 3-8: TANK T-111

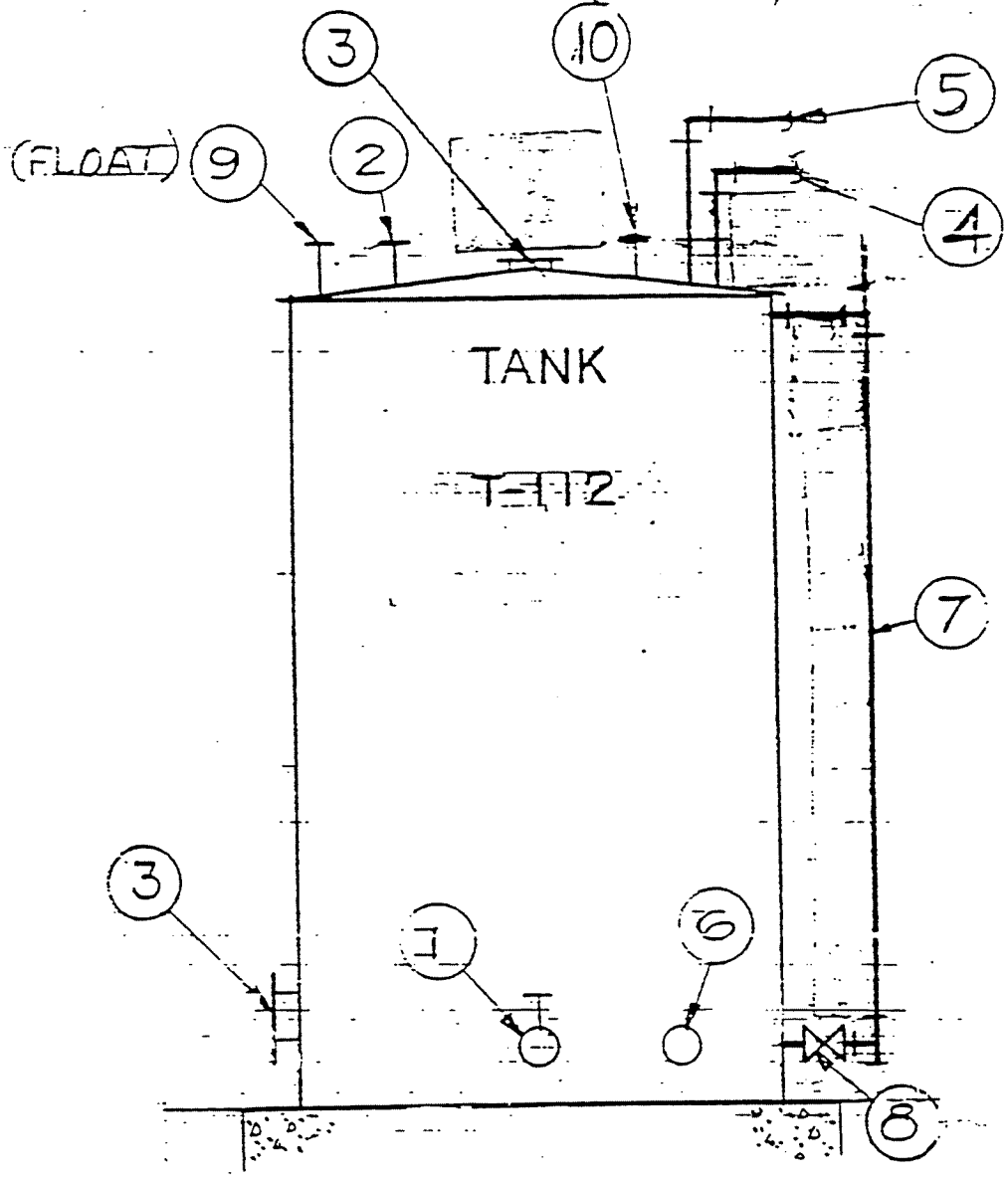
PHASE II REMOVAL ACTION
FRONTIER CHEMICAL-ROYAL AVENUE SITE
NIAGARA FALLS, NEW YORK

REMOVAL ACTION PLAN

SOURCE: FRONTIER CHEMICAL WASTE PROCESS, INC.

LEGEND:

1 – DISCHARGE
2 – VENT
3 – MANHOLE
4 – LOW TOTAL ORGANIC CARBON
5 – CITY WATER
6 – 6" TANK CLEANOUT
7 – OVERFLOW
8 – DRAIN
9 – LEVEL INDICATOR
10 – DRUM PUMPING (DS-17, BUILDING #27)



SPECS:

STL., 12ø X 14'-6"
12,267 GAL.

FIGURE 3-9: TANK T-112

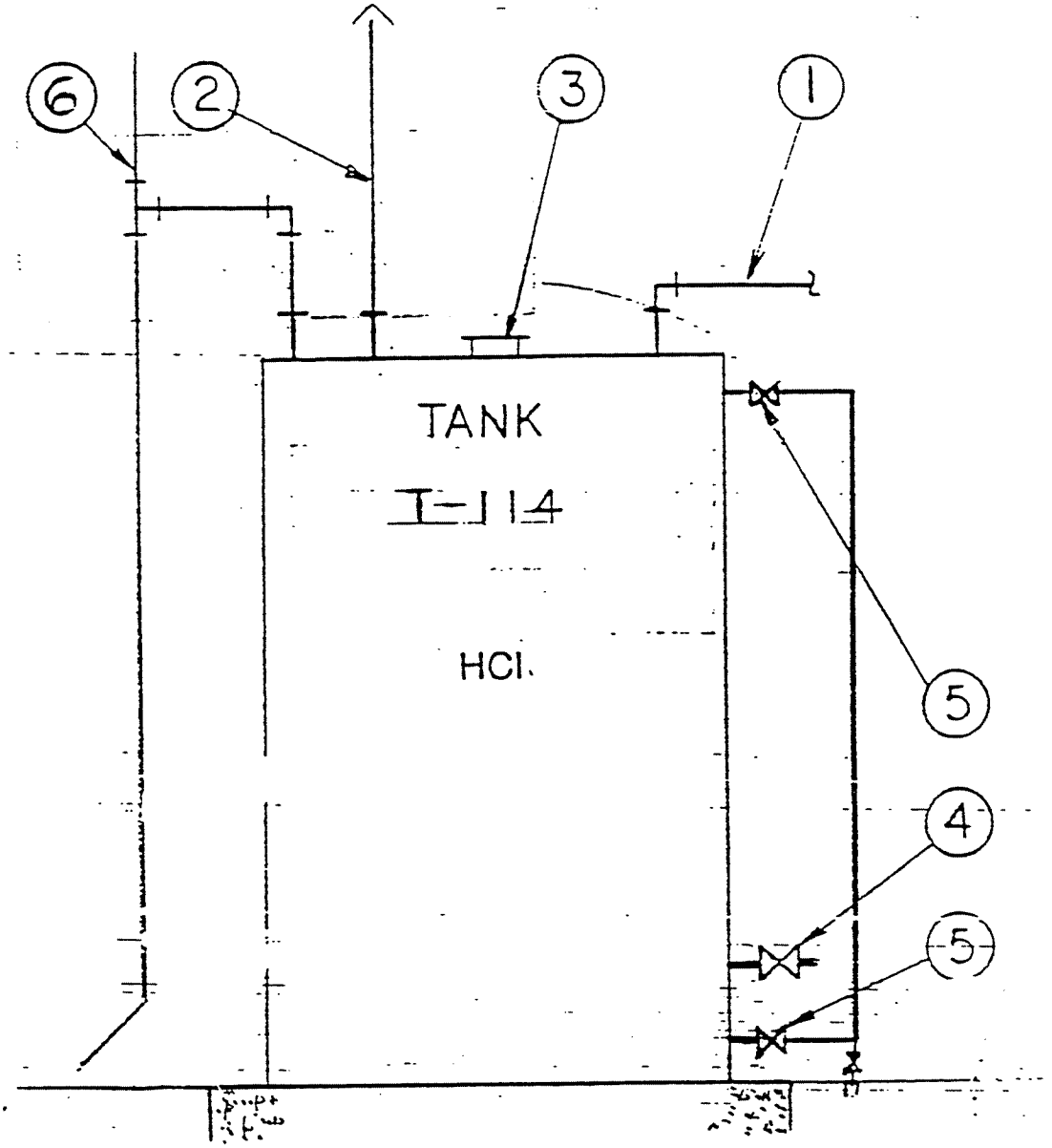
PHASE II REMOVAL ACTION
FRONTIER CHEMICAL-ROYAL AVENUE SITE
NIAGARA FALLS, NEW YORK

REMOVAL ACTION PLAN

SOURCE: FRONTIER CHEMICAL WASTE PROCESS, INC

LEGEND:

1 – PRODUCT FEED
2 – VENT
3 – MANHOLE
4 – PRODUCT DISCHARGE
5 – SIGHTGLASS
6 – OVERFLOW TO SUMP



SPECS:

F.R.P., 8'ø X 13' HG.
4,888 GAL.

FIGURE 3-10: TANK T-114

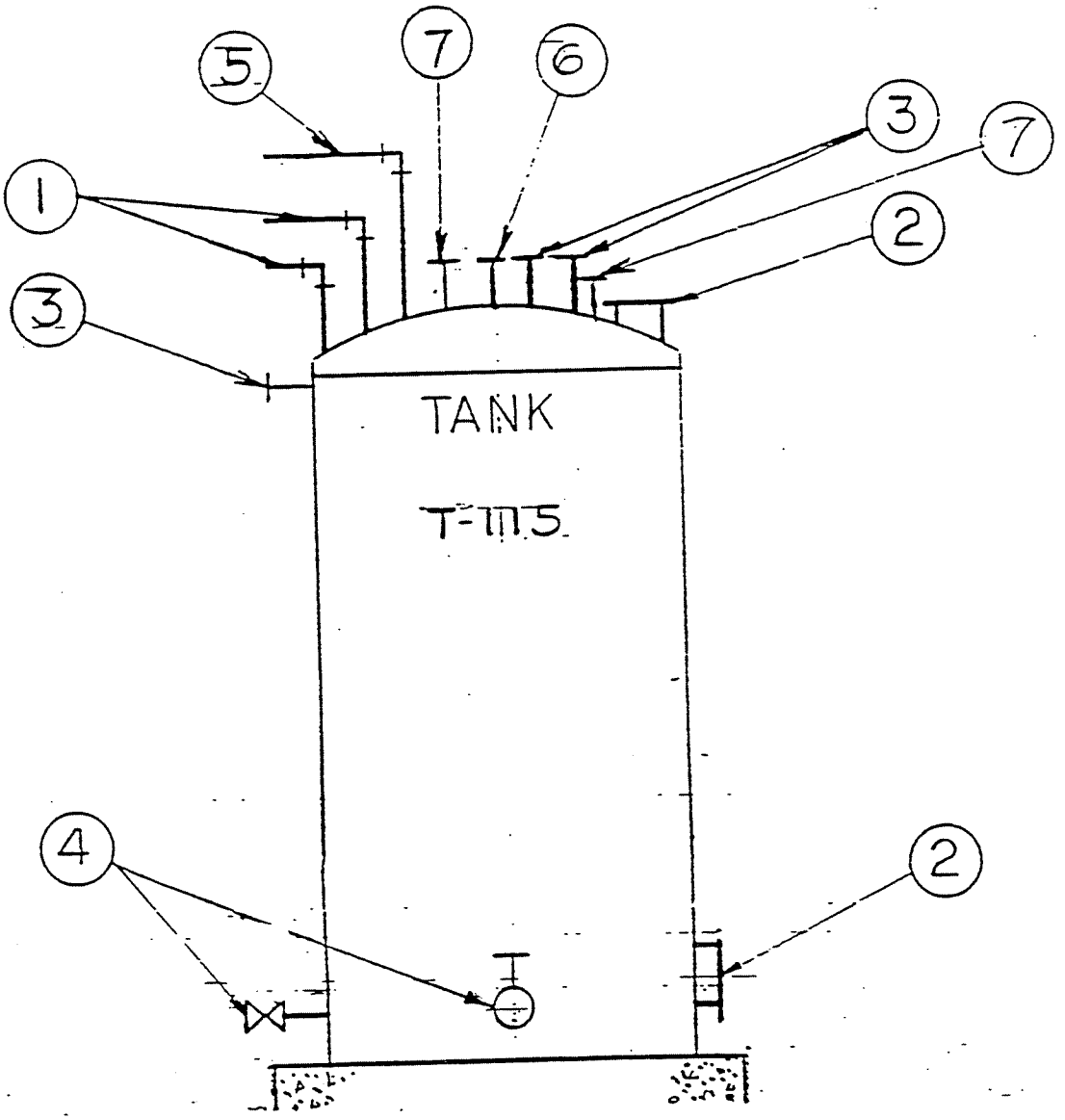
PHASE II REMOVAL ACTION
FRONTIER CHEMICAL-ROYAL AVENUE SITE
NIAGARA FALLS, NEW YORK

REMOVAL ACTION PLAN

SOURCE: FRONTIER CHEMICAL WASTE PROCESS, INC

LEGEND:

1 – PRODUCT FEED
2 – MANHOLE
3 – BACKWASH FEED
4 – DISCHARGES
5 – CITY WATER
6 – VENT
7 – HI LEVEL INDICATOR CONTROLLER



SPECS.
F.R.P., 9'ø X 15'-8"
7,460 GALS.

FIGURE 3-11: TANK T-11

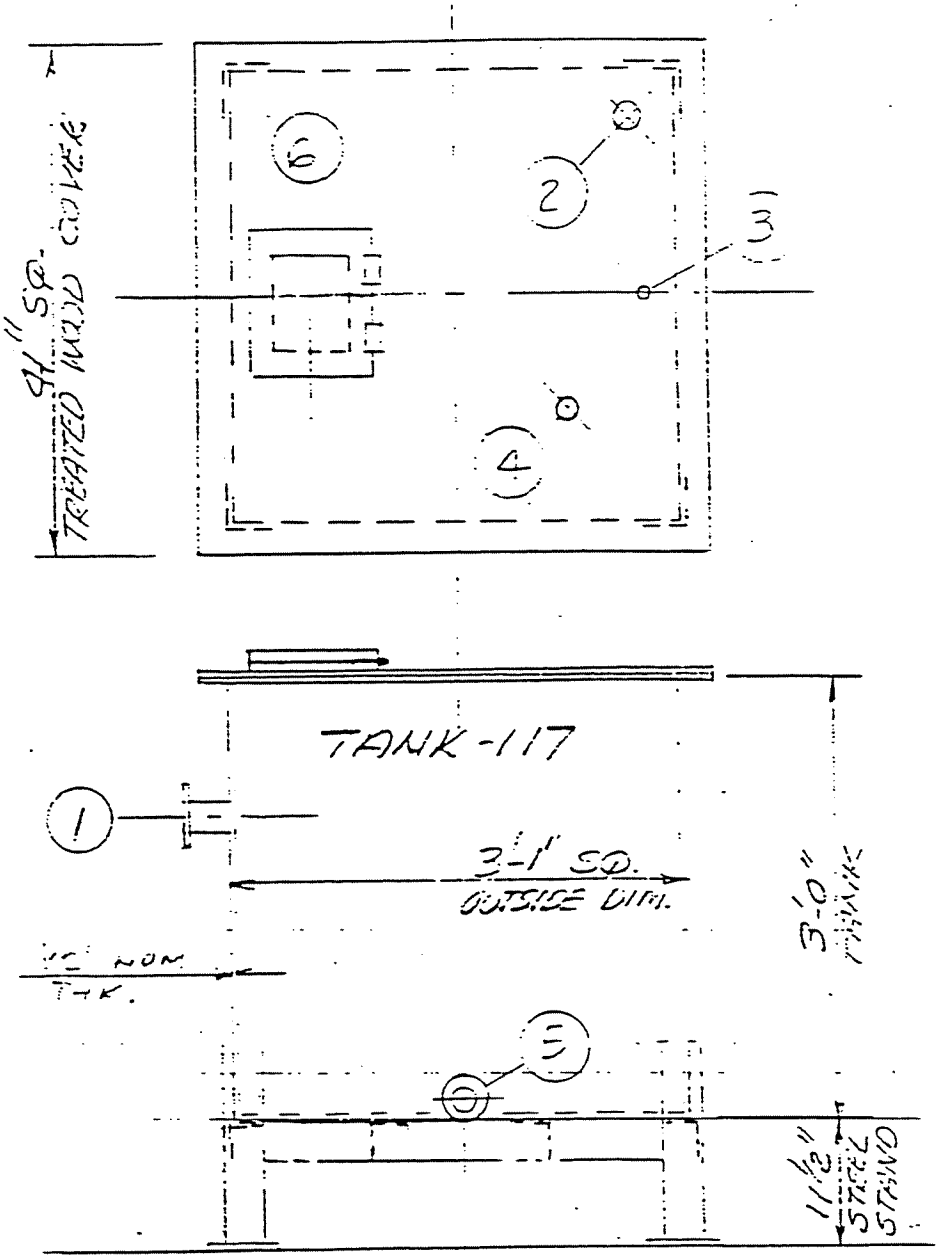
PHASE II REMOVAL ACTIO
FRONTIER CHEMICAL-ROYAL AVENUE SIT
NIAGARA FALLS, NEW YOF

REMOVAL ACTION PLAN

SOURCE: FRONTIER CHEMICAL WASTE PROCESS, IN

LEGEND:

1. LIME INLET
2. MAGNESIUM HYDROXIDE FILL
3. VENT
4. FLOAT SWITCH ENTRY
5. PRODUCT OUTLET
6. HINGED OBSERVATION POR



SPECS.

MAT'L POLYURETHANE - DIM. AS ABOVE

CAP: 201-GALLONS

FIGURE 3-12: TANK T-117

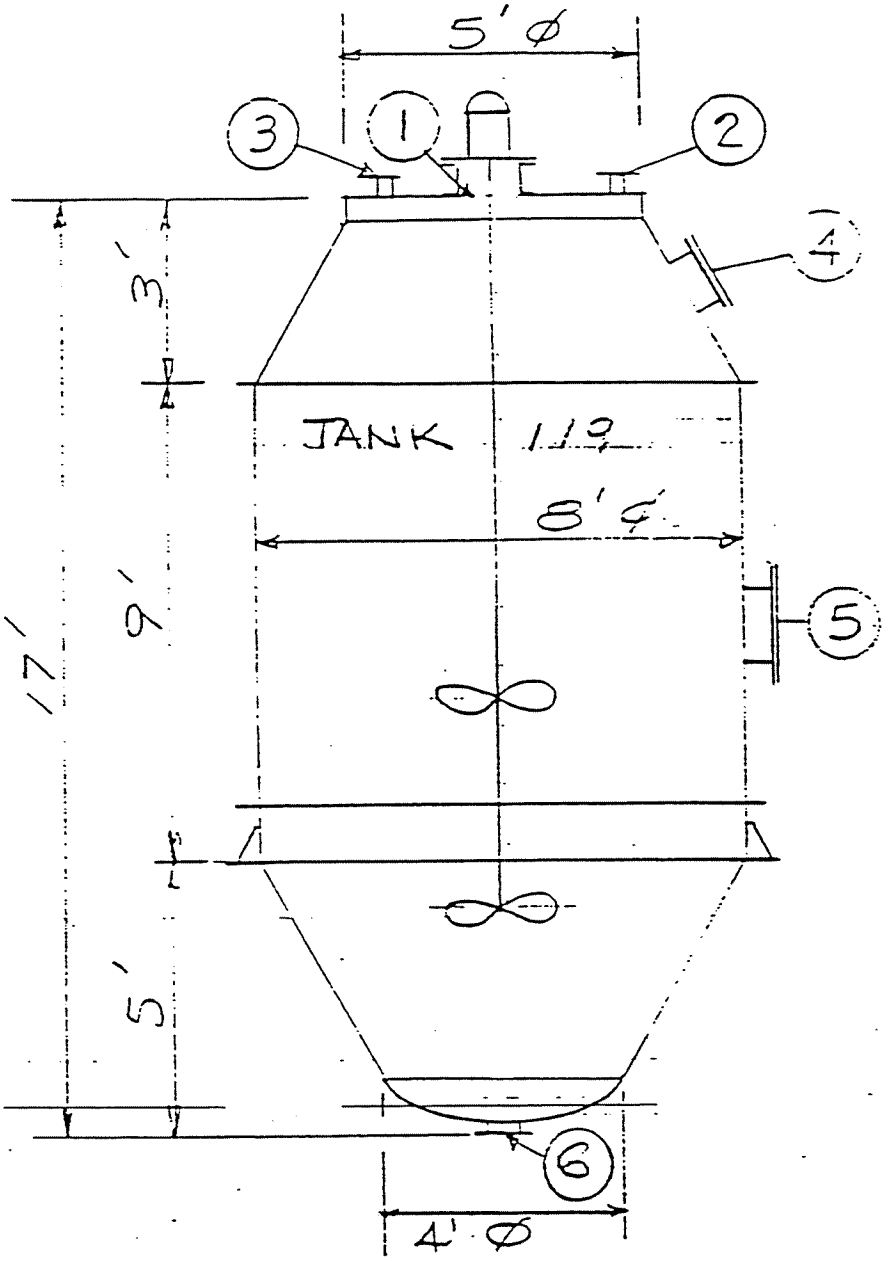
PHASE II REMOVAL ACTION
FRONTIER CHEMICAL-ROYAL AVENUE SITE
NIAGARA FALLS, NEW YORK

REMOVAL ACTION PLAN

SOURCE: FRONTIER CHEMICAL WASTE PROCESS, INC.

LEGEND:

1 - MIXER
2 - MAGNESIUM HYDROXIDE
3 - LEVEL INDICATOR
4 - HAND HOLE
5 - MANHOLE
6 - PRODUCT OUTLET



SPECS

STEEL - DIM. AS ABOVE

5,480 GALS

FIGURE 3-13: TANK T-119

PHASE II REMOVAL ACTION
FRONTIER CHEMICAL-ROYAL AVENUE SITE
NIAGARA FALLS, NEW YORK

REMOVAL ACTION PLAN

SOURCE: FRONTIER CHEMICAL WASTE PROCESS, INC

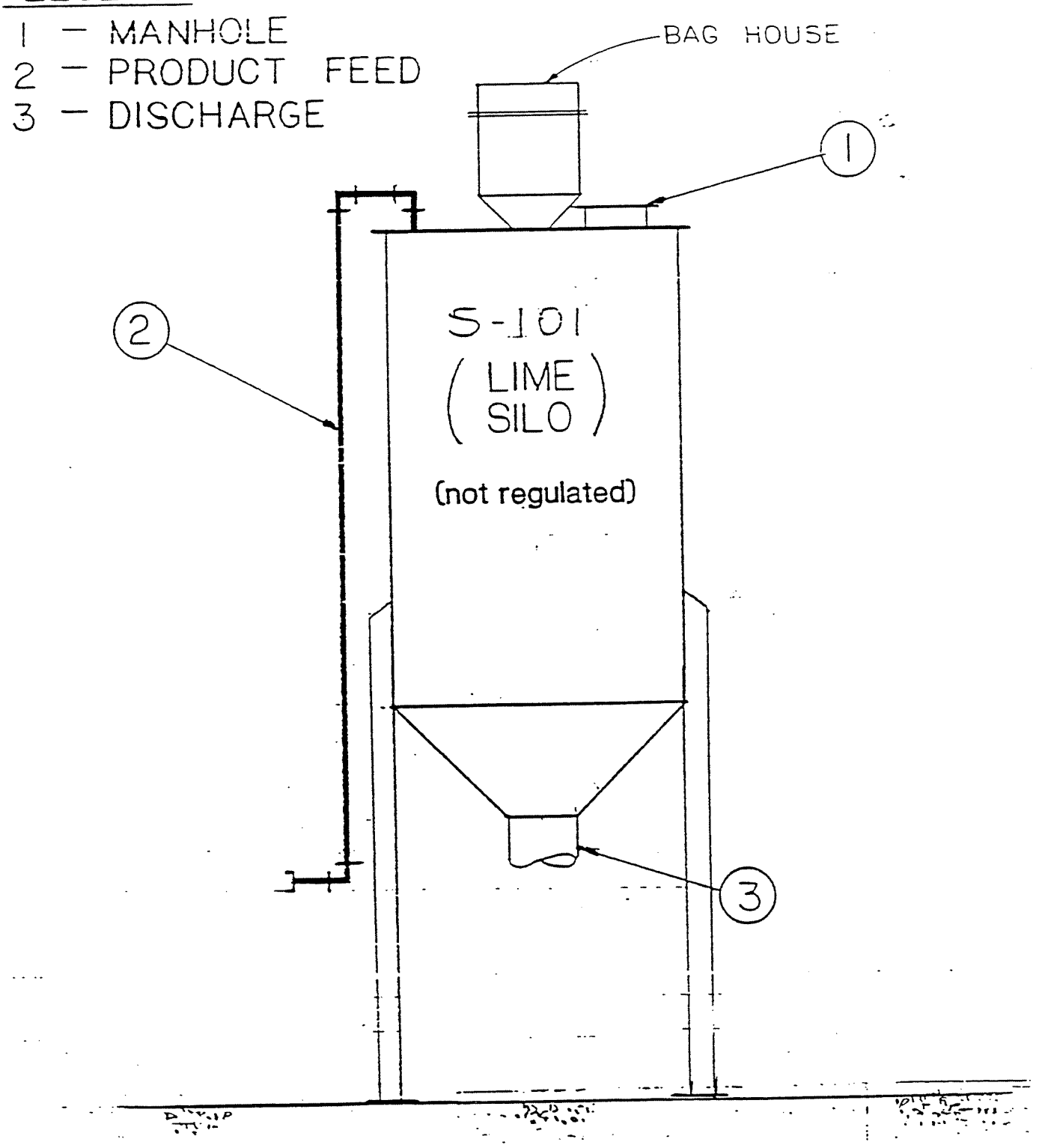


FIGURE 3-14: TANK S-101

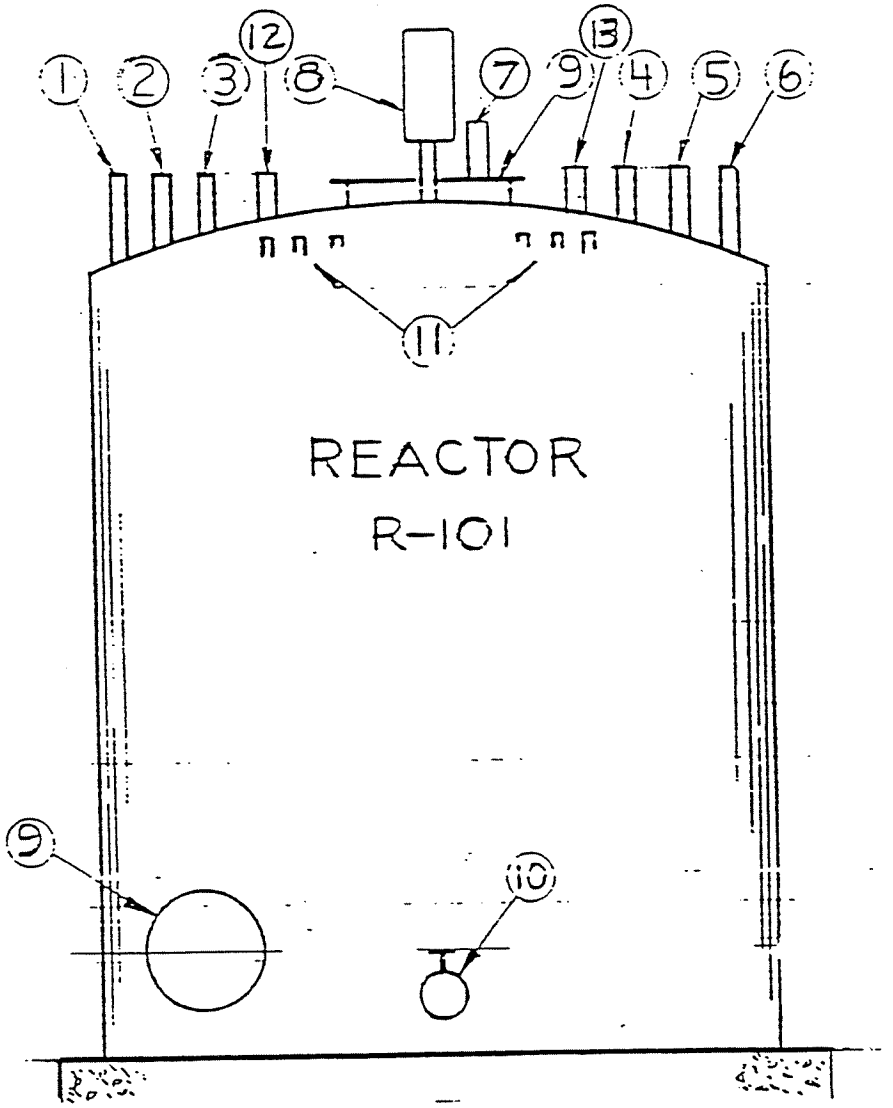
PHASE II REMOVAL ACTION
FRONTIER CHEMICAL-ROYAL AVENUE SITE
NIAGARA FALLS, NEW YORK

REMOVAL ACTION PLAN

SOURCE: FRONTIER CHEMICAL WASTE PROCESS, INC.

LEGEND:

1 - ACID (T-103 & T-104)
2 - LIME/$Mg(OH)_2$ (T-117)
3 - ACID (STRONG VIA T-105)
4 - SPARE
5 - SUMP WATERS (RECYCLE)
6 - BISULFITE (T-106)
7 VENT
8 - MIXER
9 - MANHOLE
10 - PRODUCT DISCH.
11 - INACTIVE COOLING UNI
12 - TREATED CYANIDE (T-30
13 - SPARE



SPECS:
F.R.P. - 11'-9"Ø X 17'
13,804 GALS.

FIGURE 3-15: TANK R-101

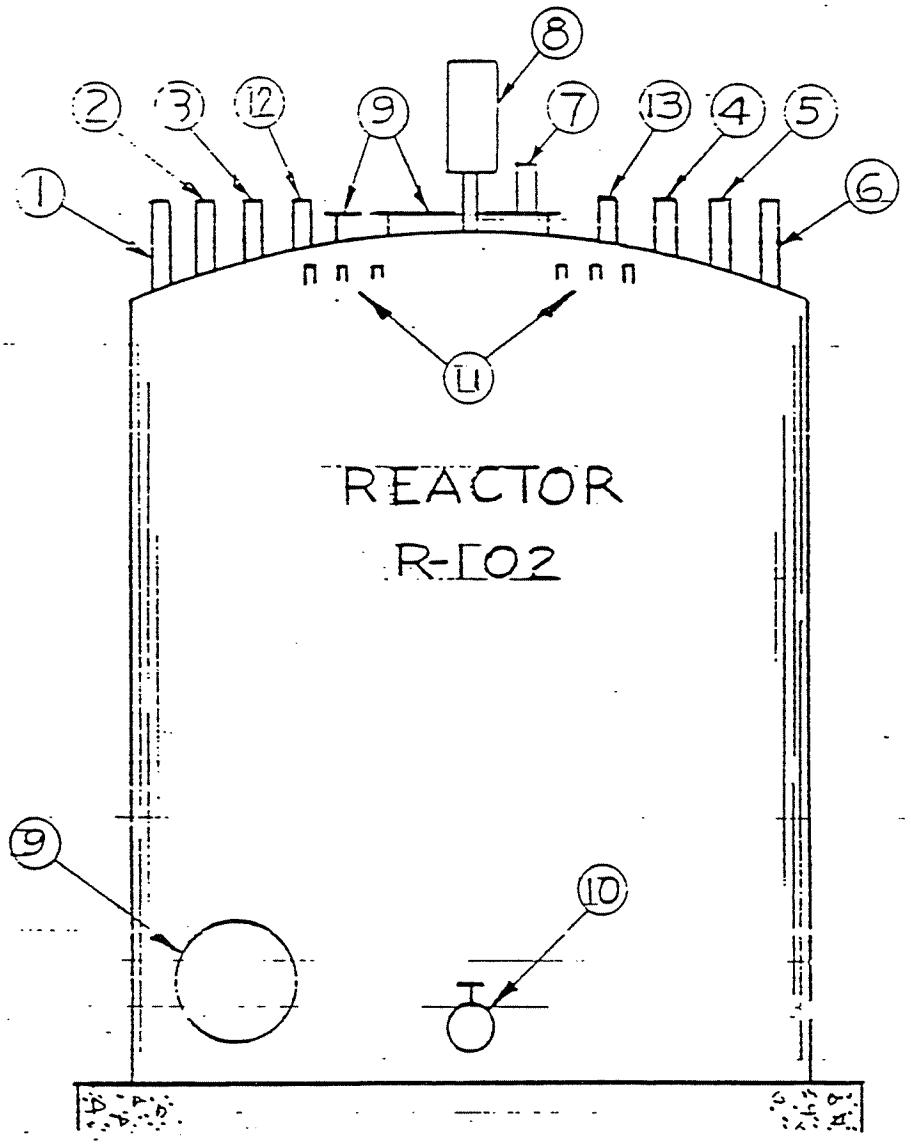
PHASE II REMOVAL ACTION
FRONTIER CHEMICAL-ROYAL AVENUE SITE
NIAGARA FALLS, NEW YORK

REMOVAL ACTION PLAN

SOURCE: FRONTIER CHEMICAL WASTE PROCESS, INC.

LEGEND:

1 - ACID (T-103 & T-104)
2 - LIME/$Mg(OH)_2$ (T-117)
3 - ACID (STRONG VIA T-105)
4 - SPARE
5 - SUMP WATERS (RECYCLE)
6 - BISULFITE (T-106)
7 - VENT
8 - MIXER
9 - MANHOLE
10 - PRODUCT DISCH
11 - INACTIVE COOLING UN
12 - TREATED CYANIDE (T-
13 - SPARE



SPECS:

ER P - 11'-8"Ø X 17'-2"
13,734 GALS.

FIGURE 3-16: TANK R-102

PHASE II REMOVAL ACTION
FRONTIER CHEMICAL-ROYAL AVENUE SITE
NIAGARA FALLS, NEW YORK

REMOVAL ACTION PLAN

SOURCE: FRONTIER CHEMICAL WASTE PROCESS, INC

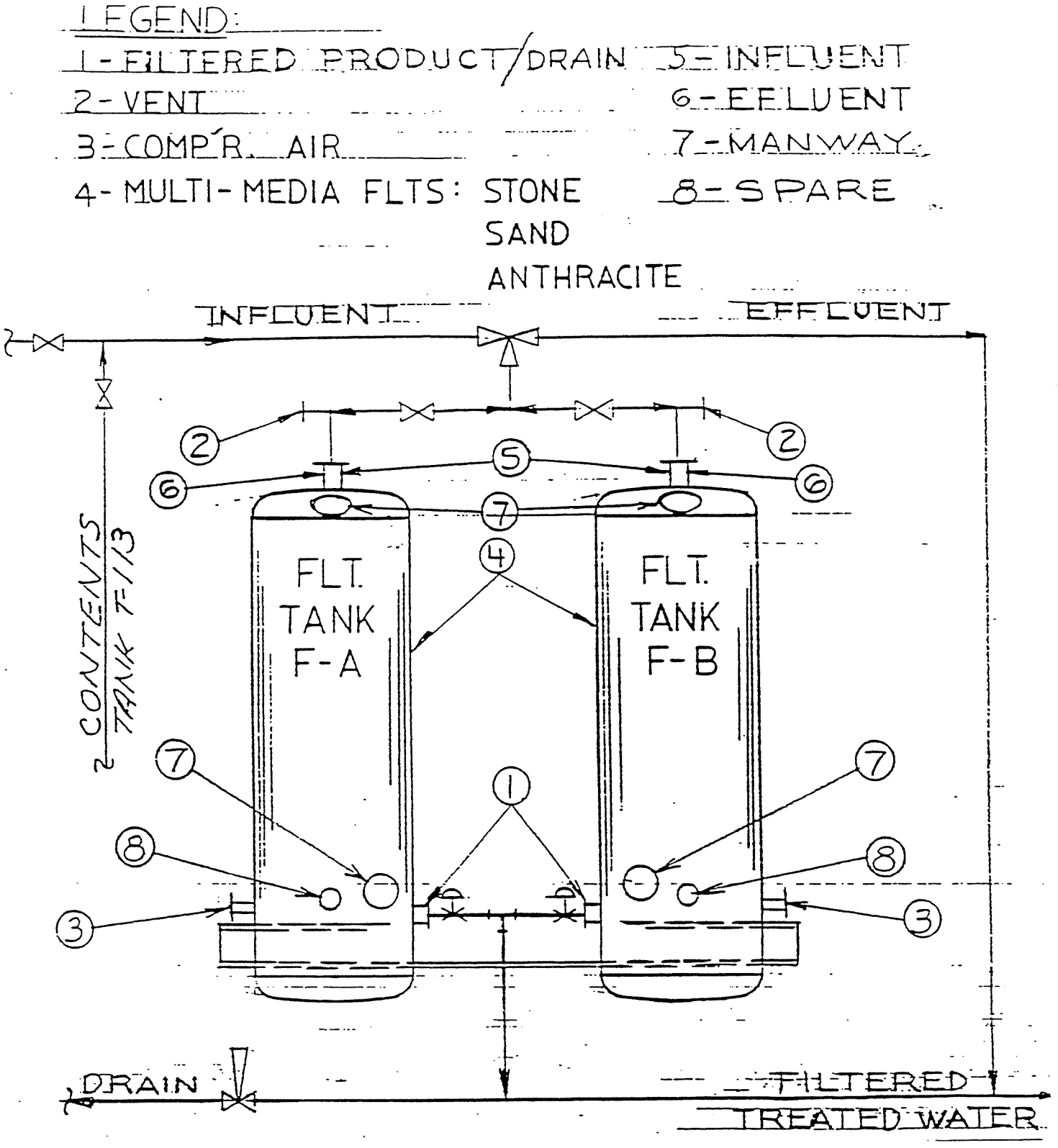


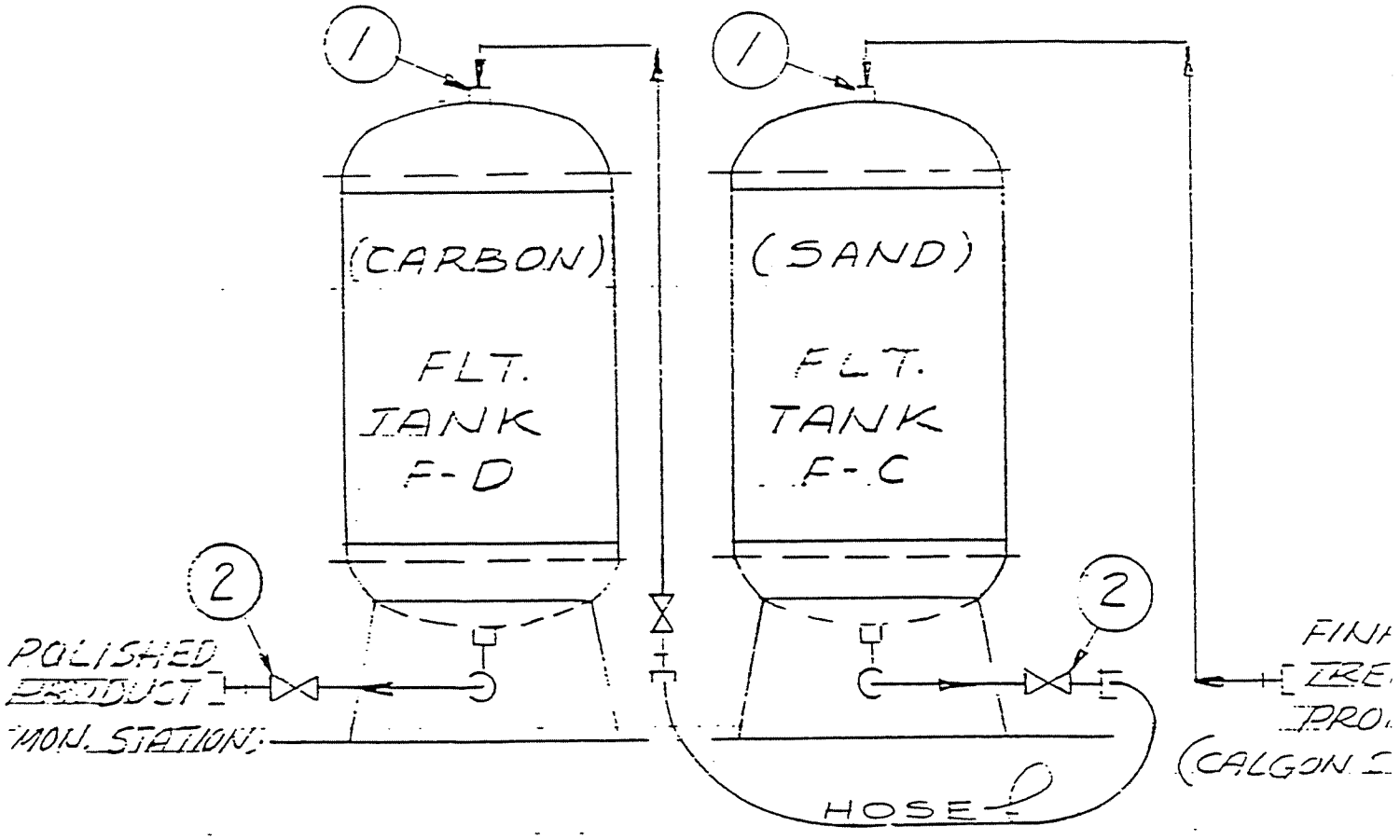
FIGURE 3-17: TANK F-A & F-B

PHASE II REMOVAL ACTION
FRONTIER CHEMICAL-ROYAL AVENUE SITE
NIAGARA FALLS, NEW YORK

REMOVAL ACTION PLAN

SOURCE: FRONTIER CHEMICAL WASTE PROCESS, INC.

LEGEND
1 - TREATED / FILTERED PRODUCT
2 - FILTERED PRODUCT / DRAIN



SPECS:
FRP - 3'Ø x 4' TAN to TAN
250 GALS/UNIT

FIGURE 3-18: TANK F-C & F-D

PHASE II REMOVAL ACTION
FRONTIER CHEMICAL-ROYAL AVENUE SITE
NIAGARA FALLS, NEW YORK

REMOVAL ACTION PLAN

SOURCE: FRONTIER CHEMICAL WASTE PROCESS, INC.

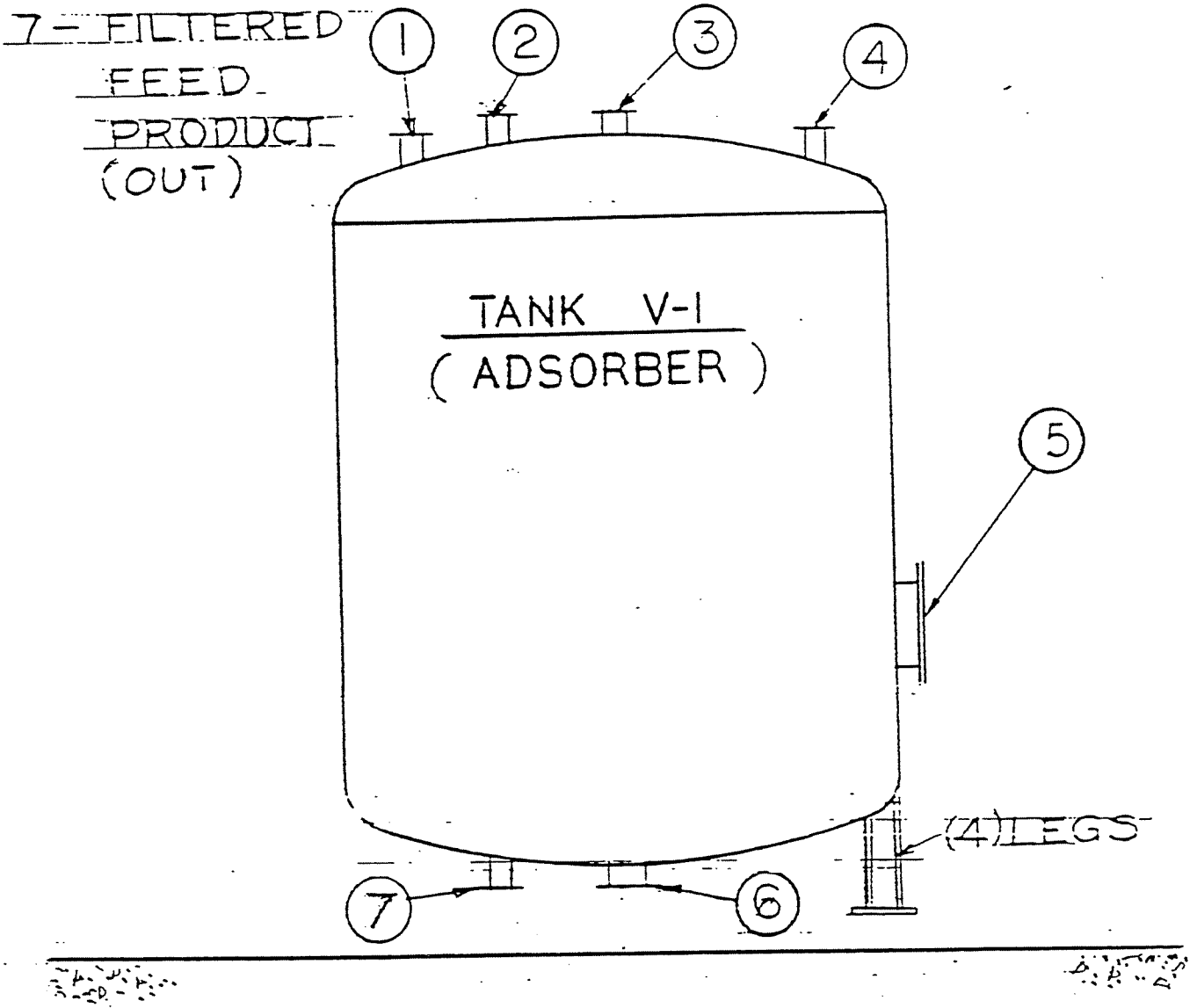


FIGURE 3-19: TANK V-1

PHASE II REMOVAL ACTION
FRONTIER CHEMICAL-ROYAL AVENUE SITE
NIAGARA FALLS, NEW YORK

REMOVAL ACTION PLAN

SOURCE: FRONTIER CHEMICAL WASTE PROCESS, INC

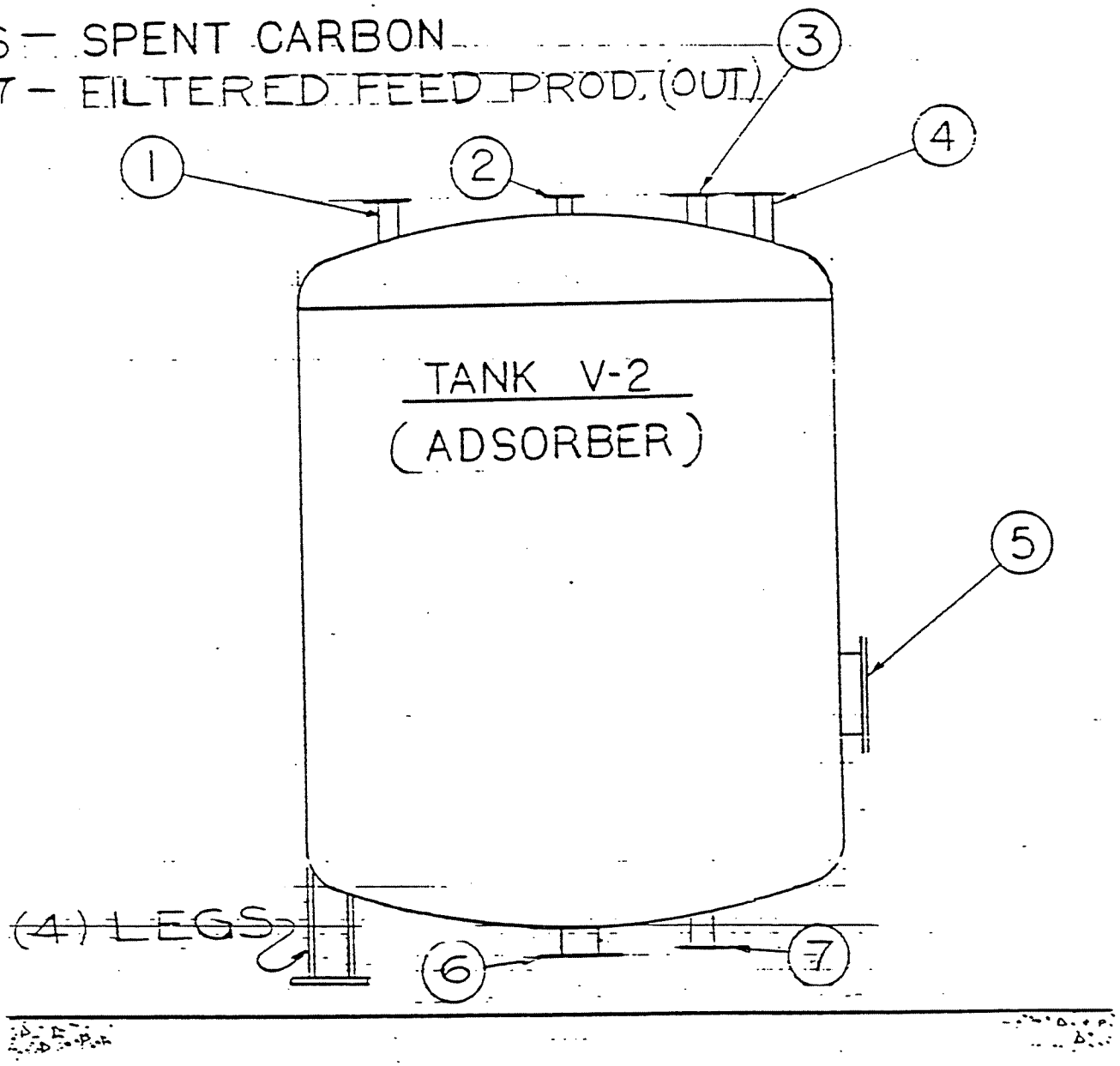


FIGURE 3-20: TANK V-2

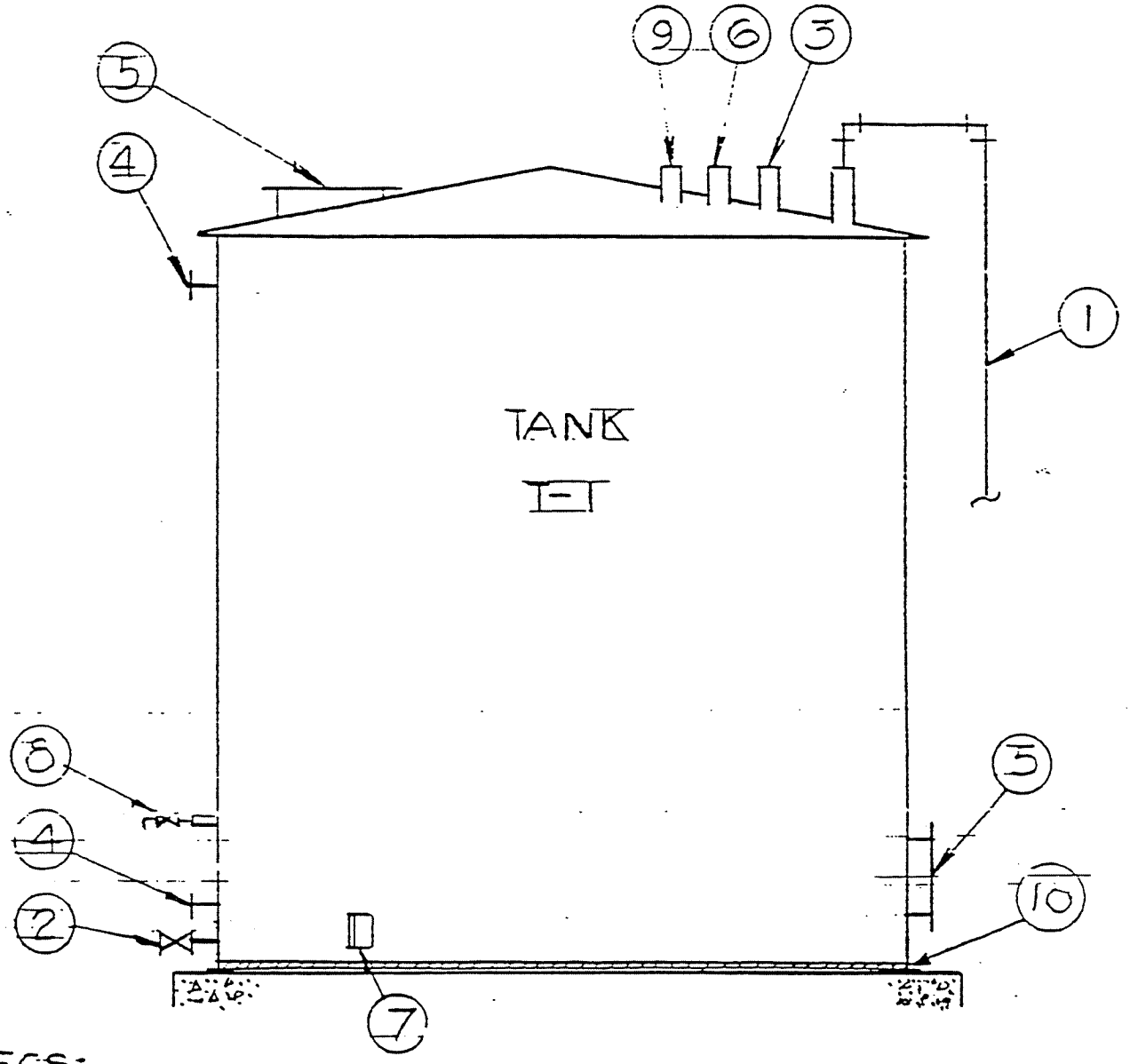
PHASE II REMOVAL ACTION
FRONTIER CHEMICAL-ROYAL AVENUE SITE
NIAGARA FALLS, NEW YORK

REMOVAL ACTION PLAN

SOURCE: FRONTIER CHEMICAL WASTE PROCESS, INC.

LEGEND:

1 - TREATED AQUEOUS IN
2 - CITY SEWER DISCH.
3 - SPARE
4 - SPARES
5 - MANHOLE
6 - LEVEL INDICATOR
7 - GROUNDING TERMINAL
8 - SAMPLE PORT
9 - VENT
10 - 1" STEEL GRID



SPECS:

STEEL - 30'-0" ϕ x 20'

105,700 GALS.

FIGURE 3-21: TANK T-1

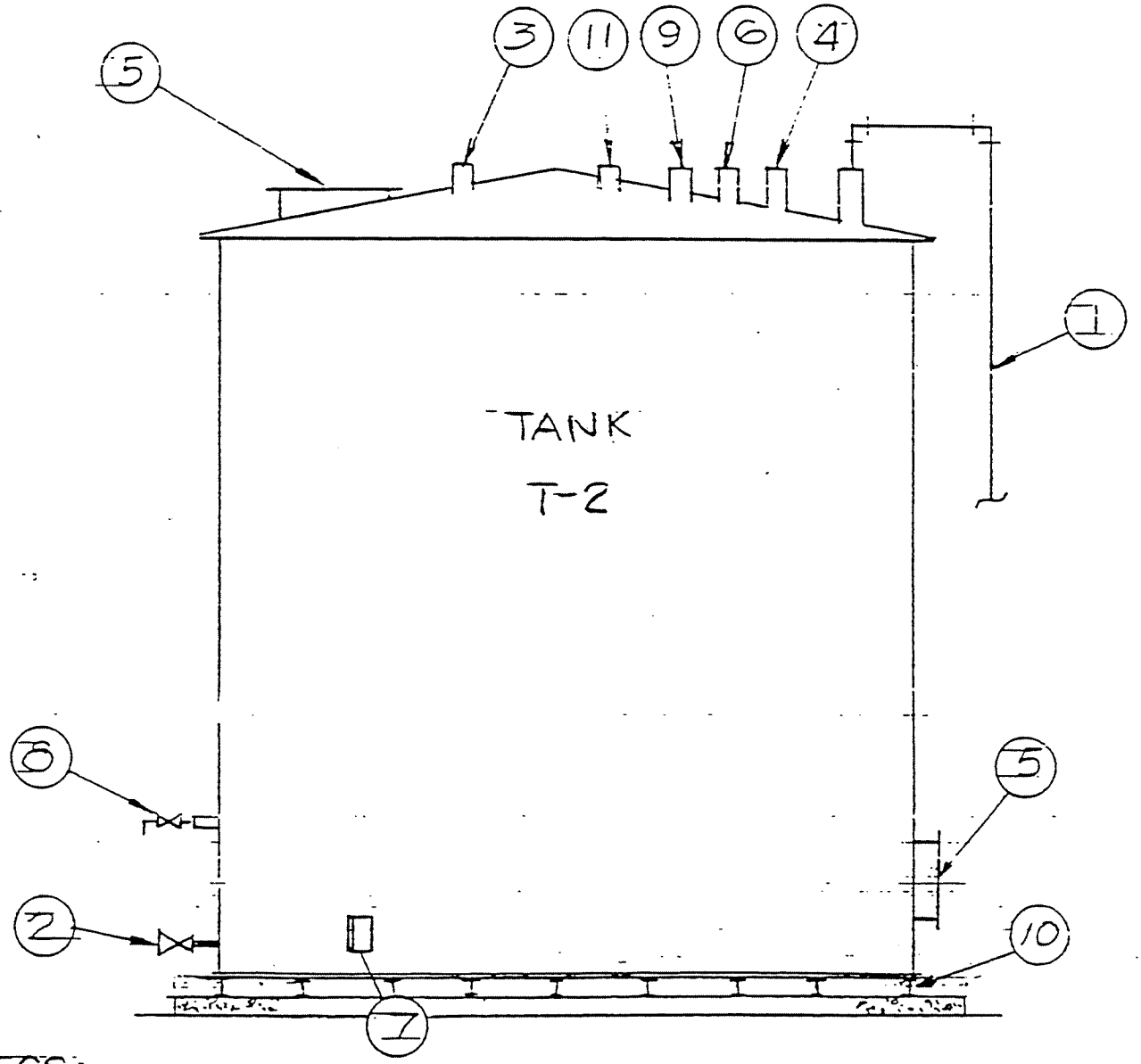
PHASE II REMOVAL ACTION
FRONTIER CHEMICAL-ROYAL AVENUE SITE
NIAGARA FALLS, NEW YORK

REMOVAL ACTION PLAN

SOURCE: FRONTIER CHEMICAL WASTE PROCESS, INC.

LEGEND:

1 - TREATED AQUEOUS IN
2 - CITY SEWER DISCH.
3 - SPARE
4 - SPARES
5 - MANHOLE
6 - LEVEL INDICATOR
7 - GROUNDING TERMINAL
8 - SAMPLE PORT
9 - VENT
10 - 6" I - BEAM GRILLAGE
11 - SPARE



SPECS:

STEEL - 30'-0" Ø x 19'-6"

102 950 GALS

FIGURE 3-22: TANK T-2

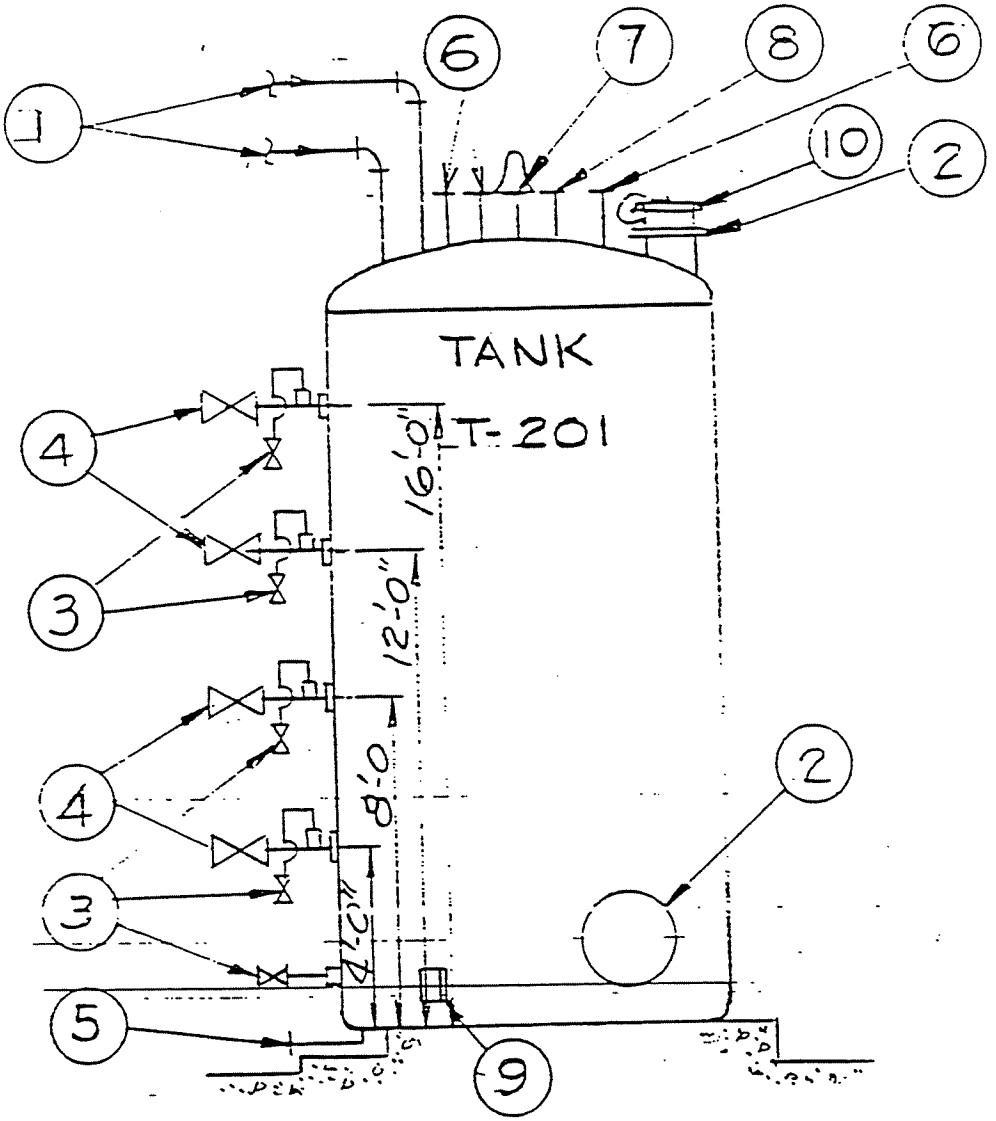
PHASE II REMOVAL ACTION
FRONTIER CHEMICAL-ROYAL AVENUE SITE
NIAGARA FALLS, NEW YORK

REMOVAL ACTION PLAN

SOURCE: FRONTIER CHEMICAL WASTE PROCESS, INC

LEGEND:

1 - PRODUCT FEED
2 - MANHOLE
3 - SAMPLE PORT
4 - DISCHARGE (CASCADE)
5 - DRAIN
6 - SPARES
7 - FLAME ARRESTOR
8 - HI LEVEL (ULTRASONIC - MICROPROCESSOR) ALARM/INDICATOR
9 - GROUNDING TERMINA
10 - EMERGENCY PRESSUR RELIEF COVER VENT



SPECS:
STEEL - 12' ϕ x 21'-6"
LG. 190 GALS.

FIGURE 3-23: TANK T-201

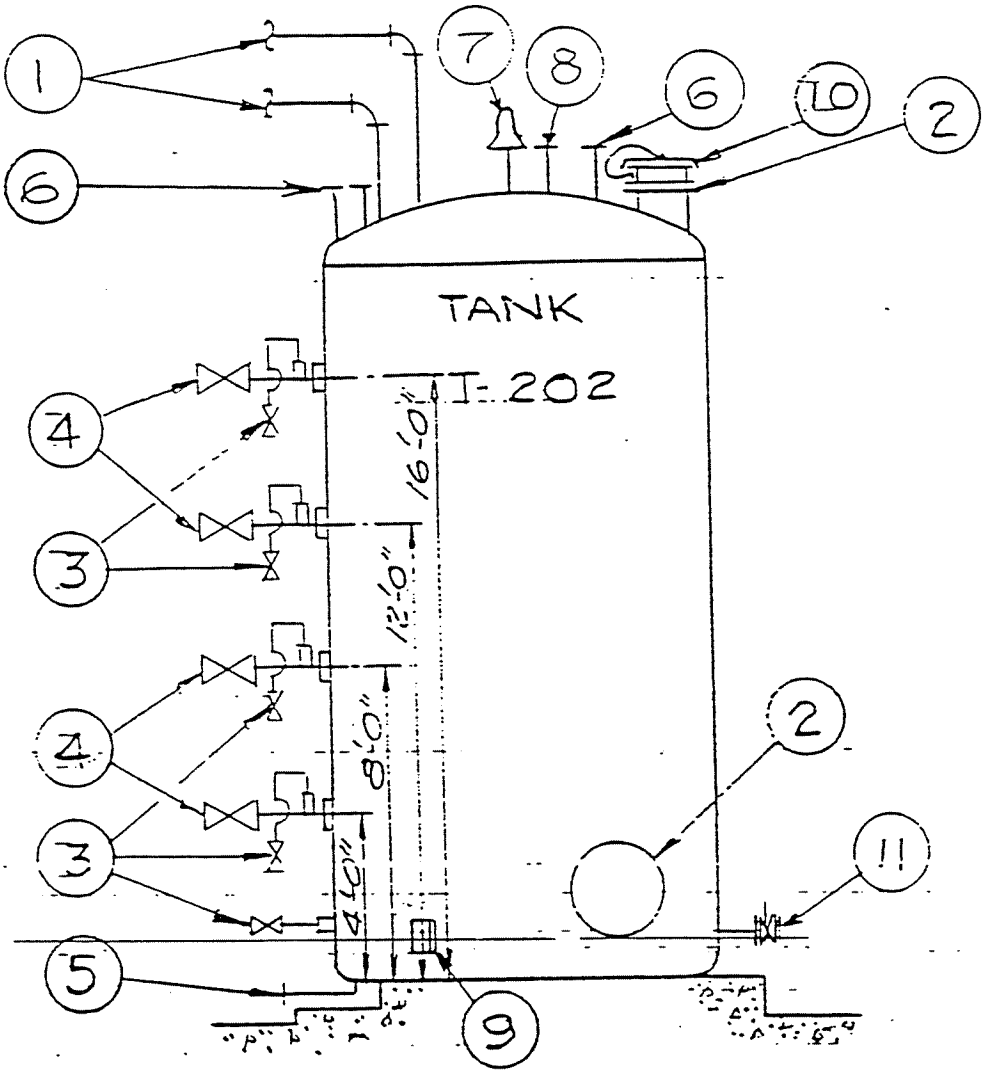
PHASE II REMOVAL ACTION
FRONTIER CHEMICAL-ROYAL AVENUE SITE
NIAGARA FALLS, NEW YORK

REMOVAL ACTION PLAN

SOURCE: FRONTIER CHEMICAL WASTE PROCESS, INC.

LEGEND:

1 - PRODUCT FEED
2 - MANHOLE
3 - SAMPLE PORT
4 - DISCHARGE (CASCADE)
5 - DRAIN
6 - SPARES
7 - FLAME ARRESTOR
8 - HI LEVEL (ULTRASONIC-MICROPROCESSOR) ALARM INDICATOR
9 - GROUNDING TERMINA
10 - EMERGENCY PRESSUF RELIEF COVER VENT
11 - 6" TANK CLEANOUT NOZZ



SPECS:
STEEL - 12'Ø x 21'-6"
18,190 GALS

FIGURE 3-24: TANK T-202

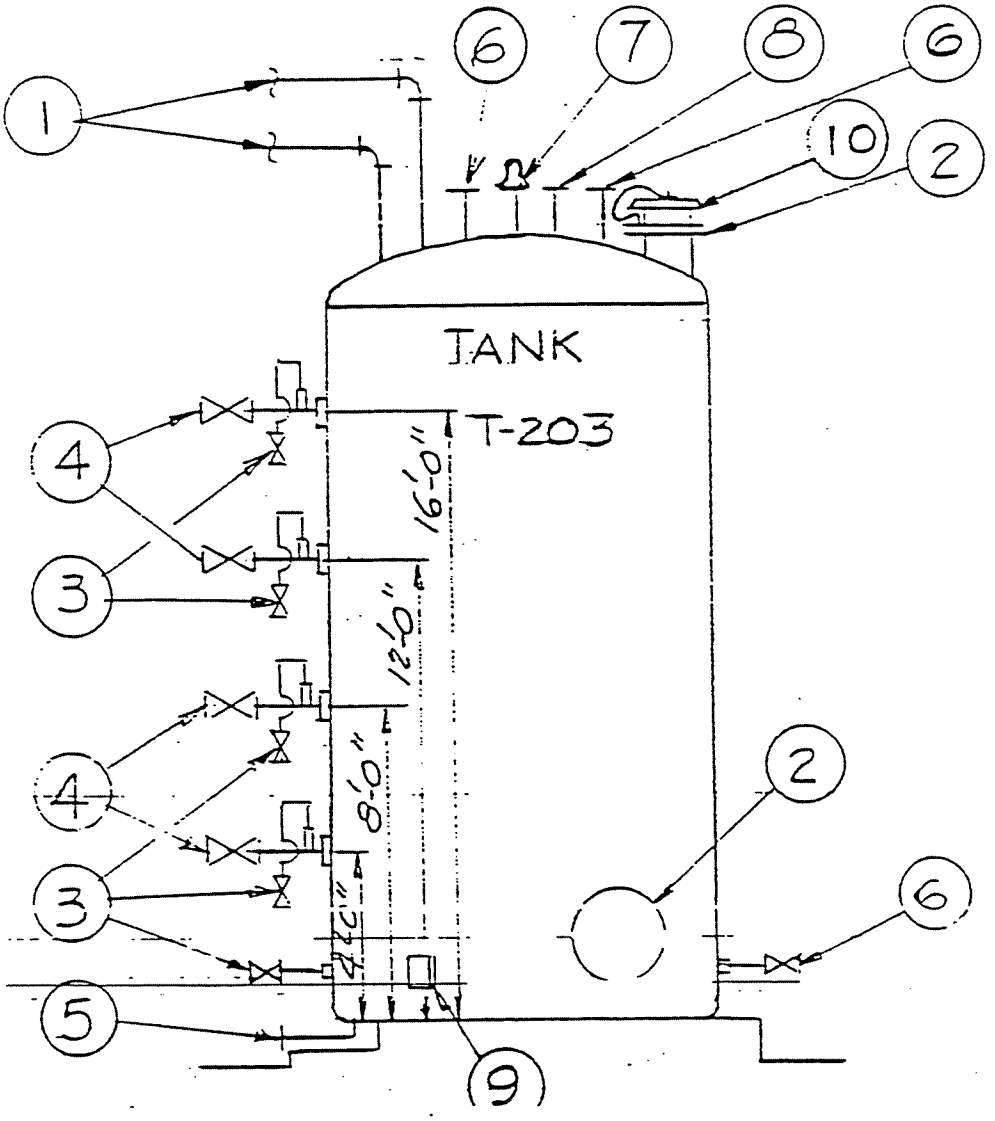
PHASE II REMOVAL ACTION
FRONTIER CHEMICAL-ROYAL AVENUE SITE
NIAGARA FALLS, NEW YORK

REMOVAL ACTION PLAN

SOURCE: FRONTIER CHEMICAL WASTE PROCESS, INC

LEGEND:

1 - PRODUCT FEED
2 = MANHOLE
3 = SAMPLE PORT
4 - DISCHARGE (CASCADE)
5 - DRAIN
6 - SPARES
7 = FLAME ARRESTOR
8 - HI LEVEL (ULTASONIC MICROPROCESSOR) ALARM/INDICATOR
9 - GROUNDING TERMINA
10 - EMERGENCY PRESSU RELIEF COVER VENT



SPECS
STEEL - 12' Ø x 21'-6"
18,190 GALS

FIGURE 3-25: TANK T-203

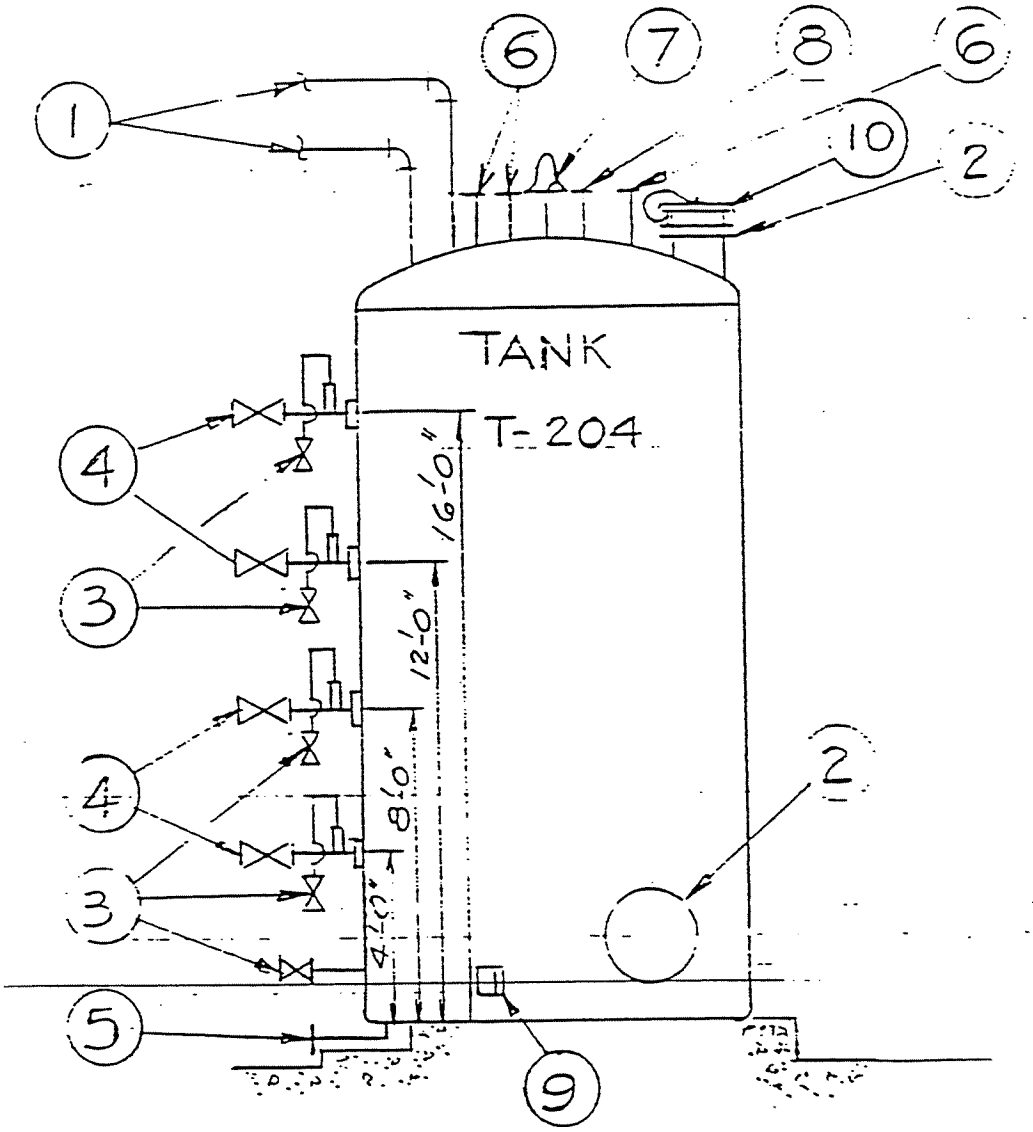
PHASE II REMOVAL ACTION
FRONTIER CHEMICAL-ROYAL AVENUE SITE
NIAGARA FALLS, NEW YORK

REMOVAL ACTION PLAN

SOURCE: FRONTIER CHEMICAL WASTE PROCESS, INC

LEGEND:

1 - PRODUCT FEED
2 - MANHOLE
3 - SAMPLE PORT
4 - DISCHARGE (CASCADE)
5 - DRAIN
6 - SPARES
7 - FLAME ARRESTOR
8 - HI LEVEL (ULTRASONIC MICROPROCESSOR) ALARM/INDICATOR
9 - GROUNDING TERMINAL
10 - EMERGENCY PRESSURE RELIEF COVER VENT



SPECS
STEEL - 12' ø x 21'-6"
18,190 GALS

FIGURE 3-26: TANK T-204

PHASE II REMOVAL ACTION
FRONTIER CHEMICAL-ROYAL AVENUE SITE
NIAGARA FALLS, NEW YORK

REMOVAL ACTION PLAN

SOURCE: FRONTIER CHEMICAL WASTE PROCESS, INC.

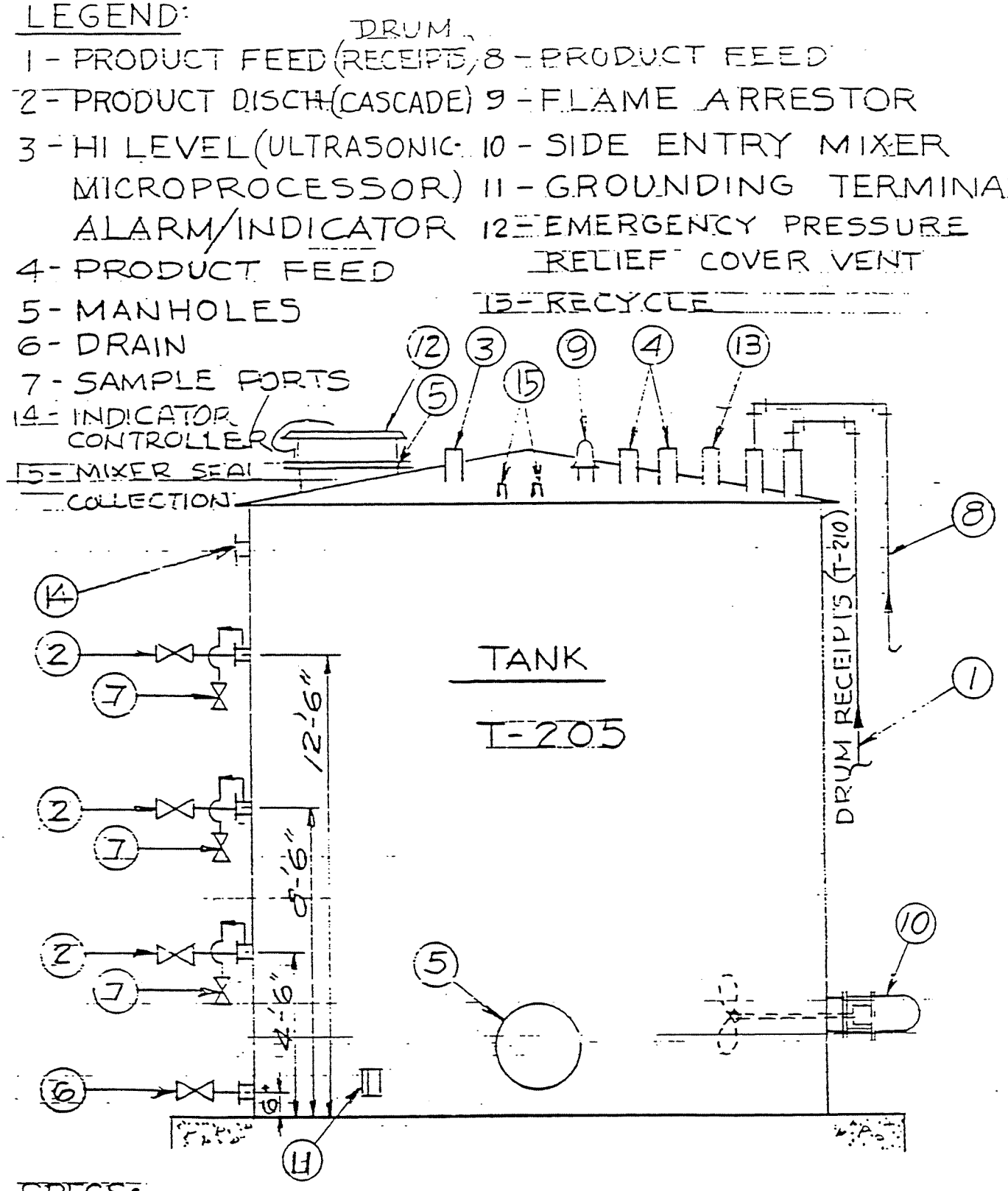


FIGURE 3-27: TANK T-205

PHASE II REMOVAL ACTION
FRONTIER CHEMICAL-ROYAL AVENUE SITE
NIAGARA FALLS, NEW YORK

REMOVAL ACTION PLAN

SOURCE: FRONTIER CHEMICAL WASTE PROCESS, INC.

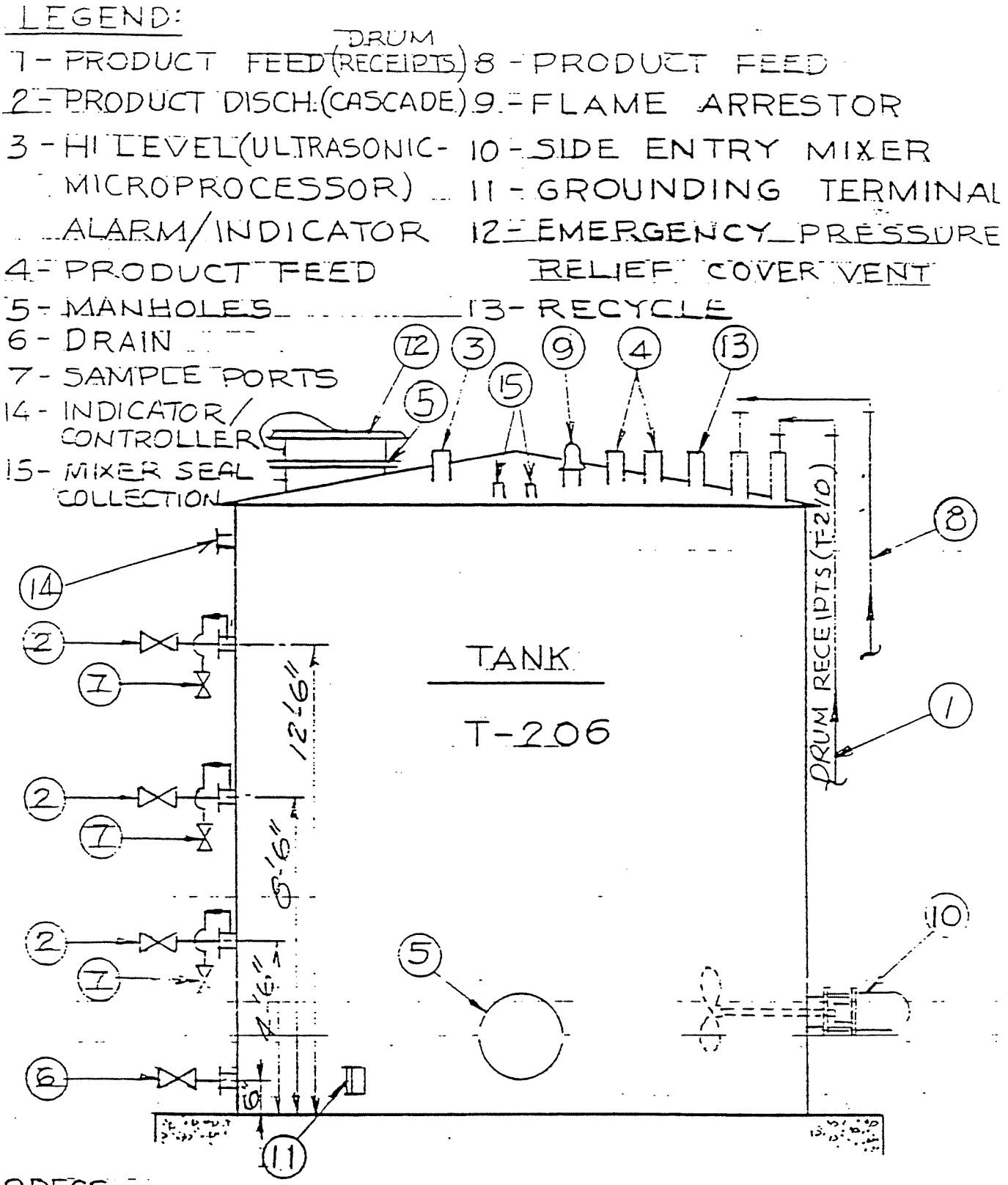


FIGURE 3-28: TANK T-206

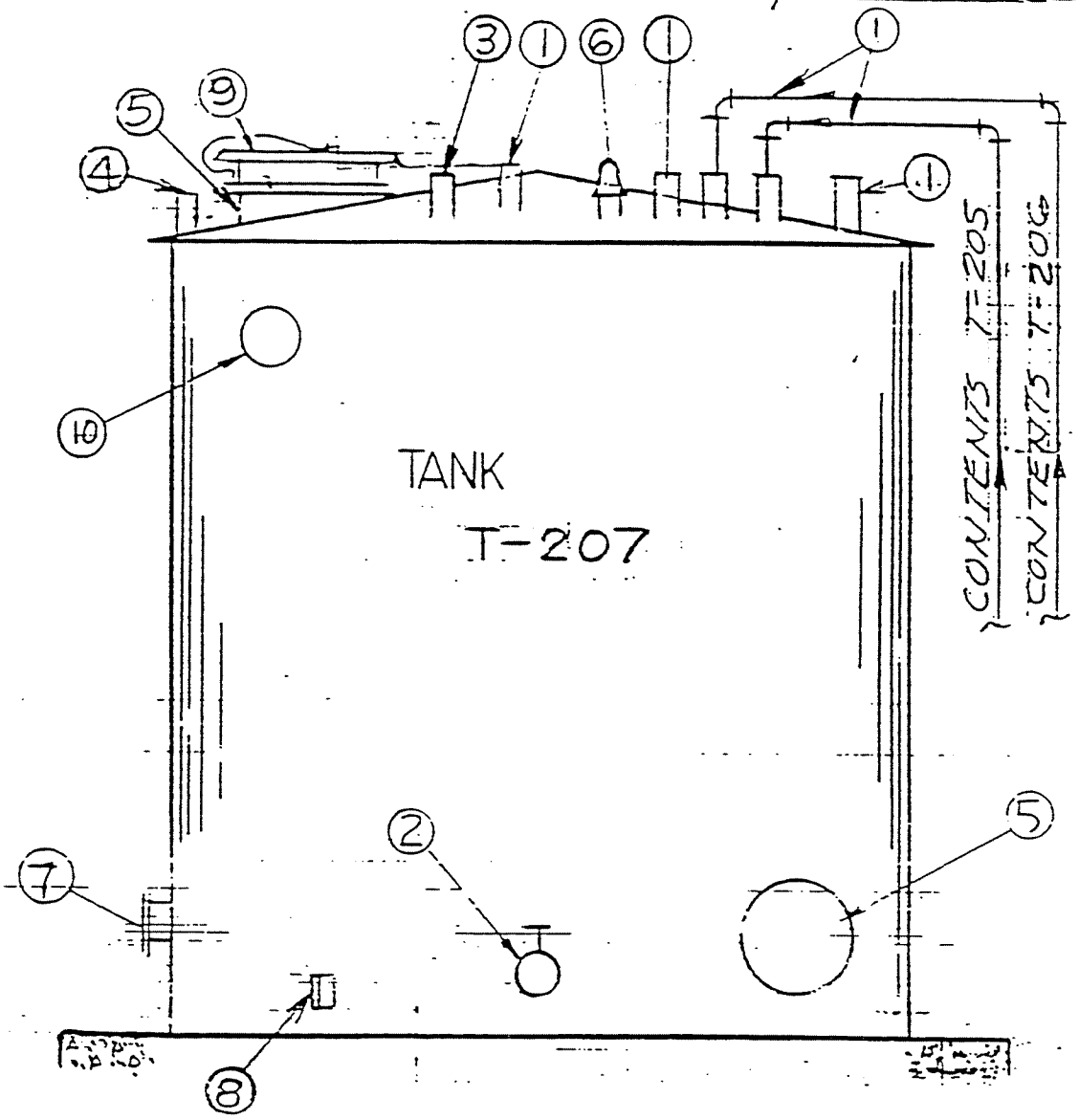
PHASE II REMOVAL ACTION
FRONTIER CHEMICAL-ROYAL AVENUE SITE
NIAGARA FALLS, NEW YORK

REMOVAL ACTION PLAN

SOURCE: FRONTIER CHEMICAL WASTE PROCESS, INC.

LEGEND:

1 - PRODUCT FEED
2 - PRODUCT DISCH.
3 - HI LEVEL (ULTRASONIC MICROPROCESSOR) ALARM INDICATOR
4 - SPARE
5 - MANHOLE
6 - FLAME ARRESTOR
7 - SPARE
8 - GROUNDING TERMINA
9 - EMERGENCY PRESSUR RELIEF COVER VENT
10 - NICATOR / CONTROLLER



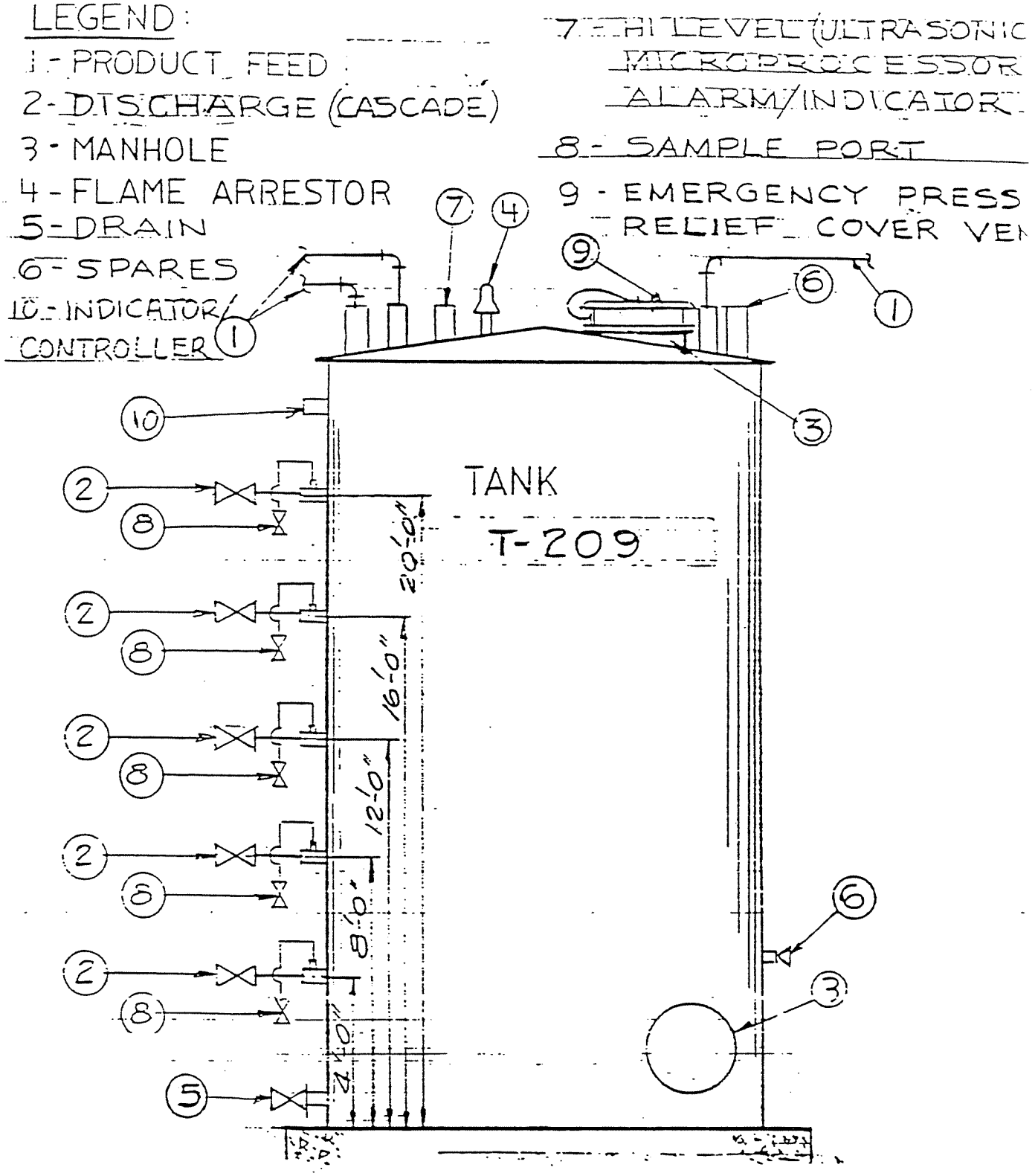
SPECS:
STEEL - 22'Ø X 17'-0"
48,365 GALS.

FIGURE 3-29: TANK T-207

PHASE II REMOVAL ACTION
FRONTIER CHEMICAL-ROYAL AVENUE SITE
NIAGARA FALLS, NEW YORK

REMOVAL ACTION PLAN

SOURCE: FRONTIER CHEMICAL WASTE PROCESS, INC



SPECS:

STEEL - 12'Ø X 24'-0"

20,304 GALS.

FIGURE 3-30: TANK T-209

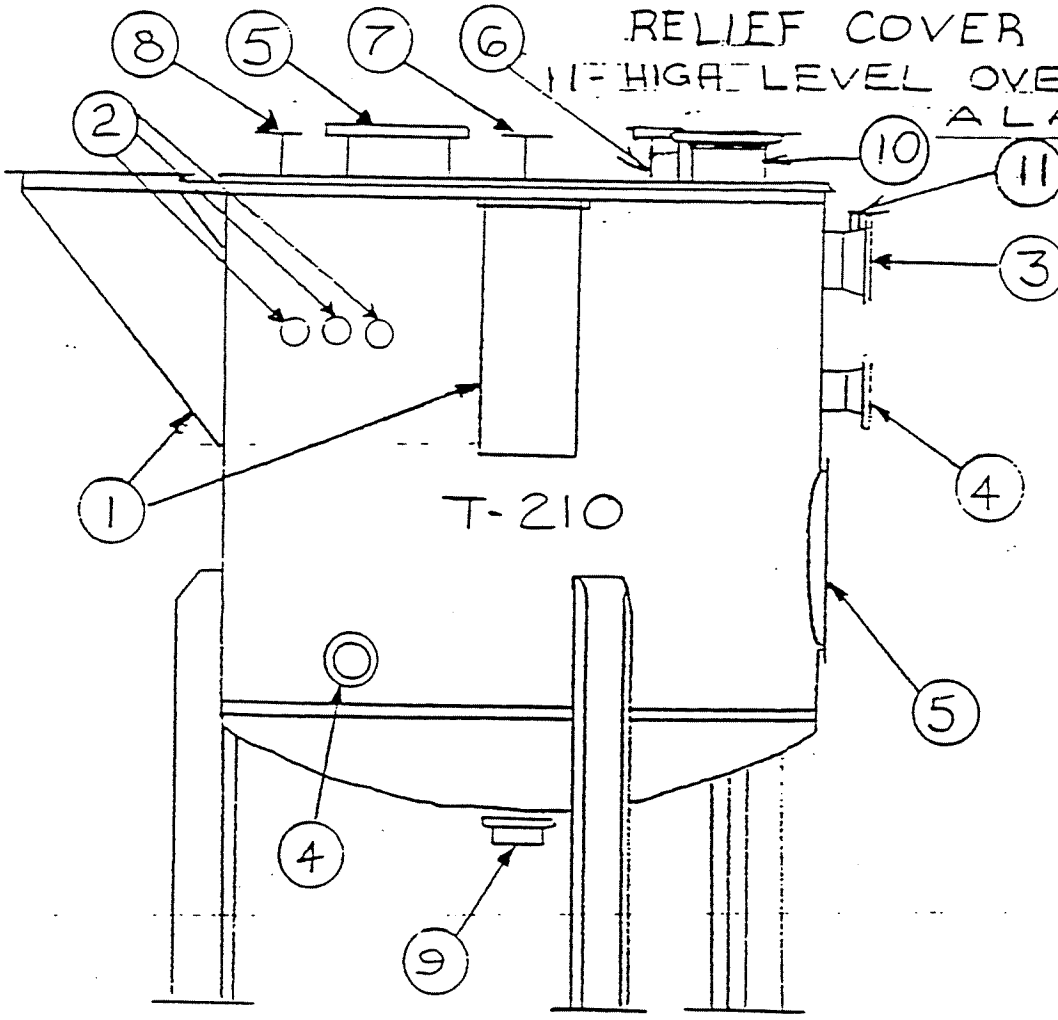
PHASE II REMOVAL ACTION
FRONTIER CHEMICAL-ROYAL AVENUE SITE
NIAGARA FALLS, NEW YORK

REMOVAL ACTION PLAN

SOURCE: FRONTIER CHEMICAL WASTE PROCESS, INC

LEGEND:

1 - MATERIALS SHUTE
2 - FEED NOZZLES
3 - PRODUCT DISCH.
4 - RECYCLE PORT
5 - MANHOLE
6 - FLAME ARRESTOR
7 - CARDOX HIGH TEMP. ALARM
8 - HIGH TEMP. ALARM
9 - DRAIN
10 - EMERGENCY PRESSURE RELIEF COVER VENT
11 - HIGH LEVEL OVER FLOW ALARM



11 - HIGH LEVEL ALARM

SPECS:

STEEL - 6'-0" ϕ x 5'-3"

1,200 GALS

FIGURE 3-31: TANK T-210

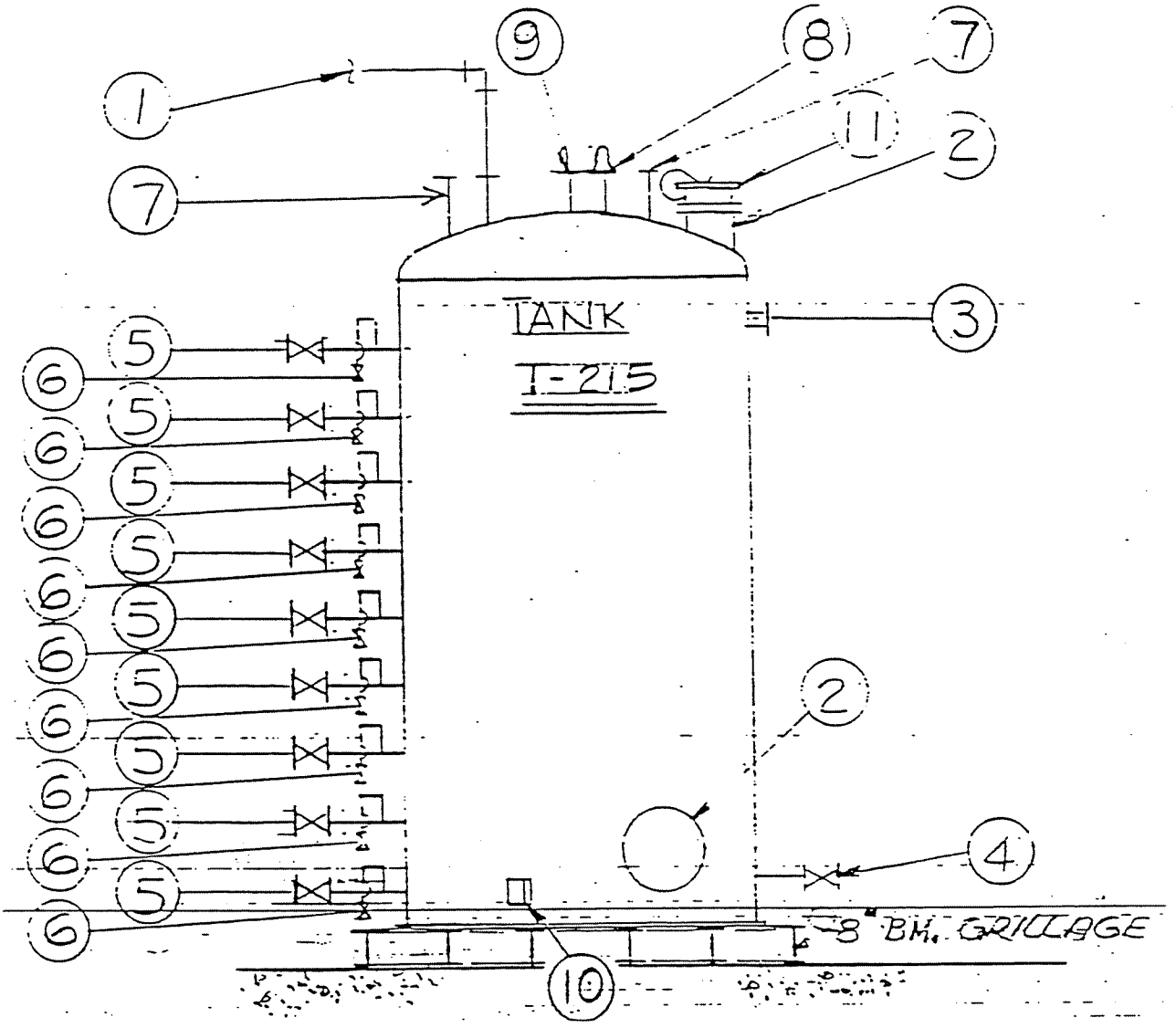
PHASE II REMOVAL ACTION
FRONTIER CHEMICAL-ROYAL AVENUE SITE
NIAGARA FALLS, NEW YORK

REMOVAL ACTION PLAN

SOURCE: FRONTIER CHEMICAL WASTE PROCESS, INC.

LEGEND:

1 – PRODUCT FEED
2 – MANHOLE
3 – BACK-UP HI LEVEL ALARM
4 – DRAIN
5 – DISCHARGE (CASCADE)
6 – SAMPLE PORT
7 – SPARE
8 – FLAME ARRESTOR
9 – HI LEVEL (ULTRASON
MICROPROCESSOR)
ALARM/INDICATOR
10 – GROUNDING TERMINA
11 – EMERGENCY PRESS
RELIEF COVER VENT



SPECS
STEEL – 12' ϕ x 20'-0" ST. SIDE
16,920 GALS.

FIGURE 3-32: TANK T-215

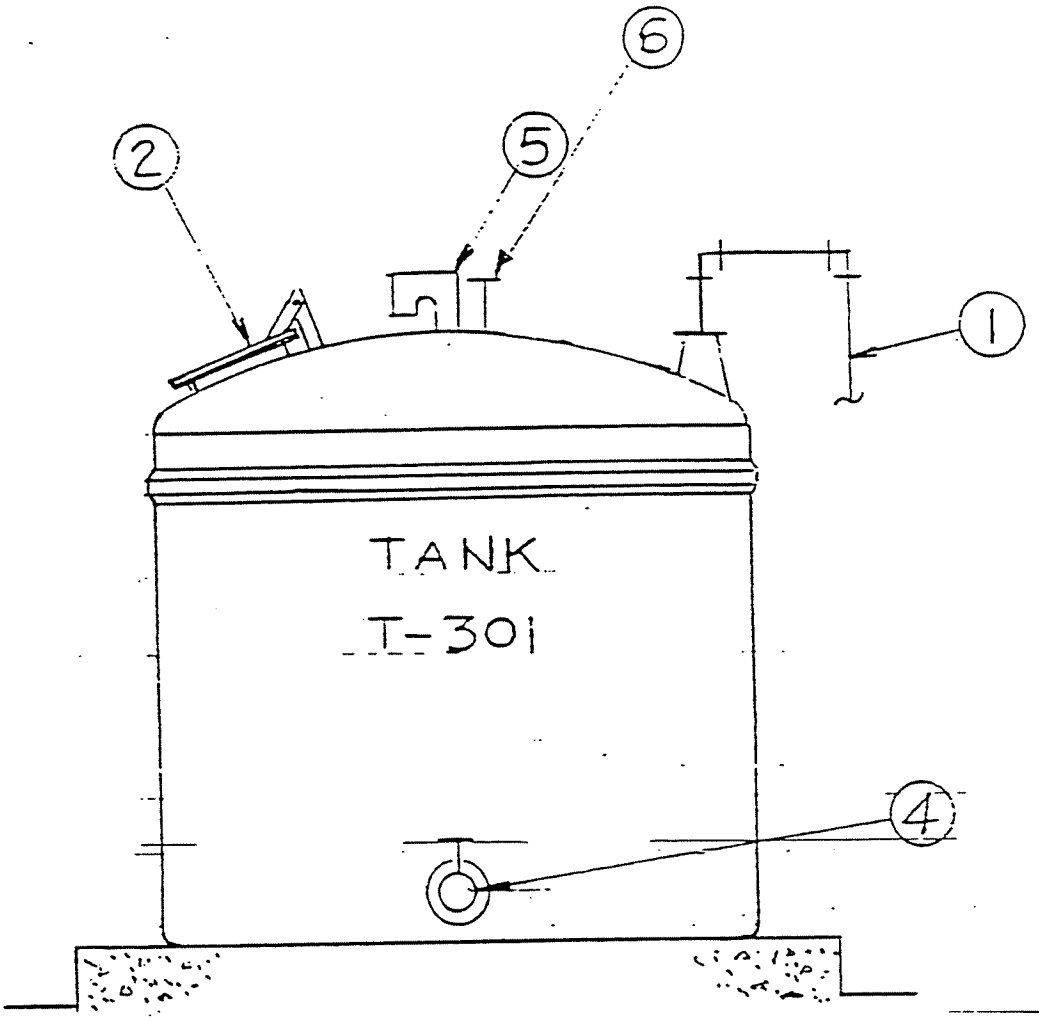
PHASE II REMOVAL ACTION
FRONTIER CHEMICAL-ROYAL AVENUE SITE
NIAGARA FALLS, NEW YORK

REMOVAL ACTION PLAN

SOURCE: FRONTIER CHEMICAL WASTE PROCESS, INC.

LEGEND:

1 = PRODUCT FEED
2 = MANHOLE (HINGED)
3 = VOID
4 - PRODUCT DISCHARGE
5 = VENT
6 - HIGH LEVEL (ULTRASONIC - MICROPROCES
ALARM / INDICATOR



SPECS:

FRP 12'-8" ø x 10'
9,430 GALS.

FIGURE 3-33: TANK T-301

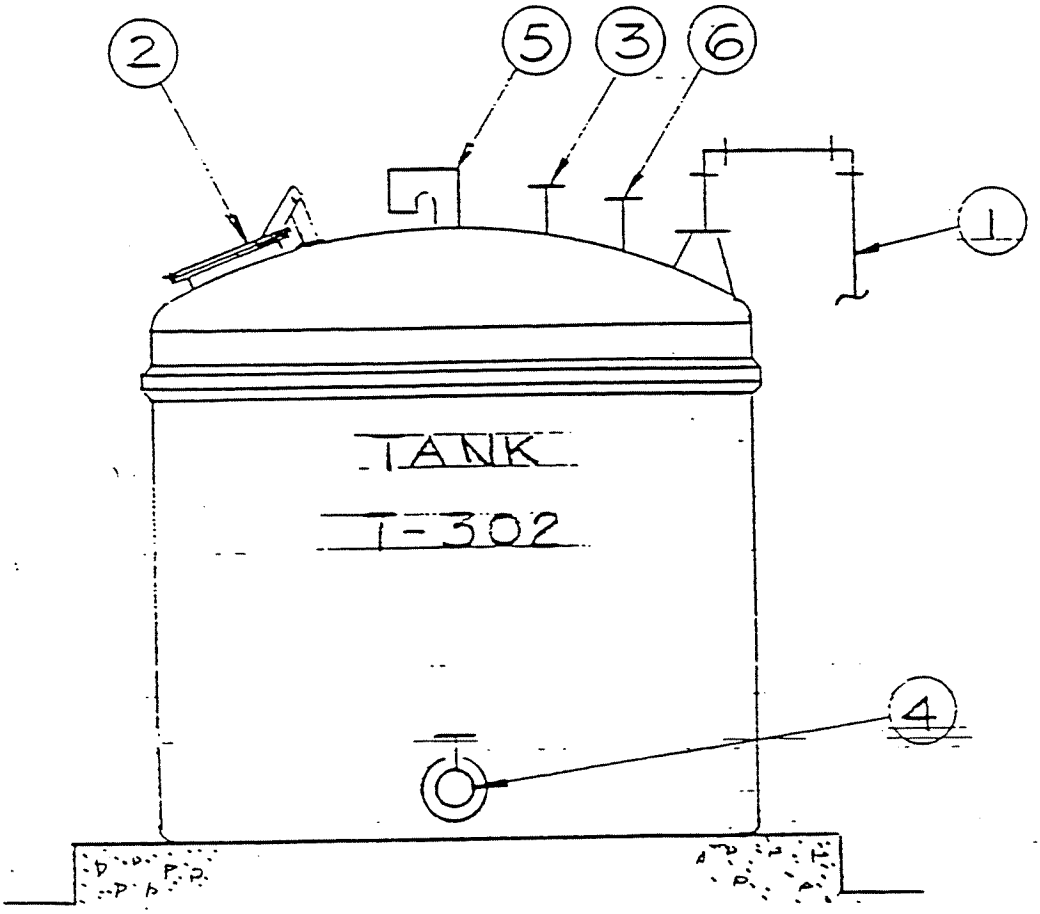
PHASE II REMOVAL ACTION
FRONTIER CHEMICAL-ROYAL AVENUE SITE
NIAGARA FALLS, NEW YORK

REMOVAL ACTION PLAN

SOURCE: FRONTIER CHEMICAL WASTE PROCESS, INC

LEGEND:

1 = PRODUCT FEED
2 = MANHOLE (HINGED)
3 = SPARE
4 = PRODUCT DISCHARGE
5 = VENT
6 = HI LEVEL (ULTRASONIC - MICROPROCESSOR ALARM/INDICATOR



SPECS:

FRP 12'-8" Φ x 10'
9,430 GALS.

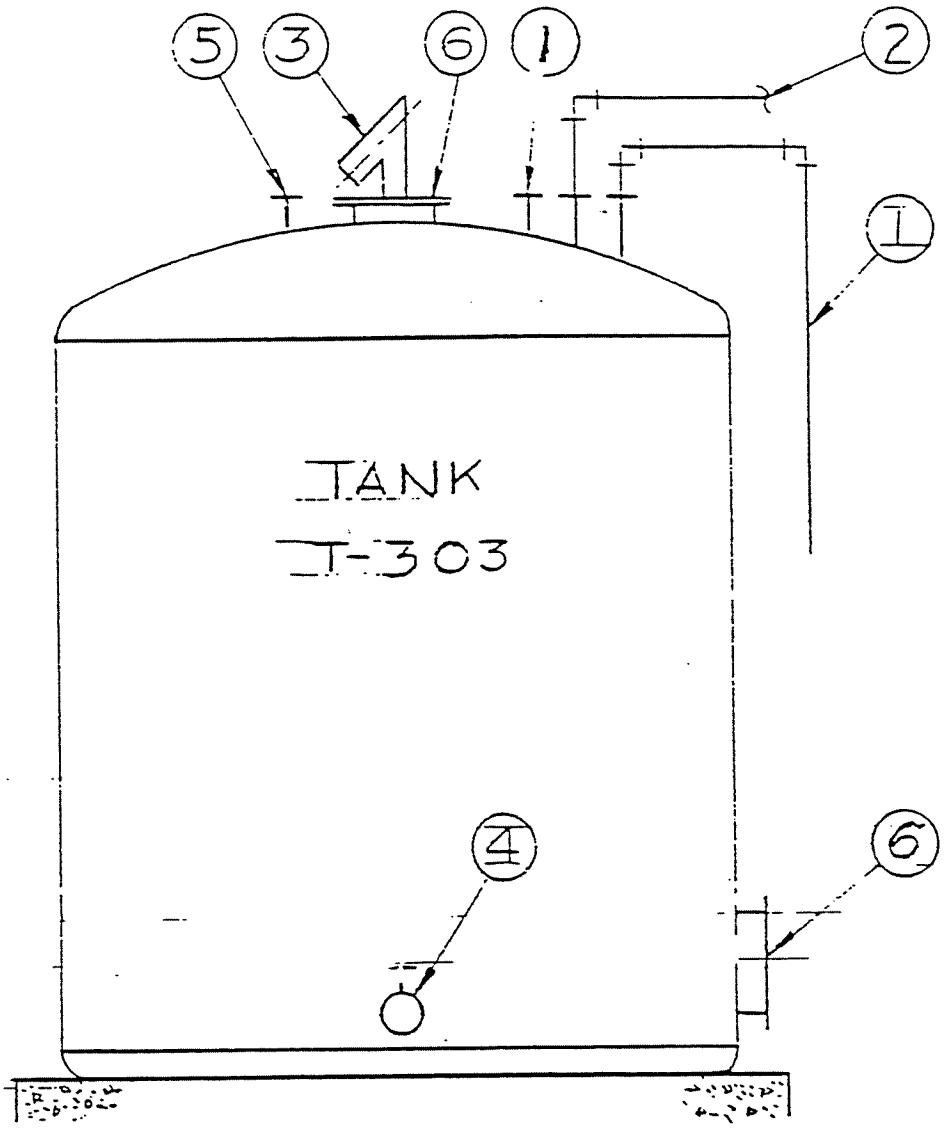
FIGURE 3-34: TANK T-302

PHASE II REMOVAL ACTION
FRONTIER CHEMICAL-ROYAL AVENUE SITE
NIAGARA FALLS, NEW YORK

SOURCE: FRONTIER CHEMICAL WASTE PROCESS, INC.

LEGEND

1 - CYANIDE (RECEIPTS)
2 - FRESH WATER
3 - VENT
4 - PRODUCT DISCH.
5 - HI LEVEL (ULTRASONIC - MICROPROCESSOR) ALARM/INDICATOR
6 - MANHOLES



SPECS:
FRP-10'-0"Ø x 17'-0"
9,962 GALS.

FIGURE 3-35: TANK T-303

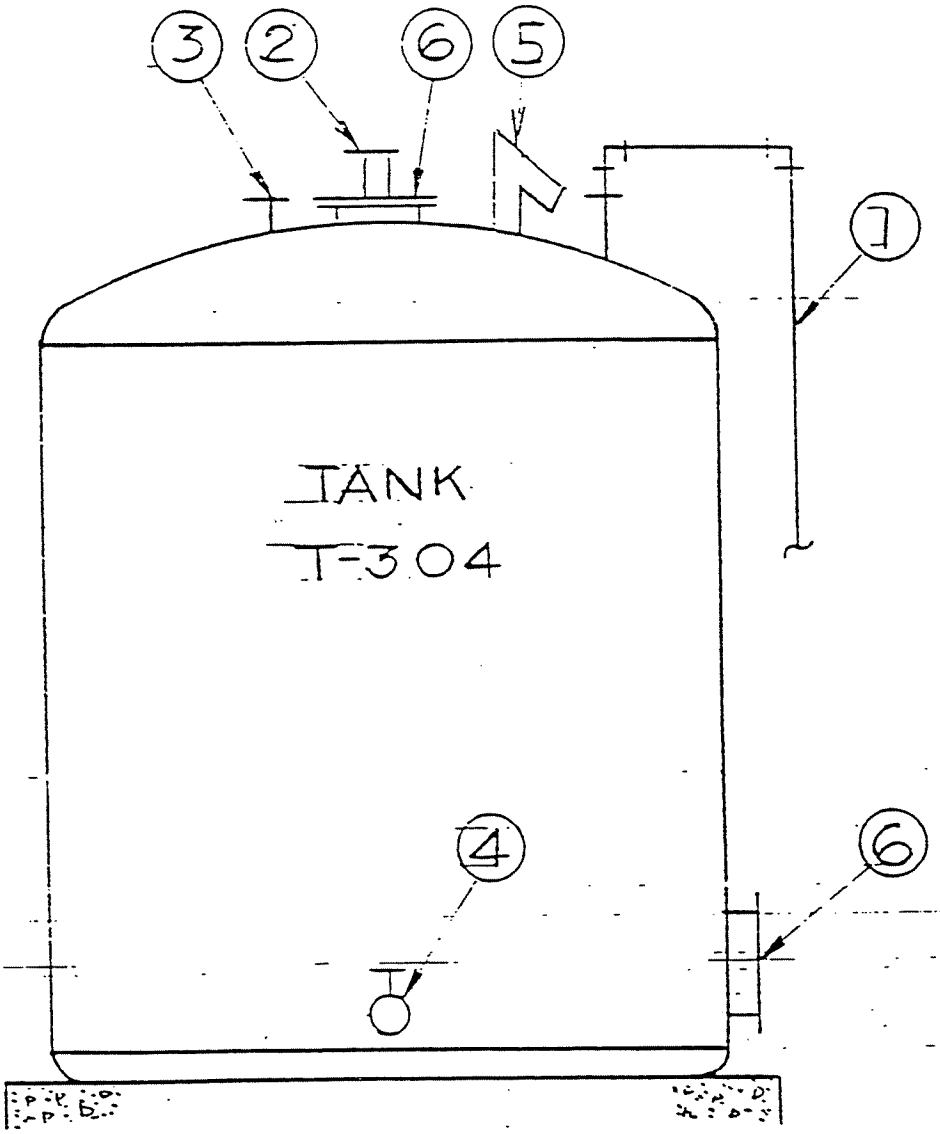
PHASE II REMOVAL ACTION
FRONTIER CHEMICAL-ROYAL AVENUE SITE
NIAGARA FALLS, NEW YORK

REMOVAL ACTION PLAN

SOURCE: FRONTIER CHEMICAL WASTE PROCESS, INC.

LEGEND

1 - HYPO (RECEIPTS)
2 - SPARE
3 - HI LEVEL (ULTRASONIC - MICROPROCESSOR) ALARM/INDICATOR
4 - PRODUCT DISCH.
5 - VENT
6 - MANHOLES



SPECS:
F.R.P. - 10'-0" ⌀ X 19'-11"
11,672 GALS

FIGURE 3-36: TANK T-304

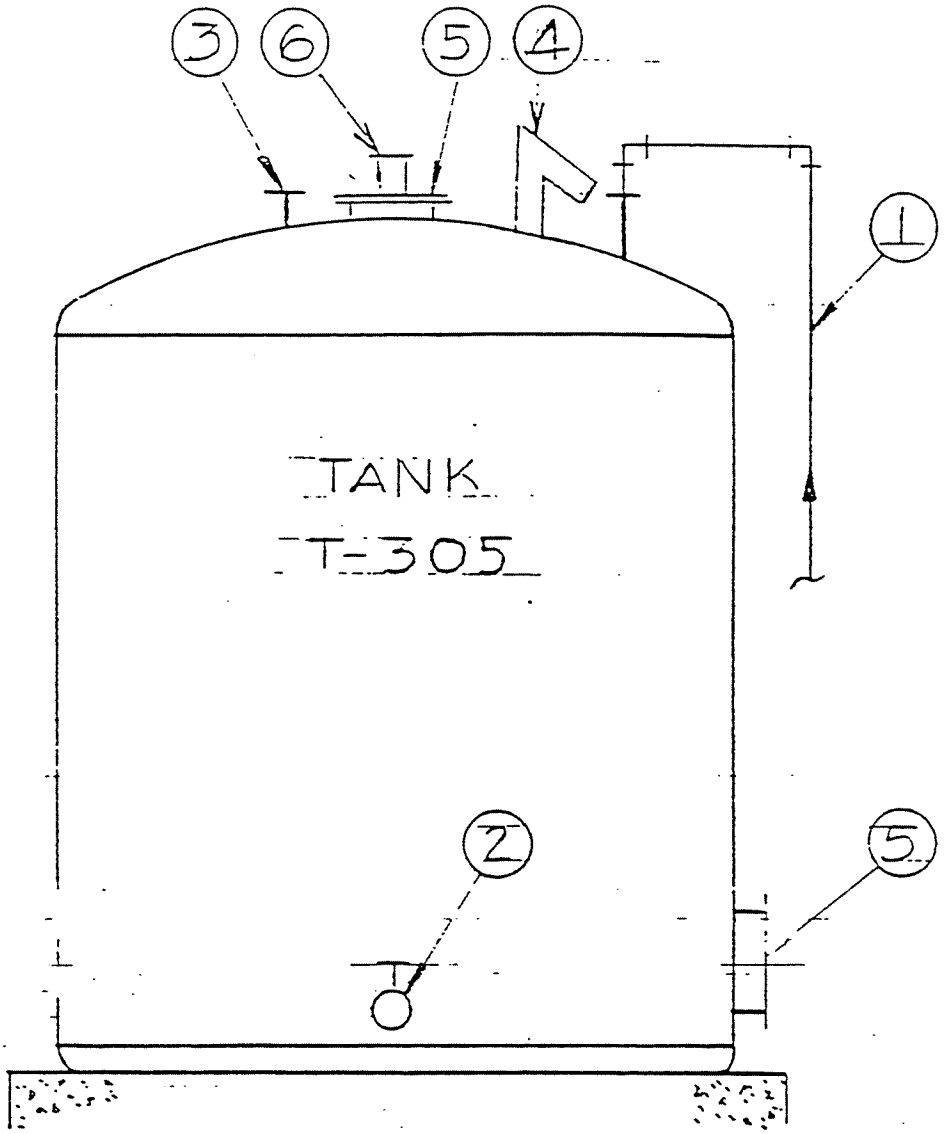
PHASE II REMOVAL ACTION
FRONTIER CHEMICAL-ROYAL AVENUE SITE
NIAGARA FALLS, NEW YORK

REMOVAL ACTION PLAN

SOURCE: FRONTIER CHEMICAL WASTE PROCESS, INC.

LEGEND

1 - HYPO (RECEIPTS)
2 - PRODUCT DISCH.
3 - SPARE
4 - VENT
5 - MANHOLES
6 - HI LEVEL (ULTRASONIC - MICROPROCESS ALARM/INDICATO



SPECS:
F.R.P. - 8'-0" ø x 19'-11"
672 GALS.

FIGURE 3-37: TANK T-305

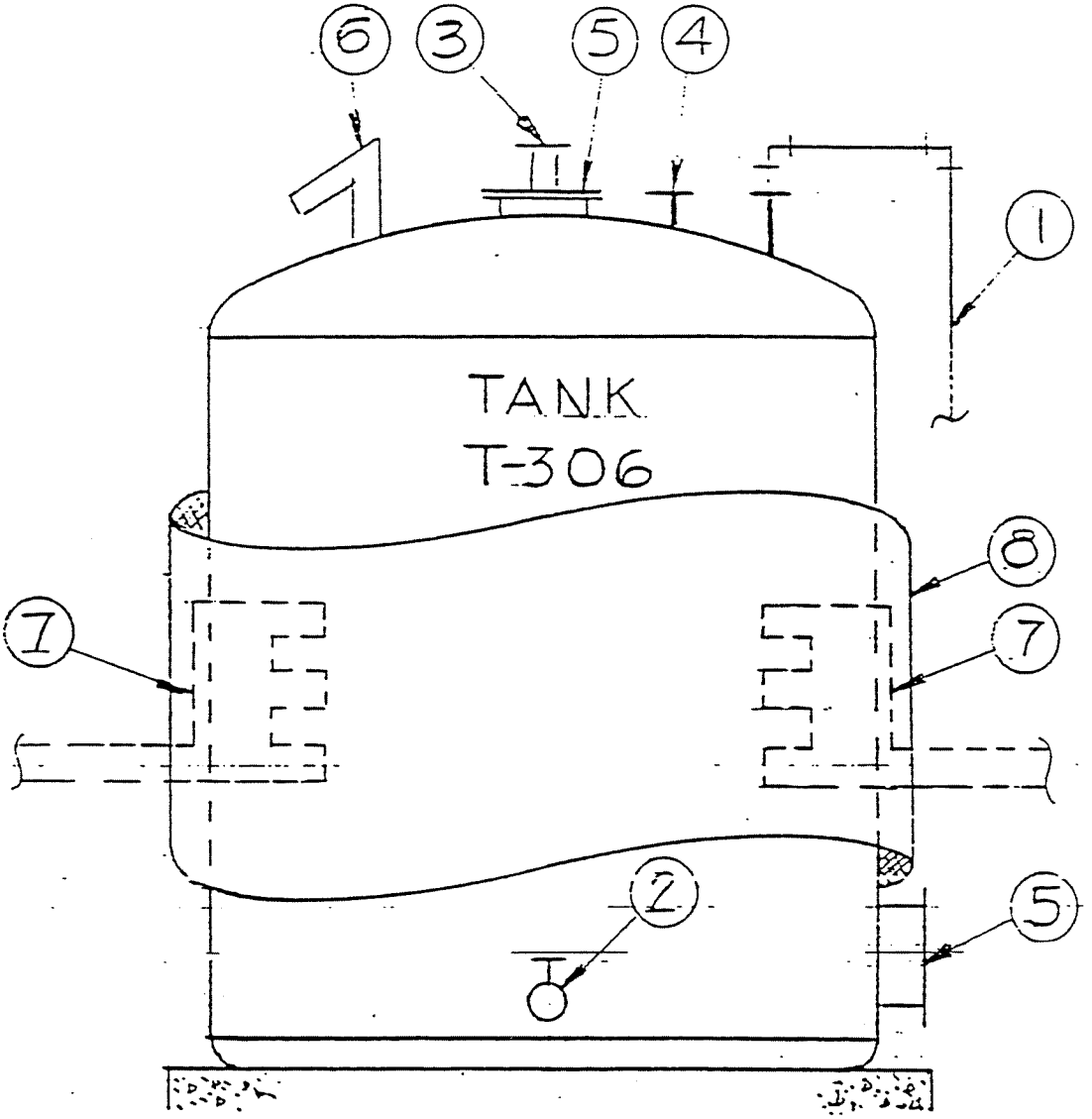
PHASE II REMOVAL ACTION
FRONTIER CHEMICAL-ROYAL AVENUE SITE
NIAGARA FALLS, NEW YORK

REMOVAL ACTION PLAN

SOURCE: FRONTIER CHEMICAL WASTE PROCESS, INC

LEGEND

1 - CAUSTIC (RECEIPTS)
2 - PPRODUCT DISCH.
3 - HI LEVEL (ULTRASONIC - MICROPROCESSOR) ALARM/INDICATOR
4 - SPARE
5 - MANHOLES
6 - VENT
7 - ELECTRIC HEAT PANEL
8 - 2" THK. INSULATION



SPECS:
FRP-10'-0"ϕ x 17'-0"
9,962 GALS.

FIGURE 3-38: TANK T-306

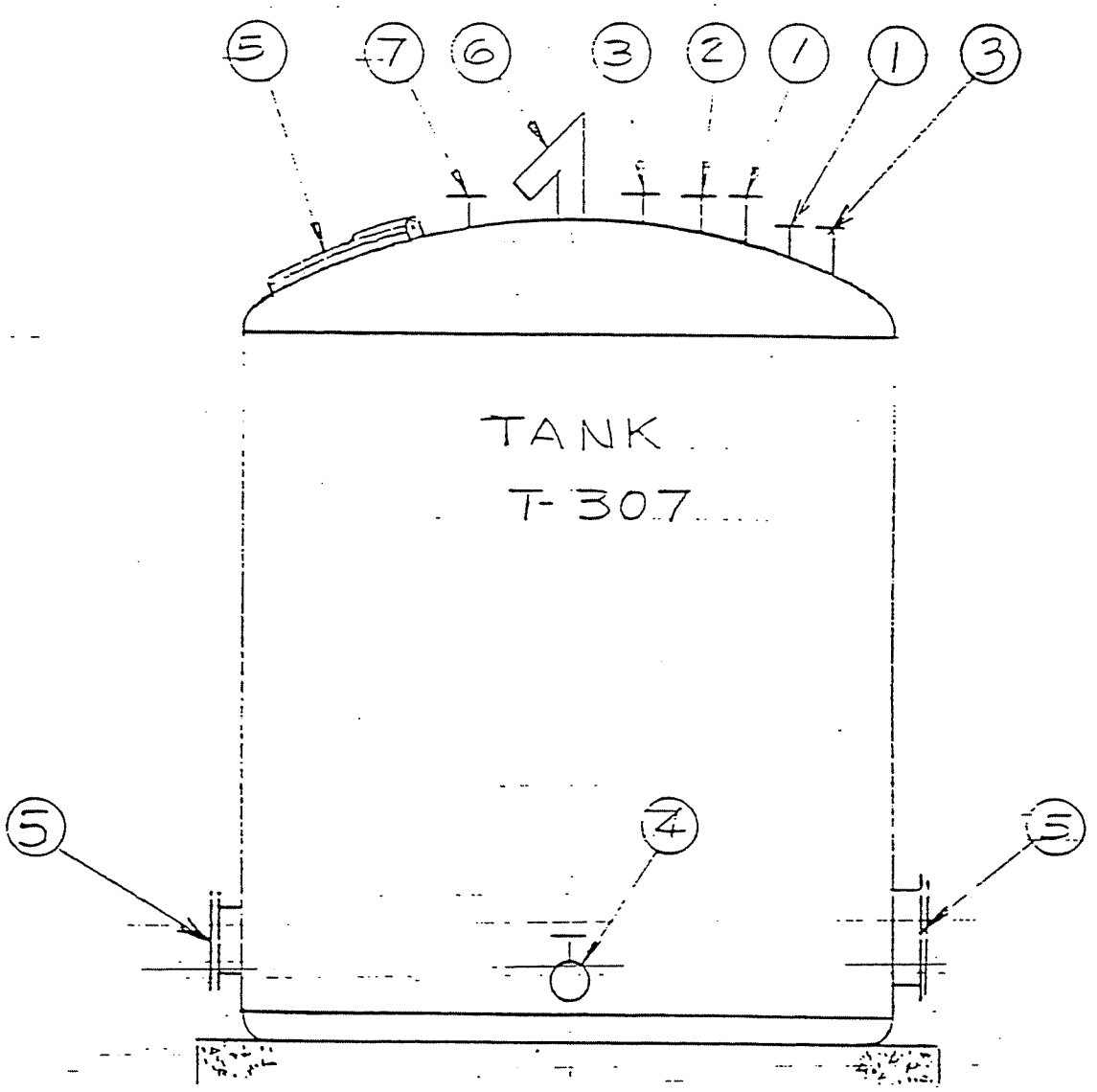
PHASE II REMOVAL ACTION
FRONTIER CHEMICAL-ROYAL AVENUE SITE
NIAGARA FALLS, NEW YORK

REMOVAL ACTION PLAN

SOURCE: FRONTIER CHEMICAL WASTE PROCESS, INC.

LEGEND

1 - TREATED CYANIDE (R-301, R-302)
2 - SPARE
3 - SPARE
4 - PRODUCT DISCH.
5 - MANHOLE
6 - VENT
7 - HI LEVEL INDICATOR/ALAR



SPECS:
F.R.P. - 10-0" Ø x 17-0" S.T. SIDE
9,962 GALS.

FIGURE 3-39: TANK T-307

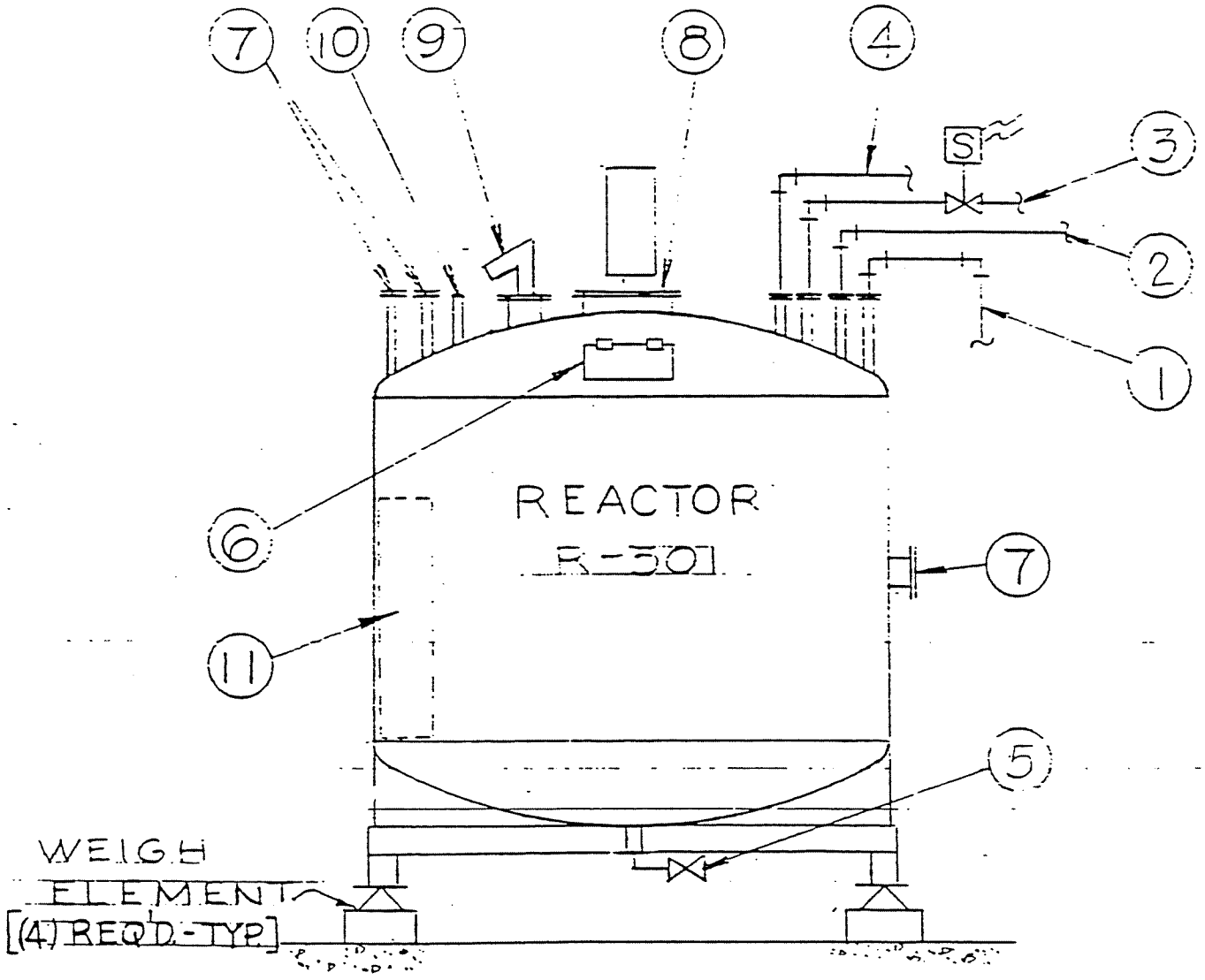
PHASE II REMOVAL ACTION
FRONTIER CHEMICAL-ROYAL AVENUE SITE
NIAGARA FALLS, NEW YORK

REMOVAL ACTION PLAN

SOURCE: FRONTIER CHEMICAL WASTE PROCESS, INC

LEGEND:

1-CYANIDE RECEIPTS
2-CAUSTIC
3-CITY WATER
4-HYPO FEED
5-PRODUCT DISCH.
6-HINGED INSPECTION PORT
7-FEED LINES
8-MIXER
9-VENT
10-TEMP. INDICATOR PO
11-BAFFLES -8"W.x 68
(4-REQ'D.)



SPECS:

F.R.P.-10'ØX10" ST. SIDE
5,860 GALS.

FIGURE 3-40: TANK R-30

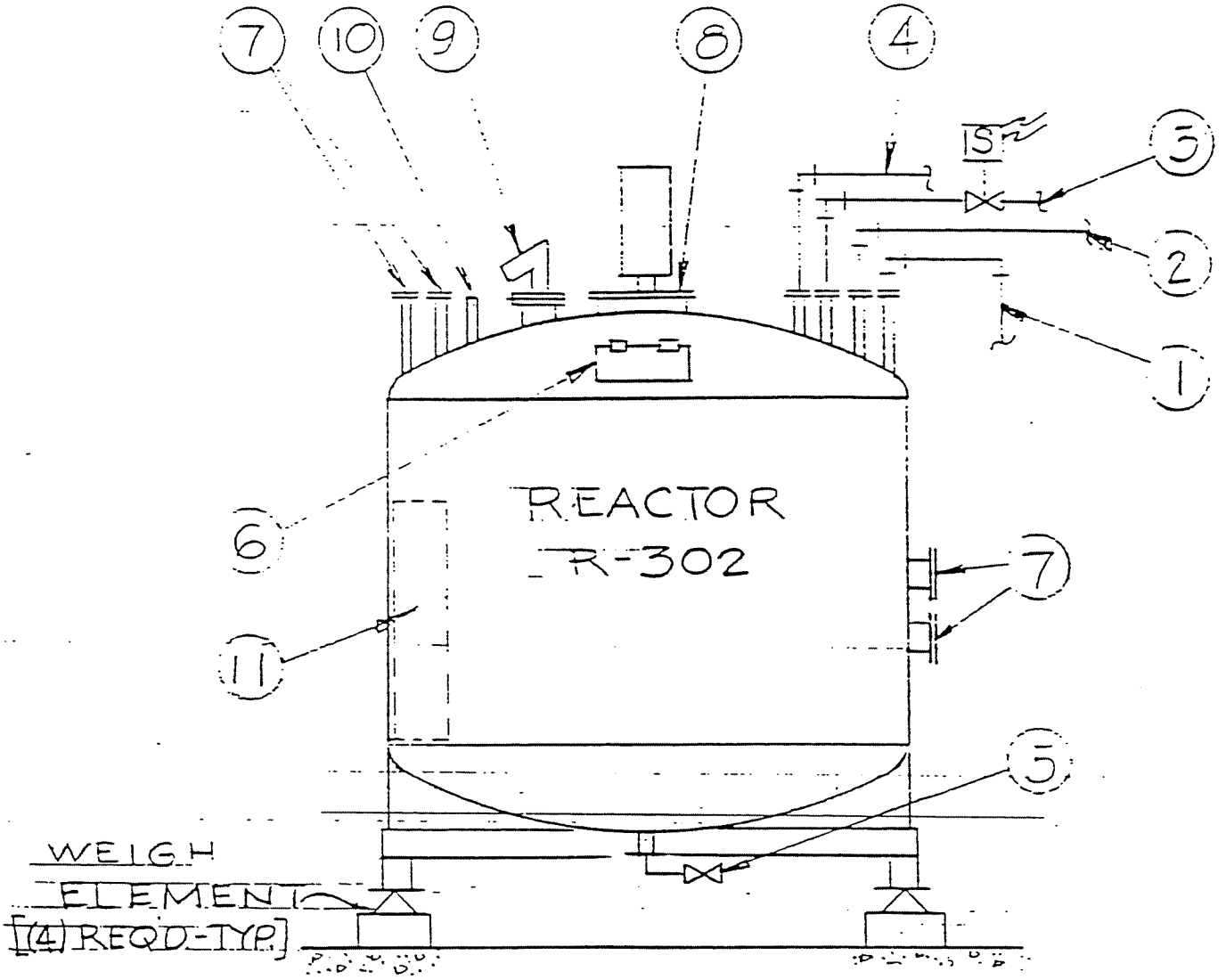
PHASE II REMOVAL ACTIOI
FRONTIER CHEMICAL-ROYAL AVENUE SIT
NIAGARA FALLS, NEW YOR

REMOVAL ACTION PLAN

SOURCE FRONTIER CHEMICAL WASTE PROCESS, INC

LEGEND:

1-CYANIDE RECEIPTS
2-CAUSTIC
3-CITY WATER
4-HYPO FEED
5-PRODUCT DISCH
6-HINGED INSPECTION PORT (4-REQ'D.)
7-FEED LINES
8-MIXER
9-VENT
10-TEMP. INDICATOR PO
11-BAFFLES -8"W x 68



SPECS:

F.R.P.-10'Ø x 10" ST. SIDE
6,274 GALS.

FIGURE 3-41: TANK R-302

PHASE II REMOVAL ACTION
FRONTIER CHEMICAL-ROYAL AVENUE SITE
NIAGARA FALLS, NEW YORK

REMOVAL ACTION PLAN

SOURCE: FRONTIER CHEMICAL WASTE PROCESS, INC

FIGURE 5-1

TANK INSPECTION FORM

TANK INSPECTION FORM

FRONTIER CHEMICAL - ROYAL AVENUE SITE

REMOVAL ACTION PLAN

I. TANK INFORMATION

Tank ID#_____ Dimensions (Ht x Dia) _____ Material: _____

Tank Contents/Description _____

_____

Phases:

1) Descr._____ Est. Vol. _____ Waste Code(s): _____

2) Descr._____ Est. Vol. _____ Waste Code(s): _____

3) Descr._____ Est. Vol. _____ Waste Code(s): _____

II. REMOVAL INFORMATION

Removal Start Date: _____

Removal Method Description: _____

_____

_____

Tank Phase Removal (Phases from I.4 (above):

Phase 1) Date:_____ Method: _____ Est. Vol. _____

Transport Container: Tank Trailer _____ ID#_____

Drum(s) _____ No. _____

Other _____ Description _____

Contractor:_____

Tank Phase Removal (cont.)

Phase 2) Date:_____ Method: _____ Est. Vol. _____

Transport Container: Tank Trailer _____ ID#_____

Drum(s) _____ No. _____

Other _____ Description _____

Contractor:_____

Phase 3) Date:_____ Method: _____ Est. Vol._____

Transport Container: Tank Trailer _____ ID#_____

Drum(s) _____ No. _____

Other _____ Description _____

Contractor:_____

III. TANK/ANCILLARY EQUIPMENT CLEANING

Tank: Cleaning Date: _____ Cleaning Contractor: _____

Cleaning Methd Used: _____

_____

Interior Decon:

Water-Soluble Waste/Materials: | Fuels Blending Wastes:

Triple Rinsed ?: _____ Interior Visually Clean?: _____

Exterior Decon: Visually Clean?: _____

Inspection Date/Initials: _____

Decon Waters

Dishcharged to: _____ Est. Vol.: _____

Piping/Ancillary Equipment: Cleaning Date: _____ Cleaning Contractor:_____

Description: _____

_____

Inspection Date: _____

Decon Waters

Dishcharged to: _____ Est. Vol.: _____

BLASLAND, BOUCK & LEE, INC.
ENGINEERS & SCIENTISTS

Syracuse, NY • Rochester, NY • Islandia, NY • White Plains, NY • Middletown, NY • Cranbury, NJ • Philadelphia, PA • Pittsburgh, PA
Durham, NC • Columbus, OH • Boca Raton, FL • Tampa, FL • Orlando, FL • Miami, FL • Irvine, CA