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POST-REMEDIAL CONSTRUCTION OPERATIONS, MAINTENANCE, AND MONITORING MANUAL FOR CHERRY FARM SITE (NYSDEC SITE NO. 9-15-063) RIVER ROAD SITE (NYSDEC SITE NO. 9-15-031)

Tonawanda, New York

SUBMITTED TO:

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION DIVISION OF HAZARDOUS WASTE REMEDIATION

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September 2006

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SECTION 1

INTRODUCTION

1.1 PURPOSE

In accordance with the New York State Department of Environmental Conservation (NYSDEC) Order on Consent (Index Nos. B9-0046-84-10 and B9-0047-91-02), the Potentially Responsible Parties (PRP) Group for the Cherry Farm Site (NYSDEC No. 9-15-063) and River Road Site (NYSDEC No. 9-15-031) has completed the required remediation of the combined sites. The key remedial action elements for the property included consolidation and capping of waste fill; regrading the Site for surface water management; and collection, treatment, and disposal of groundwater.

This document presents an operations, maintenance, and monitoring (OM&M) manual for post-remedial construction activities at the Cherry Farm/River Road Site (the Site), which complies with the requirements set forth under 6 NYCRR Part 360-2.15(i)(7). Ongoing OM&M will be conducted to ensure the effectiveness of the groundwater treatment system and surface water management program. Also, inspections and maintenance are required for the landfill cap, site security systems, runoff control structures, and access roads. This manual describes groundwater and surface water monitoring, cover and drainage system inspection, reporting requirements, emergency response procedures, and community involvement. It also includes Standard Operating Procedures (SOPs) for operation of the groundwater extraction and treatment system (Volume II of this manual). This manual was prepared in accordance with guidance from NYSDEC Draft DER-10 (NYSDEC, 2002).

1.2 SITE HISTORY

The River Road Site and Cherry Farm Site are adjoining sites located in the Town of Tonawanda, Erie County, New York (see Figure 1.1). The River Road Site occupies approximately 23 acres, and is located along the Niagara River south of the Grand Island Bridge. The northern half of the River Road Site is owned by Mr. Matthew Duggan of Amherst, New York and the southern portion of the Site is owned by Niagara River World, Inc. and Clarence Material Corporation (Pineledge Holding Corporation). The Tonawanda Coke Corporation owned and operated two retention ponds located on property adjoining the Site's southwestern boundary. The ponds were closed during the winter of 1998 (prior to April 1998).

The Cherry Farm Site is a 56-acre parcel owned by Niagara Mohawk Power Corporation, and located immediately north of the River Road Site. These two sites were at one time a part of a larger property owned by Wickwire-Spencer Steel Company. Due to the common history, former common ownership, and similar remedial programs, it was considered appropriate by the NYSDEC and PRPs to combine the remedial program at the two sites.

The Cherry Farm and River Road Sites were used for the disposal of waste from steel manufacturing processes from approximately 1908 to 1963, and were operated as a landfill for disposal of industrial wastes from the facilities in the area from 1963 until about 1970. Flyash, bottom ash, slag, sludge, liquid boiler cleaning waste, concrete rubble, and miscellaneous wastefill were disposed.

1.3 GEOLOGY AND HYDROGEOLOGY

Detailed hydrogeologic investigations of the Site have been conducted and documented in previous reports: Cherry Farm Remedial Investigation Report, O'Brien & Gere, June 1989; River Road Phase I/Phase II Remedial Investigation Report, Dvirka & Bartilucci, September 1993. A summary of the Site geology and hydrogeology is provided below, based on the referenced investigations, and observations made during the installation of the recovery wells, monitoring wells, and observation wells in August and September, 1996.

Cherry Farm Site

From the surface to bedrock, the Cherry Farm/River Road Site consists of five major stratigraphic units as follows: fill; marsh deposits; fine alluvial sand sediments; gray clay and silt (till) above bedrock; and shale bedrock.

The thickness of the fill deposit ranges from 15 to 20 feet. The marsh deposits below the fill range in thickness to about five feet and grade to fine silts and sands at the eastern edge of the Site. With increasing depth below the marsh deposits, silty sands grade to relatively clean alluvial sands. The thickness of this alluvial sand unit is on the order of 30 feet close to the Niagara River. Above the bedrock and below the alluvial sands is what appears to be a few feet of silt and clay (till), which in some areas of the Site has been replaced by coarse alluvial sands and gravel. A shale bedrock completes the stratigraphic section of the subsurface materials at the Cherry Farm Site.

The groundwater system beneath the Cherry Farm/River Road Site can be divided into two primary hydrogeologic units: fill materials, and alluvial sands. These two units are separated over much of the Site by the finer-grained marsh deposits where they are present. Groundwater flow direction in both units, based on water level data and river elevations, appears to be primarily westerly, towards the river.

River Road Site

Some differences were observed between the Cherry Farm and River Road Site stratigraphy. At the River Road Site, the thickness of the fill is variable, reaching greater than 25 feet in some areas. Below the fill materials, marsh deposits were encountered, but appeared to be discontinuous. Alluvial/lacustrine sediments lie below the fill at the River Road Site. Only in some areas of the Site are the alluvial/lacustrine sediments separated from the fill by marsh deposits. The alluvial/lacustrine sediments are described as gray-brown silt to clayey silt and gray-brown coarse to fine sand with lesser amounts

of silt, clay and gravel. These deposits range in thickness from 15 to 35 feet. A till unit, with thicknesses of up to 16 feet in the eastern portion of the Site, lies below the alluvial/lacustrine sediments and on top of the bedrock.

Groundwater flow direction in both the fill materials, and the alluvial/lacustrine sediments, based on water level data and river elevations, appears to be primarily westerly, towards the river.

1.4 GOALS OF THE REMEDIAL ACTION

The objective of the remedial action is to provide a cost-effective corrective measure in conformance to accepted standards, reduce mobility, limit potential pathways of contamination, and minimize long-term operation and maintenance costs. To the extent practicable, the remedial design for the Site was developed to reflect the proposed post-remedial development of a waterfront park and recreation area on the Cherry Farm Site by the Town of Tonawanda. A Draft Master Plan for the proposed park was developed by Wendel Engineers (Wendel). The remedial design consultant (Parsons) worked with Wendel to integrate the master plan with the remedial design. As a result of this effort, certain features were incorporated into the subgrade plan to minimize disturbance of the cap system during future developments. These included grading of site soils to accommodate pathways, creation of a "hill" overlooking a proposed amphitheater, and installation of park utility corridors. These efforts were completed concurrently with the remedial action.

1.5 REMEDIAL ACTION SUMMARY

The remedial measures implemented for the Site were in accordance with the combined Record of Decision (NYSDEC, 1994). The Remedial Design for the combined properties included the following items:

- Consolidation of wastes and installation of permeable and impermeable barriers over the wastes;
- Stabilization and habitat enhancements of the shoreline along the Niagara River, including installation of wooded and wetland areas;
- Removal and consolidation of contaminated sediments located within onsite drainage ditches;
- Installation of soil covers to support vegetation;
- Installation and operation of groundwater extraction wells (deep/intermediate zone) and groundwater collection trenches (shallow zone);
- Collection and disposal of light non-aqueous phase liquids (LNAPL) present in groundwater on the River Road Site;
- Treatment of groundwater and subsequent discharge to the Town of Tonawanda Wastewater Treatment facility.

- Removal of river sediments impacted by the Site, and subsequent placement in an onsite sediment disposal area (SDA).

The final cover system consists of, from the top down, 6 inches of topsoil, 18 inches of protective cover soil and an isolation geotextile layer, as shown on the Drawings contained in Section 12. Erosion control measures include vegetation for the capped area and riprap along the shoreline of the Niagara River. Habitat enhancements were integrated into the shoreline erosion protection design to provide additional wetland area onsite.

The groundwater treatment system includes oil/water separation, flow equalization, and pH adjustment. The groundwater treatment facility is located on the River Road portion of the Site. Public access to the portions of the Site where the treatment facility is located is restricted by a security fence.

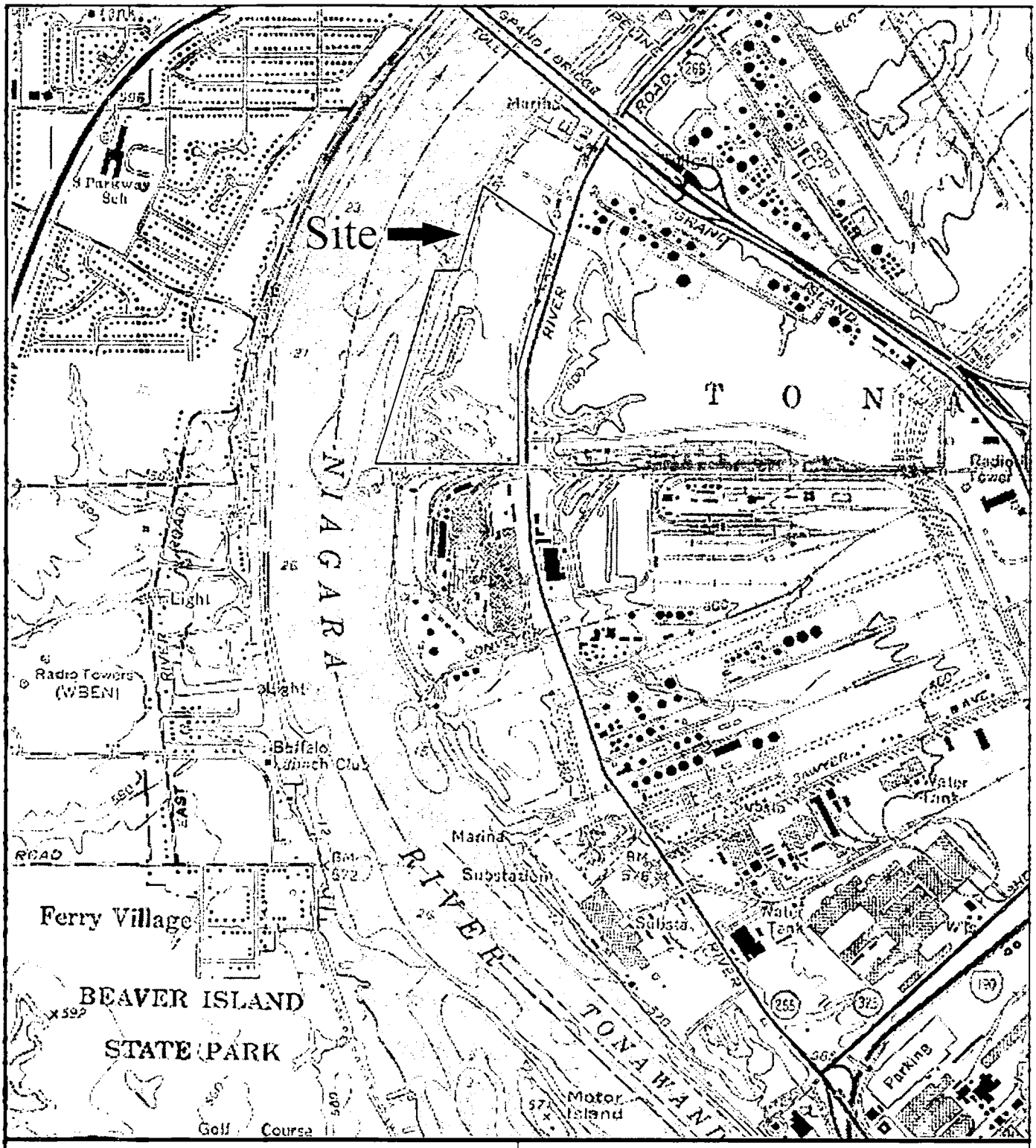
The remediation was substantially completed by December 1998, with followup wetland plantings and final grading/seeding of the SDA in 1999.

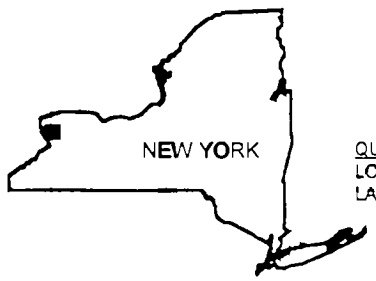
In October 2002, the intermediate/deep groundwater collection system was turned off as part of a groundwater upwelling study. Based on the results of the study, which showed no significant impacts to the Niagara River, NYSDEC approved permanently shutting down the intermediate/deep groundwater collection system in November 2004. Nine of the 11 intermediate/deep groundwater extraction wells were abandoned in July 2005. RW-4 and RW-5 were left in place as monitoring wells.

1.6 SUMMARY OF OM&M MODIFICATIONS

Based on recommendations made in the 2003 Annual and Five Year Review Report, the following modifications have been approved by NYSDEC (letter dated November 29, 2004) and implemented:

- The chemical analytical parameter list for the intermediate/deep groundwater samples was reduced by eliminating metals and pesticides. This change was enacted during the August 2005 groundwater sampling event.
- The groundwater sampling frequency was reduced from semi-annual to annual. This change was enacted in 2004.
- Groundwater level monitoring was reduced from monthly to quarterly, beginning in October 2004.
- Nine (9) of the 11 intermediate/deep groundwater extraction wells were abandoned. This work was conducted in July 2005, and documented in a letter to NYSDEC dated August 26, 2005. Only extraction wells RW-4 and RW-5 were left in place, to be used as monitoring points.





QUADRANGLE LOCATION
LONGITUDE: 78° 52' 30"
LATITUDE: 42° 52' 30"

SOURCE: U.S.G.S. 7.5 SERIES BUFFALO NW, New York-Ont (TOPOGRAPHIC), 1965

Figure 1.1

Cherry Farm/River Road Site PRP Group
Cherry Farm/River Road Site

SITE LOCATION MAP

PARSONS
180 LAWRENCE BELL DRIVE - SUITE 104 * WILLIAMSVILLE, N.Y. 14221 * 716 / 633-7074

SECTION 2

SITE MONITORING

2.1 ENVIRONMENTAL MONITORING PLAN

Groundwater (shallow collection system sumps), surface water, and treatment plant influent and effluent monitoring will be a regular part of the post-closure activities at the Site. Collected and pre-treated groundwater (shallow and deep) is ultimately discharged to the Town of Tonawanda's Wastewater Treatment Facility under the provisions of an Industrial Discharge Permit (Volume II, Appendix A). The following subsections describe the monitoring points, procedures for sampling, analysis of samples, and the evaluation of sample results.

A series of groundwater monitoring wells and sumps were installed at upgradient and downgradient locations to provide adequate data to evaluate the effectiveness of the groundwater extraction system. The environmental monitoring system for groundwater and surface water includes the following:

- Seven intermediate/deep groundwater monitoring wells (two upgradient and five downgradient) to assess groundwater quality and efficiency of the groundwater extraction system;
- Nine observation wells to measure the hydraulic gradient of shallow groundwater as it enters the shallow interceptor trenches;
- Four sumps located in the shallow trenches to assess the shallow groundwater quality, and to collect LNAPL, if present; and
- Three surface water sampling points to assess surface water quality.

A description of the wells, piezometers, and sampling and analytical protocol is provided in the following sections. Also, a discussion regarding evaluation of the data is presented.

2.1.1 Groundwater Monitoring Plan

The groundwater monitoring wells to be monitored during post-closure operations are shown on Figure 2.1. These include two upgradient and five downgradient monitoring wells (see Appendix A for well logs). Sampling and analysis of groundwater collected from the monitoring wells will be conducted annually. Each year, the season during which samples are collected will be varied. The annual sampling events will be separated by a minimum of two quarters, and a maximum of four quarters. A sampling and analysis summary is provided in Table 2.1.

Upgradient:

MW-1 (Cherry Farm); and MW-2 (River Road).

Downgradient:

MW-3; MW-4; MW-5; MW-6; and MW-7. RW-4, and RW-5, formerly groundwater extraction wells, were sampled in August 2005 and March 2006, at the request of NYSDEC.

2.1.2 Surface Water Monitoring Plan

Post-remedial construction surface water monitoring will be conducted at each of three areas of shallow open channel flow (see Figure 2.1 for locations). Sampling and analysis of surface water monitoring points will be conducted annually, at the same time as the groundwater sampling.

2.1.3 Onsite Treatment Plant Performance Monitoring

A continuous electronic flow meter and sampler were installed at the effluent discharge point from the treatment plan for compliance monitoring/reporting. Sampling will be conducted in accordance with the industrial wastewater discharge permit issued by the Town of Tonawanda (Appendix A of Volume II, Manual of SOPs). A summary of required chemical analytical samples and analysis for the treatment plant is provided in Table 2.2 Samples are collected from the treatment plant on the following schedule:

- Monthly: PCB arochlors from sampling points ML-1, ML-2, and between carbon vessels (see Appendix C of Volume II for treatment plant process and instrumentation diagram, showing sampling locations). PCB arochlors from a skimmed oil sample, collected from the oil/water separator. Oil and grease from ML-1 and ML-2.

- Semi-annually (January and July): In addition to PCBs and oil and grease as described above, TSS, BOD, iron, phosphorus, and zinc.

- Annually (November): In addition to PCBs and oil and grease as described above, list of 126 Priority Pollutants.

2.2 SAMPLING PROCEDURES

2.2.1 Groundwater Sampling Procedures

The following is a step-by-step sampling procedure for the collection of groundwater samples from the monitoring wells. Well sampling procedures and data obtained will be recorded on the sampling forms in Appendix B (or similar), and in a field notebook.

- The equipment will be assembled (see Table 2.3), inspected and calibrated to ensure it is in proper working order before mobilizing to the site.

- Upgradient well(s) will be selected as the initial sampling location(s). Wells will be measured or sampled in order of increasing contamination potential (upgradient to downgradient).

- Prior to any well evacuation or sampling at a well(s), the static water level will be measured. The well will also be examined for the presence of immiscible layers. An electronic water level indicator or interface probe (if immiscible layers are suspected) will be used to measure water levels or product levels. Use the surveyed well elevation reference point marked on the inner well casing when conducting the measurements. Measurement of water and floating liquids must be performed prior to measuring the levels of any sinking (dense) liquids in the monitoring well.
- Measured levels, obtained by lowering the probe(s) below the water surface, must be recorded in the field notebook and the well sampling record to the nearest 0.01 foot.
- The probe will be decontaminated (decontamination procedures are discussed in Section 2.2.3).
- If immiscible phases are detected, they must be collected (removed from the well) before any purging activities take place in a well. The floating immiscible layer will be removed from the well using a bailer or a peristaltic pump.
- If no immiscible layers are detected or if the detected immiscible layers have been removed from the well, the well must be purged to ensure that any stagnant water is replaced by fresh formation water. Wells will be purged of a minimum of three well volumes whenever possible (high yield wells). If the well is purged to dryness (low yield well, recovery greater than 2 hours), the well will be sampled as soon as sufficient volume is available. Bailers, peristaltic pumps, or centrifugal pumps can be used to purge the wells.
- Former extraction wells, RW-4 and RW-5, now being utilized as monitoring wells, will be purged and sampled utilizing low-flow techniques. The wells will be sampled using peristaltic or submersible pumps and HDPE or similar tubing. The tubing will be securely fastened to the well casing during sampling to prevent movement and disturbance of any sediments in the well annulus. Pumps will be operated at 1,000 milliliters per minute or less during purging and sampling. The objective of the low-flow sampling technique is to minimize turbidity during sampling, thus more correctly approximating the actual groundwater concentrations.
- During purging, pH, temperature, conductance, and turbidity will be measured and recorded after each well volume is removed. The purge water will be contained and disposed of in the onsite groundwater treatment plant.
- Equipment used during purging will be decontaminated prior to its reuse. Decontamination should follow the procedures discussed in Section 2.2.3.
- Samples will be collected subsequent to purging, and after the well has recovered with enough volume to allow collection of a sample.

- If immiscible layers are detected in the well after purging, the layers must be sampled as if it were a groundwater sample. After sampling the immiscible layers in the well, they must be purged from the well and a groundwater sample obtained.
- Samples will be collected with disposable bailers or from a dedicated pump. Samples will be containerized and preserved in the order of volatilization sensitivity of the parameters (VOCs, SVOCs, metals/inorganics, etc.).
- Temperature, pH, and specific conductance will be measured in the field before and after sample collection.
- Measurements, observations, procedures, and time will be recorded on the sampling record sheet and in the field notebook.
- Samples will be placed in laboratory coolers, on ice, and shipped overnight to the laboratory. Chain-of-Custody procedures will be followed as outlined in Section 2.2.3.

2.2.2 Sump and Surface Water Sampling Procedures

Field procedures for sump and surface water sampling are described below.

- Surface water samples will be collected directly into the appropriate sample bottle. If the surface water flow is insufficient for direct filling of sample bottles, a decontaminated glass or stainless steel beaker may be used to collect the sample.
- Care will be exercised to ensure that the selected surface water sampling point is not in a visible area of stagnant water. Sampling of the sumps will take place prior to evacuation of water or LNAPL from the sump.
- Surface water samples will be collected while standing downstream from the sampling point, taking care not to disturb sediments near the sampling point.
- Sump samples will be collected with a disposable bailer from the top of the sump manhole, and decanted into the appropriate sample containers. No purging is necessary.
- For both surface water and sump samples, temperature, conductivity, and pH will be measured, and sample description and location noted in the field logbook. Surface water and sump sampling procedures and data obtained during sampling will be recorded on the forms included in Appendix B.
- Samples will be preserved and prepared for submittal to the contract laboratory.

2.2.3 Equipment Decontamination

Prior to using sampling equipment and between sampling points for groundwater and surface water, the non-dedicated, non-disposable equipment (meters, probes, glassware, and bailers) coming in contact with groundwater, LNAPL, or surface water will be decontaminated using the following procedure:

- The equipment will be thoroughly cleaned with a non-phosphate detergent/soap mixture if there is no visible LNAPL on the sampling equipment.
- If LNAPL is present (as measured with interface probe) and is visible on the sampling probe, the sampling equipment will be washed/rinsed with a pesticide-quality hexane after wiping the majority of the LNAPL off of the equipment. The equipment will then be rinsed with potable water, washed with non-phosphate detergent and rinsed with distilled water.
- After cleaning sampling equipment (with or without LNAPL), the sampling equipment will be rinsed three times with potable or distilled water and then thoroughly dried using clean disposable towels.
- If sampling equipment is to be reused, it shall not be placed directly on the ground. Some equipment (bailers, glassware, etc.) will be wrapped in aluminum foil to protect it from becoming contaminated between use.
- Sample equipment will be decontaminated between use in different wells or sumps.
- Decontamination fluids will be contained and disposed of at the onsite groundwater treatment plant.

2.2.4 Field Sample Custody

A COC record (see Appendix B) will accompany the sample containers from selection and preparation at the laboratory, during shipment to the field for sample collection and preservation, and during return to the laboratory. Triplicate copies of the COC will be completed for each sample set collected.

The COC identifies the field personnel responsible for taking samples, the project name and number, the name of the analytical laboratory to which the samples are sent, and the method of sample shipment. The COC also lists a unique description of the sample bottles in the set. If samples will be split and sent to different laboratories, a copy of the COC will be sent with each sample.

The "REMARKS" space is used to indicate if the sample is a matrix spike, matrix spike duplicate, or matrix duplicate. Since they are not specific to any one sample point, trip and field blanks are indicated on separate rows. Once the bottles are properly accounted for on the form, the sampler will write his or her name, and the date and time on the first "RELINQUISHED BY" space. The sampler will also write the method of shipment, the shipping cooler identification number, and the shipper airbill number on the top of the COC, when applicable. Mistakes will be crossed out with a single line and initialed by the sampler.

One copy of the COC will be retained by sampling personnel, and the other copy will be put into a sealable plastic bag and taped inside the lid of the shipping cooler. Custody seals provided by the laboratory will be affixed to the latch and across the back and front lids of the cooler; and the person relinquishing the sample will place their

signature across the seal. The COC seal must placed so that the seal must be broken to open the container. The seal will be taped, and the cooler wrapped tightly with clear packing tape. The cooler will be relinquished by field personnel to personnel responsible for shipment, typically an overnight carrier, or the cooler will be delivered by field personnel directly to the laboratory. Breakage of the seals before receipt at the laboratory may indicate tampering If tampering is apparent, the laboratory will contact the person designated on the COC, and the sample will not be analyzed.

2.3 SAMPLE ANALYSIS PROGRAM

2.3.1 Sample Analysis

Samples will be collected annually, and analyzed for the chemical parameters shown below, using NYSDEC Analytical Services Protocol (ASP) methods. Details of the sampling and analysis program, including required QA/QC samples, are provided in Table 2.1.

Collection Trench Sumps (shallow) and Surface Water	Monitoring and Extraction Wells (intermediate/deep)
TCL VOCs	TCL VOCs
TCL SVOCs	TCL SVOCs
TCL pesticides and PCBs	PCBs
TAL metals and cyanide	

TCL = Target Compound List; TAL = Target Analyte List

2.3.2 Data Quality Management

Groundwater and surface water samples will be analyzed in accordance with the NYSDEC Analytical Services Protocol by a laboratory which is approved by the New York State Department of Health Environmental Laboratory Approval Program (ELAP). For quality assurance/quality control purposes, trip blanks, matrix spike/matrix spike duplicates, and field duplicates will be collected as shown on Table 2.1.

The field and analytical equipment will be calibrated immediately prior to each day's activities. Calibration procedures will conform to the manufacturer's standard instructions and will include, but not be limited to, instrumentation necessary to measure water level, pH, Eh, conductivity, temperature, turbidity, and combustible gas. The calibration will confirm that the equipment is functioning within allowable tolerances, prior to field use. The calibration procedure and data will be noted in the field notebook.

The data quality management and quality assurance/quality control procedures described above pertain only to groundwater and surface water samples collected from the Site. Samples collected from the treatment plant, as mentioned above, will be analyzed in accordance with the existing discharge permit.

2.4 WATER LEVEL MEASUREMENTS

Quarterly water level monitoring will be performed to evaluate hydraulic gradients. In addition to the water level measurements, the characteristics of LNAPL, if present, will be described, and the thickness measured. An electronic water level indicator will be used to measure levels, with an accuracy of approximately 0.01 feet.

Groundwater levels are measured at each of the following locations:

- Nine groundwater monitoring wells (MW-1 through MW-7, and RW-4, RW-5);
- Nine observations wells (OW-1 through OW-9);
- Four sumps (S-1 through S-4); and

Niagara River water elevations will also be collected at the same frequency as the monitoring wells and piezometers are measured. The river elevations will be calculated from the staff gauge installed adjacent to a gabion wall near Sump 3 (see Figure 2.1).

2.5 EVALUATION OF MONITORING RESULTS

The chemical and hydraulic monitoring data collected during each year will be assembled and evaluated. The evaluation will consist of an evaluation of water quality and recovery system performance. An annual report incorporating the evaluations and data will be prepared in accordance with this OM&M Manual.

2.5.1 Water Quality Evaluation

An electronic water quality database will be developed and maintained, using data from the monitoring rounds. The database will facilitate production of the summary tables, and provide identification of results exceeding standards.

The annual evaluation of data will consider aspects of data quality relevant to the reporting of low and zero concentrations, missing data values, outliers, and the units of measure. The monitoring data will be compared to the NYSDEC groundwater or surface water quality standards and guidance values. The annual report will provide a summary of the groundwater, surface water, and treatment/recovery system monitoring performed during the entire year.

2.5.2 Reporting

An annual report will be prepared to summarize the water level and water quality results from the previous quarterly (and semiannual) reports, and present the results of the statistical evaluations (if conducted). Groundwater contour maps showing hydraulic

gradients and flow directions, hydrographs of monitoring wells and piezometers showing water level trends, and a brief discussion of the effectiveness of the shallow groundwater collection trench system will also be included. See Section 4 for additional discussion on reporting requirements.

RIVER ROAD
RIVER WALK PATH
RIVER ROAD
RIVER WALK PATH
RIVER WALK PATH
ACCESS GATE
38'-1" x 57'
CULVERT
STONE PARKING LOT
STONE ACCESS ROAD
CHERRY FARM SITE
(NYSDEC SITE NO. 9-15-063)
DRAINAGE EASEMENT
SW-1
S-1
BARRIER ISLAND
GABION WALL
NIAGARA RIVER
U.S. HARBOR LINE
BARRIER ISLAND
S-2
GABION WALL
BARRIER ISLAND
GABION WALL
S-3
STAFF GAUGE
U.S. HARBOR LINE
DRAINAGE SWALE
RIVER ROAD SITE
(NYSDEC SITE
NO. 9-15-031)
DRAINAGE SWALE
GROUNDWATER TREATMENT PLANT
SW-2
S-4
NIAGARA RIVER
SW-3

LEGEND

- S-1 — COLLECTION TRENCH SUMP
- OW-5 — OBSERVATION WELL
- MW-1 — MONITORING WELL
- SHALLOW GROUNDWATER COLLECTION TRENCH
- GROUNDWATER CONVEYANCE PIPING
- SW-1 — SURFACE WATER SAMPLE COLLECTION AREA
- RIPRAP
- SEDIMENT CAP (IN RIVER)

250 0 250 500

SCALE: 1"=250'

FIGURE 2.1

CHERRY FARM/RIVER ROAD SITE
ANNUAL GROUNDWATER MONITORING REPORT
OPERATIONS, MAINTENANCE AND MONITORING SITE PLAN

PARSONS
180 LAWRENCE BELL DRIVE, SUITE 104
WILLIAMSVILLE, NEW YORK 14221
716-633-7074

P:\442205\cad\SK-442205-c01.dwg, 05/16/06 at 15:58, MAB, 1=1

Table 2.1
Sampling and Analysis Summary
Annual Event
Cherry Farm/River Road Site

Matrix	Parameter	Field Samples					QC Samples		Total Samples
		Analytical Method(a)	Number of Samples	Field Duplicate	MS/MSD(b) (Total)	Sub-Total	Trip Blank	Field Blank	
Groundwater									
MW-1 through MW-7	TCL VOCs	ASP 95-1	9	1	1	12	2		14
RW-4, RW-5	TCL SVOCs	ASP 95-2	9	1	1	12			12
	TCL PCBs	ASP 95-3	9	1	1	12			12
Extraction Trench Sumps	TCL VOCs	ASP 95-1	4			4			4
S-1 through S-4	TCL SVOCs	ASP 95-2	4			4			4
	TCL Pest/PCB	ASP 95-3	4			4			4
	TAL Inorganics (c)	CLP-M	4			4			4
Surface Water	TCL VOCs	ASP 95-1	3			3		1	4
SW-1 through SW-3	TCL SVOCs	ASP 95-2	3			3		1	4
	TCL Pest/PCB	ASP 95-3	3			3		1	4
	TAL Inorganics (c)	CLP-M	3			3		1	4

(a) New York State Department of Environmental Conservation Analytical Services Protocol, 1995.

(b) Matrix Spike/Matrix Spike Duplicate for organic analyses; matrix spike and laboratory duplicate for inorganic analyses.

(c) TAL Inorganics analysis includes cyanide.

Table 2.2
Sampling and Analysis Summary
Treatment Plant Groundwater Discharge Monitoring
Cherry Farm/River Road Site

Event	Location	Parameter	Analytical Method(a)	Number of Samples	Purpose
Monthly	ML-1, ML-2	PCBs	8082	2	Compliance
		oil and grease		2	Compliance
	Between carbon	PCBs	8082	1	Performance
	Oil/water separator	PCBs	8082	1	Compliance
Semiannual	ML-2	TSS	160.2	1	Compliance
		BOD-5	405.1	1	Compliance
	(composite)	**Iron**	**200.7**	**1**	**Compliance**
(January and July)		Phosphorus	365.4	1	Compliance
		Zinc	200.7	1	Compliance
Annual	ML-2	VOCs	624	1	Compliance
	(composite)	TCL SVOCs	8270	1	Compliance
		Total Phenolics	420.1		Compliance
(November)		PCBs	608		Compliance
		TCL Pesticides	8081A	1	Compliance
(includes trip blank		**Priority Pollutant Metals**	**200.7**		**Compliance**
for VOCs)		Mercury	245.1		Compliance
		Total Cyanide	335.4		Compliance
		TAL Inorganics(c)	CLP-M	1	Compliance

(a) New York State Department of Environmental Conservation Analytical Services Protocol, 1995.
(b) Matrix Spike/Matrix Spike Duplicate for organic analyses; matrix spike and laboratory duplicate for inorganic analyses.
(c) TAL Inorganics analysis includes cyanide.

TABLE 2.3

GROUNDWATER SAMPLING EQUIPMENT

Explosive gas meter	Personal safety equipment (hard hats, etc.)	Sample bottles
Interface probe (NAPL and water)	Deionized water	Alconox or equivalent detergent
Potable water	Disposable nitrile gloves	Disposable towels
pH meter, conductivity meter	Bailers or pumps	Pumps
Nylon rope	Shipping labels	Ice chests
Sampling records/forms	Chains-of-custody	Indelible ink pens

SECTION 3

POST-REMEDIAL CONSTRUCTION OPERATIONS & MAINTENANCE

3.1 INTRODUCTION

This section contains procedures for post-remedial construction operations and maintenance of the groundwater treatment system, landfill cover system, surface water drainage systems, and other site structures. For groundwater treatment plant operating and maintenance procedures, see Volume II of this OM&M Manual. A summary of maintenance tasks, showing frequency of occurrence, is provided in Table 3.1.

3.2 ROUTINE INSPECTIONS

The Site will be inspected each quarter throughout the post-remedial construction period. A post-closure inspection checklist is contained in Appendix C. A site map (Figure 2.1) should also be used, when needed, to document problems and indicate areas that require attention. Specific maintenance activities are further discussed below.

The Site will be inspected for:

- Excessive debris, litter, and waste;
- Loss of vegetative cover;
- Integrity of drainage system including:
  - sediment buildup;
  - pooling or ponding;
  - slope integrity;
  - overall adequacy of surface runoff drainage system;
  - shoreline embankment protection along the Niagara River, including riprap, shoreline barrier islands, and gabion walls;
- Condition of access road, gates, and fencing;
- Integrity of groundwater monitoring and observation wells;
- Integrity of the cover system including:
  - erosion or settling of cap material;
  - slippage or slope failure, with particular attention to the area around the former SDA;
  - leachate breakthroughs;

- animal burrows; and
- woody, deep rooted vegetation.

The Site was inspected annually for five years for the establishment and growth of aquatic and woody vegetation in the emergent wetlands and wooded riparian wetland, respectively; and for utilization of these wetlands by fish and wildlife (per March 25, 1996 USACE permit). This requirement was completed in 2003.

3.3 MAINTENANCE

3.3.1 Cover System Maintenance

Inspection and maintenance of the landfill cover system will include the following:

- Landfill cover vegetation is fully established. Conduct annual ground inspections to determine the status of woody plant species on the Site, including surface and side slope areas.
- Mow the Site cover system surface once a year (after September 1) to control woody vegetation and promote short grass species. In addition, paths will be mowed on an as-needed basis from the access road to each of the four extraction tench sumps.

Erosion of the cap or other site maintenance problems detected during routine site inspections or following particularly heavy storm events will be corrected. Repairs of eroded areas will be made with materials and methods specified herein. If an eroded topsoil layer is encountered, the repair action may include, but is not limited to, the following:

- Covering repaired areas with topsoil, as specified in the Contract Documents, to minimum thickness (6-inches) and design grades; and
- Reseeding and fertilizing in accordance with materials and application rates specified in Section 02990 of the Contract Documents (Appendix D).

The need for cap repairs due to subsidence or settling will be based on whether the function of the cap in the affected area has been impaired. Repair actions may include, but are not limited to:

- Stripping and stockpiling topsoil from the affected area;
- Regrading the affected area in accordance with the grading plan shown on the record drawings; and
- Replacing topsoil, reseeding, and fertilizing to reestablish vegetative cover in accordance with Section 02990 (Appendix D) of the Contract Documents.

For animal control, the following procedures will be followed:

- Inspect for groundhog or other animal burrow or den entrances on the landfill. If den or burrow entrances are found, the entrances will be plugged with bentonite and the bare areas will be reseeded and fertilized, if necessary. Seed and fertilizer will be of the same type and quality as originally specified.
- If burrowing becomes persistent, an animal control specialist will be contacted to conduct trapping and removal of burrowing animals.

3.3.2 Maintenance of Site Structures

Drainage System

The elements of the drainage system, including the perimeter drainage swales, will be maintained throughout the post-closure period. These elements will be inspected quarterly to verify that the structures are intact and undisturbed, and that channels and discharge areas are free of obstructions which would impair the free flow of surface water run-off.

In the event any of the structures are found to be damaged or incapable of conveying the design flows, repairs will be made as soon as practical, as follows:

- Any obstructions found in swales will be removed.
- If any culverts are found to be damaged, such that their function is impaired, they will be repaired or replaced.
- Accumulated sediment will be removed from drainage swales and/or around outlet structures, as required, to maintain required capacity and proper operation.
- Riprap in drainage swales will be replaced or repaired, if needed.

Facility Access Control

Facility access control includes the following:

- Maintenance of fencing around the groundwater treatment plant, including gaps below fence, chain link fabric, and fence posts.
- Maintenance of gates and locks, to prevent unauthorized access;
- Maintenance of warning signs, to ensure visibility; and
- Maintenance of the access roads, including snow plowing, to allow easy access by authorized personnel.

Any repairs will be conducted on an as-needed basis.

3.3.3 Groundwater Monitoring Wells, Piezometers, and Sumps

General Inspection: Monitoring wells, piezometers, and sumps will be inspected for damage quarterly, as water level measurements are collected. If a well or piezometer is

damaged such that representative water levels or groundwater samples cannot be obtained, or it is damaged beyond repair or rendered inoperative, a discussion will be held with NYSDEC to determine whether any action is necessary, such as repair or replacement.

Wells may need occasional cleaning as well screens may become encrusted with mineral deposits.

Sedimentation: Sedimentation in the monitoring wells, piezometers, and sumps will be evaluated by measuring the depth, and comparing to the constructed depth. Sediment will be removed if it is impacting the function of the well, piezometer, or sump.

LNAPL: The four extraction trench sumps will be monitored for LNAPL thickness and sedimentation. The thickness of LNAPL, if present, will be measured and recorded. If the measured thickness of LNAPL is ½-inch or greater, the LNAPL will be bailed from the sump (or pumped) and placed in the oil recovery tank in the treatment building. Any floating debris in the sumps will be immediately removed and disposed.

3.3.4 Conveyance Piping

To mitigate scaling, and provide adequate flow through the system, the groundwater conveyance pipelines may require flushing. When necessary, a high-pressure flush will be used to remove sediment buildup and scaling. A high-volume pump will initially be attached to Sump 1, the most northerly collection trench sump. Water will be flushed through the discharge piping, collected at the treatment plant building, and run through the treatment system. The pump will then be moved downstream to Sump 2, Sump 3, and Sump 4, sequentially, and the process repeated.

Detailed instructions for conducting the annual line flushing, including equipment specifications, are included in Volume II, SOPs.

In addition to the pipeline flushing described above, pool-grade hydrochloric acid will be added to the sumps on a quarterly basis. Two gallons of acid will be added to each sump, using precautions contained in the Health and Safety Plan (Appendix E).

3.3.5 Shoreline Structures and Enhancements

Maintenance of other shoreline structures and enhancements, including riprap shoreline, barrier islands, gabion walls, and associated shoreline plantings may include the following:

- Replacement of riprap, cobbles, or other stone adjacent to the river, if shoreline inspections reveal substantial damage to the barrier islands, gabion walls, or riprap shoreline.
- Monitoring of shoreline vegetation and wetlands is no longer required, in accordance with the March 25, 1996 USACE permit. This 5-year monitoring program was completed in 2003.

3.3.6 Waste Disposal

Waste that accumulates in the treatment plant will require periodic disposal. Types of wastes expected, and storage/disposal guidelines, are listed below:

- Bag filters and personal protective equipment. Bag filters, PPE, and other waste are stored in 55-gallon drums within the treatment plant building
- Oil (LNAPL) containing PCBs. Oil is periodically skimmed from an oil/water separator within the treatment plant, and is placed in an LNAPL holding tank. Water from the bottom of the tank is periodically drained and run through the treatment plant. When the oil in this tank approaches capacity, it will be disposed.
- Spent carbon vessels (with carbon) and housings. Spent carbon will be disposed at the time a carbon changeout is required.
- Waste characterization will be conducted on the wastestreams identified above prior to arranging for disposal. Parameters to be analyzed will include PCBs and other parameters, as required by the disposal facility. Based on operations to date, and sampling and analysis conducted in 2005, it is assumed that the bag filters, PPE, etc, and the spent carbon will be non-hazardous. The oil from the holding tank is assumed to be hazardous due to PCB content.

3.4 HEALTH AND SAFETY REQUIREMENTS

A site-specific Post-Remedial-Construction Health and Safety Plan has been prepared for the Cherry Farm/River Road Site, specifically for conducting OM&M activities, and is included as Appendix E. The plan was prepared in accordance with the Occupational, Health and Safety Administration's regulations in 29 CFR 1910.120, and the appropriate state and local regulations. The plan contains the following, in addition to other required information:

- Organization and responsibilities of the project/health and safety team;
- Characterization of the chemical and physical hazards present at the Site;
- A description of the medical program required for OM&M personnel;
- A summary of the air monitoring program to be conducted during OM&M activities;
- Instruction on selection and use of personal protective equipment (PPE), and action levels for upgrading or downgrading PPE;
- Proper delineation of work zones and equipment personal decontamination; and
- An accident prevention and contingency plan (evacuation, first aid, emergency response team notification, routes to the hospital, etc.)

Table 3.1
Cherry Farm/River Road Site
Task Frequency Table

Task	Frequency	Comments	Target Date	Related SOP
Treatment System Compliance Tasks				
Treatment plant sampling for PCBs, oil and grease	Monthly	Samples are picked up at the office by laboratory personnel.	First week of month	SOP-7
Treatment plant sampling for BOD, TSS, iron, phosphorus, and zinc	Semi-annual	Samples are picked up at the office by laboratory personnel.	January and July	SOP-7
126 Priority Pollutants sampling	Annual	Samples are picked up at the office by laboratory personnel.	November 15	SOP-7
Self monitoring (discharge) report to Town of Tonawanda.	Monthly	Self-monitoring report by 25th of each month for previous month's activity. Include sample results, flow data, treatment plant notes, mail to Town of Tonawanda.	25th of each month	SOP-7
Monthly flow e-mailed to the Town of Tonawanda	Monthly	E- mail flow data to Bill Mucci at bmucci@tonawnda.ny.us.	8th of each month	SOP-7
Treatment System Maintenance				
Backflow valve test	Annual	Requires licensed Town of Tonawanda plumber. Town sends reminder letter with list of approved plumbers.	March 31	
Acid-clean pH probe sensor	Weekly	To maintain accurate readings between calibrations.		SOP-3,5,6
Equalization tank pH probe calibration	Weekly	Change calibration solutions out after every few uses to ensure accurate calibration.		SOP-3,5,6
Acidification tank pH probe calibration	Once/two weeks	Change calibration solutions out after every few uses to ensure accurate calibration.		SOP-3,5,6
Change out calibration solutions	As needed	Record in log book and mark on bottles with initials.		SOP-3,5,6
Chemical transfer	Three times per week/as needed	Store empty drums inside the plant during the colder months for pick-up. Drums can be stored outside when temperatures are above 55°F. Start keeping inside in October.		SOP-3,5

Table 3.1
Cherry Farm/River Road Site
Task Frequency Table

Task	Frequency	Comments	Target Date	Related SOP
Chemical order/delivery	As needed	Order when 1 or 2 drums of each chemical are remaining		SOP-3,5
Acid clean sumps	Monthly/as needed	Use muriatic acid from a pool store (two gallons per sump), usually treat when the flow into the plant drops below 8-9 gpm.		SOP-10
Remove LNAPL from Sump 1	Monthly	Use duct tape to hold control switch over from automatic to manual in control box next to sump, pump water level to bottom to remove oil.		SOP-10
Line flushing	Annual		3rd quarter	SOP-13
Check emergency eye wash and shower	Weekly	Mark in the log book when it was checked and whether it passed.		
Check first aid kit	Monthly	Make sure all required contents are present, current (not expired). If item is replaced, make notation on check sheet.		
PPE/waste drum pick-up	As needed	After a drum is full, disposal may be required. Disposal regulations may apply.		
Empty chemical drum pick up	As needed	CDI takes empty drums when they deliver chemicals		SOP-3,5
Landfill Maintenance				
Site inspections	Quarterly	NYSDEC requires advance notice of inspection so they can be present.		
Garbage and litter pick-up	As needed	Shoreline litter and trash can be disposed of in a dumpster.		
Snow plowing	As needed	Keep access road to treatment plant plowed.		
Landfill cap mowing	Annual	Entire cap area, after bird nesting season is complete.	September	

This list is complementary to the OM&M manual and SOPs. Ensure all OM&M SOPs are followed.

SECTION 4

REPORTS

4.1 INTRODUCTION

This section describes the reporting and recordkeeping requirements for the post-remedial construction period. The primary reporting element is an annual summary report, submitted to NYSDEC, NYSDOH, and the public repository, as shown below:

Mr. Michael Hinton (1 hard copy, 1 CD)
NYSDEC
270 Michigan Avenue
Buffalo, New York 14203-2999
Phone: (716) 851-7220

Mr. Cameron O'Connor (1 hard copy)
NYSDOH
584 Delaware Avenue
Buffalo, New York 14202
Ph: 716-847-4502

Richard Fedigan (1 hard copy)
NYSDOH
Flanigan Square, Room 300
547 River Street
Troy, NY 12180-2216
Ph: 518-402-7860

City of Tonawanda Public Library (1 hard copy)
333 Main Street
City of Tonawanda, New York 14150
Ph: 716-693-5043

4.2 ANNUAL REPORT

An annual report will be prepared to summarize the water level and water quality results from the previous quarterly (and semi-annual) reports, and present the results of the statistical evaluations (after at least eight sampling rounds). A groundwater contour map showing hydraulic gradients and flow directions, hydrographs of monitoring wells and piezometers showing water level trends, and a brief discussion of the effectiveness of the shallow groundwater collection trench system will also be included. The annual report will also summarize the inspection and maintenance activities on the cap, treatment plant, groundwater collection trench system, and site structures.

4.3 FIVE-YEAR REVIEW REPORT

At five-year intervals, a five-year review report will also be submitted to NYSDEC, in lieu of the typical annual report. The report will summarize the preceding five years of OM&M activities. It will provide recommendations for continued OM&M, and, where appropriate, modifications to various components of the OM&M Manual. For example, as discussed in Section 2, the parameter list and monitoring frequency for groundwater sampling may be modified based on results obtained over the five-year period. The next five year report will cover the period of January 1, 2004 through December 31, 2008.

4.4 MONITORING RECORDS

The environmental monitoring records that will be maintained include the following:

- A field information log, which contains well purge information, sampling information, field analytical data, instrument calibration check data, and general information such as weather conditions, observation, etc.;
- Chain-of-custody forms for the environmental and LNAPL samples;
- Records of data, drawings, and calculations of data evaluation;
- Electronic and hard copy records of the environmental chemical analyses, such as chemical analytical results from groundwater sampling events (see Section 4.7 for details); and
- Photographs (taken during quarterly inspections, or other field activities, such as the annual line-flushing event).

4.5 INSPECTIONS/MAINTENANCE RECORDS

A log book will be maintained onsite to track daily maintenance activities conducted. Also, routine inspections will be conducted quarterly. A site inspection form is presented in Appendix C. The site plan included in Section 2 should also be utilized, where appropriate, to document results of the inspections.

4.6 GROUNDWATER DISPOSAL RECORDS

Pre-treated groundwater will be disposed via discharge to the Town of Tonawanda's sanitary sewer system for subsequent final treatment at the Town's Wastewater Treatment Facility. Discharge monitoring records will be submitted in accordance with the industrial wastewater discharge permit issued by the Town (Appendix A of Volume II, treatment plant SOPs), and will be maintained at the groundwater treatment plant by the treatment plant operator.

4.7 SITE PLANS AND DRAWINGS

A site plan showing locations of monitoring points, final grade contours, locations of barrier islands, riprap shoreline, gabion walls, and in-river sediment caps is provided in Section 2, Figure 2.1. The other site plans and construction details, including record drawings of final grading and subgrade plans, cover system details, interceptor trench sumps, location of utilities and piping, etc., can be found in:

- Appendix J of the June 1995 Design Report, Cherry Farm Site, River Road Site;
- Appendix A of the May 1998 Final Remedial Design Report, Sediment Removal at Cherry Farm Site, River Road Site; and
- October 1999 Final Construction Certification Report, Cherry Farm Site, River Road Site.

Copies of these reports are maintained at:

NYSDEC Region 9 Office
270 Michigan Avenue
Buffalo, New York, 14203-2999
(716) 851-7220

SECTION 5

PERSONNEL AND CITIZEN PARTICIPATION

5.1 INTRODUCTION

The goal of the citizen participation program is to increase public understanding of the remediation and OM&M process. To keep the public informed about activities at the Site, the PRP group will maintain a local document repository at the City of Tonawanda Public Library, which will contain the pertinent documents relating to the Site investigation and remediation.

5.2 ORGANIZATION

The principal parties involved in implementation of the OM&M program at the Cherry Farm/River Road Site are: the NYSDEC; the Cherry Farm/River Road Site PRP Group; the OM&M Project Manager; OM&M field personnel; and an analytical laboratory. Responsibilities, qualifications, and training requirements for the OM&M personnel are described in the following paragraphs.

5.3 RESPONSIBILITIES AND DUTIES

Implementation of the Cherry Farm/River Road OM&M will require onsite personnel. Personnel will conduct routine inspections, sampling, and maintenance, as well as operate and maintain the groundwater collection system. Additionally, a Project Manager will be required to organize and oversee field and reporting activities on behalf of the PRP Group.

5.3.1 PRP Group

The PRP Group will perform or contract for the services of a Project Manager, operation and maintenance field personnel, and an analytical laboratory.

5.3.2 OM&M Personnel

The OM&M Project Manager will have the following responsibilities:

- Schedule and coordinate the monitoring activities, as described in Section 2;
- Evaluate the environmental monitoring data to determine if reportable exceedances occur, and to determine if any health or environmental hazards are present;
- Oversee inspection of the Site to ensure adequate maintenance is being conducted as described in Section 3;

- Maintain and submit the required documentation and records of OM&M activities as described in Sections 4;
- Oversee the activities conducted by the OM&M field personnel;
- Be available to respond in an emergency situation in accordance with the Contingency Plan (Appendix E);
- Serve as the primary interface between the NYSDEC and PRP Group; and
- Maintain records of the OM&M costs for the Site.

The onsite OM&M field personnel will have the following responsibilities:

- Obtain environmental samples, as described in Section 2 of this manual, including completion of chain-of-custody forms and field notes;
- Conduct the site inspection and maintenance activities, as described in Section 3 of this manual;
- Carry out the operations associated with the onsite groundwater treatment plant, including proper recording of data and ordering chemicals;
- Conduct regular calibration of site sampling and monitoring equipment and maintain calibration records;
- Adhere to the requirements of the OM&M Health and Safety Plan (see Appendix E); and
- Promptly inform the OM&M Project Manager of any problems associated with the landfill cap system, groundwater monitoring system, groundwater collection system and treatment plant, or site security system.

5.3.3 Subcontracted Analytical Laboratory

The subcontracted analytical laboratory will have the following responsibilities:

- Coordinate the analytical testing with the Project Manager;
- Schedule, analyze, and maintain quality assurance of the analytical work; and
- Provide timely reports to the OM&M Project Manager, summarizing the analytical results.

5.4 QUALIFICATIONS AND TRAINING

The OM&M onsite field personnel must each have a high school diploma or equivalent (as a minimum), secondary education in environmental science, and receive the following training:

- OSHA 40-hour hazardous waste site worker training (29 CFR 1910.120) (only required for personnel performing groundwater sampling, liner repairs, or other activities which could result in exposure to waste materials);

- Site specific health and safety and contingency plan implementation and training; and
- Training regarding Site specific O&M procedures described in Sections 2 and 3 of this manual;
- Training regarding site-specific OM&M procedures related to the treatment plant, as described in Volume II of this manual.

In addition, the O&M personnel must be familiar with the Site's engineering drawings, relevant specifications, sampling and analysis protocols, environmental monitoring, and reporting requirements.

5.5 CITIZEN PARTICIPATION PROGRAM

The goal of the citizen participation program is to increase public understanding of the remediation process at this Site.

- A local Document Repository has been established, which will contain the pertinent documents relating to the investigation and remediation of the Site, including the O&M reports discussed in Section 4 at the following address:

  Public Repository
  City of Tonawanda Public Library
  333 Main Street
  City of Tonawanda, New York 14150
  Ph: 716-693-5043

- On an as-needed basis in the future, NYSDEC will prepare Fact Sheets, and the PRP Group will be responsible for distributing the Fact Sheets in accordance with a contact list. The intent of the Fact Sheets is to inform the public about pertinent OM&M activities that will be conducted at the Site.

Key Contacts

The PRP Group representatives are::

Mr. William R. Jones
National Grid
300 Erie Boulevard West
Syracuse, NY 13202
Phone: (315) 428-5690

Mr. Ed Peterson
GM
Pontiac Centerpoint Campus – Central
2000 Centerpoint Parkway
Mailcode 483-520-190
Pontiac, MI 48341-3147
Phone: (248) 753-5849

Mr. Hugh Stephens (for GM)
Stephens and Stephens, LLP
410 Main St.
Buffalo, NY 14202-3702
Phone: 716-852-7590

Mr. Timothy Metcalf
Honeywell
101 Columbia Road
Morristown, NJ 07962
Phone: 973-455-4107

Key New York State Department of Environmental Conservation contact is:

Mr. Michael Hinton
270 Michigan Ave.
Buffalo, NY 14203-2999
Phone: (716) 851-7220
Fax: (716) 851-7226

SECTION 6

REFERENCES

NYSDEC, 1994. Order On Consent Index No. B9-0046-84-10 and B9-0047-91-02, Site Codes #915063 and #915031. New York State Department of Environmental Conservation.

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NYSDEC, 1998b. Consent Order Amendment for the Cherry Farm/River Road Sites, New York State Department of Environmental Conservation, November 2, 1998.

NYSDEC, 2002. Draft DER-10, Technical Guidance for Site Investigation and Remediation. December 2002.

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Parsons, 2000. OM&M Manual: Post-Construction Operations, Maintenance, and Monitoring Manuals for Cherry Farm Site (NYSDEC Site No. 9-15-063) and River Road Site (NYSDEC Site No. 9-15-031), Tonawanda, New York. January 2000.

Wendel Engineers, 1995. Cherry Farm Park Master Plan, prepared by Wendel Engineers, Inc., Lockport, New York.

APPENDIX A

MONITORING WELL AND RECOVERY WELL CONSTRUCTION AND BORING LOGS

Asbuilt Elevations

WELL	Top of Riser Elevation	Elevation Well Bottom	Screen (from top of riser in vault) (1) Bottom Elevation	Bottom Depth	Top Elevation	Top Depth	Designed Top Screen Elevation	Diff in Top of Scr	Designed Inlet Elev.	ASBUILT Inlet Elev.	Inlet Depth from Top of Riser	Lower Sensor Elevation	Upper Sensor Elevation	Depth to Sensor from Top of Riser Lower	Upper
RW-1	581.82	533.97	538.97	42.85	553.97	27.85	555	1.03	547.5	546.47	35.35	560	561	21.82	20.82
RW-2	581.82	529.02	534.02	47.8	554.12	27.7	555	0.88	545	544.12	37.7	560	561	21.82	20.82
RW-3	582.30	528.35	533.35	48.95	553.5	28.8	555	1.5	545	543.5	38.8	560	561	22.3	21.3
RW-4	581.83	529.53	534.53	47.3	554.63	27.2	555	0.37	545	544.63	37.2	560	561	21.83	20.83
RW-5	582.05	529.35	534.35	47.7	554.35	27.7	555	0.65	545	544.35	37.7	560	561	22.05	21.05
RW-6	570.76	531.46	536.46	34.3	551.56	19.2	555	3.44	547.5	544.06	26.7	560	561	10.76	9.76
RW-7	570.67	531.27	536.27	34.4	551.37	19.3	555	3.63	547.5	543.87	26.8	560	561	10.67	9.67
RW-8	583.83	534.36	539.36	44.47	549.46	34.37	550	0.54	545	544.46	39.37	560	561	23.83	22.83
RW-9	583.86	534.71	539.71	44.15	549.71	34.15	550	0.29	545	544.71	39.15	560	561	23.86	22.86
RW-10	583.28	541.88	546.88	36.4	556.98	26.3	550	-6.98	545	551.98	31.3	560	561	23.28	22.28
RW-11	581.22	539.92	544.92	36.3	555.02	26.2	550	-5.02	545	550.02	31.2	560	561	21.22	20.22

Cherry Farm/River Road
Recovery Well Construction Data

Asbuilt Elevations

Recovery Well	Ground Surface at Drill	Depth Drilled (ft)	Well Bottom Depth (ft)	Length of Riser + Sump Installed	Length of Screen Installed	Total Length (ft)	Cut to fit Vault	Well Total Depth at Riser	Top of Riser Elevation	Elevation Well Bottom	Screen (from top of riser in vault) (1)				Filter Pack (bgs during drill) (2)				Bentonite Seal (bgs during drill) (2)			
											Bottom		Top		Bottom		Top		Bottom		Top	
											Elevation	Depth	Elevation	Depth	Elevation	Depth	Elevation	Depth	Elevation	Depth	Elevation	Depth
RW-1	581.47	49	46.5	34.95	15	49.95	2.1	47.85	581.82	533.97	538.97	42.85	553.97	27.85	532.47	49.35	558.97	22.5	558.97	22.5	563.97	17.5
RW-2	581.22	52	51.9	35	20.1	55.1	2.3	52.8	581.82	529.02	534.02	47.8	554.12	27.7	529.22	52.6	558.72	22.5	558.72	22.5	563.92	17.3
RW-3	581.67	52	52.85	35.1	20.15	55.25	1.3	53.95	582.30	528.35	533.35	48.95	553.5	28.8	529.67	52.63	557.82	23.85	557.82	23.85	563.97	17.7
RW-4	580.61	51.8	51.3	35	20.1	55.1	2.8	52.3	581.83	529.53	534.53	47.3	554.63	27.2	528.81	53.02	558.31	22.3	558.31	22.3	562.91	17.7
RW-5	580.56	54	51	35	20	55	2.3	52.7	582.05	529.35	534.35	47.7	554.35	27.7	526.56	55.49	558.56	22	558.56	22	562.86	17.7
RW-6	570.4	39.5	38.5	25	15.1	40.1	0.8	39.3	570.76	531.46	536.46	34.3	551.56	19.2	530.9	39.86	555.9	14.5	555.9	14.5	558.9	11.5
RW-7	570.1	39.2	38.9	25	15.1	40.1	0.7	39.4	570.67	531.27	536.27	34.4	551.37	19.3	530.9	39.77	555.2	14.9	555.2	14.9	559.1	11
RW-8	582.79	50	48.37	45.17	10.1	55.27	5.8	49.47	583.83	534.36	539.36	44.47	549.46	34.37	532.79	51.04	553.42	29.37	553.42	29.37	557.79	25
RW-9	582.82	50	47.9	40.9	10	50.9	1.75	49.15	583.86	534.71	539.71	44.15	549.71	34.15	532.82	51.04	553.92	28.9	553.92	28.9	558.82	24
RW-10	582.8	45	41.5	35	10.1	45.1	3.7	41.4	583.28	541.88	546.88	36.4	556.98	26.3	537.8	45.48	560.3	22.5	560.3	22.5	565.3	17.5
RW-11	581.9	45	42	35	10.1	45.1	3.8	41.3	581.22	539.92	544.92	36.3	555.02	26.2	536.9	44.32	559	22.9	559	22.9	564.4	17.5

(1) Screen depths and elevations were determined from the length of the well screen and riser and the as-built elevation of the top of the riser as-built in the well vault

(2) Filter pack and bentonite seal depths and elevations were determined during well installation, measuring from a ground surface reference point of known elevation.

PARSONS ENGINEERING SCIENCE

DRILLING RECORD

BORING NO. MW-1

Contractor: SJB SERVICES
Driller: SJB VARIES
Inspector: DANIEL LIPP and GENE MELNYK
Rig Type: CME 75/85 TRAC
Method: VARIED

PROJECT NAME: Cherry Farm/River Road
PROJECT NUMBER: 726673.41

Sheet 1 of 3
Location: Along River Road near entrance to Cherry Farm

Weather: sunny 40

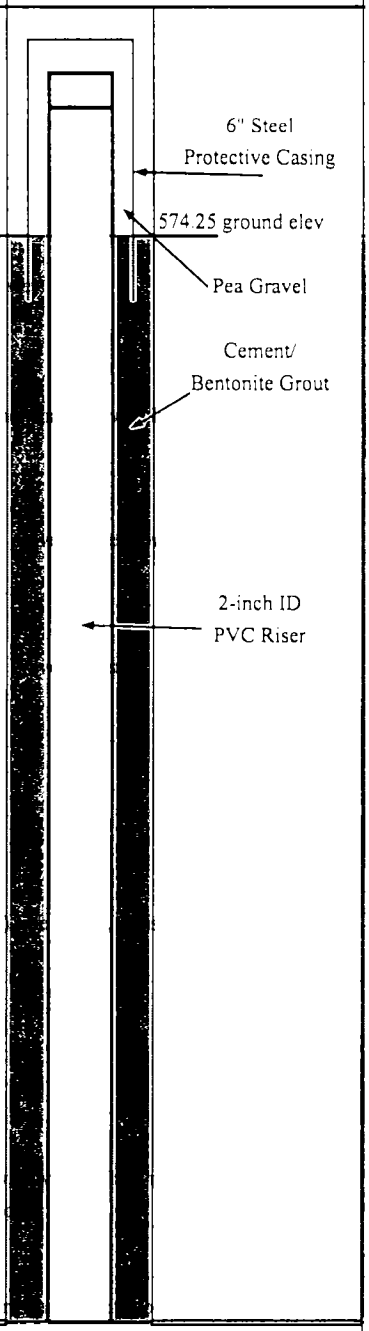
GROUNDWATER OBSERVATIONS

Date				
From				
DTW				

Date/Time Start: 10/25/96 1100
Date/Time Finish: 10/28/96 1400

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
		0			
				3	
	SS-1	1	4	4	Brown topsoil and roots, wet
				5	
		2		4	
				2	
	SS-2	3	15	3	Black medium to fine sand, some brown clay,moist
				2	
		4		4	
				2	
	SS-3	5	12	2	Brown clay, some course gravel, trace brown medium to fine
				4	sand moist
		6		6	
				1	
	SS-4	7	15	2	Brown clay, some course gravel, moist
				4	
		8		3	
				woh	
	SS-5	9	3	1	Brown clay, moist
				3	
		10		2	
				woh	
	SS-6	11	6	2	Brown silty clay, trace (-) fine gravel, moist, stiff
				2	
		12		2	
				woh	
	SS-7	13	4	2	Stiff brown clay
				3	
		14		3	
				1	
	SS-8	15	12	1	Upper 6" stiff brown clay, lower 6" black moist
				2	foundry sand, petroleum odor
		16		4	
				woh	
	SS-9	17	18	woh	Gray silt/sand-wet stiff brown clay with foundry sand

WELL CONSTRUCTION



STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Depths and elevations noted on the log are from the time the borehole was drilled.

Contractor:	SJB SERVICES				PARSONS ENGINEERING SCIENCE DRILLING RECORD	BORING NO.	MW-1
Driller:	SJB VARIES						
Inspector:	DANIEL LIPP and GENE MELNYK				PROJECT NAME Cherry Farm/River Road	Sheet 2 of 3	
Rig Type:	CME 75/85 TRAC				PROJECT NUMBER 726673.41	Location:	
Method:	VARIED						
					Weather sunny 40		
GROUNDWATER	OBSERVATIONS						
Date					Date/Time Start 10/25/96 1100		
From							
DTW					Date/Time Finish 10/28/96 1400		

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL	WELL CONSTRUCTION
				woh		
		18		1		
				woh		18.75' Morie 00 sand
	SS-10	19	15	woh	Gray silt, some clay, wet dilatent, soft	
				2		
		20		1		
				woh		20.75'
	SS-11	21	24	woh	Gray silty clay with silt layer, wet, dilatent	
				woh		
		22		woh		
				woh		
	SS-12	23	12	woh	Gray silty clay with layers of very fine sand, wet	
				woh		
		24		woh		
				wor		Morie 0 sand
	SS-13	25	14	wor	Same as above	
				2		
		26		1		
				wor		
	SS-14	27	12	1	Gray silty clay with dilatent fine sand layers, wet	
				1		
		28		2		
				4		
	SS-15	29	8	3	Gray sandy clay with layers of sand, wet	
				2		
		30		3		
				4		
	SS-16	31	24	1		.010 Slotted PVC Screen
				2		
		32		6		
				2		
	SS-17	33	24	2	Gray fine sand and silt, trace (-) clay, wet	
				4		
		34		3		
				3		
	SS-18	35	24	3	Gray fine sand and silt, trace (-) clay, wet dilatent	
				4		
		36		5		
				5		
	SS-19	37	24	4	Gray silt, trace (+) fine sand,trace clay, wet dilatent	
				3		
		38		4		
				4		

STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Depths and elevations were determined at the time the borehole was drilled.

PARSONS ENGINEERING SCIENCE

DRILLING RECORD

BORING NO. MW-1

Contractor: SJB SERVICES

Driller: SJB VARIES

Inspector: DANIEL LIPP and GENE MELNYK

Rig Type: CME 75/85 TRAC

Method: VARIED

PROJECT NAME Cherry Farm/River Road

PROJECT NUMBER 726673.41

Sheet 3 of 3

Location:

Weather sunny 40

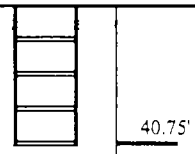
Date/Time Start 10/25/96 1100

Date/Time Finish 10/28/96 1400

GROUNDWATER OBSERVATIONS				
Date				
From				
DTW				

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
	SS-20	39	14	4	Gray silt, some fine sand, trace (-) clay, wet, dilatent
				3	
		40		7	
				woh	
	SS-21	41	16	5	Gray silt and very fine sand, trace(-) fine gravel, wet, dilatent
				7	
		42		6	

WELL CONSTRUCTION



STANDARD PENETRATION

SS = SPLIT SPOON

A = AUGER CUTTINGS

SUMMARY: Depths and elevations were determined at the time the borehole was drilled.

PARSONS ENGINEERING SCIENCE

DRILLING RECORD

BORING NO. MW-2

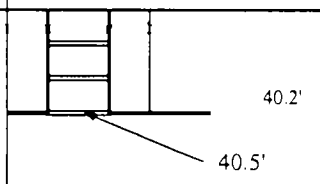
Sheet 3 of 3

Location:

Contractor:	SJB SERVICES
Driller:	SJB VARIES
Inspector:	DANIEL LIPP and GENE MELNYK
Rig Type:	CME 75/85 TRAC
Method:	VARIED
PROJECT NAME	Cherry Farm/River Road
PROJECT NUMBER	726673.41
Weather	sunny 40
Date/Time Start	10/21/96 1530
Date/Time Finish	10/23/96 1700

GROUNDWATER OBSERVATIONS

Date				
From				
DTW				

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL	COMMENTS
	SS-20	39	12	14	Brown silt and clay, some course gravel, trace fine gravel, wet	
				8		
		40		9		

STANDARD PENETRATION

SS = SPLIT SPOON

A = AUGER CUTTINGS

SUMMARY: Depths and elevations noted at the time the borehole was drilled.

PARSONS ENGINEERING SCIENCE

DRILLING RECORD

BORING NO. MW-2

Contractor: SJB SERVICES
Driller: SJB VARIES
Inspector: DANIEL LIPP and GENE MELNYK
Rig Type: CME 75/85 TRAC
Method: VARIED

PROJECT NAME: Cherry Farm/River Road
PROJECT NUMBER: 726673.41

Sheet 1 of 3
Location: Along River Road infront of Pine Hill
Cement

Weather: sunny 40

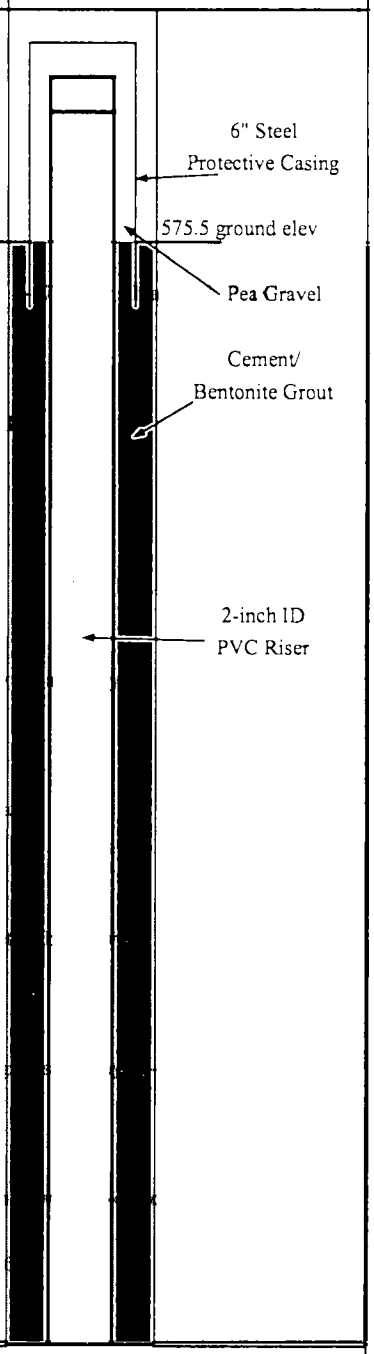
Date/Time Start: 10/21/96 1530

Date/Time Finish: 10/23/96 1700

GROUNDWATER OBSERVATIONS

Date				
From				
DTW				

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
		0			
				1	
	SS-1	1	18	20	Topsoil 0-6", concrete fill 6-17", gray silt and fill 17-18"
				10	
		2		10	
				2	
	SS-2	3	0	4	Metal debris, trace gray fill
				3	
		4		1	
				woh	
	SS-3	5	14	1	Gray /brown silt and clay
				1	
		6		3	
				woh	
	SS-4	7	12	1	Black sand 0-2', then gray silt and clay
				1	
		8		2	
				woh	
	SS-5	9	10	woh	Gray silt/clay and black sand
				4	
		10		2	
				4	
	SS-6	11	24	9	Gray silt/clay, fill (concrete rubble), wet
				6	
		12		2	
				1	
	SS-7	13	24	12	Gray silt and sand 0-12', gray silty clay 12-24"
				1	
		14		1	
	SS-8	15			Drill casing to 22' and then washed-out casing
		16			Top of marsh deposit at 16'
	SS-9	17	0.20		



STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Depths and elevations noted at the time the borehole was drilled.

Contractor:	SJB SERVICES				PARSONS ENGINEERING SCIENCE DRILLING RECORD	BORING NO.	MW-2
Driller:	SJB VARIES						
Inspector:	DANIEL LIPP and GENE MELNYK				PROJECT NAME Cherry Farm/River Road	Sheet 2 of 3	
Rig Type:	CME 75/85 TRAC				PROJECT NUMBER 726673.41	Location	
Method:	VARIED						
					Weather sunny 40		
GROUNDWATER OBSERVATIONS							
Date					Date/Time Start 10/21/96 1530		
From							
DTW					Date/Time Finish 10/23/96 1700		

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL	COMMENTS
		18				
						18.50
	SS-10	19				Morie 00 sand
		20				
				2		20.5'
	SS-11	21	24	4	Gray/brown clay and silt, some medium to fine sand, wet	
				2		
		22		1		
				woh		
	SS-12	23	10	1	Same as above	
				3		
		24		4		
				woh		
	SS-13	25	10	3	Brown medium to fine sand, some silt, wet	Morie 0 sand
				6		
		26		4		
				woh		
	SS-14	27	15	8	Brown medium to fine sand, some silt some course	
				14	gravel, wet	
		28		16		
				2		
	SS-15	29	18	5	Brown silt, medium to fine sand, some fine gravel, wet	
				4		
		30		2		
				woh		
	SS-16	31	24	3	Brown silt and clay, trace medium to fine sand, wet	.010 Slotted PVC
				3		screen
		32		2		
				1		
	SS-17	33	24	2	Same as above	
				2		
		34		1		
				7		
	SS-18	35	18	8	Same as above	
				5		
		36		6		
				14		
	SS-19	37	10	3	Same as above	
				2		
		38		2		
				12		

STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Depths and elevations noted from the time the borehole was drilled.

PARSONS ENGINEERING SCIENCE

DRILLING RECORD

BORING NO. MW-3

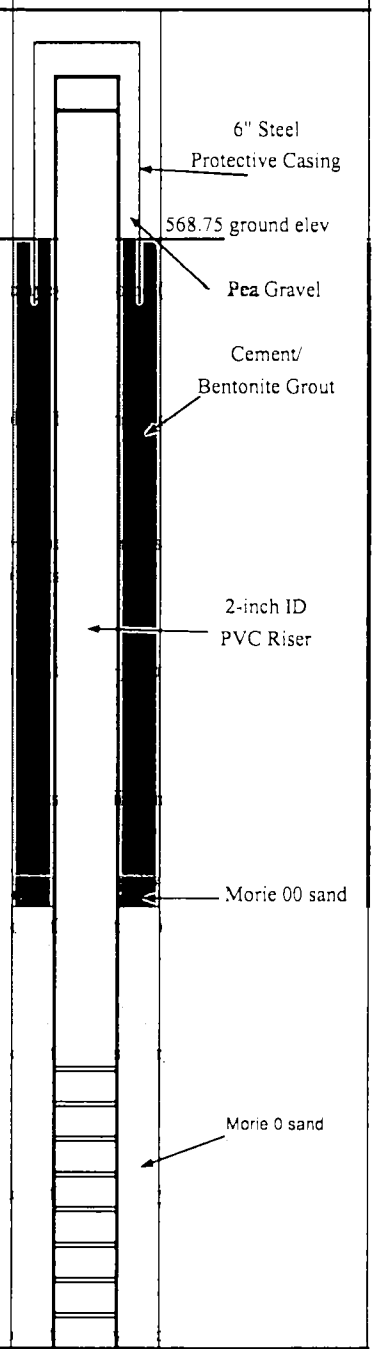
Sheet 1 of 2

Contractor:	SJB SERVICES
Driller:	SJB VARIES
Inspector:	GEORGE HERMANCE
Rig Type:	CME 75/85 TRAC
Method:	VARIED
PROJECT NAME	Cherry Farm/River Road
PROJECT NUMBER	726673.41
Location:	Northwest corner of Cherry Farm
Weather	sunny 55
Date/Time Start	9/23/96 1300
Date/Time Finish	9/24/96 1420

GROUNDWATER OBSERVATIONS

Date				
From				
DTW				

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
		0			
				woh	
	SS-1	1	12	1	Dark brown then brown clayey silt, some (-) fine sand
				1	
		2		1	
				woh	
	SS-2	3	8	woh	Brown clayey silt, then black fine sand and silt, moist soft, roots
				woh	
		4		1	
				woh	
	SS-3	5	18	1	Black clayey silt, trace (+) fine sand, roots to 5.5' then gray silty
				1	fine sand, mois, trace (+) roots
		6		2	
				2	
	SS-4	7	16	1	Gray fine sand, some (+) silt, trace (+) roots to 7.5' then wet
				2	dilatent sand
		8		1	
				1	
	SS-5	9	24	1	Gray fine sand, some (+) roots, wet dilatent
				1	
		10		2	
				1	
	SS-6	11	20	2	Gray medium to fine sand, little silt, trace (-) very fine gravel
				2	wet dilatent
		12		2	
				1	
	SS-7	13	14	1	Gray medium to fine sand, little (+) silt, trace (-) very fine
				1	gravel wet dilatent
		14		1	
				3	
	SS-8	15	18	2	Gray medium to fine sand, little silt (in layers), wet dilatent
				2	
		16		3	
				2	
	SS-9	17	12	4	Gray medium to fine sand, little silt, wet, dilatent



STANDARD PENETRATION

SS = SPLIT SPOON

A = AUGER CUTTINGS

SUMMARY: Depths and elevations determined at the time the borehole was drilled.

Contractor:	SJB SERVICES				PARSONS ENGINEERING SCIENCE DRILLING RECORD	BORING NO. MW-3
Driller:	SJB VARIES					
Inspector:	GEORGE HERMANCE				PROJECT NAME Cherry Farm/River Road	Sheet 2 of 2
Rig Type:	CME 7585 TRAC				PROJECT NUMBER 726673.41	Location:
Method:	VARIED					
					Weather sunny 55	
GROUNDWATER	OBSERVATIONS					
Date					Date/Time Start 9/23/96 1300	
From						
DTW					Date/Time Finish 9/24/96 1420	

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL	WELL CONSTRUCTION
				4		
		18		9		
				5		
	SS-10	19	24	6	Same as above 15-17', trace (-) roots	.010 Slotted PVC Screen
				6		
		20		7		
				4		
	SS-11	21	15	5	Gray medium to fine sand, silt, wet, dilatent	
				6		
		22		7		
				6		
	SS-12	23	20	7	Gray fine sand and silt, wet, dilatent	
				7		
		24		8		
				2		
	SS-13	25	6	4	Gray fine sand, trace (-) silt,wet, dilatent	Morie 0 sand
				4		
		26		7		
				2		
	SS-14	27	18	4	Alternating layers of medium to fine sand and tan clayey	
				1	silt to 28'	
		28		1		
				2		
	SS-15	29	18	1	Alternating layers of medium to fine sand and tan clayey	28.50
				3	silt , wet	29.50
		30		2		

STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Depths and elevations determined at the time the borehole was drilled.

PARSONS ENGINEERING SCIENCE

DRILLING RECORD

BORING NO. MW-4

Contractor: SJB SERVICES
Driller: SJB VARIES
Inspector: DANIEL LIPP
Rig Type: CME 75/85 TRAC
Method: VARIED

PROJECT NAME: Cherry Farm/River Road
PROJECT NUMBER: 726673.41

Sheet 1 of 3
Location: near river middle of Cherry Farm

Weather: sunny 55

Date/Time Start: 10/2/96 1400

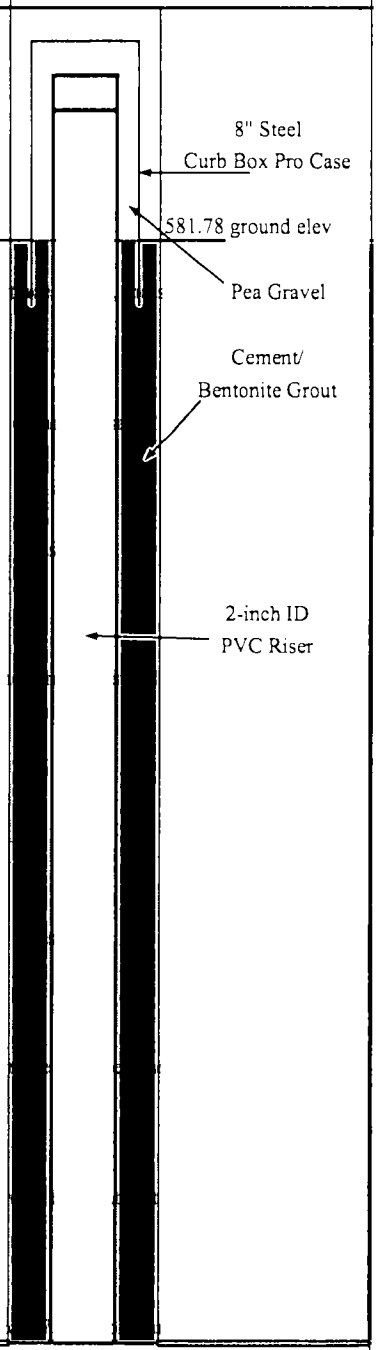
Date/Time Finish: 10/4/96 0840

GROUNDWATER OBSERVATIONS

Date				
From				
DTW				

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
		0			
				7	
	SS-1	1	12	6	Black medium fine sand, trace gravel, moist, fill
				18	
		2		20	
				22	
	SS-2	3	12	8	Same as above with trace of tan fine sand
				11	
		4		20	
				14	
	SS-3	5	20	28	Black medium fine sand, moist, fill
				28	
		6		25	
				19	
	SS-4	7	22	18	Black and tan medium fine sand, moist, fill
				15	
		8		13	
				4	
	SS-5	9	0	3	No recovery
				3	
		10		2	
				2	
	SS-6	11	10	2	Black medium fine sand, moist, fill
				2	
		12		2	
				1	
	SS-7	13	18	1	Black medium fine sand, trace tan fine sand, wet, fill
				1	
		14		1	
				WOH	
	SS-8	15	15		Black medium fine sand, wet, fill (water at 14')
		16			
				woh/.1	
	SS-9	17	24	2	Black medium to fine sand, 17.7 top of marsh deposit

WELL CONSTRUCTION

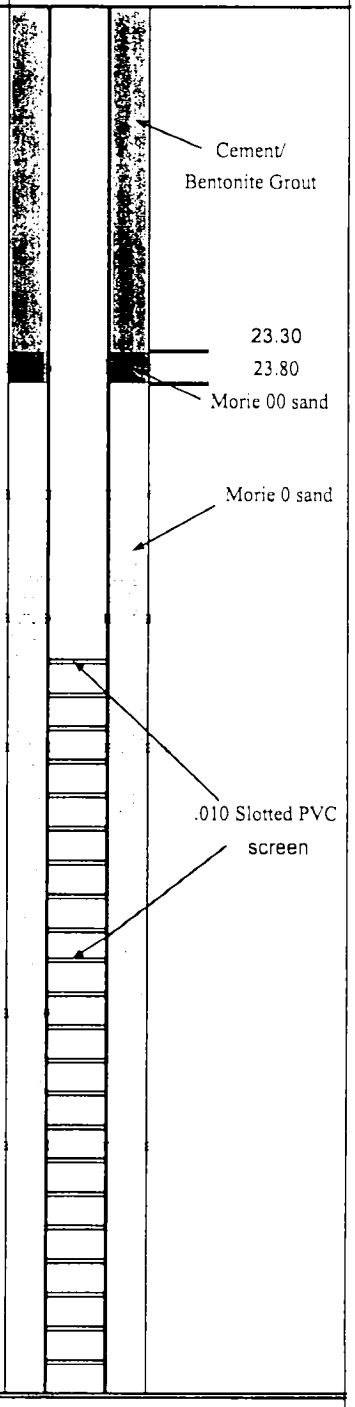


STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Depths and elevations determined at the time the borehole was drilled.

Contractor:	SJB SERVICES				PARSONS ENGINEERING SCIENCE DRILLING RECORD	BORING NO.	MW-4
Driller:	SJB VARIES						
Inspector:	DANIEL LIPP				PROJECT NAME Cherry Farm/River Road	Sheet 2 of 3	
Rig Type:	CME 75/85 TRAC				PROJECT NUMBER 726673.41	Location:	
Method:	VARIED						
					Weather sunny 55		
GROUNDWATER	OBSERVATIONS						
Date					Date/Time Start 10/2/96 1400		
From							
DTW					Date/Time Finish 10/4/96 0840		

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
				3	
		18			
				1	
	SS-10	19	12	1	Gray and brown sandy silt
				2	
		20		3	
				3	
	SS-11	21	18	1	Gray and brown sandy silt
				2	
		22		2	
				1	
	SS-12	23	20	2	Gray medium to fine sand, some silt, wet
				2	
		24		4	
				8	
	SS-13	25	15	3	Gray medium to fine sand, trace silt, moist
				3	
		26		5	
				4	
	SS-14	27	12	4	Gray medium to fine sand, some fine gravel, moist
				5	
		28		5	
				12	
	SS-15	29	15	5	Gray medium to fine sand, trace fine gravel, moist
				4	
		30		7	
				2	
	SS-16	31	8	5	same as above
				5	
		32		5	
				4	
	SS-17	33	10	4	Gray medium to fine sand, wet
				7	
		34		7	
				3	
	SS-18	35	10	3	Gray medium to fine sand, trace fine gravel, moist
				3	
		36		6	
				7	
	SS-19	37	12	4	same as above
				3	
		38		3	
				4	



STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Depths and elevations determined at the time the borehole was drilled.

Contractor: SJB SERVICES					PARSONS ENGINEERING SCIENCE DRILLING RECORD	BORING NO. MW-4
Driller: SJB VARIES						
Inspector: DANIEL LIPP					PROJECT NAME Cherry Farm/River Road	Sheet 3 of 3
Rig Type: CME 75/85 TRAC					PROJECT NUMBER 726673.41	Location: near river middle of Cherry Farm
Method: VARIED						
					Weather sunny 55	
GROUNDWATER OBSERVATIONS						
Date					Date/Time Start 10/2/96 1400	
From						
DTW					Date/Time Finish 10/4/96 0840	
Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL	WELL CONSTRUCTION
	SS-20	39	18	2	Brown and gray medium to fine sand, some fine gravel, some	
				2	silt, moist	
		40		3		
				1		
	SS-21	41	15	1	Brown and gray medium to fine sand, trace silt, trace fine	
				4	gravel, moist	.010 Slotted PVC screen
		42		4		
				2		
	SS-22	43	24	1	Brown silt, some gray medium to fine sand, (+) clay,moist	
				2		
		44		3		
				1		
	SS-23	45	18	1	Brown silt and clay, some gray medium to fine sand	
				2		
		46		2		
				woh		Morie 0 sand
	SS-24	47	24	1	Brown and gray clay, some silt, trace gray medium to fine sand	
				1		47.70
		48		1		48.50

STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Depths and elevations determine at the time the borehole was drilled.

PARSONS ENGINEERING SCIENCE

DRILLING RECORD

BORING NO. MW-5

Contractor: SJB SERVICES
Driller: SJB VARIES
Inspector: DANIEL LIPP
Rig Type: CME 75/85 TRAC
Method: VARIED

PROJECT NAME: Cherry Farm/River Road
PROJECT NUMBER: 726673.41

Sheet 1 of 3
Location: near river, southwest end of Cherry Farm

Weather: sunny 45

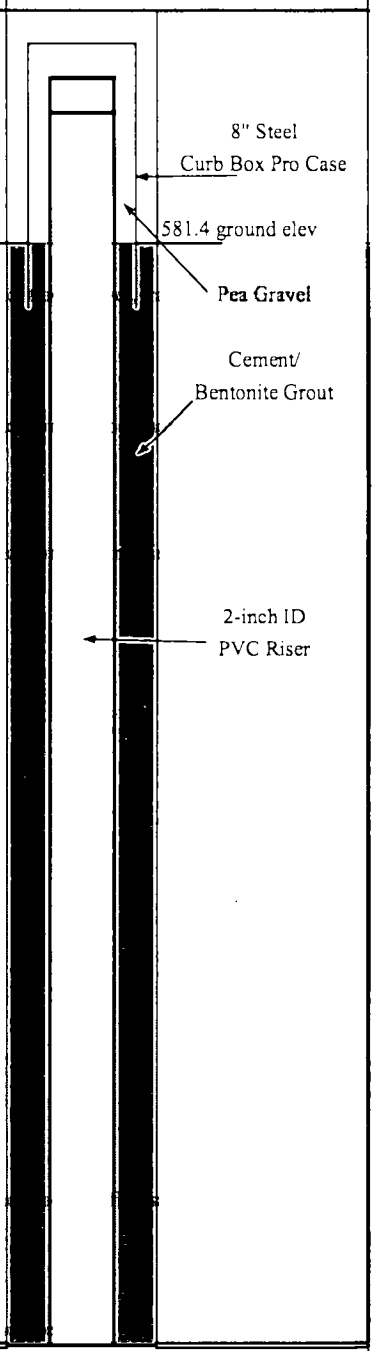
GROUNDWATER OBSERVATIONS

Date				
From				
DTW				

Date/Time Start: 10/7/96 1000
Date/Time Finish: 10/8/96 1750

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
		0			
				5	
	SS-1	1	18	6	Black medium to fine sand, trace gravel, trace red brick, moist fill
				5	
		2		8	
				9	
	SS-2	3	18	5	Black medium to fine sand, some wood, moist fill
				20	
		4		20	
				6	
	SS-3	5	8	7	Black medium to fine sand, some tan medium to fine sand, moist fill
				11	
		6		8	
				6	
	SS-4	7	24	7	Same as above
				5	
		8		4	
				1	
	SS-5	9	15	2	Same as above
				2	
		10		2	
				1	
	SS-6	11	8	2	Same as above
				2	
		12		2	
				7	
	SS-7	13	12	8	Same as above
				14	
		14		16	
				6	
	SS-8	15	10	5	Black medium to fine sand, trace tan fine sand, trace white fine gravel, wet fill
				16	
		16		8	
				2	
	SS-9	17	18	2	Black medium to fine sand, wet fill

WELL CONSTRUCTION



STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Depths and elevations determined at the time the borehole was drilled.

Contractor: SJB SERVICES					PARSONS ENGINEERING SCIENCE DRILLING RECORD	BORING NO.	MW-5
Driller: SJB VARIES							
Inspector: DANIEL LIPP					PROJECT NAME Cherry Farm/River Road	Sheet 2 of 3	
Rig Type: CME 75/85 TRAC					PROJECT NUMBER 726673.41	Location:	
Method: VARIED							
					Weather sunny 45		
GROUNDWATER OBSERVATIONS							
Date					Date/Time Start 10/7/96 1000		
From							
DTW					Date/Time Finish 10/8/96 1750		

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL	WELL CONSTRUCTION
				2		
		18		4		
				1		
	SS-10	19	24	woh	Brown silt sand, trace black medium to fine sand,Marsh	
				1	deposit at 19', wet, casing at 20'	Cement/ Bentonite Grout
		20		woh		
				woh		
	SS-11	21	0	woh	No recovery	
				woh		
		22		woh		
				woh		21.90
	SS-12	23	24	woh	Black and brown silt and medium to fine sand, trace	22.30
				woh	clay, wet	Morie 00 sand
		24		woh		
				woh		
	SS-13	25	24	woh	Same as above	Morie 0 sand
				woh		
		26		woh		
				woh		
	SS-14	27		5	Brown medium to fine sand, some black silt,wet	
				5		
		28		5		
				6		
	SS-15	29	18	3	Brown and gray medium to fine sand, wet	
				6		
		30		12		.010 Slotted PVC
				10		Screen
	SS-16	31	10	11	Gray medium to fine sand, some fine gravel,wet	
				10		
		32		10		
				7		
	SS-17	33		9	Same as above	
				10		
		34		7		
				11		
	SS-18	35	12	9	Gray medium to fine sand, wet	
				10		
		36		11		
				4		
	SS-19	37	10	7	Same as above	
				5		
		38		7		
				5		

STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Depths and elevations determined at the time the borehole was drilled.

Contractor: SJB SERVICES					PARSONS ENGINEERING SCIENCE DRILLING RECORD	BORING NO. MW-5
Driller: SJB VARIES						
Inspector: DANIEL LIPP					PROJECT NAME Cherry Farm/River Road	Sheet 3 of 3
Rig Type: CME 75/85 TRAC					PROJECT NUMBER 726673.41	Location:
Method: VARIED						
GROUNDWATER OBSERVATIONS					Weather sunny 45	
Date					Date/Time Start 10/7/96 1000	
From						
DTW					Date/Time Finish 10/8/96 1750	
Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL	WELL CONSTRUCTION
	SS-20	39	10	5	Gray medium to fine sand, trace fine gravel	
				3		
		40		2		
				3		
	SS-21	41	15	4	Gray and brown medium to fine sand, some brown clay	
				22		.010 Slotted PVC Screen
		42		0		
				5		
	SS-22	43	18	4	Same as above	
				5		
		44		7		
				6		
	SS-23	45	15	3	Same as above	
				3		
		46		2		
				woh		Morie 0 sand
	SS-24	47	24	woh	Same as above	
						46.40
		48				47.50

STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Depths and elevations determined at the time the borehole was drilled.

PARSONS ENGINEERING SCIENCE

DRILLING RECORD

BORING NO. MW-6

Sheet 1 of 3

Contractor: SJB SERVICES
Driller: SJB VARIES
Inspector: DANIEL LIPP
Rig Type: CME 75/85 TRAC
Method: VARIED

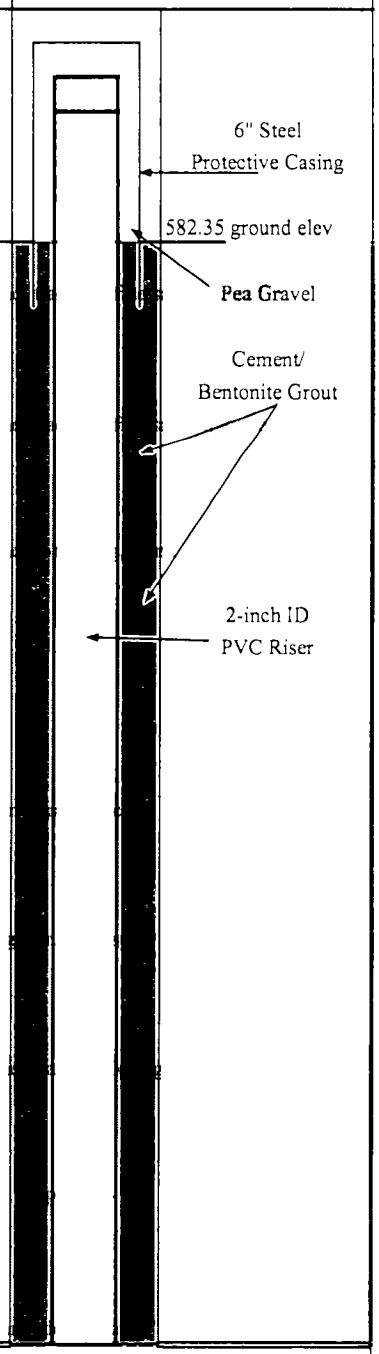
PROJECT NAME Cherry Farm/River Road
PROJECT NUMBER 726673.41
Location: Near river, middle of River Road Site

Weather sunny 40
Date/Time Start 10/11/96 0900
Date/Time Finish 10/15/96 0900

GROUNDWATER OBSERVATIONS				
Date				
From				
DTW				

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
		0			
				3	
	SS-1	1	24	6	Black medium to fine sand, trace tan fine sand, moist fill
				13	
		2		11	
				9	
	SS-2	3	24	7	Black medium to fine sand, trace tan fine sand, trace red fine
				13	sand, moist fill
		4		60	
				32	
	SS-3	5	5	32	Black medium to fine sand, some slag, some course gravel
				84	moist fill
		6		0	
				50/.4	
	SS-4	7	0		No recovery
		8			
				34	
	SS-5	9	8	26	Brown medium to fine sand, trace brick
				7	
		10		5	
				2	
	SS-6	11	15	2	Red and brown brick, slag, sand, moist
				4	
		12		4	
				5	
	SS-7	13	16	4	Red and brown brick, sand, slag, black slag with NAPL @ 13.8'
				2	
		14		4	
				2	
	SS-8	15	12	1	Black sand and slag, wet, NAPL odor
				2	
		16		13	
				8	
	SS-9	17		19	Same as above, top of marsh deposit at 19'

WELL CONSTRUCTION



STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Depths and elevations determined at the time the borhole was drilled.

PARSONS ENGINEERING SCIENCE

DRILLING RECORD

BORING NO. MW-6

Sheet 2 of 3

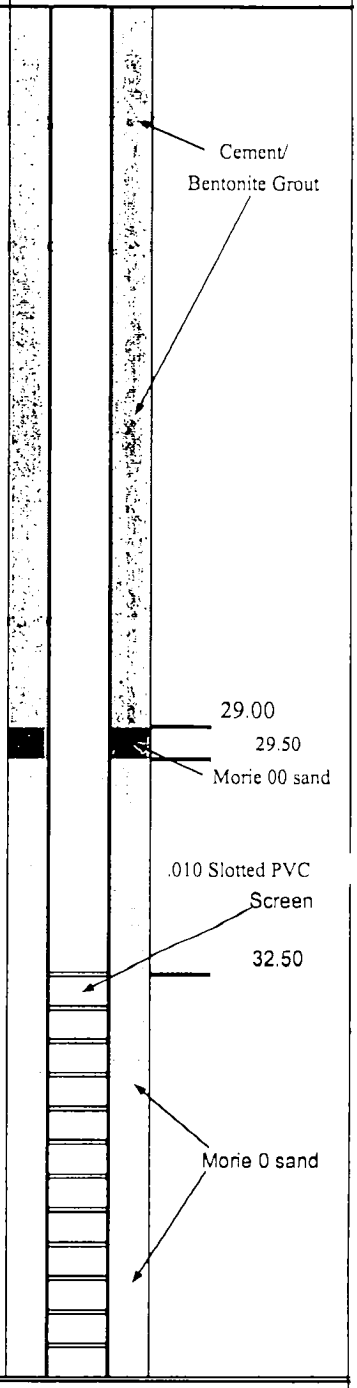
Contractor:	SJB SERVICES
Driller:	SJB VARIES
Inspector:	DANIEL LIPP
Rig Type:	CME 75/85 TRAC
Method:	VARIED
PROJECT NAME	Cherry Farm/River Road
PROJECT NUMBER	726673.41
Location:	
Weather	sunny 40
Date/Time Start	10/11/96 0900
Date/Time Finish	10/15/96 0900

GROUNDWATER OBSERVATIONS

Date				
From				
DTW				

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
				4	
		18		1	
				3	
	SS-10	19	24	2	Black course gravel and slag, some marsh deposit
				5	
		20		2	
				2	
	SS-11	21	18	4	Gray medium to fine sand, some silt, wet
				2	
		22		2	
				3	
	SS-12	23	18	2	Same as above, wet
				2	
		24		5	
				4	
	SS-13	25	18	3	Same as above, wet
				3	
		26		4	
				3	
	SS-14	27	10	2	Gray medium to fine sand, wet
				6	
		28		7	
				11	
	SS-15	29	15	9	Same as above
				7	
		30		8	
				4	
	SS-16	31	8	6	Same as above
				7	
		32		8	
				3	
	SS-17	33	8	5	Same as above
				8	
		34		15	
				12	
	SS-18	35	12	16	Same as above
				19	
		36		12	
				3	
	SS-19	37	8	6	Same as above
				8	
		38		10	
				3	

WELL CONSTRUCTION



STANDARD PENETRATION

SS = SPLIT SPOON

A = AUGER CUTTINGS

SUMMARY: Depths and elevations determined at the time the borehole was drilled.

PARSONS ENGINEERING SCIENCE

DRILLING RECORD

BORING NO. MW-6

Sheet 3 of 3

Location:

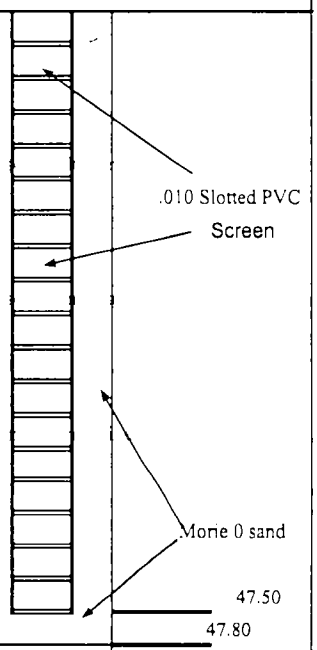
Contractor:	SJB SERVICES
Driller:	SJB VARIES
Inspector:	DANIEL LIPP
Rig Type:	CME 75/85 TRAC
Method:	VARIED
PROJECT NAME	Cherry Farm/River Road
PROJECT NUMBER	726673.41
Weather	sunny 40
Date/Time Start	10/11/96 0900
Date/Time Finish	10/15/96 0900

GROUNDWATER OBSERVATIONS

Date				
From				
DTW				

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
	SS-20	39	6	12	Same as above
				7	
		40		3	
				2	
	SS-21	41	10	2	Gray medium to fine sand, some silt, wet
				2	
		42		2	
				8	
	SS-22	43	15	7	Gray medium to fine sand, some fine gravel, some wood, wet
				9	
		44		3	
				woh	
	SS-23	45	24	woh	Brown and gray clay, trace medium to fine sand
				2	
		46		2	
				woh	
	SS-24	47	20	woh	Same as above
				woh	
		48		woh	

WELL CONSTRUCTION



STANDARD PENETRATION

SS = SPLIT SPOON

A = AUGER CUTTINGS

SUMMARY: Depths and elevations determined at the time the borehole was drilled.

PARSONS ENGINEERING SCIENCE

DRILLING RECORD

BORING NO. MW-7

Sheet 1 of 3

Contractor: SJB SERVICES
Driller: SJB VARIES
Inspector: DANIEL LIPP
Rig Type: CME 75/85 TRAC
Method: VARIED

PROJECT NAME Cherry Farm/River Road
PROJECT NUMBER 726673.41

Location: Southeast corner of River Road infront of treatment building

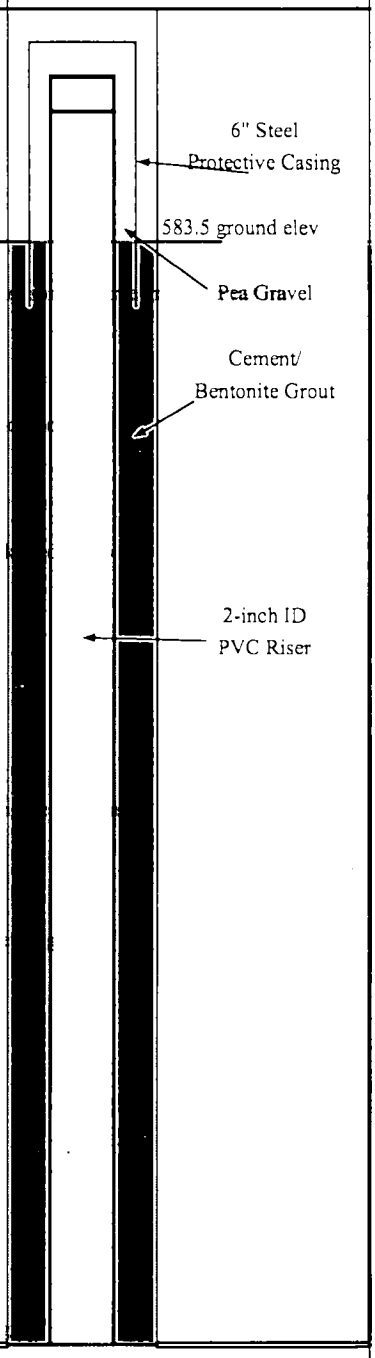
Weather sunny 40
Date/Time Start 10/16/96 0910
Date/Time Finish 10/18/96 1200

GROUNDWATER OBSERVATIONS

Date				
From				
DTW				

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
		0			
				2	
	SS-1	1	10	4	Black medium to fine sand, some course gravel, moist fill
				6	
		2		8	
				2	
	SS-2	3	24	4	Black medium to fine sand, moist fill
				4	
		4		8	
				20	
	SS-3	5	18	24	Course gravel, some black medium to fine sand, dry fill
				13	
		6		13	
				50/0	
	SS-4	7	0		No recovery
		8			
				25	
	SS-5	9	6	50/0	Black sand, slag, tan resin like material
		10			
				25	
	SS-6	11	12	10	Gray black, blue, slag, wet slag
				15	
		12		50/.4	
	SS-7	13	NA		Not attempted in slag
		14			
				50/.2	
	SS-8	15	0.20		Wet gray slag
		16			
				50/.2	
	SS-9	17	0.20		Cement like wet gray slag

WELL CONSTRUCTION



STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Depths and elevations determined at the time the borehole was drilled.

PARSONS ENGINEERING SCIENCE
DRILLING RECORD

BORING NO. MW-7

Sheet 2 of 3

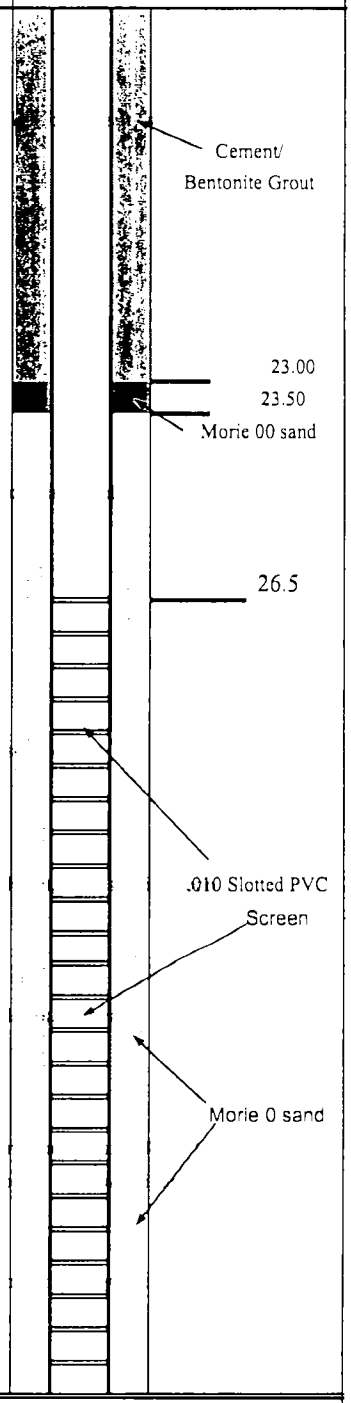
Contractor: SJB SERVICES
Driller: SJB VARIES
Inspector: DANIEL LIPP
Rig Type: CME 75/85 TRAC
Method: VARIED

PROJECT NAME: Cherry Farm/River Road
PROJECT NUMBER: 726673.41
Location:

Weather: sunny 40
Date/Time Start: 10/16/96 0910
Date/Time Finish: 10/18/96 1200

GROUNDWATER OBSERVATIONS				
Date				
From				
DTW				

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
		18			
				29	
	SS-10	19	14	17	Gray slag to 19' then black brown silty sand, top of marsh
				9	deposit
		20		2	
	SS-11	21	NA	NA	Not attempted
		22			
				2	
	SS-12	23		2	Gray fine slag, wet
				4	
		24		5	
				2	
	SS-13	25	24	2	Black silt and clay, trace black medium to fine sand, wet
				4	
		26		5	
				2	
	SS-14	27	15	1	Same as above
				2	
		28		2	
				3	
	SS-15	29	18	3	Gray black fine sand, some (+) silt, wet, alot of slag in
				4	top of spoon
		30		4	
				2	
	SS-16	31	12	5	Gray fine sand, wet dilatent, wash slag in spoon
				7	
		32		9	
				5	
	SS-17	33	4	6	Gray fine sand, wet dilatent, 8" of wash in spoon
				6	
		34		6	
				5	
	SS-18	35	12	2	medium dark brown/gray soft silt and clay, 4" of dark
				5	gray/brown medium to fine sand, wet,dilatent
		36		6	
				4	
	SS-19	37	12	3	Medium dark brown/gray silty clay and fine sand
				4	dilatent, wet soft
		38		4	
				2	



STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Depths and elevations determined at the time the borehole was drilled.

Contractor:	SJB SERVICES				PARSONS ENGINEERING SCIENCE DRILLING RECORD	BORING NO. MW-7
Driller:	SJB VARIES					
Inspector:	DANIEL LIPP				PROJECT NAME Cherry Farm/River Road	Sheet 3 of 3
Rig Type:	CME 75/55 TRAC				PROJECT NUMBER 726673.41	Location:
Method:	VARIED					
					Weather sunny 40	
GROUNDWATER	OBSERVATIONS					
Date					Date/Time Start 10/16/96 0910	
From						
DTW					Date/Time Finish 10/18/96 1200	

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL	WELL CONSTRUCTION
	SS-20	39	18	2	Medium dark gray/brown silty clay soft, some fine dark gray	
				2	sand within, wet/soft	
		40		2		
				3		
	SS-21	41	12	3	Soft silty clay and fine medium brown sand, as above	
				5		
		42		5		41.5'
				2		
	SS-22	43	20	2	Top 6" as above, bottom 14" soft wet medium red/gray silt clay	Morie 0 sand
				1		
		44		1		44'

STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Depths and elevations determined at the time the borehole was drilled.

PARSONS ENGINEERING SCIENCE
DRILLING RECORD

BORING NO. OW-1

Sheet 1 of 1

Contractor: SJB SERVICES
Driller: SJB VARIES
Inspector: GEORGE HERMANCE
Rig Type: CME 7585 TRAC
Method: VARIED

PROJECT NAME CHERRY FARM/RIVER ROAD
PROJECT NUMBER 726673.41
Location: Northwest corner of cherry farm

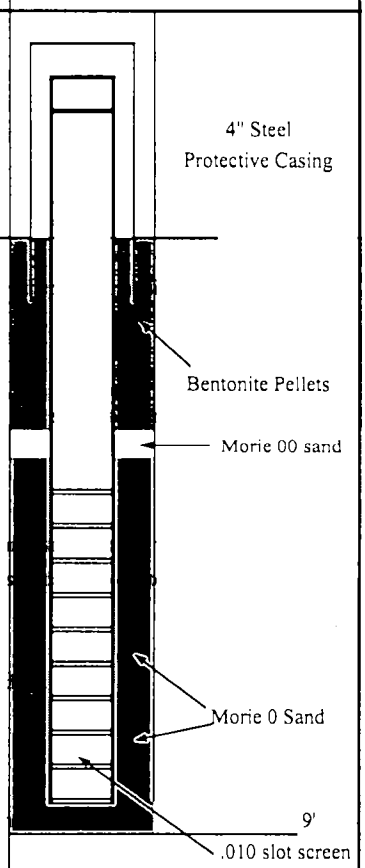
Weather sunny 45
Date/Time Start 12/11/96 0915
Date/Time Finish 12/11/96 0938

GROUNDWATER OBSERVATIONS

Date				
From				
DTW			0.00	

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
		0			
				4	
	SS-1	1	18	3	Brown clayey silt for 10" then black medium to fine sand, trace
				4	silt, moist
		2		4	
				7	
	SS-2	3	14	7	Black brown medium to fine sand, wet, then dark gray silty
				4	clay at bottom
		4		3	
				3	
	SS-3	5	16	1	Black medium to fine sand, some (-) silt, trace (+) roots to 4.5'
				1	then gray fine sand and silt, damp to dilatent
		6		2	
				2	
	SS-4	7	15	1	Gray black fine sand and silt
				3	
		8		1	
				2	
	SS-5	9	15	1	Gray medium to fine sand, some silt, wet
				2	
		10		2	
	SS-6	11			
		12			
	SS-7	13			
		14			
	SS-8	15			
		16			
	SS-9	17			

WELL CONSTRUCTION



STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Ground surface elevation at time of drilling

PARSONS ENGINEERING-SCIENCE
DRILLING RECORD

BORING NO. OW-1

Contractor: SJB SERVICES
Driller:
Inspector: GEORGE HERMANCE
Rig Type: CME 7585 TRAC
Method: VARIED

PROJECT NAME CHERRY FARM/RIVER ROAD
PROJECT NUMBER 726673.41

Sheet 2 of 2
Location:

Weather sunny 45

GROUNDWATER OBSERVATIONS

Date				
From				
DTW				

Date/Time Start 12/11/96 0915

Date/Time Finish 12/11/96 0938

Photovac Reading	Sample I.D.	Sample Depth	Percent Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL	COMMENTS
				12		
		18		49		18'
				5		18.5 morie 0 sand
	SS-10	19		2	Gray sloppy slag to 18.5 then black and gray sandy	
				2	silt, roots (woodchips)	
		20		1		
		21				
		22				
		23				
		24				
		25				
		26				
		27				
		28				
		29				
		30				
		31				
		32				
		33				
		34				
		35				
		36				
		37				
		38				

STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY:

PARSONS ENGINEERING SCIENCE
DRILLING RECORD

BORING NO. OW-2

Sheet 1 of 2

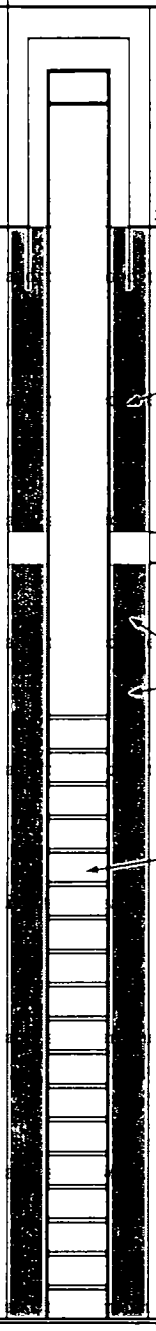
Contractor:	SJB SERVICES
Driller:	SJB VARIES
Inspector:	DANIEL LIPP
Rig Type:	CME 75&5 TRAC
Method:	VARIED
PROJECT NAME	CHERRY FARM/RIVER ROAD
PROJECT NUMBER	726673.41
Location:	
Weather	sunny 45
Date/Time Start	10/9/96 1430
Date/Time Finish	10/9/96 1700

GROUNDWATER OBSERVATIONS

Date				
From				
DTW				

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
		0			
				5	
	SS-1	1	20	3	Black medium to fine sand, trace wood, trace red fine sand
				5	moist fill
		2		4	
				7	
	SS-2	3	24	13	Black medium to fine sand, trace red fine sand, moist fill
				25	
		4		23	
				8	
	SS-3	5		12	Black medium to fine sand, some wood, trace fine sand, moist
				9	fill
		6		5	
				4	
	SS-4	7	8	3	Black medium to fine sand, trace red fine sand, moist fill
				3	
		8		2	
				3	
	SS-5	9	12	5	Black medium to fine sand, trace wood, trace metal
				5	
		10		10	
				23	
	SS-6	11	8	15	Black wood, some medium to fine sand, moist fill
				4	
		12		5	
				4	
	SS-7	13	15	3	Black medium to fine sand, some tan fine sand, moist fill
				4	
		14		4	
				5	
	SS-8	15	12	3	Black medium to fine sand, some wood, wet
				3	
		16		2	
				2	
	SS-9	17	24	1	Black medium to fine sand, top of marsh deposit at 17.8'

WELL CONSTRUCTION



4" Steel Protective Casing

581.95 ground elev

Cement/ Bentonite Grout

Morie 00 Sand

Morie 0 Sand

.010 slot screen sch 40 pvc

STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Ground surface elevation at time of drilling

PARSONS ENGINEERING SCIENCE
DRILLING RECORD

BORING NO. OW-2

Contractor: SJB SERVICES
Driller: SJB VARIES
Inspector: DANIEL LIPP
Rig Type: CME 7585 TRAC
Method: VARIED

PROJECT NAME CHERRY FARM/RIVER ROAD
PROJECT NUMBER 726673.41

Sheet 2 of 2
Location:

Weather sunny 45

GROUNDWATER OBSERVATIONS

Date				
From				
DTW				

Date/Time Start 10/9/96 1430

Date/Time Finish 10/9/96 1700

Photovac Reading	Sample I.D.	Sample Depth	Percent Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL	WELL CONSTRUCTION
				2		
		18		2		17.50
						17.8 morie 0 sand
	SS-10	19				
		20				
		21				
		22				
		23				
		24				
		25				
		26				
		27				
		28				
		29				
		30				
		31				
		32				
		33				
		34				
		35				
		36				
		37				
		38				

STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Ground surface elevation at time of drilling

PARSONS ENGINEERING SCIENCE
DRILLING RECORD

BORING NO. OW-3

Contractor: SJB SERVICES
Driller: SJB VARIES
Inspector: JEFF POULSEN
Rig Type: CME 7585 TRAC
Method: VARIED

PROJECT NAME CHERRY FARM/RIVER ROAD
PROJECT NUMBER 726673.41

Sheet 1 of 1
Location: along river, middle of cherry farm

Weather sunny 45

Date/Time Start 12/10/96 1150

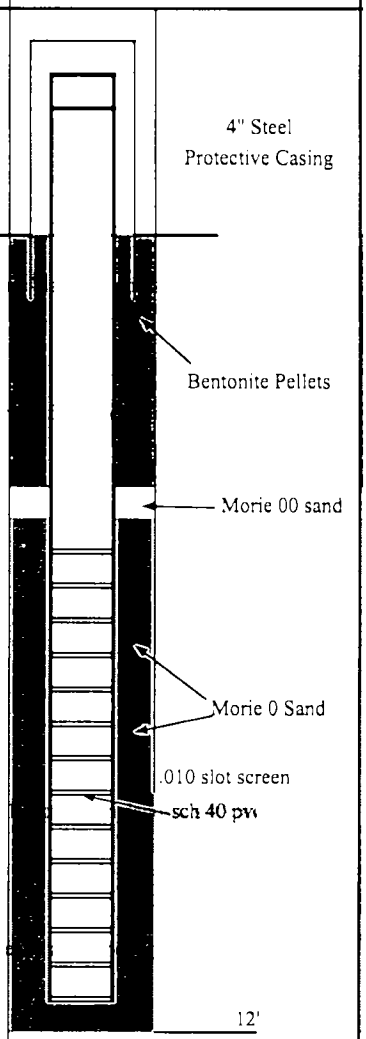
Date/Time Finish 12/10/96 1325

GROUNDWATER OBSERVATIONS

Date				
From				
DTW				

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
		0			
				3	
	SS-1	1	12	3	6" of clay cover, 6" of fine black silt and sand, damp
				3	
		2		3	
				3	
	SS-2	3	18	4	12" same as above, 6" waste fill, black sand/cinders
				17	
		4		6	
				7	
	SS-3	5	12	7	Black waste fill, dry
				11	
		6		9	
				7	
	SS-4	7	12	6	Same as above
				17	
		8		30	
				27	
	SS-5	9	16	19	6" waste fill black, wet, 10" of marsh deposit, silt/clay, organic
				4	material
		10		2	
				4	
	SS-6	11	12	2	Medium gray/brown fine silt and sand, organics
				2	
		12		4	
	SS-7	13			
		14			
	SS-8	15			
		16			
	SS-9	17			

WELL CONSTRUCTION



STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Ground surface elevation at time of drilling

PARSONS ENGINEERING SCIENCE
DRILLING RECORD

BORING NO. OW-4

Contractor: SJB SERVICES
Driller: SJB VARIES
Inspector: JEFF POULSEN
Rig Type: CME 7585 TRAC
Method: VARIED

PROJECT NAME CHERRY FARM/RIVER ROAD
PROJECT NUMBER 726673.41

Sheet 1 of 1
Location: along river, middle of cherry farm

Weather sunny 45

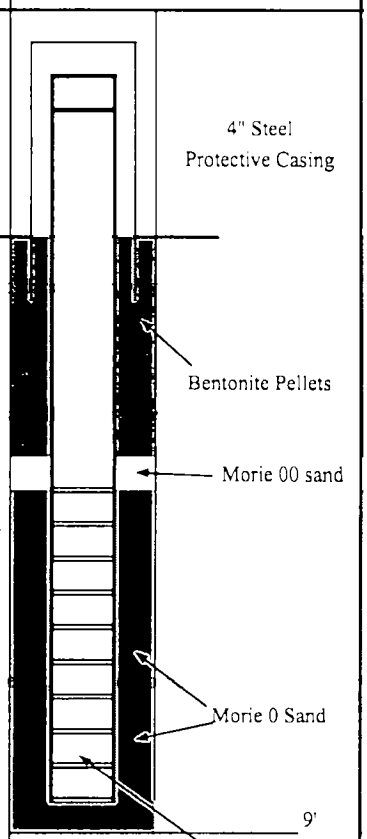
Date/Time Start 12/10/96 1015

Date/Time Finish 12/10/96 1300

GROUNDWATER OBSERVATIONS

Date				
From				
DTW				

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
		0			
				8	
	SS-1	1	18	8	6" of clay cover, black to dark brown waste fill, cinders, gravel,
				10	sand, damp
		2		20	
				14	
	SS-2	3	18	22	black to dark brown waste fill, cinders, gravel, sand, damp
				24	
		4		30	
				24	
	SS-3	5	12	25	Same as above, wet
				17	
		6		10	
				6	
	SS-4	7	12	2	6" same as above, 6" fine silt, marsh deposits
				1	
		8		1	
				1	
	SS-5	9	5	1	Marsh deposit
				1	
		10		1	
	SS-6	11			
		12			
	SS-7	13			
		14			
	SS-8	15			
		16			
	SS-9	17			



WELL CONSTRUCTION

STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Ground surface elevation at time of drilling

PARSONS ENGINEERING SCIENCE
DRILLING RECORD

BORING NO. OW-5

Sheet 1 of 2

Contractor: SJB SERVICES
Driller: SJB VARIES
Inspector: DANIEL LIPP
Rig Type: CME 7535 TRAC
Method: VARIED

PROJECT NAME CHERRY FARM/RIVER ROAD
PROJECT NUMBER 726673.41

Location: along river, southwest end of cherry farm

Weather sunny 45

Date/Time Start 10/10/96 1430

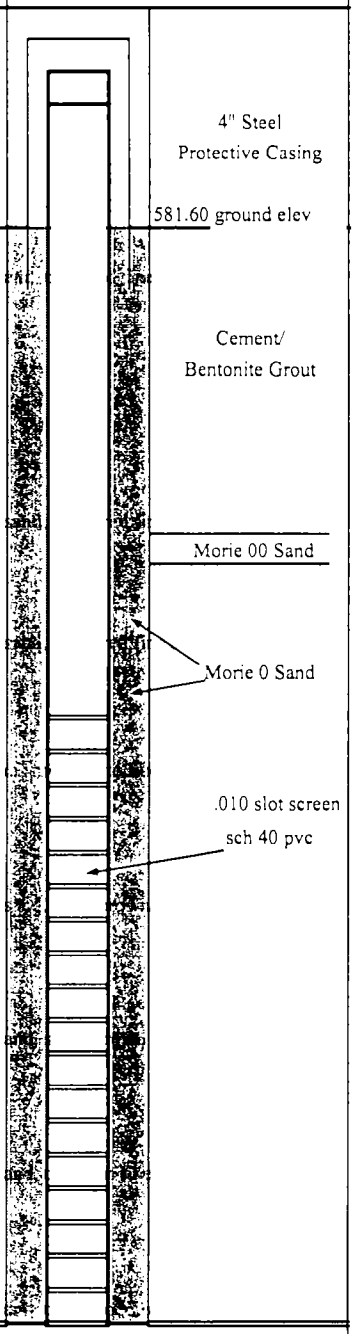
Date/Time Finish 10/10/96 1730

GROUNDWATER OBSERVATIONS

Date				
From				
DTW				

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
		0			
				5	
	SS-1	1	18	5	Black medium to fine sand, trace red fine sand, moist fill
				5	
		2		6	
				5	
	SS-2	3	24	6	Same as above
				10	
		4		17	
				9	
	SS-3	5	24	11	Brown medium to fine sand, some red fine sand, moist fill
				11	
		6		12	
				7	
	SS-4	7	18	6	Brown medium to fine sand, some red fine sand, some tan fine
				7	sand, moist fill
		8		7	
				8	
	SS-5	9	15	4	Tan fine sand, some black medium to fine sand, trace red fine
				2	moist fill
		10		2	
				1	
	SS-6	11	8	4	Brown medium to fine sand, trace brown fine sand, moist fill
				2	
		12		4	
				4	
	SS-7	13		6	Black medium to fine sand, some brown fine sand, moist fill
				25	
		14		37	
				5	
	SS-8	15	15	8	Black medium to fine sand, trace tan fine sand, moist fill
				10	
		16		8	
				7	
	SS-9	17		8	Black medium to fine sand, trace wood, water at 16'

WELL CONSTRUCTION



STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Ground surface elevation at time of drilling

PARSONS ENGINEERING SCIENCE
DRILLING RECORD

BORING NO. OW-5

Sheet 2 of 2

Location:

Contractor: SJB SERVICES
Driller: SJ B VARIES
Inspector: DANIEL LIPP
Rig Type: CME 7585 TRAC
Method: VARIED

PROJECT NAME CHERRY FARM/RIVER ROAD
PROJECT NUMBER 726673.41

Weather sunny 45

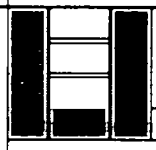
Date/Time Start 10/10/96 1430

Date/Time Finish 10/10/96 1730

GROUNDWATER OBSERVATIONS				
Date				
From				
DTW				

Photovac Reading	Sample I.D.	Sample Depth	Percent Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
				12	
		18		19	
				3	
	SS-10	19	18	4	Brown and black silty clay, trace black medium to fine
				2	sand, wet
		20		1	
		21			
		22			
		23			
		24			
		25			
		26			
		27			
		28			
		29			
		30			
		31			
		32			
		33			
		34			
		35			
		36			
		37			
		38			

WELL CONSTRUCTION



18.50
19' monie 0 sand

STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Ground surface elevation at time of drilling

PARSONS ENGINEERING SCIENCE
DRILLING RECORD

BORING NO. OW-6

Sheet 1 of 1

Contractor: SJB SERVICES
Driller: SJB VARIES
Inspector: JEFF POULSEN
Rig Type: CME 7585 TRAC
Method: VARIED

PROJECT NAME CHERRY FARM/RIVER ROAD
PROJECT NUMBER 726673.41

Location: along river, southwest corner of cherry farm

Weather sunny 45

Date/Time Start 12/9/96 1530

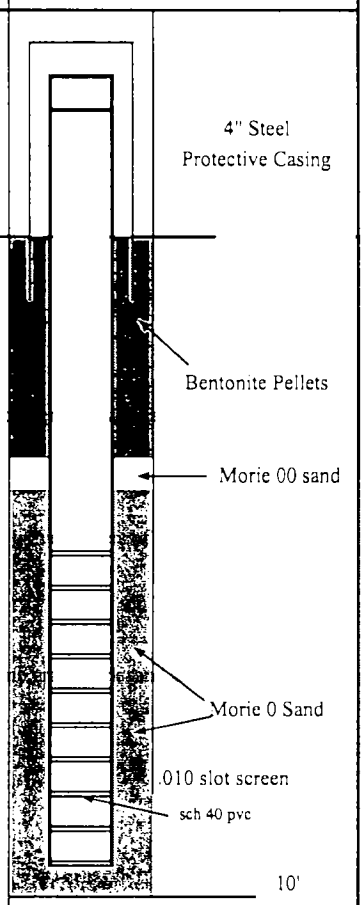
Date/Time Finish 12/9/96 1555

GROUNDWATER OBSERVATIONS

Date				
From				
DTW				

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
		0		1	
	SS-1	1	16	2	Red clay, fill cover
				7	
		2		3	
				6	
	SS-2	3	12	7	6" of red clay, 6" black cinders and wet sand, wet
				7	
		4		15	
				8	
	SS-3	5	12	26	Dark gray/brown course gravel, layers of tan fine sand and
				20	silt, wet
		6		7	
				1	
	SS-4	7	24	2	6" same as above, 18" fine gray/black sand and silt, organic
				1	odor, wet
		8		2	
				6	
	SS-5	9	18	2	Same as above
				2	
		10		3	
	SS-6	11			
		12			
	SS-7	13			
		14			
	SS-8	15			
		16			
	SS-9	17			

WELL CONSTRUCTION



STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Ground surface elevation at time of drilling

PARSONS ENGINEERING SCIENCE
DRILLING RECORD

BORING NO. OW-7

Sheet 1 of 1

Contractor: SJB SERVICES
Driller: SJB VARIES
Inspector: JEFF POULSEN
Rig Type: CME 7585 TRAC
Method: VARIED

PROJECT NAME CHERRY FARM/RIVER ROAD
PROJECT NUMBER 726673.41

Location: along river, Northwest corner of river road

Weather sunny 45

Date/Time Start 12/9/96 1445

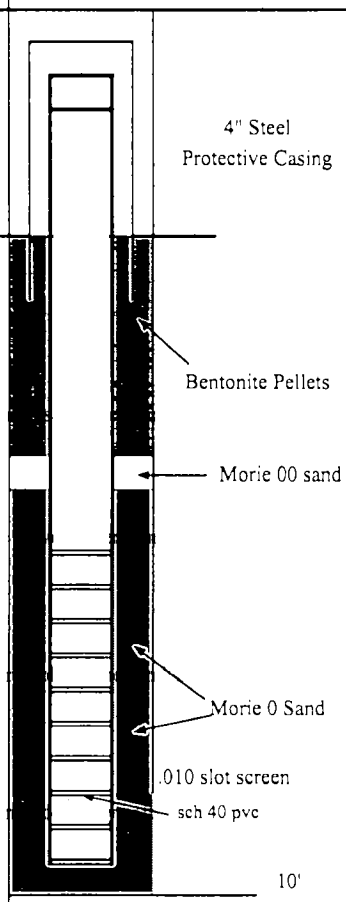
Date/Time Finish 12/10/96 0940

GROUNDWATER OBSERVATIONS

Date				
From				
DTW				

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
		0			
				1	
	SS-1	1	16	2	Red clay, fill, cover
				7	
		2		3	
				6	
	SS-2	3	12	7	12" red clay, 6" black cinders and wet sand
				7	
		4		15	
				8	
	SS-3	5	12	26	Dark gray/brown course gravel, layers tan wet fine sand and
				20	silt
		6		7	
				1	
	SS-4	7	24	2	6" same as above, 18" gray/black fine sand/silt, wet organices
				1	
		8		2	
				5	
	SS-5	9	2	5	2" of gray silty clay, some odor, very soft
				6	
		10		10	
	SS-6	11			
		12			
	SS-7	13			
		14			
	SS-8	15			
		16			
	SS-9	17			

WELL CONSTRUCTION



STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Ground surface elevation at time of drilling

PARSONS ENGINEERING SCIENCE
DRILLING RECORD

BORING NO. OW-8

Contractor: SJB SERVICES
Driller: SJB VARIES
Inspector: JEFF POULSEN
Rig Type: CME 7585 TRAC
Method: VARIED

PROJECT NAME CHERRY FARM/RIVER ROAD
PROJECT NUMBER 726673.41

Sheet 1 of 1
Location: along river, southwest end of river road

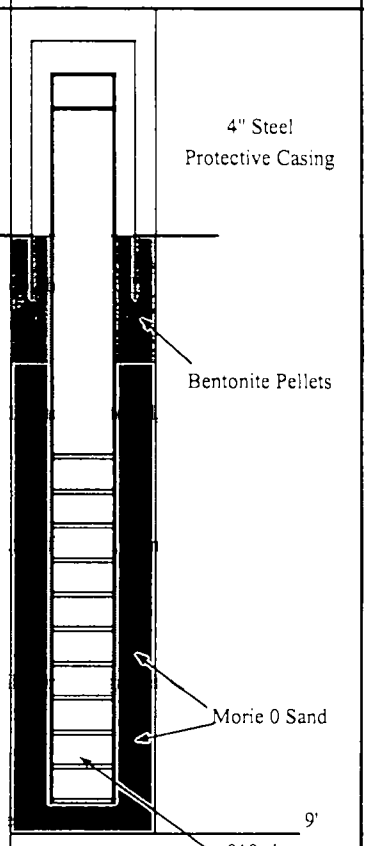
Weather sunny 45
Date/Time Start 12/9/96 1115
Date/Time Finish 12/9/96 1400

GROUNDWATER OBSERVATIONS

Date				
From				
DTW				

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
		0			
				2	
	SS-1	1	18	2	Red cover clay, damp, geofabric at 1.5'
				2	
		2		4	
				3	
	SS-2	3	18	3	1' light brown sand fill, 1' black waste fill, sand, gravel, slug
				6	
		4		1	
				2	
	SS-3	5	12	3	Black waste fill, sand, 0.5" of gravel, damp
				50/1	
		6			
				12	
	SS-4	7	16	38	Dark gray black waste fill, cinders, gravel, sand, slight odor
				40	
		8		50/2	
				52	
	SS-5	9	8	50/2	Black gray waste fill, wet
		10			
	SS-6	11			
		12			
	SS-7	13			
		14			
	SS-8	15			
		16			
	SS-9	17			

WELL CONSTRUCTION



STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Ground surface elevation at time of drilling

PARSONS ENGINEERING SCIENCE
DRILLING RECORD

BORING NO. OW-9

Contractor: SJB SERVICES
Driller: SJB VARIES
Inspector: DANIEL LIPP
Rig Type: CME 75 85 TRAC
Method: VARIED

PROJECT NAME CHERRY FARM/RIVER ROAD
PROJECT NUMBER 726673.41

Sheet 1 of 2
Location: near river, middle of river road

Weather sunny 45

Date/Time Start 10/25/96 0836

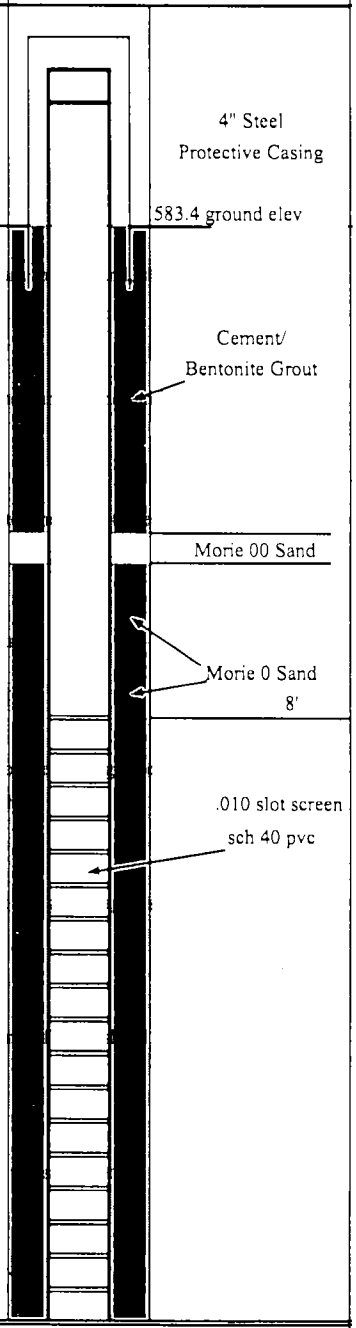
Date/Time Finish 10/25/96 0954

GROUNDWATER OBSERVATIONS

Date				
From				
DTW				

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
		0			
				3	
	SS-1	1	16	4	Black and brown medium to fine sand, slag, moist
				2	
		2		2	
				5	
	SS-2	3	24	7	Black, brown and tan medium to fine sand, slag, moist
				5	
		4		50	
				10	
	SS-3	5	12	30	Black and tan medium to fine sand, trace slag, all fill, moist
				50/.2	
		6			
				50/.3	
	SS-4	7	2		Slag, crystalline in nature
		8			
				33	
	SS-5	9	18	32	Black brown medium to fine sand, gray crystalline slag, fine
				18	gravel, dry mixture in shoe
		10		38	
				25	
	SS-6	11	12	15	Black fine sand and silt fill, gray slag in shoe of spoon, moist
				50/.4	
		12			
				50/0	
	SS-7	13	0		No recovery, small chunk of brick slag 13', wet
		14			
				12	
	SS-8	15	6	50/.4	Slag, gray white brick, moist to wet
		16			
				12	
	SS-9	17	20	22	Wet gray slag

WELL CONSTRUCTION



STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Ground surface elevation at time of drilling

PARSONS ENGINEERING SCIENCE
DRILLING RECORD

BORING NO. OW-9

Sheet 2 of 2

Location:

Contractor: SJB SERVICES
Driller: SJB VARIES
Inspector: DANIEL LIPP
Rig Type: CME 7535 TRAC
Method: VARIED

PROJECT NAME CHERRY FARM/RIVER ROAD
PROJECT NUMBER 726673.41

Weather sunny 45

Date/Time Start 10/25/96 0836

Date/Time Finish 10/25/96 0954

GROUNDWATER OBSERVATIONS

Date				
From				
DTW				

Photovac Reading	Sample I.D.	Sample Depth	Percent Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL	COMMENTS
				12		
		18		49		18'
				5		18.5 morie 0 sand
	SS-10	19		2	Gray sloppy slag to 18.5 then black and gray sandy	
				2	silt, roots (woodchips)	
		20		1		
		21				
		22				
		23				
		24				
		25				
		26				
		27				
		28				
		29				
		30				
		31				
		32				
		33				
		34				
		35				
		36				
		37				
		38				

STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Ground surface elevation at time of drilling

PARSONS ENGINEERING SCIENCE

DRILLING RECORD

BORING NO. RW - 1

Sheet 1 of 3

Contractor: SJB SERVICES
Driller: ART KOSKE
Inspector: GEORGE HERMANCE
Rig Type: CME 75-85 TRAC
Method: VARIED

PROJECT NAME: Cherry Farm/River Road
PROJECT NUMBER: 726673.41
Location: Northwest Corner - Cherry Farm

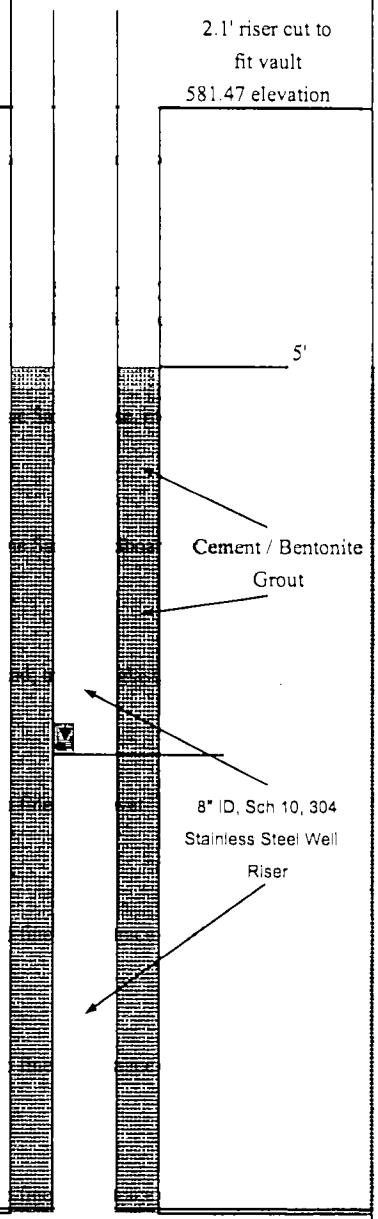
Weather: Sunny,
Date/Time Start: 9/10/96 0930hrs
Date/Time Finish: 9/16/96 1530 hrs

GROUNDWATER OBSERVATIONS

Date				
From				
DTW				

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
		0			
				1	
	SS-1	1	15	8	Black, Brown, Tan, medium to fine Sand, some (-) Silt,
				14	trace(+) roots, moist
		2		9	
				6	
	SS-2	3	12	6	Black, Brown, medium to fine Sand, trace (+) Silt, trace (-)
				8	clay, trace (-) fine Gravel, trash, plastic, moist
		4		7	
				4	
	SS-3	5	12	3	Black, Tan , medium to fine Sand, loose, moist,
				5	
		6		6	
				7	
	SS-4	7	4	7	Black, Tan , medium to fine Sand, cardboard, moist,
				8	
		8		6	
				1	
	SS-5	9	12	3	Black , medium to fine Sand, trace (-) glass, moist, cement
				5	
		10		4	
				1	
	SS-6	11	17	3	Black and Tan, medium to fine Sand, wet
				5	
		12		1	
				3	
	SS-7	13	15	4	Black and Tan, medium to fine Sand, trace (-) Slag, wet
				3	
		14		4	
				1	
	SS-8	15	20	3	Black and Tan, medium to fine Sand, trace (+) Silt, wet
				4	
		16		5	
				2	
	SS-9	17	24	3	Black and Tan, medium to fine Sand, trace (+) Silt, to 17.5'

WELL CONSTRUCTION



STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Depth and elevation noted at time borehole was drilled

PARSONS ENGINEERING SCIENCE

DRILLING RECORD

BORING NO. RW - 1

Sheet 2 of 3

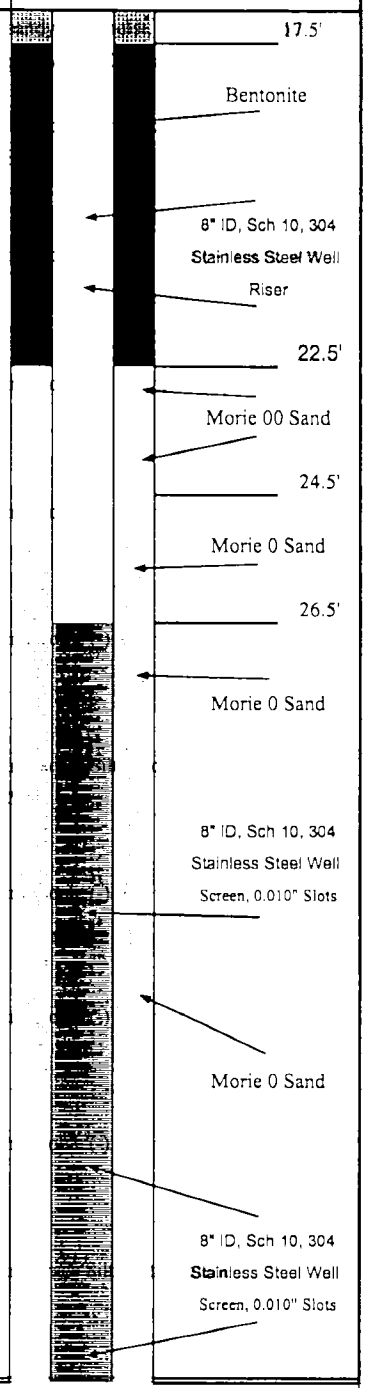
Contractor	SJB SERVICES
Driller:	ART KOSKE
Inspector:	GEORGE HERMANCE
Rig Type:	CME 75-85 TRAC
Method:	VARIED
PROJECT NAME	Cherry Farm/River Road
PROJECT NUMBER	726673.41
Location:	
Weather	Sunny,
Date/Time Start	9/10/96 0930hrs
Date/Time Finish	9/16/96 1530 hrs

GROUNDWATER OBSERVATIONS

Date				
From				
DTW				

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
				5	then stained gray black, sandy Silt, moist, stiff, roots, wood
		18		2	Top of Marsh Deposit at 17.5'
				WOH	
	SS-10	19	14	WOH	Gray, medium to fine Sand, some Silt, trace roots, wet, loose,
				1	roots in black Sand and Silt
		20		1	
				1	
	SS-11	21	12	2	Gray, medium to fine Sand, some (-) Silt, trace (--) roots, wet
				2	
		22		4	
				1	
	SS-12	23	18	1	Gray, medium to fine Sand, some (-) Silt, trace (--) roots, wet
				2	dilatent
		24		2	
				WOR	
	SS-13	25	18	2	Gray, medium to fine Sand, some (-) Silt, wet
				1	dilatent
		26		4	
				3	
	SS-14	27	15	9	Gray, medium to fine Sand, some (-) Silt, wet
				11	dilatent, loose at bottom
		28		11	
				1	
	SS-15	29	20	11	Gray, medium to fine Sand, some Silt, trace (-) fine Gravel,
				13	wet, dilatent , gravel at 29.5'
		30		19	
				1	
	SS-16	31	24	4	Gray, medium to fine Sand, some (-) Silt, wet
				7	dilatent,
		32		9	
				2	
	SS-17	33	12	7	Gray, medium to fine Sand, some (-) Silt, wet
				6	dilatent,
		34		5	
				3	
	SS-18	35	24	7	Gray, medium to fine Sand, some (-) Silt, wet
				7	dilatent,
		36		10	
				WOR	
	SS-19	37	24	WOH	Gray ,medium to fine Sand, trace Silt, wet, dilatent
				1	
		38		1	
				WOR	

WELL CONSTRUCTION



STANDARD PENETRATION

SS = SPLIT SPOON

A = AUGER CUTTINGS

SUMMARY: Depth and elevation noted at time borehole was drilled

Contractor:	SJB SERVICES				PARSONS ENGINEERING SCIENCE DRILLING RECORD	BORING NO. RW - 1
Driller:	ART KOSKE					
Inspector:	GEORGE HERMANCE				PROJECT NAME Cherry Farm/River Road	Sheet 3 of 3
Rig Type:	CME 75-85 TRAC				PROJECT NUMBER 726673.41	Location:
Method:	VARIED					
					Weather Sunny,	
GROUNDWATER OBSERVATIONS						
Date					Date/Time Start 9/10/96 0930hrs	
From						
DTW					Date/Time Finish 9/16/96 1530 hrs	

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL	WELL CONSTRUCTION
	SS-20	39	14	WOR	Gray medium to fine Sand, trace(+) Silt, trace (+) Clay, some	
				WOR	layering, soft, wet	8" ID, Sch 10, 304 Stainless Steel Well Screen, 0.010" Slots
		40		WOH		
				WOR		
	SS-21	41	18	WOH	Gray medium to fine Sand, some Silt in layers, trace Clay	
				2	for the last 6"	41.5'
		42		3		
				1		Morie 0 Sand
	SS-22	43	6	1	Gray, Tan, Silt and Clay, wet	
				1		
		44		1		8" ID, Sch 10, 304 Stainless Steel Well Riser / Sump
				WOR		
	SS-23	45	6	WOR	Gray, Tan, Silt and Clay, wet	
				WOR		
		46		WOR		
				WOR		46.5'
	SS-24	47	0	WOR	No Recovery	
				2		Morie 0 Sand
		48		2		48'

STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Depth and elevation noted at time borehole was drilled

PARSONS ENGINEERING SCIENCE
DRILLING RECORD

BORING NO. RW - 2

Sheet 1 of 3

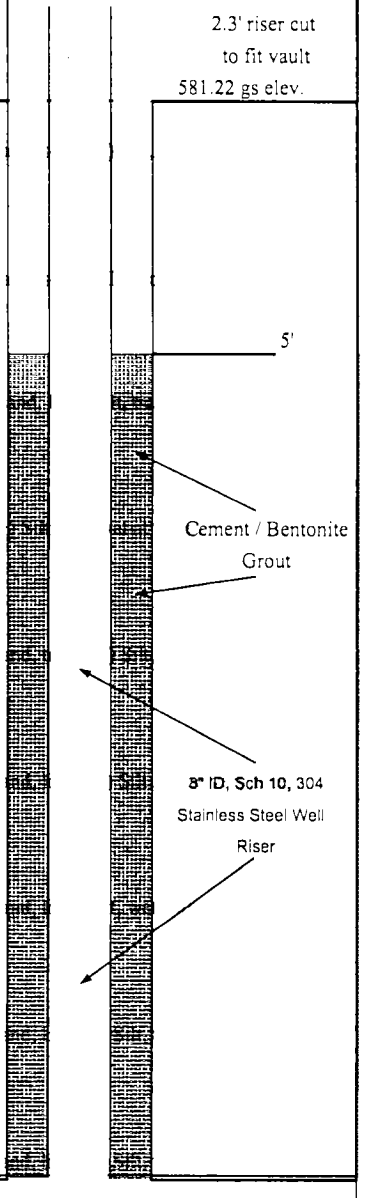
Contractor:	SJB SERVICES
Driller:	ART KOSKE
Inspector:	GEORGE HERMANCE
Rig Type:	CME 75-85 TRAC
Method:	VARIED
PROJECT NAME	Cherry Farm/River Road
PROJECT NUMBER	726673.41
Location:	Northwest Corner - Cherry Farm
Weather	Sunny, 60 degrees
Date/Time Start	9/16/96 0815hrs
Date/Time Finish	9/18/96 1130 hrs

GROUNDWATER OBSERVATIONS

Date				
From				
DTW				

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
		0			
				5	
	SS-1	1	15	17	Black, medium to fine Sand, some (-) Silt, wood, moist
				12	
		2		16	
				17	
	SS-2	3	24	21	Black, medium to fine Sand, some Silt, wood, trace (-) Clay,
				29	moist, fill
		4		31	
				10	
	SS-3	5	24	5	Black , medium to fine Sand, little Silt, trace Slag, wood,
				4	moist
		6		4	
				3	
	SS-4	7	24	4	Black, fine Sand, little(+) Silt, fill, wet at 7 feet
				3	
		8		2	
				1/12	
	SS-5	9	18		Black, medium to fine Sand, trace (+) Silt, wet , fill
				1	
		10		1	
				1	
	SS-6	11	20	1	Black, medium to fine Sand, little (+) Silt , trace very fine,
				1	gravel, wet, fill
		12		1	
				1	
	SS-7	13	24	1	Black, medium to fine Sand, little Silt, wet, fill
				1	
		14		2	
				1	
	SS-8	15	24	1	Black, medium to fine Sand, little (-) Silt, trace Clay, wet, fill
				5	
		16		6	
				1	
	SS-9	17	24	1	Black, medium to fine Sand, little (-) Silt, wet to 17.3'

WELL CONSTRUCTION



STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Depth and elevation noted at time borehole was drilled

PARSONS ENGINEERING SCIENCE
DRILLING RECORD

BORING NO. RW - 2

Contractor: SJB SERVICES
Driller: ART KOSKE
Inspector: GEORGE HERMANCE
Rig Type: CME 75-85 TRAC
Method: VARIED

PROJECT NAME: Cherry Farm/River Road
PROJECT NUMBER: 726673.41

Sheet 2 of 3
Location:

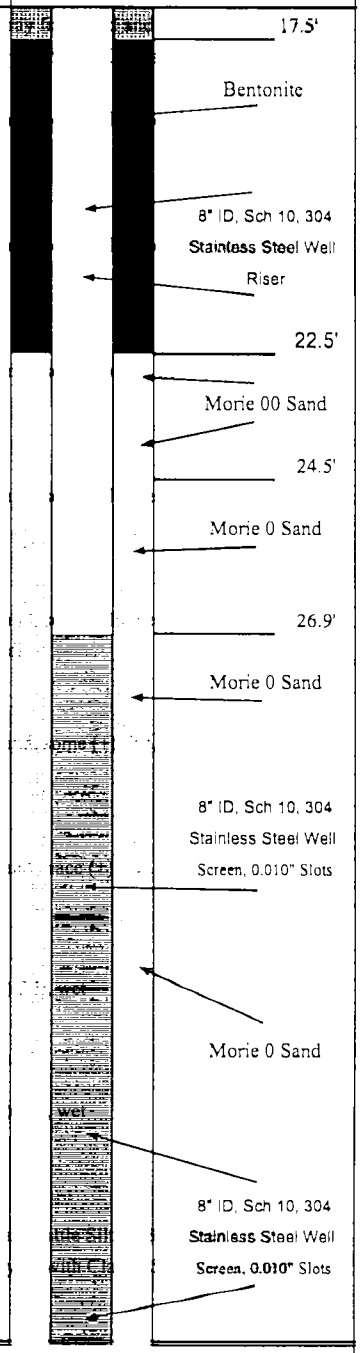
Weather: Sunny, 60 degrees
Date/Time Start: 9/16/96 0815hrs
Date/Time Finish: 9/18/96 1130 hrs

GROUNDWATER OBSERVATIONS

Date				
From				
DTW				

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
				7	then stained black and gray fine Sand and Silt, trace Clay, roots,
		18		5	Top of Marsh Deposit at 17.3'
				1	
	SS-10	19	16	2	Gray, medium to fine Sand, some Silt, trace (+) roots,
				2	grass, wet
		20		3	
				2	
	SS-11	21	12	1	Gray, medium to fine Sand, some Silt, trace (+) roots, wet
				1	
		22		1	
				2	
	SS-12	23	14	2	Gray, medium to fine Sand, some (-) Silt, trace (--) roots to
				1	22.5', wet, dilatent
		24		2	
				2	
	SS-13	25	12	1	Gray, medium to fine Sand, some Silt, wet
				2	dilatent
		26		1	
				2	
	SS-14	27	24	2	Gray, medium to fine Sand, some Silt, wet
				5	dilatent, some color bands
		28		6	
				3	
	SS-15	29	6	10	Gray, medium to fine Sand, some (+) Silt, wet
				13	dilatent
		30		13	
				7	
	SS-16	31	22	10	Gray, medium to fine Sand, trace (+) Silt, wet
				7	dilatent,
		32		6	
				8	
	SS-17	33	24	12	Gray, fine Sand, little (-) Silt, wet
				14	dilatent,
		34		16	
				10	
	SS-18	35	24	14	Gray, fine Sand, little (-) Silt, wet
				14	dilatent,
		36		14	
				8	
	SS-19	37	24	7	Gray, medium to fine Sand, little Silt, to 37.5' then Gray
				2	medium to fine Sand layers with Clayey Silt, wet, dilatent
		38		3	
				3	

WELL CONSTRUCTION



STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Depth and elevation noted at time borehole was drilled

PARSONS ENGINEERING SCIENCE
DRILLING RECORD

BORING NO. RW - 2

Sheet 3 of 3

Contractor: SJB SERVICES
Driller: ART KOSKE
Inspector: GEORGE HERMANCE
Rig Type: CME 75-85 TRAC
Method: VARIED

PROJECT NAME Cherry Farm/River Road
PROJECT NUMBER 726673.41
Location:

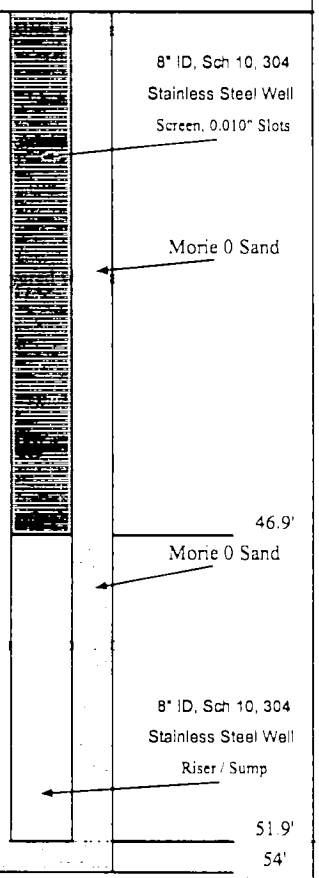
Weather Sunny, 60 degrees
Date/Time Start 9/16/96 0815hrs
Date/Time Finish 9/18/96 1130 hrs

GROUNDWATER OBSERVATIONS

Date				
From				
DTW				

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
	SS-20	39	14	2	Gray medium to fine Sand layered with tanish Clayey Silt
				2	wet, dilatent
		40		4	
				2	
	SS-21	41	12	2	Same as 38' to 40'
				2	
		42		3	
				2	
	SS-22	43	12	3	Gray medium to fine Sand layered with tanish Clayey Silt
				5	wet, dilatent
		44		6	
				3	
	SS-23	45	12	1	Same as 42' to 44'
				3	
		46		3	
				1	
	SS-24	47	6	1	Same as 44' to 46'
				2	
		48		1	
				4	
	SS-25	49	6	3	Running Sand, Clayey Silt in Shoe of Spoon
				5	
		50		6	
				3	
	SS-26	51	0	1	Running Sand
				9	
		52		14	

WELL CONSTRUCTION



STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Depth and elevation noted at time borehole was drilled

PARSONS ENGINEERING SCIENCE
DRILLING RECORD

BORING NO. RW - 3

Contractor: SJB SERVICES
Driller: ART KOSKE
Inspector: GEORGE HERMANCE
Rig Type: CME 75-85 TRAC
Method: VARIED

PROJECT NAME: Cherry Farm/River Road
PROJECT NUMBER: 726673.41

Sheet 1 of 1
Location: Northwest Center - Cherry Farm

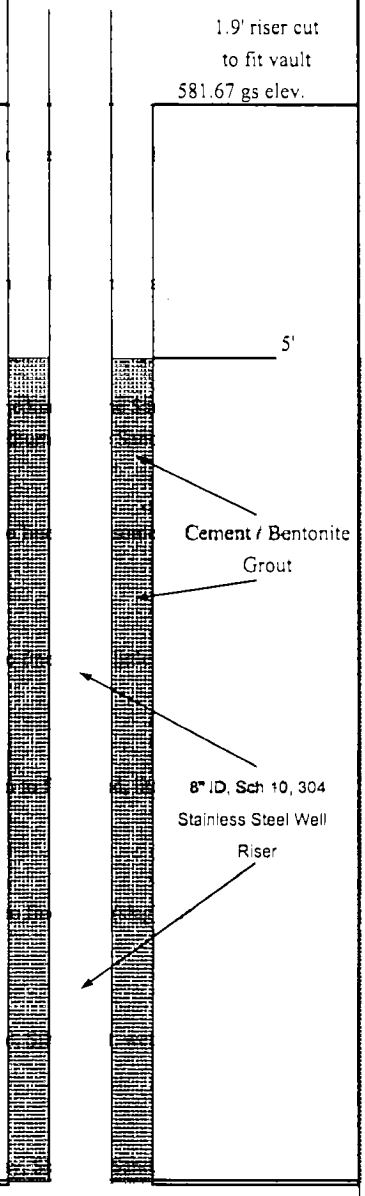
Weather: Sunny,
Date/Time Start: 9/19/96 0855hrs
Date/Time Finish: 9/23/96 1000 hrs

GROUNDWATER OBSERVATIONS

Date				
From				
DTW				

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
		0			
				3	
	SS-1	1	18	4	Black and Tan medium to fine Sand, dry, loose
				4	
		2		5	
				3	
	SS-2	3	16	4	Black, some Tan, medium to fine Sand, trace (-) Silty
				6	Clay, damp, loose
		4		7	
				4	
	SS-3	5	22	10	Brown clay then Black medium to fine Sand and SILT, trace
				18	(-) Clay, then back to medium to fine Sand, damp
		6		25	
				12	
	SS-4	7	20	11	Black and Tan medium to fine Sand, some(-) Silt, trace (-)
				10	Clay, damp to moist
		8		9	
				3	
	SS-5	9	16	3	Black and Tan medium to fine Sand, little (-) Silt, damp
				3	
		10		3	
				1	
	SS-6	11	20	1	Black and brown medium to fine Sand, little Silt, trace (-)
				2	Clay, wet at 10.5'
		12		2	
				50	
	SS-7	13	8	50/.3	Black and gray medium to fine Sand (slag), slag in shoe of
					spoon, wet
		14			
				18	
	SS-8	15	6	50/.3	Black, tan, red Slag, Sand, Silt, moist, wet
					easy drill past 15'
		16			
				25	
	SS-9	17	16	38	Black , brown, white, gray, Slag and Sand, some Silt

WELL CONSTRUCTION



STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Depth and elevation noted at time borehole was drilled

PARSONS ENGINEERING SCIENCE
DRILLING RECORD

BORING NO. RW - 3

Sheet 2 of 3

Location:

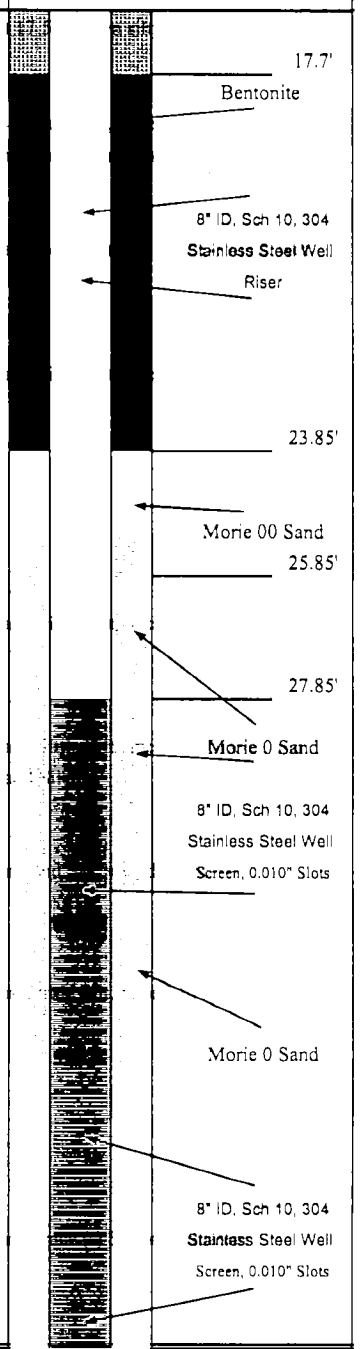
Contractor:	SJB SERVICES
Driller:	ART KOSKE
Inspector:	GEORGE HERMANCE
Rig Type:	CME 75-85 TRAC
Method:	VARIED
PROJECT NAME	Cherry Farm/River Road
PROJECT NUMBER	726673.41
Weather	Sunny.
Date/Time Start	9/19/96 0855hrs
Date/Time Finish	9/23/96 1000 hrs

GROUNDWATER OBSERVATIONS

Date				
From				
DTW				

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
				28	Top of Marsh Deposit at 17.5', Brown silty Sand, wet
		18		8	
				3	
	SS-10	19	16	4	Black, medium to fine Sand and Silt, little roots, to 18.5',
				3	wet 18.5', to 20' Gray, medium to fine SAND, little Silt, trace
		20		4	roots, wet
				3	
	SS-11	21	15	2	Gray, medium to fine Sand, some (-) Silt, trace (-) roots, wet
				2	dilatent
		22		2	
				2	
	SS-12	23	12	2	Gray, medium to fine Sand, little Silt, trace (-) roots to 23'
				2	wet, dilatent
		24		3	
				8	
	SS-13	25	0	4	No Recovery
				4	
		26		2	
				2	
	SS-14	27	18	1	Gray, medium to fine Sand, little Silt, trace (-) very fine
				2	Gravel, wet, dilatent
		28		4	
				5	
	SS-15	29	10	8	Gray, medium to fine Sand, little Silt, trace fine Gravel, and
				7	wet dilatent, fine Sand and Silt
		30		8	
				10	
	SS-16	31	2	8	Gray medium to fine Sand and Silt, wet, dilatent
				10	
		32		9	
				6	
	SS-17	33	18	8	Gray medium to fine Sand, little Silt, trace (-) very fine
				9	Gravel, wet, dilatent
		34		12	
				13	
	SS-18	35	0	13	No Recovery
				10	
		36		10	
				6	
	SS-19	37	18	4	Gray medium to fine Sand, trace (-) Silt, wet, dilatent
				4	
		38		5	
				3	

WELL CONSTRUCTION



STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Depth and elevation noted at time borehole was drilled

PARSONS ENGINEERING SCIENCE
DRILLING RECORD

BORING NO. RW - 3

Sheet 3 of 3

Location:

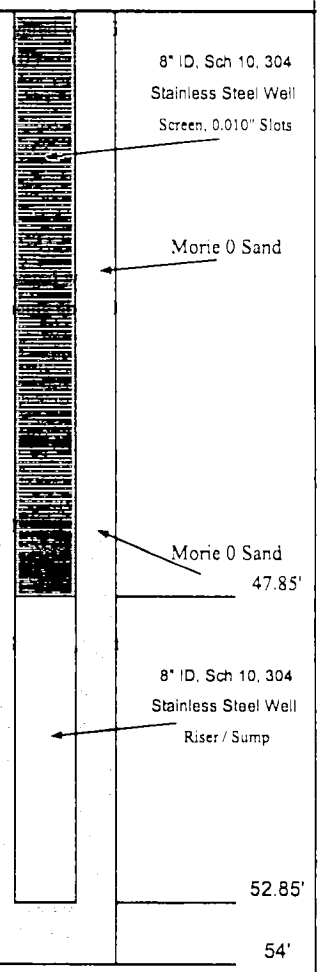
Contractor:	SJB SERVICES
Driller:	ART KOSKE
Inspector:	GEORGE HERMANCE
Rig Type:	CME 75-85 TRAC
Method:	VARIED
PROJECT NAME	Cherry Farm/River Road
PROJECT NUMBER	726673.41
Weather	Sunny,
Date/Time Start	9/19/96 0855hrs
Date/Time Finish	9/23/96 1000 hrs

GROUNDWATER OBSERVATIONS

Date				
From				
DTW				

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
	SS-20	39	18	1	Gray medium to fine Sand layered with Gray brown Clayey
				2	Silt, wet, dilatent, spacing <0.05'
		40		3	
				1	
	SS-21	41	14	1	Same as 38' to 40'
				5	
		42		4	
				5	
	SS-22	43	16	3	Gray medium to fine Sand layered with a red gray Silty Clay/
				2	Clayey Silt, wet, dilatent, spacing about 0.1'
		44		2	
				1	
	SS-23	45	18	1	Same as 42' to 44'
				2	
		46		1	
				3	
	SS-24	47	12	2	Same as 44' to 46', thicker layering
				1	
		48		2	
				2	
	SS-25	49	8	1	Gray red Silty Clay/Clayey Silt, wet, dilatent
				3	some fine Sand stringers
		50		1	
				3	
	SS-26	51	20	2	Same as 48' to 50'
				1	
		52		1	

WELL CONSTRUCTION



STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Depth and elevation noted at time borehole was drilled

PARSONS ENGINEERING SCIENCE
DRILLING RECORD

BORING NO. RW - 4

Contractor: SJB SERVICES
Driller: ART KOSKE
Inspector: GEORGE HERMANCE
Rig Type: CME 75-85 TRAC
Method: VARIED

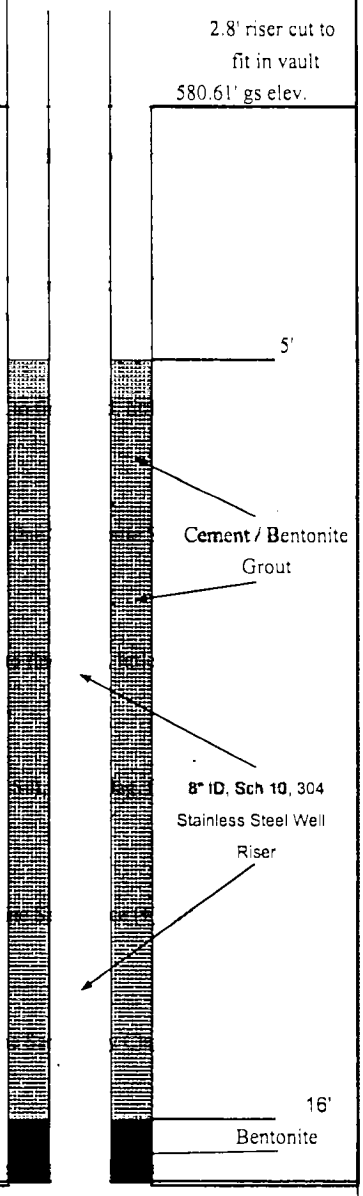
PROJECT NAME: Cherry Farm/River Road
PROJECT NUMBER: 726673.41
Sheet 1 of 3
Location: Cherry Farm

Weather: Sunny, Cool
Date/Time Start: 9/25/96 1000hrs
Date/Time Finish: 9/27/96 1000 hrs

GROUNDWATER OBSERVATIONS				
Date				
From				
DTW				

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
		0			
				2	
	SS-1	1	18	3	Brown Clayey Silt, trace Sand, trace very fine Gravel, moist
				2	
		2		4	
				6	
	SS-2	3	18	7	Brown Clayey Silt to 2.5', then Black and Tan fine Sand, little
				19	Silt, trace Slag, gravel, moist
		4		22	
				5	
	SS-3	5	14	13	Black, Tan, Red medium to fine Sand, little Silt, slag, wood,
				17	damp
		6		29	
				27	
	SS-4	7	12	18	Black, Tan, Yellow, Red fine Sand, little Silt, slag, wood,
				13	moist, fill
		8		14	
				5	
	SS-5	9	16	5	Black and Tan, medium to fine Sand, little Silt, trace Slag
				2	moist, fill
		10		2	
				3	
	SS-6	11	24	12	Black fine Sand, little (-) Silt, trace Slag, fill, damp to wet
				6	
		12		3	
				3	
	SS-7	13	18	4	Black, Tan, medium to fine Sand, trace (+) Silt, wet, NAPL,
				4	fill
		14		1	
				1	
	SS-8	15	24	1	Black red and Brown, fine Sand, Silty Clay, wet, soft, NAPL
				1	stench
		16		1	
				woh	
	SS-9	17	24	woh	Stained Clayey Silt, Marsh Deposit changes to gray Sand and

WELL CONSTRUCTION

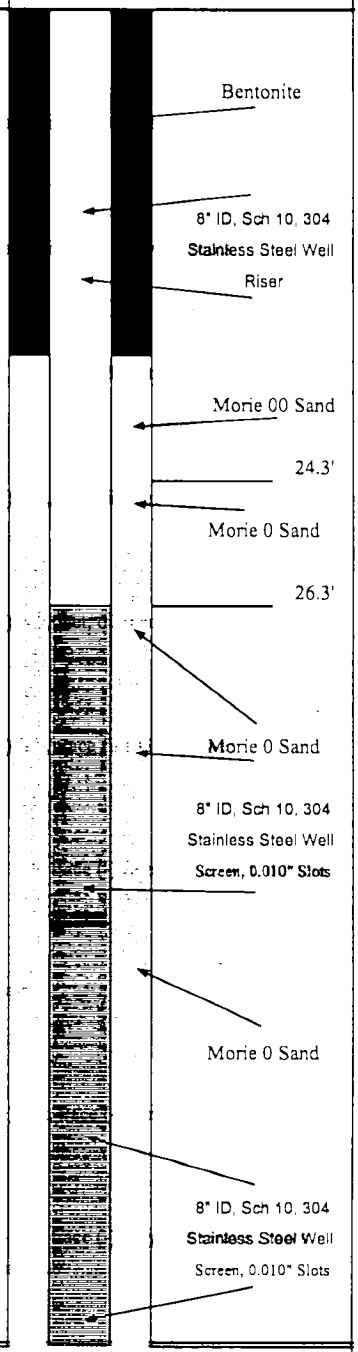


STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Depth and elevation noted at time borehole was drilled

Contractor:	SJB SERVICES				PARSONS ENGINEERING SCIENCE DRILLING RECORD	BORING NO.	RW - 4
Driller:	ART KOSKE						
Inspector:	GEORGE HERMANCE				PROJECT NAME Cherry Farm/River Road	Sheet 2 of 3	
Rig Type:	CME 75-85 TRAC				PROJECT NUMBER 726673.41	Location:	
Method:	VARIED						
					Weather Sunny, Cool		
GROUNDWATER OBSERVATIONS							
Date					Date/Time Start 9/25/96 1000hrs		
From							
DTW					Date/Time Finish 9/27/96 1000 hrs		

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
				WOH	Silt with roots at 18'.
		18		1	
				1/18	
	SS-10	19	15		Gray, medium to fine Sand, little Silt, wet, roots
		20		3	
				2	
	SS-11	21	20	2	Gray, medium to fine Sand, little (-) Silt, wet, roots
				3	
		22		6	
				2	
	SS-12	23	20	4	Gray fine Sand, little (-) Silt, wet, dilatent
				2	
		24		5	
				1	
	SS-13	25	24	2	Gray fine Sand, some (-) Silt, wet, dilatent
				1	
		26		3	
				3	
	SS-14	27	24	5	Gray fine Sand, some (-) Silt, wet, dilatent
				3	
		28		8	
				2	
	SS-15	29	18	7	Gray fine Sand, little (+) Silt, trace fine Gravel, wet
				9	
		30		13	
				6	
	SS-16	31	20	7	Gray fine Sand, little (-) Silt, trace (-) fine Gravel, wet, dilatent
				8	
		32		13	
				8	
	SS-17	33	12	4	Gray fine Sand, wet, dilatent
				5	
		34		5	
				10	
	SS-18	35	16	11	Gray fine Sand, trace (+) Silt, trace (-) very fine Gravel, wet
				10	dilatent
		36		11	
				7	
	SS-19	37	24	4	Gray fine Sand, little (-) Silt, trace (-) very fine Gravel, roots
				3	and shells, Silt banding at 37.8'
		38		3	
				1	



WELL CONSTRUCTION

STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Depth and elevation noted at time borehole was drilled

PARSONS ENGINEERING SCIENCE
DRILLING RECORD

BORING NO. RW - 4

Sheet 3 of 3

Contractor: SJB SERVICES
Driller: ART KOSKE
Inspector: GEORGE HERMANCE
Rig Type: CME 75-85 TRAC
Method: VARIED

PROJECT NAME Cherry Farm/River Road
PROJECT NUMBER 726673.41
Location:

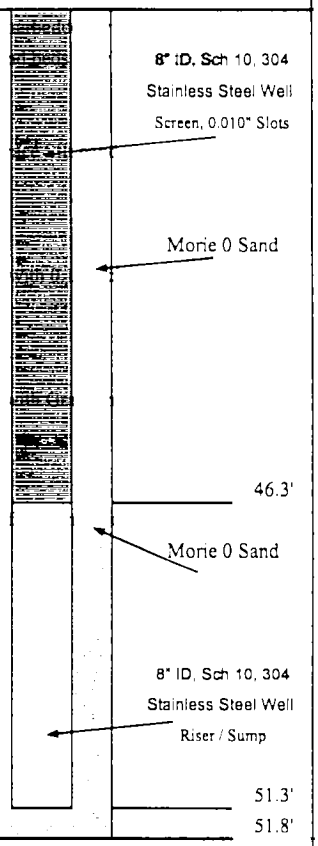
Weather Sunny, Cool
Date/Time Start 9/25/96 1000hrs
Date/Time Finish 9/27/96 1000 hrs

GROUNDWATER OBSERVATIONS

Date				
From				
DTW				

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
	SS-20	39	14	2	Gray medium to fine Sand interbedded with Brown, Tan
				2	Clayey Silt spaced at 0.1', sand beds vary in thickness
		40		4	
				4	
	SS-21	41	22	4	Gray medium to fine Sand, trace Silt bands, wet, dilatent
				5	
		42		5	
				4	
	SS-22	43	20	1	Gray fine Sand, interbedded with 0.1' thick layers of Silty Clay
				5	wet
		44		2	
				1	
	SS-23	45	16	3	Tan Silty Clay, interbedded with Gray fine Sand, wet
				1	
		46		1	
				woh/18	
	SS-24	47	18		Same as 44' to 46', but Gray fine Sand and Silt
		48		1	
				1	
	SS-25	49	6	1	Same as 46' to 48'
				1	
		50		1	
				1	
	SS-26	51	12	1	Same as 48' to 50' to refusal
				1	
		52		50/.2	

WELL CONSTRUCTION



STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Depth and elevation noted at time borehole was drilled

PARSONS ENGINEERING SCIENCE
DRILLING RECORD

BORING NO. RW - 5

Sheet 1 of 3

Contractor: SJB SERVICES
Driller: ART KOSKE
Inspector: GEORGE HERMANCE
Rig Type: CME 75-85 TRAC
Method: VARIED

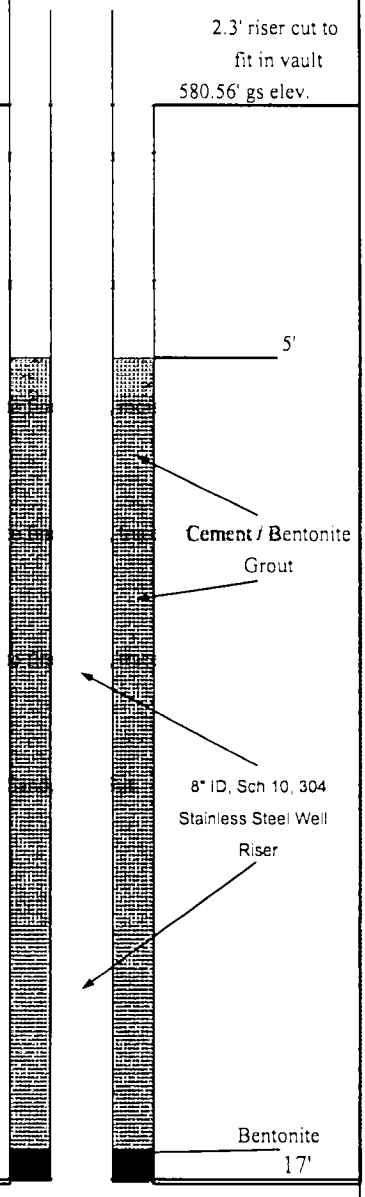
PROJECT NAME Cherry Farm/River Road
PROJECT NUMBER 726673.41
Location: Cherry Farm

Weather Cloudy, Rain, Wind, 60 degrees
Date/Time Start 9/27/96, 1545 hrs.
Date/Time Finish 9/30/96 1505 hrs

GROUNDWATER OBSERVATIONS

Date				
From				
DTW				

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
		0			
				4	
	SS-1	1	10	4	Black and Brown, medium to fine Sand, moist
				3	
		2		2	
				6	
	SS-2	3	12	19	Black and Brown, medium to fine Sand, moist
				19	
		4		13	
				4	
	SS-3	5	16	7	Black and Tan, medium to fine Sand, moist
				7	
		6		5	
				3	
	SS-4	7	16	3	Black and Tan, medium to fine Sand, trace red fine Sand,
				3	moist
		8		3	
				1	
	SS-5	9	10	2	Black and Tan, medium to fine Sand, trace red fine Sand,
				2	moist fill
		10		1	
				2	
	SS-6	11	15	1	Dark Brown, black, fine Sand, little Silt
				2	
		12		4	
				20	
	SS-7	13	24	21	same as 10' to 12'
				19	
		14		15	
				2	
	SS-8	15	18	5	same as 10' to 12'
				4	
		16		5	
				2	
	SS-9	17	24	2	16' to 17' fill as above



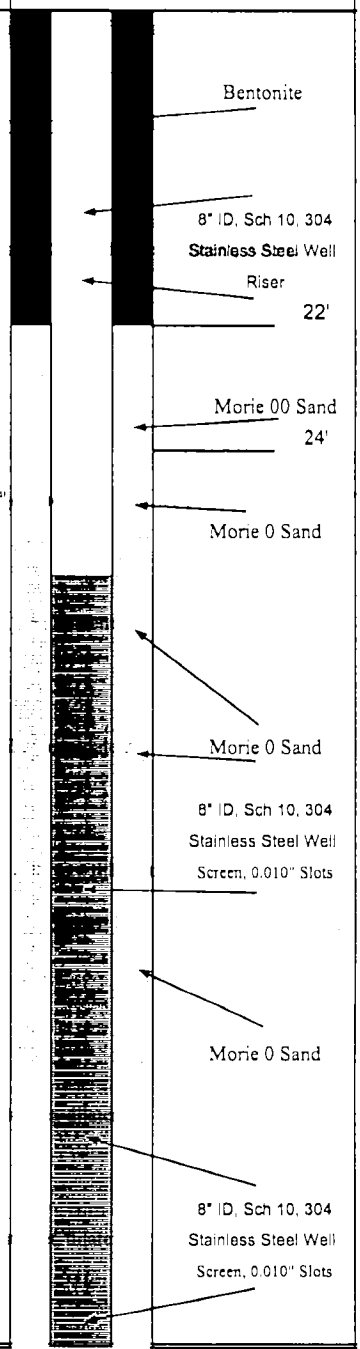
STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Depth and elevation noted at time borehole was drilled

Contractor:	SJB SERVICES				PARSONS ENGINEERING SCIENCE DRILLING RECORD	BORING NO. RW - 5
Driller:	ART KOSKE					
Inspector:	GEORGE HERMANCE				PROJECT NAME Cherry Farm/River Road	Sheet 2 of 3
Rig Type:	CME 75-85 TRAC				PROJECT NUMBER 726673.41	Location:
Method:	VARIED					
					Weather Cloudy, Rain, Wind, 60 degrees	
GROUNDWATER	OBSERVATIONS					
Date					Date/Time Start 9/27/96, 1545 hrs.	
From						
DTW					Date/Time Finish 9/30/96 1505 hrs	

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
				1	17' to 18' dark red and brown Clay, fuel/salvent odor
		18		1	
				woh/18	
	SS-10	19	20		Dark red and brown Clay, oily odor, slight sheen, trace
					organics
		20		20	
				1/12	
	SS-11	21	14		Brown Black stained Clayey Silt, soft, wet, dilatent, NAPL
				1	
		22		1	
				woh/24	
	SS-12	23	24		Same as 20' to 22'
		24			
				1	
	SS-13	25	20	1	Brown and Gray, Clayey Sand, little Silt, wet, soft, all gray last 6"
				1	
		26		1	
				3	
	SS-14	27	18	5	Gray fine Sand and Silt, wet, dilatent
				9	
		28		9	
				3	
	SS-15	29	12	5	Gray fine Sand, some Silt, wet, dilatent
				5	
		30		6	
				5	
	SS-16	31	18	3	Gray fine Sand, little (-) Silt, wet, dilatent
				6	
		32		5	
				7	
	SS-17	33	24	4	Same as 30' to 32'
				8	
		34		9	
				8	
	SS-18	35	10	12	Gray fine Sand, little Silt, wet, dilatent
				13	
		36		13	
				8	
	SS-19	37	10	10	Gray fine Sand, little Silt, wet, dilatent
				12	
		38		14	
				13	

WELL CONSTRUCTION



STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Depth and elevation noted at time borehole was drilled

PARSONS ENGINEERING SCIENCE
DRILLING RECORD

BORING NO. RW - 5

Sheet 3 of 3

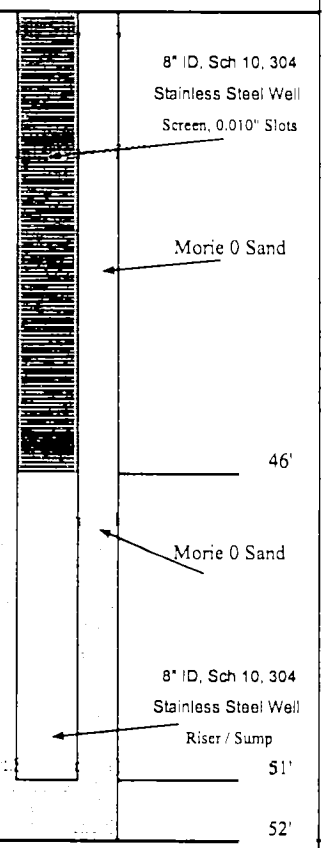
Location:

Contractor:	SJB SERVICES
Driller:	ART KOSKE
Inspector:	GEORGE HERMANCE
Rig Type:	CME 75-85 TRAC
Method:	VARIED
PROJECT NAME	Cherry Farm/River Road
PROJECT NUMBER	726673.41
Weather	Cloudy, Rain, Wind, 60 degrees
Date/Time Start	9/27/96, 1545 hrs.
Date/Time Finish	9/30/96 1505 hrs

GROUNDWATER OBSERVATIONS				
Date				
From				
DTW				

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
	SS-20	39	12	11	Gray medium to fine Sand, little Silt, wet, dilatent
				6	
		40		3	
				5	
	SS-21	41	10	7	Dark gray medium to fine Sand, layers of Silt, wet, dilatent
				9	
		42		11	
				5	
	SS-22	43	12	4	Same a 40' to 42'
				9	
		44		12	
				2	
	SS-23	45	0	2	No Recovery, Wash Only
				2	
		46		1	
				1	
	SS-24	47	6	3	Tan, brown Silty Clay layers with gray black medium to fine
				4	Sand, 'interbeds
		48		6	
				1	
	SS-25	49	6	2	Same as 46' to 48' with more Silt
				2	
		50		3	
				1	
	SS-26	51	10	4	Gray and Tan fine Sand and Silt, trace (+) Clay, wet, dilatent
				5	
		52		9	

WELL CONSTRUCTION



STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Depth and elevation noted at time borehole was drilled

PARSONS ENGINEERING SCIENCE
DRILLING RECORD

BORING NO. RW - 6

Contractor: SJB SERVICES
Driller: ART KOSKE
Inspector: GEORGE HERMANCE
Rig Type: CME 75-85 TRAC
Method: VARIED

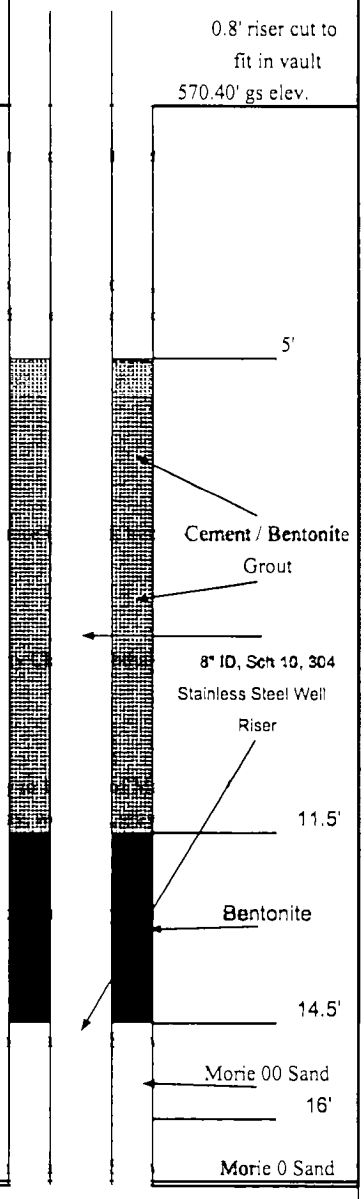
PROJECT NAME: Cherry Farm/River Road
PROJECT NUMBER: 726673.41
Sheet 1 of 3
Location: Cherry Farm/ RiverRoad

Weather: Rain, 45 degrees
Date/Time Start: 10/21/96, 0823 hrs.
Date/Time Finish: 10/22/96 1700 hrs

GROUNDWATER OBSERVATIONS

Date				
From				
DTW				

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
		0			
				woh	
	SS-1	1	18	5	Black medium to fine Sand, some Silt, wet, dilatent
				4	
		2		4	
				2	
	SS-2	3	24	1	Brown, Black medium to fine Sand for 6", then Gray Clay for
				1	12", then Red Clay for 6", Very strong odor "moth balls"
		4		1	
				woh/24	
	SS-3	5	0		No Recovery
		6			
				woh/24	
	SS-4	7	18		Red, Brown Silty Clay, trace (-) Sand, trace (-) Gravel, wet, soft
					Strong "moth ball" odor
		8			
				1	
	SS-5	9	24	1/18"	Red, Brown Clay and Silty Clay, naphthalene? odor, wet,soft
		10			
				1	
	SS-6	11	24	1/18"	Red, Brown Silt and Clay to 11', top of Marsh at 11', Black fine
					Sand and Silt, little(-) Clay, wet, soft, gray at 12'
		12			
				woh/24	
	SS-7	13	6		Black and Gray fine Sand, Black Silty Clay, wet, soft.
		14			
				1	
	SS-8	15	18	3	Gray medium to fine Sand, trace (+) Silt, wet, dilatent
				3	
		16		4	
				3	
	SS-9	17	18	2	Gray medium to fine Sand, trace (+) Silt, wet, dilatent



STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Depth and elevation noted at time borehole was drilled

PARSONS ENGINEERING SCIENCE
DRILLING RECORD

BORING NO. RW - 6

Sheet 2 of 3

Location:

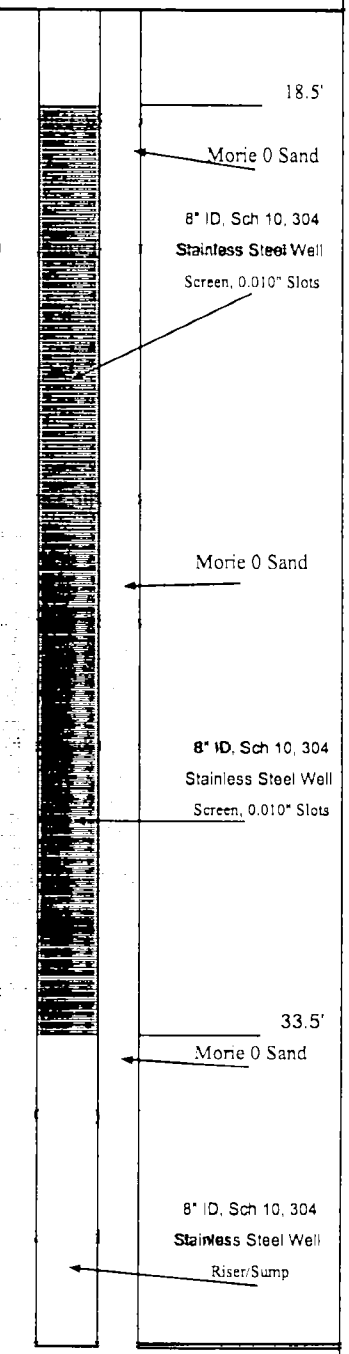
Contractor:	SJB SERVICES
Driller:	ART KOSKE
Inspector:	GEORGE HERMANCE
Rig Type:	CME 75-85 TRAC
Method:	VARIED
PROJECT NAME	Cherry Farm/River Road
PROJECT NUMBER	726673.41
Weather	Rain, 45 degrees
Date/Time Start	10/21/96, 0823 hrs.
Date/Time Finish	10/22/96 1700 hrs

GROUNDWATER OBSERVATIONS

Date				
From				
DTW				

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
				4	
		18		3	
				2	
	SS-10	19	10	3	Gray medium to fine Sand, little (-) Silt, wet, dilatent
				3	
		20		3	
				2	
	SS-11	21	12	4	Gray fine Sand, trace (+) Silt, trace (-) very fine Gravel, wet
				4	dilatent
		22		8	
				2	
	SS-12	23	24	6	Same as 20' to 22'
				7	
		24		7	
				2	
	SS-13	25	14	4	Gray medium to fine Sand, trace Silt, trace (+) very fine Gravel,
				4	wet, dilatent
		26		9	
				2	
	SS-14	27	6	4	Gray medium to fine Sand, trace (-) Silt, wet, dilatent
				10	
		28		12	
				5	
	SS-15	29	12	7	Gray and Black Clay and fine Sand, trace (+) Silt, wet
				7	
		30		10	
				9	
	SS-16	31	0	2	No Recovery
				4	
		32		4	
				3	
	SS-17	33	6	2	Tan Silty Clay, wet, dilatent, soft
				1	
		34		1	
				2	
	SS-18	35	18	4	Tan Silty Clay, some fine Sand in layers, wet, soft
				2	
		36		3	
				1	
	SS-19	37	19	1	Gray, Tan Silty Clay, some Sand and Silt layers, wet
				2	
		38		1	
				5	

WELL CONSTRUCTION



STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Depth and elevation noted at time borehole was drilled

PARSONS ENGINEERING SCIENCE
DRILLING RECORD

Contractor:	SJB SERVICES	BORING NO.	RW - 6
Driller:	ART KOSKE		
Inspector:	GEORGE HERMANCE	PROJECT NAME: Cherry Farm/River Road	Sheet 3 of 3
Rig Type:	CME 75-85 TRAC	PROJECT NUMBER: 726673.41	Location:
Method:	VARIED		
		Weather: Rain, 45 degrees	
GROUNDWATER OBSERVATIONS		Date/Time Start: 10/21/96, 0823 hrs.	
Date		Date/Time Finish: 10/22/96 1700 hrs	
From			
DTW			

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL	WELL CONSTRUCTION
	SS-20	39	12	7	Tan Silty Clay to 38.5', then to 39.5' broken coarse to fine Sand	Morie 0 Sand
				30	and 'Gravel, Green Shale at 39.5', Top of Rock at 39.5'	39.5'
		40		50/0		

STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Depth and elevation noted at time borehole was drilled

PARSONS ENGINEERING SCIENCE
DRILLING RECORD

BORING NO. RW - 7

Sheet 1 of 3

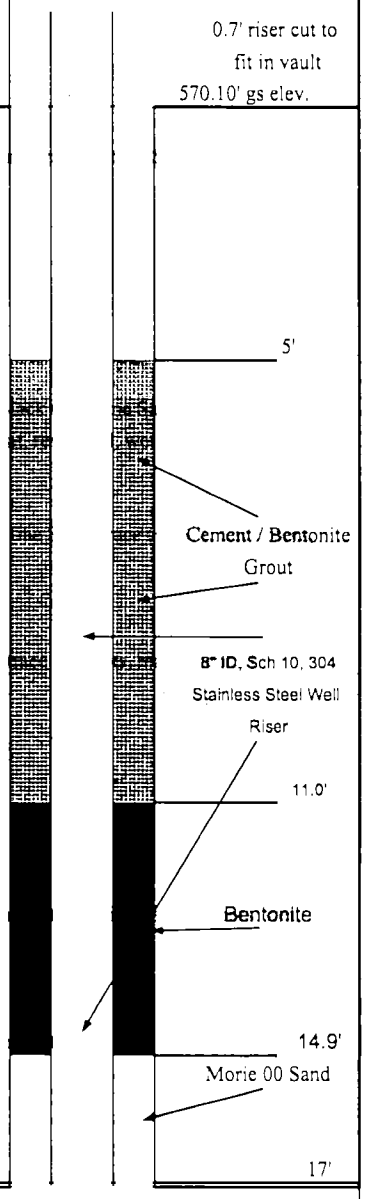
Contractor:	SJB SERVICES
Driller:	ART KOSKE
Inspector:	GEORGE HERMANCE
Rig Type:	CME 75-85 TRAC
Method:	VARIED
PROJECT NAME	Cherry Farm/River Road
PROJECT NUMBER	726673.41
Location:	Cherry Farm/ RiverRoad
Weather	Partly Sunny, 45 degrees
Date/Time Start	10/23/96, 0854 hrs.
Date/Time Finish	10/24/96 1700 hrs

GROUNDWATER OBSERVATIONS

Date				
From				
DTW				

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
		0			
				5	
	SS-1	1	12	12	Black medium to fine Sand, trace (-) Silt, Slag, moist
				15	
		2		15	
				50/0	
	SS-2	3	0		Probably Slag
		4			
				5	
	SS-3	5	16	4	Black Slag for 8", then Black Gray fine Sand and Silt, trace (+)
				2	roots, top of marsh deposit, reworked, wet
		6		2	
				3	
	SS-4	7	6	4	Brown, Gray medium to fine Sand, trace (+) Silt, trace roots,
				2	wet
		8		3	
				1	
	SS-5	9	16	1	Gray fine Sand and Silt, trace (+) roots, marsh deposit
				3	
		10		4	
				2	
	SS-6	11	6	5	Same as 8' to 10'
				3	
		12		4	
				2	
	SS-7	13	14	1	Gray medium to fine Sand, little(-) Silt, trace (-) roots, wet,
				3	dilatent
		14		5	
				2	
	SS-8	15	16	1	Gray medium to fine Sand, little Silt, wet, dilatent
				1	
		16		1	
				4	
	SS-9	17	24	5	Same as 14' to 16'

WELL DIAGRAM



STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Depth and elevation noted at time borehole was drilled

PARSONS ENGINEERING SCIENCE
DRILLING RECORD

Contractor:	SJB SERVICES
Driller:	ART KOSKE
Inspector:	GEORGE HERMANCE
Rig Type:	CME 75-85 TRAC
Method:	VARIED

PROJECT NAME: Cherry Farm/River Road
PROJECT NUMBER: 726673.41

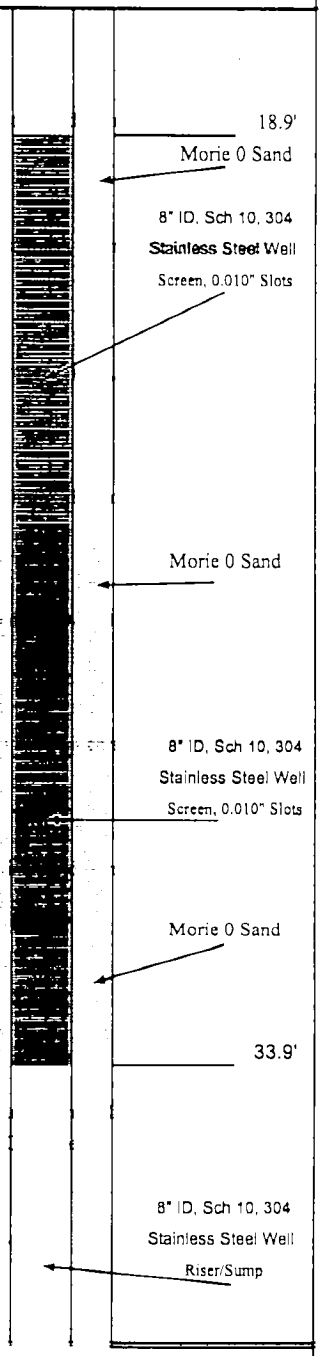
BORING NO. RW - 7
Sheet 2 of 3
Location:

Weather: Partly Sunny, 45 degrees
Date/Time Start: 10/23/96, 0854 hrs.
Date/Time Finish: 10/24/96 1700 hrs

GROUNDWATER OBSERVATIONS				
Date				
From				
DTW				

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
				5	
		18		8	
				6	
	SS-10	19	24	3	Gray, fine Sand, trace (+) Silt, wet, dilatent
				6	
		20		5	
				3	
	SS-11	21	10	4	Gray, fine Sand, trace (+) Silt, trace(-) very fine Gravel, wet,
				8	dilatent
		22		11	
				15	
	SS-12	23	24	12	Gray, medium to fine Sand, trace (-) Silt, trace (+) very fine
				11	Gravel, wet
		24		8	
				8	
	SS-13	25	12	8	Gray, medium to fine Sand, little Silt, trace (-) very fine Gravel
				5	wet, dilatent
		26		3	
				6	
	SS-14	27	6	5	Black and Gray fine Sand and Silt, wet, dilatent
				6	
		28		10	
				5	
	SS-15	29	6	4	Same as 26' to 28' with some Silt stringers
				7	
		30		10	
				5	
	SS-16	31	12	7	Black and Gray medium to fine Sand, some Silt, trace (+) very
				6	fine Gravel, wet
		32		8	
				5	
	SS-17	33	16	3	Same as 30' to 32'
				4	
		34		4	
				3	
	SS-18	35	6	4	Dark gray medium to fine Sand, some Silt, trace(-) very fine
				5	Gravel to 35' then Tan Silty Clay, wet
		36		7	
				1	
	SS-19	37	6	3	Gray Tan Silt and Silty Clay, wet
				2	
		38		3	
				5	

WELL CONSTRUCTION



STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Depth and elevation noted at time borehole was drilled

PARSONS ENGINEERING SCIENCE
DRILLING RECORD

BORING NO. RW - 7

Sheet 1 of 1

Contractor:	SJB SERVICES
Driller:	ART KOSKE
Inspector:	GEORGE HERMANCE
Rig Type:	CME 75-85 TRAC
Method:	VARIED
PROJECT NAME	Cherry Farm/River Road
PROJECT NUMBER	726673.41
Location:	
Weather	Partly Sunny, 45 degrees
Date/Time Start	10/23/96, 0854 hrs.
Date/Time Finish	10/24/96 1700 hrs

GROUNDWATER OBSERVATIONS

Date				
From				
DTW				

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL	WELL CONSTRUCTION
	SS-20	39	12	4	Tan gray Silt to 39.2' then Green Shale,	38.9'
				50/.2	Top of rock at 39.2'	39.2'
		40				

Morie 0 Sand

8" ID, Sch 10, 304 Stainless Steel Well Riser/Sump

STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Depth and elevation noted at time borehole was drilled

PARSONS ENGINEERING SCIENCE
DRILLING RECORD

BORING NO. RW - 8

Contractor: SJB SERVICES
Driller: ART KOSKE
Inspector: GEORGE HERMANCE
Rig Type: CME 75-85 TRAC
Method: VARIED

PROJECT NAME: Cherry Farm/River Road
PROJECT NUMBER: 726673.41

Sheet 1 of 3
Location: Cherry Farm

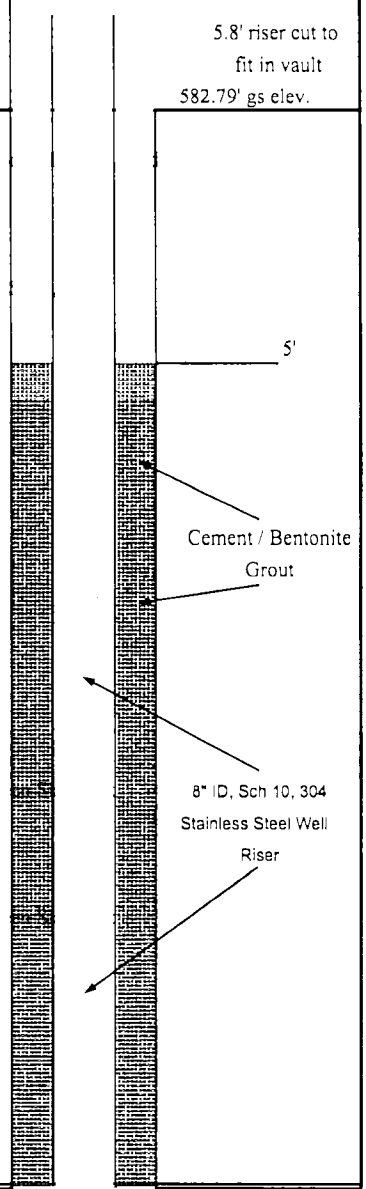
Weather: Overcast, 60 degrees
Date/Time Start: 10/1/96, 1628 hrs.
Date/Time Finish: 10/4/96 1025 hrs

GROUNDWATER OBSERVATIONS

Date				
From				
DTW				

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
		0			
				7	
	SS-1	1	20	17	Black , Brown, Gray, wood, slag and Sand, moist
				8	
		2		7	
				17	
	SS-2	3	12	10	Gray, Black, Slag, some Sand, moist
				50	
		4		50/.2	
				50/0	
	SS-3	5	0		No Recovery
		6			
				50/.5	
	SS-4	7	6		Slag and Brick
		8			
				50/.4	
	SS-5	9	3		Slag, moist
		10			
				50	
	SS-6	11	12	50	Gray, Brown, Black, Green Slag, wet
				50/0	
		12			
				29	
	SS-7	13	12	50	Gray, Brown, Black, Green Slag, wet
				50/0	
		14			
				45	
	SS-8	15	10	50/.4	Gray and Tan Slag, wet
		16			
				34	
	SS-9	17	12	35	Gray Slag, wet

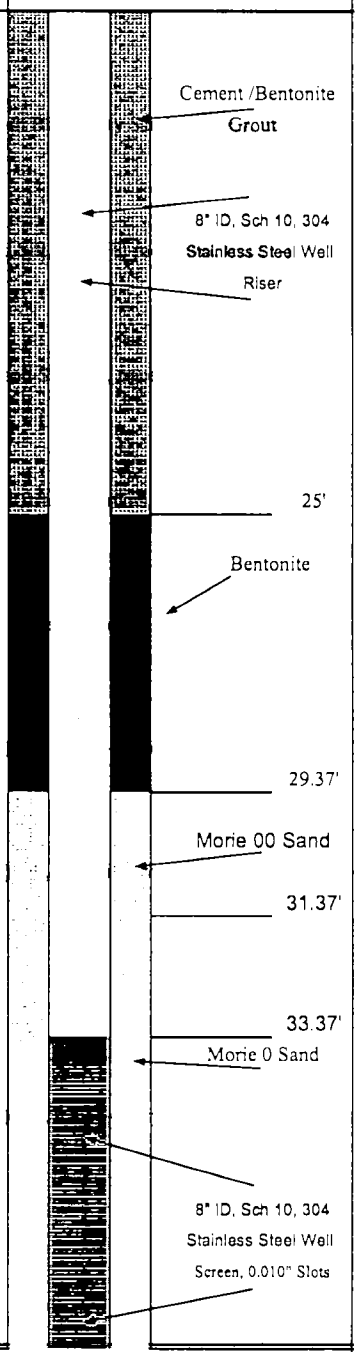
WELL DIAGRAM



STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Depth and elevation noted at time borehole was drilled

Contractor: SJB SERVICES					PARSONS ENGINEERING SCIENCE DRILLING RECORD	BORING NO. RW - 8
Driller: ART KOSKE						
Inspector: GEORGE HERMANCE					PROJECT NAME Cherry Farm/River Road	Sheet 2 of 3
Rig Type: CME 75-85 TRAC					PROJECT NUMBER 726673.41	Location:
Method: VARIED						
					Weather Overcast, 60 degrees	
GROUNDWATER OBSERVATIONS						
Date					Date/Time Start 10/1/96, 1628 hrs.	
From						
DTW					Date/Time Finish 10/4/96 1025 hrs	
Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL	WELL CONSTRUCTION
				50/.4		
		18				
				14		
	SS-10	19	15	18	Gray Slag, wet to 19', then Black Silty Sand and Clay, trace roots	
				4	to 20'	
		20		3		
				2		
	SS-11	21	12	2	Dark Gray fine Sand and Silt, trace (+) roots, wet, trace (-)	
				1	Clay	
		22		1		
				2		
	SS-12	23	24	1	Gray, Brown fine Sand and Silt, wet, trace (+) roots	
				2		
		24		2		
				1		
	SS-13	25	20	2	Gray fine Sand, some Silt, trace (+) roots, wet	
				1		
		26		4		
				1		
	SS-14	27	18	1	Gray fine Sand, some Silt, wet, dilatent	
				1		
		28		1		
				2		
	SS-15	29	24	1	Gray fine Sand, some (-) Silt, trace (-) roots, wet, dilatent	
				2		
		30		3		
				2		
	SS-16	31	24	2	Gray fine Sand, some (-) Silt, wet, dilatent	
				5		
		32		5		
				2		
	SS-17	33	24	2	Same as 30' to 32'	
				2		
		34		1		
				8		
	SS-18	35	20	10	Gray fine Sand, little (+) Silt, trace (-) very fine Gravel, wet,	
				12	dilatent	
		36		13		
				7		
	SS-19	37	24	9	Same as 34' to 36'	
				7		
		38		11		
				2		



STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Depth and elevation noted at time borehole was drilled

PARSONS ENGINEERING SCIENCE
DRILLING RECORD

BORING NO. RW - 8

Contractor: S/B SERVICES
Driller: ART KOSKE
Inspector: GEORGE HERMANCE
Rig Type: CME 75-85 TRAC
Method: VARIED

PROJECT NAME: Cherry Farm/River Road
PROJECT NUMBER: 726673.41

Sheet 3 of 3
Location:

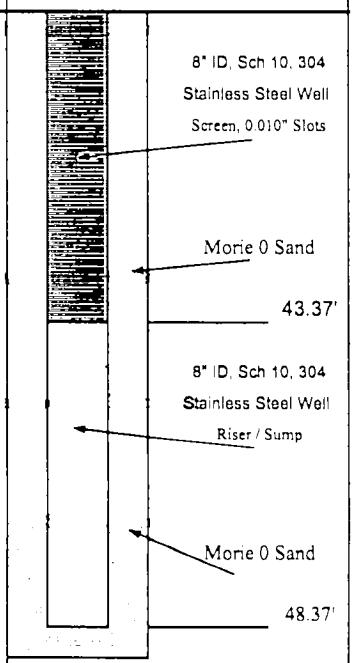
Weather: Overcast, 60 degrees
Date/Time Start: 10/1/96, 1628 hrs.
Date/Time Finish: 10/4/96 1025 hrs

GROUNDWATER OBSERVATIONS

Date				
From				
DTW				

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
	SS-20	39	12	3	Gray fine Sand, little Silt, trace (+) Clay, trace (-) very fine
				2	Gravel, wet, dilatent
		40		4	
				3	
	SS-21	41	8	4	Same as 38' to 40'
				2	
		42		5	
				7	
	SS-22	43	12	8	Gray medium to fine SAND, trace (+) Silt, wet
				10	
		44		11	
				4	
	SS-23	45	6	3	Tan Clayey Silt with gray fine Sand layers, wet
				2	
		46		2	
				2	
	SS-24	47	12	1	Tan Silty Clay, trace (-) fine Sand in layers, wet, soft
				3	
		48		1	

WELL CONSTRUCTION



STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Depth and elevation noted at time borehole was drilled

PARSONS ENGINEERING SCIENCE
DRILLING RECORD

BORING NO. RW - 9

Sheet 1 of 3

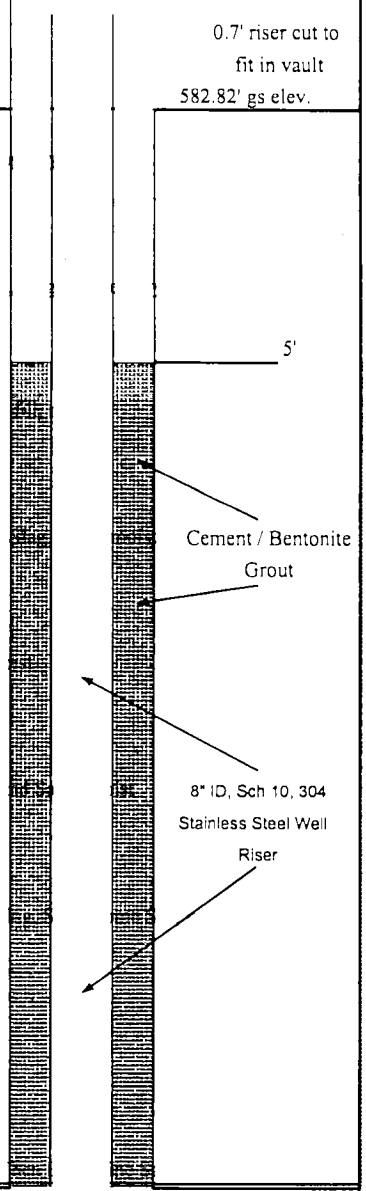
Contractor:	SJB SERVICES
Driller:	ART KOSKE
Inspector:	GEORGE HERMANCE
Rig Type:	CME 75-85 TRAC
Method:	VARIED
PROJECT NAME	Cherry Farm/River Road
PROJECT NUMBER	726673.41
Location:	River Road
Weather	Partly Cloudy, 40 degrees
Date/Time Start	10/4/96, 1527 hrs.
Date/Time Finish	10/9/96 1715 hrs

GROUNDWATER OBSERVATIONS

Date				
From				
DTW				

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
		0			
				6	
	SS-1	1	6	9	Black fine Sand, Silt, Slag, dry fill
				11	
		2		6	
				5	
	SS-2	3	6	5	Black and Red fine Sand, Slag, Gravel, dry fill
				5	
		4		11	
				6	
	SS-3	5	12	10	Red and Tan brick, Slag, fill, moist
				6	
		6		6	
				8	
	SS-4	7	12	12	Blue, white, Black, Tan, Slag, Sand, moist fill
				10	
		8		7	
				4	
	SS-5	9	8	6	Black and Pink, Slag, moist
				9	
		10		7	
				4	
	SS-6	11	12	4	Broken Slag, black Silt and Sand, moist
				4	
		12		4	
				8	
	SS-7	13	14	4	Black and Red Broken Slag, Sand, some Silt, wet at 13'
				3	
		14		50/.4	
				1	
	SS-8	15	6	4	Black Slag, wet
				8	
		16		6	
				4	
	SS-9	17	12	3	Black Slag, wet to 17'. Then Black fine Sand and Silt, wet,

WELL DIAGRAM



STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Depth and elevation noted at time borehole was drilled

PARSONS ENGINEERING SCIENCE
DRILLING RECORD

BORING NO. RW - 9

Sheet 2 of 3

Contractor: SJB SERVICES
Driller: ART KOSKE
Inspector: GEORGE HERMANCE
Rig Type: CME 75-85 TRAC
Method: VARIED

PROJECT NAME: Cherry Farm/River Road
PROJECT NUMBER: 726673.41
Location:

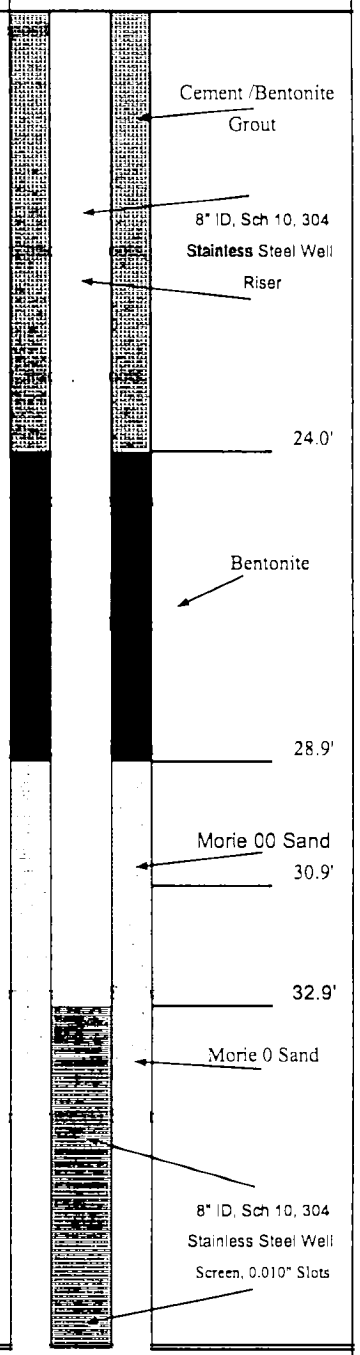
Weather: Partly Cloudy, 40 degrees
Date/Time Start: 10/4/96, 1527 hrs.
Date/Time Finish: 10/9/96 1715 hrs

GROUNDWATER OBSERVATIONS

Date				
From				
DTW				

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
				2	roots, 'Top of Marsh Deposit at 17'
		18		2	
				18	
	SS-10	19	0	20	No Recovery
				50/0	
		20			
				1	
	SS-11	21	18	1	Gray fine Sand, little Silt, trace (+) roots, wet, dilatent
				2	
		22		2	
				1	
	SS-12	23	18	2	Gray fine Sand, little Silt, trace (+) roots, wet, dilatent
				2	
		24		2	
				2	
	SS-13	25	12	3	Gray fine Sand, little Silt, trace (-) roots, wet, dilatent
				5	
		26		8	
				8	
	SS-14	27	20	14	Gray fine Sand, little (-) Silt, wet, dilatent
				13	
		28		13	
				5	
	SS-15	29	16	8	Gray fine Sand, trace (+) Silt, wet, dilatent
				9	
		30		10	
				5	
	SS-16	31	15	8	Same as 28' to 30'
				10	
		32		13	
				5	
	SS-17	33	22	9	Gray medium to fine Sand, trace (-) Silt, wet, dilatent
				12	
		34		18	
				13	
	SS-18	35	18	12	Gray medium to fine Sand, trace (-) Silt, trace (-) very fine
				11	Gravel, wet, dilatent
		36		13	
				15	
	SS-19	37	16	12	Same as 34' to 36'
				10	
		38		14	
				7	

WELL CONSTRUCTION



STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Depth and elevation noted at time borehole was drilled

PARSONS ENGINEERING SCIENCE
DRILLING RECORD

BORING NO. RW - 9

Sheet 3 of 3

Location:

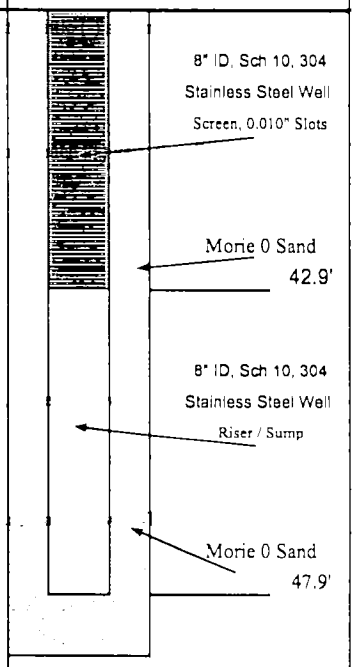
Contractor:	SJB SERVICES
Driller:	ART KOSKE
Inspector:	GEORGE HERMANCE
Rig Type:	CME 75-85 TRAC
Method:	VARIED
PROJECT NAME	Cherry Farm/River Road
PROJECT NUMBER	726673.41
Weather	Partly Cloudy, 40 degrees
Date/Time Start	10/4/96, 1527 hrs.
Date/Time Finish	10/9/96 1715 hrs

GROUNDWATER OBSERVATIONS

Date				
From				
DTW				

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
	SS-20	39	15	7	Gray medium to fine Sand, little (-) silt, trace(-) very fine
				6	Gravel, wet , dilatent
		40		7	
				5	
	SS-21	41	20	7	Gray medium to fine Sand, trace (+) very fine Gravel, trace (-)
				5	Silt, wet
		42		11	
				6	
	SS-22	43	24	10	Same as 40' to 42'
				7	
		44		8	
				6	
	SS-23	45	24	4	Gray fine Sand and Silt, trace Clay, wet
				3	
		46		4	
				2	
	SS-24	47	12	3	Gray medium to fine Sand, layered with Tan Silty Clay, wet
				1	
		48		2	

WELL CONSTRUCTION



STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Depth and elevation noted at time borehole was drilled

PARSONS ENGINEERING SCIENCE
DRILLING RECORD

BORING NO. RW - 10

Contractor: SJB SERVICES
Driller: ART KOSKE
Inspector: GEORGE HERMANCE
Rig Type: CME 75-85 TRAC
Method: VARIED

PROJECT NAME: Cherry Farm/River Road
PROJECT NUMBER: 726673.41

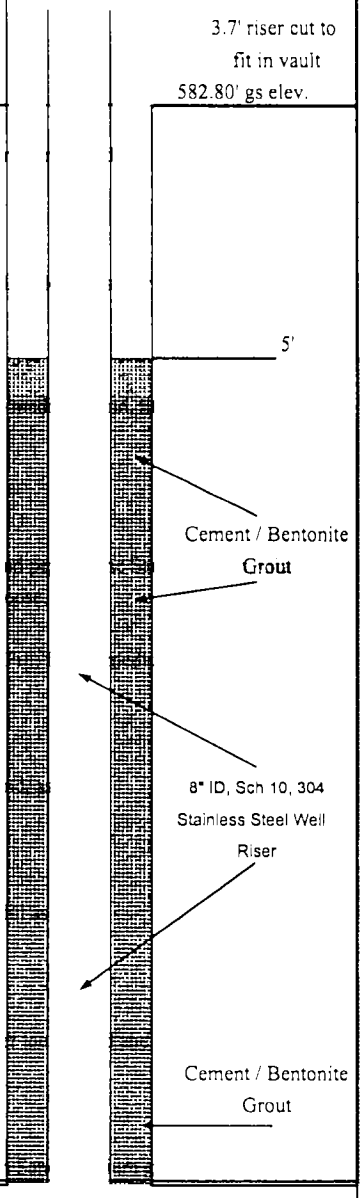
Sheet 1 of 3
Location: River Road

Weather: Clear, Cold, Calm, 40 degrees
Date/Time Start: 10/15/96, 0800 hrs.
Date/Time Finish: 10/18/96 1130 hrs

GROUNDWATER OBSERVATIONS

Date				
From				
DTW				

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
		0			
				5	
	SS-1	1	2	10	Fill, soil, rock chips, coarse ground, dry
				11	
		2		8	
				20	
	SS-2	3	4	50/0	Fill as above, soil, gravel, rock debris, dry
		4			
				3	
	SS-3	5	6	3	light to dark gray, fine to medium Sand, little gravel, angular
				6	dry
		6		6	
				11	
	SS-4	7	18	27	6 to 6.5' as above
				40	6.5' to 8' light gray salt and pepper fine Sand, medium Gravel
		8		35	angular, lime like odor, loose, damp
				50/.5	
	SS-5	9	2		Light Gray, Pink, Green Fill, fine to medium Sand, fill, rock
					chips, lime odor, damp
		10			
				40	
	SS-6	11	12	50/.2	Light gray gravel and Sand, as above
		12			
				10	
	SS-7	13	4	50/.5	Strong alkali odor, gray fill as above
		14			
				50/.4	
	SS-8	15	4		Light gray salt and pepper loose Sand and Gravel, damp,
					alkali odor, damp
		16			
				40	
	SS-9	17	12	50/.3	light gray fine to medium Sand, medium gravel, angular



STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Depth and elevation noted at time borehole was drilled

PARSONS ENGINEERING SCIENCE
DRILLING RECORD

BORING NO. RW - 10

Sheet 2 of 3

Contractor: SJB SERVICES
Driller: ART KOSKE
Inspector: GEORGE HERMANCE
Rig Type: CME 75-85 TRAC
Method: VARIED

PROJECT NAME Cherry Farm/River Road
PROJECT NUMBER 726673.41
Location:

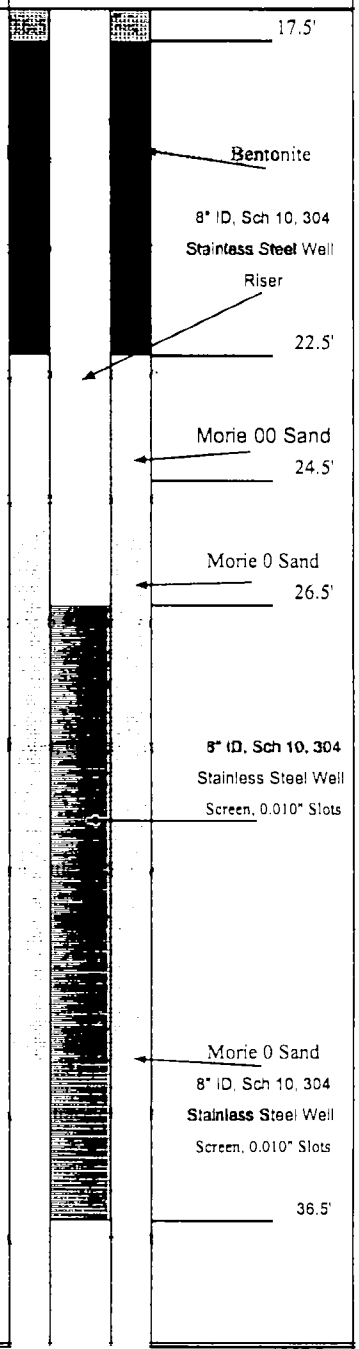
Weather Clear, Cold, Calm, 40 degrees
Date/Time Start 10/15/96, 0800 hrs.
Date/Time Finish 10/18/96 1130 hrs

GROUNDWATER OBSERVATIONS

Date				
From				
To				

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
					trace to little Silt, wet at 16.5'
		18			
				1	
	SS-10	19	20	2	18' to 18.5' as above, 18.5' to 20' through black fine Sand,
				2	trace dark brown, gray, black, fine Sand and Silt, organic
		20		1	deposits
				4	
	SS-11	21	15	2	Black fine Sand and Silt, trace (-) Clay, trace (+) roots, wet
				2	
		22		1	
				3	
	SS-12	23	18	5	Black fine Sand and Silt, trace (-) Clay, wet
				4	
		24		6	
				2	
	SS-13	25	15	1	Black fine Sand and Silt,trace (-) Clay, wet and dilatent
				3	
		26		2	
				3	
	SS-14	27	18	2	Black fine Sand and Silt to 26.5' then Gray fine Sand, little Silt
				6	wet, dilatent
		28		7	
				2	
	SS-15	29	14	5	Gray fine Sand, little Silt, wet, dilatent, trace (-) roots in layers
				5	
		30		8	
				5	
	SS-16	31	10	7	Gray medium to fine Sand, little (-) Silt, wet, dilatent
				9	
		32		12	
				5	
	SS-17	33	18	7	Same as 30' to 32'
				9	
		34		12	
				4	
	SS-18	35	12	3	Gray medium to fine SAND, trace (+) Silt, wet, dilatent,
				6	
		36		4	
				1	
	SS-19	37	14	7	Gray medium to fine SAND, little (+) Silt in some layers, wet,
				8	dilatent
		38		5	
				6	

WELL CONSTRUCTION



STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Depth and elevation noted at time borehole was drilled

PARSONS ENGINEERING SCIENCE
DRILLING RECORD

BORING NO. RW - 10

Contractor: SJB SERVICES
Driller: ART KOSKE
Inspector: GEORGE HERMANCE
Rig Type: CME 75-85 TRAC
Method: VARIED

PROJECT NAME: Cherry Farm/River Road
PROJECT NUMBER: 726673.41

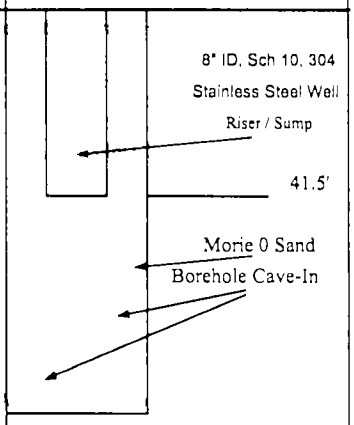
Sheet 3 of 3
Location:

Weather: Clear, Cold, Calm, 40 degrees
Date/Time Start: 10/15/96, 0800 hrs.
Date/Time Finish: 10/18/96 1130 hrs

GROUNDWATER OBSERVATIONS				
Date				
From				
DTW				

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
	SS-20	39	12	4	Gray fine Sand with layers of Silt, trace (+) Clay, wet , dilatent
				2	
		40		3	
				3	
	SS-21	41	12	2	Gray fine Sand Layered with Tan Silty Clay, wet, dilatent
				1	
		42		3	
				2	
	SS-22	43	15	3	
				1	Same as 40' to 42'
		44		3	
				8	
	SS-23	45	10	5	Gray medium to fine SAND layered with Tan Silty Clay, wet
				6	
		46		4	
				5	
	SS-24	47	18	3	Same as 44' to 46'
				5	
		48		2	

WELL CONSTRUCTION



STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Depth and elevation noted at time borehole was drilled

PARSONS ENGINEERING SCIENCE
DRILLING RECORD

BORING NO. RW - 11

Contractor: SJB SERVICES
Driller: ART KOSKE
Inspector: GEORGE HERMANCE
Rig Type: CME 75-85 TRAC
Method: VARIED

PROJECT NAME: Cherry Farm/River Road
PROJECT NUMBER: 726673.41

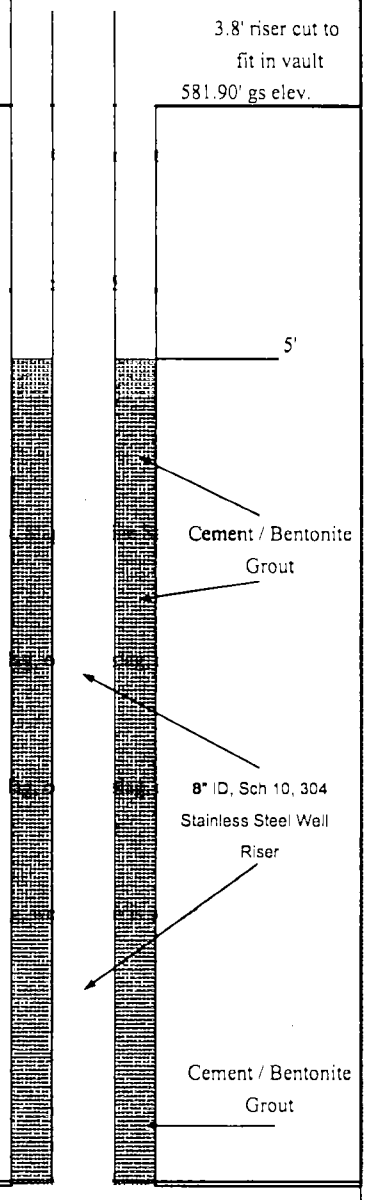
Sheet 1 of 3
Location: River Road

Weather: Partly Cloudy, 40 degrees
Date/Time Start: 10/10/96, 1135 hrs.
Date/Time Finish: 10/14/96 1600 hrs

GROUNDWATER OBSERVATIONS

Date	01/00/00		
From			
DTW			

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
		0			
				1	
	SS-1	1	12	1	Brown Clayey Silt, trace fine Gavel, moist, cover soil
				2	
		2		3	
				5	
	SS-2	3	20	6	Brown, Black Silty Clay, Black fine Sand, Slag, fill
				9	moist
		4		25	
				25	
	SS-3	5	6	50/.2	Bricks, Fill
		6			
				14	
	SS-4	7	16	24	Black, White, Blue, Gray, Slag and fine Sand, moist
				15	
		8		19	
				10	
	SS-5	9	16	13	Brown fine Sand, gray Slag, cement slag, damp
				12	
		10		10	
				6	
	SS-6	11	14	5	Brown fine Sand, gray Slag, cement slag, damp
				13	
		12		7	
				8	
	SS-7	13	2	50/.1	Brown fine Sand and Slag, wet, spoon is wet at 14'
		14			
				19	
	SS-8	15	8	50/.4	Gray Slag, wet
		16			
				9	
	SS-9	17	6	50/.4	Slag, wet



STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Depth and elevation noted at time borehole was drilled

PARSONS ENGINEERING SCIENCE
DRILLING RECORD

BORING NO. RW - 11

Sheet 2 of 3

Location:

Contractor: SJB SERVICES
Driller: ART KOSKE
Inspector: GEORGE HERMANCE
Rig Type: CME 75-85 TRAC
Method: VARIED

PROJECT NAME Cherry Farm/River Road
PROJECT NUMBER 726673.41

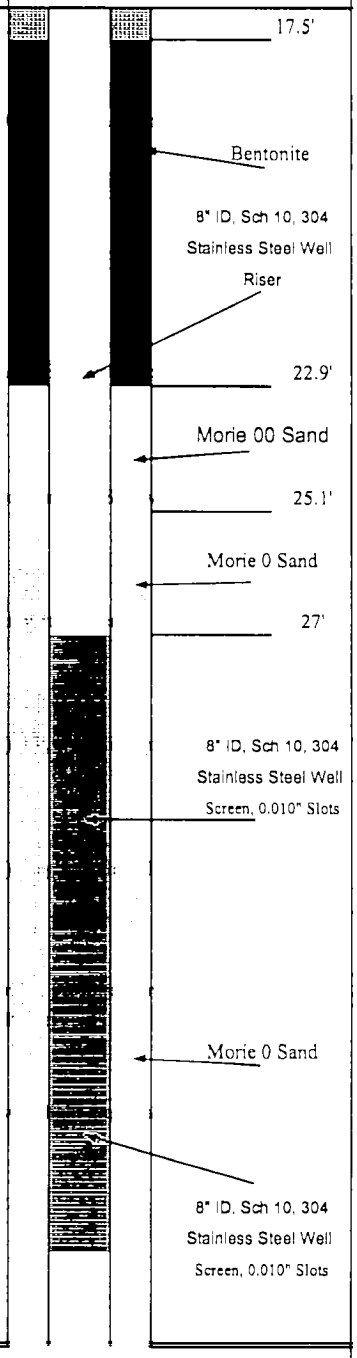
Weather Partly Cloudy, 40 degrees
Date/Time Start 10/10/96, 1135 hrs.
Date/Time Finish 10/14/96 1600 hrs

GROUNDWATER OBSERVATIONS

Date				
From				
DTW				

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
		18			
				4	
	SS-10	19	24	3	Slag for 0.5' then Black Gray fine Sand and Silt, trace (+) roots,
				2	trace (-) Clay. wet
		20		2	
				3	
	SS-11	21	0	2	No recovery
				3	
		22		2	
				2	
	SS-12	23	8	3	Dark gray and Black, Sandy Silt, wet, trace (+) roots
				4	
		24		3	
				2	
	SS-13	25	12	4	Gray laminated fine Sand, some (-) Silt, wet, dilatent
				4	
		26		7	
				7	
	SS-14	27	18	7	Gray fine Sand, little Silt, wet, dilatent
				11	
		28		13	
				4	
	SS-15	29	16	5	Gray fine Sand, trace (+) Silt, wet, dilatent
				7	
		30		8	
				7	
	SS-16	31	12	8	Gray fine Sand, trace (+) very fine Gravel, Trace (-) Silt, wet
				6	
		32		5	
				5	
	SS-17	33	15	6	Gray medium to fine Sand to 33', then Gray fine Sand layered
				7	with light gray clayey silt, wet
		34		10	
				2	
	SS-18	35	12	5	Gray fine Sand layered with light gray clayey silt, wet
				3	
		36		2	
				5	
	SS-19	37	18	3	Same as 34' to 36'
				2	
		38		2	
				2	

WELL CONSTRUCTION



STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Depth and elevation noted at time borehole was drilled

PARSONS ENGINEERING SCIENCE
DRILLING RECORD

BORING NO. RW - 11

Contractor: SJB SERVICES
Driller: ART KOSKE
Inspector: GEORGE HERMANCE
Rig Type: CME 75-85 TRAC
Method: VARIED

PROJECT NAME: Cherry Farm/River Road
PROJECT NUMBER: 726673.41

Sheet 3 of 3
Location:

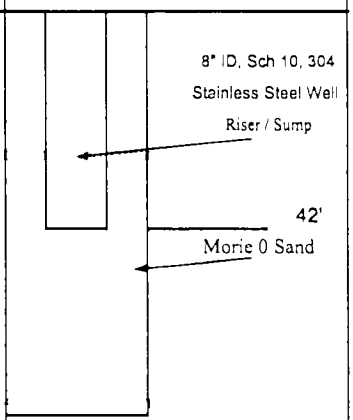
Weather: Partly Cloudy, 40 degrees
Date/Time Start: 10/10/96, 1135 hrs.
Date/Time Finish: 10/14/96 1600 hrs

GROUNDWATER OBSERVATIONS

Date				
From				
DTW				

Photovac Reading	Sample I.D.	Sample Depth	Inches Recovery	SPT	FIELD IDENTIFICATION OF MATERIAL
	SS-20	39	17	2	Same as 36' to 38'
				2	
		40		3	
				4	
	SS-21	41	20	2	Tan, Gray Silty Clay with fine Sand lamina, wet
				1	
		42		1	
				1	
	SS-22	43	16	3	Same as 40' to 42'
				5	
		44		3	
				2	
	SS-23	45	14	20	Tan, Gray Silty Clay to 45' then Green Shale, TOR at 45'
				50/.2	

WELL CONSTRUCTION



STANDARD PENETRATION
SS = SPLIT SPOON
A = AUGER CUTTINGS

SUMMARY: Depth and elevation noted at time borehole was drilled

APPENDIX B

SAMPLING FORMS

WELL SAMPLING RECORD

Site Name | | Well ID | |

Samplers | |

Total Well Depth (TOC)	feet
Initial Static Water Level (TOC)	feet
Well Diameter	inches

Purging Data

Method | | Date/Time | |

Water Volume = (Total Depth of Well - Depth To Water) x Casing Volume per Foot

Well depth	DTW	Casing Vol. per foot	Water Volume	
20	10	0.16	1.6	*gallons*

Casing Volumes (gal/ft.):					
1-inch	0.041	4-inch	0.64	10-inch	4
2-inch	0.16	6-inch	1.4		
3-inch	0.36	8-inch	2.5		

Volume of Purge Water Removed | | gallons

Sampling Data

Method | | Date/Time | |

Parameters	Bottle	Preservation	Method

Field Parameters

	1 Volume	*2 Volume*	3 Volume	*Sample*
pH				
Temp. (°C)				
Spec. Cond. (mS/cm)				
Turbidity (NTU)				
Dissolved oxygen (DO)				
ORP				

Comments:

PARSONS

SURFACE WATER SAMPLING RECORD

Site Name | Sample ID

Samplers

Sample Description

Drainage Direction
Type of Water Body
Physical Appearance/Odor
Color/Stain

Sampling Data

Method
Depth

Date/Time

Parameters	Bottle	Preservation	Method

Field Parameters

pH
Temp. (°C)
Spec. Cond. (mS/cm)
Turbidity (NTU)
Dissolved oxygen (DO)
ORP

Comments

PARSONS

CHAIN OF CUSTODY RECORD

NO:

CLIENT:	PROJECT NO.	PROJECT MGR:	ANALYSES REQUIRED	Send results to: PARSONS 180 Lawrence Bell Drive, Suite 104 Williamsville, NY 14221 Telephone: (716) 633-7074 Fax: (716) 633-7195
PROJECT NAME:	NOTES - (Reference QAPP and/or analytical protocols to be used):			Lab Submitted to:
SAMPLERS:				

FIELD SAMPLE ID	LOCATION DESCRIPTION	DATE	TIME	GRAB	COMP	MATRIX	Number of Bottles	REMARKS

Relinquished by: (Signature)	Date:	Time:	Shipped via:	Airbill #	Received by:(Signature)	Date:	Time:	Cooler Temp: ___°C Samples Intact: ___Yes ___No
Relinquished by: (Signature)	Date:	Time:	Shipped via:	Airbill #	Received by (Signature)	Date:	Time:	Cooler Temp: ___°C Samples Intact: ___Yes ___No
Relinquished by: (Signature)	Date:	Time:	Shipped via:	Airbill #:	Received by (Signature)	Date:	Time:	Cooler Temp: ___°C Samples Intact: ___Yes ___No

TYPE CODES:

SOLID

- SD- Sediment
- SS- Surface Soil
- SB- Subsurface Soil
- MW- Monitoring Well Boring
- TP- Test Pit/Tank Pit
- DR- Drum Waste
- WA- Solid Waste
- OS- Other Solid

WATER

- MW- Monitoring Well
- LC- Leachate
- SW- Surface Water
- DW- Drill Water
- FD- Fuel Dispenser
- MH- Manhole
- OW- Oil Water Separator
- PR- Piping Run
- ST- Storm Water
- WW- Waste Water
- OL- Other Liquid (eg. Drum liquid)

MATRIX

- W - Water
- S - Soil

QUALITY CONTROL

- FB- Field Blank (with date)
- TB- Trip Blank (with date)
- WB- Wash Blank (with date)

APPENDIX C

INSPECTION FORMS

POST-REMEDIAL ACTION QUARTERLY INSPECTION REPORT FORM
CHERRY FARM/RIVER ROAD SITE
TONAWANDA, NEW YORK

Quarter (1st, 2nd, 3rd, 4th) 1st

Date/Time of Inspection 2/13/2006 14:00

Inspector Name/Company Names

INSPECTION OF:	Condition		Action Required		Comments/Location
	Adequate/ Stable	Damaged/ Deteriorating	Yes	No	
1. Facility Access Control					
A. Security Fences					
1. Gaps beneath fence					
2. Chain-link fabric					
3. Fence posts					
B. Site access gates					
1. Gate repairs					
2. Gate locks					
C. Warning signs					
D. Access roads					
E. Buildings					
F. Exterior Lighting at Treatment Plant					
2. Final Cover System					
A. Vegetative Cover					
1. Cover Growth					
2. Mowing					
B. Settlement					
C. Erosion					
D.Drainage Controls					
1. Vegetated Swales					
2. Rip Rap Lined Swales					
3. Culverts					
4. Riprap Shoreline					
5. Barrier Islands					
6. Gabion Walls					
E. Animal Control					
F. Debris, Litter, Waste					

POST-REMEDIAL ACTION QUARTERLY INSPECTION REPORT FORM
CHERRY FARM/RIVER ROAD SITE
TONAWANDA, NEW YORK

Quarter (1st, 2nd, 3rd, 4th) 1st

Date/Time of Inspection 2/13/2006 14:00

Inspector Name/Company Names

3. In-river Sediment Caps					
4. Groundwater Monitoring System					
A. Monitoring Wells					
1. Well Casing and Cap					
2. Protective Casing					
3. Locks					
4. Surface Seal					
5. Floats/Pumps					
6. Piping					
7. Sedimentation					
8. LNAPL					
B. Observation Wells					
1. Sedimentation					
2. LNAPL					
B. Sumps					
1. Sedimentation					
2. LNAPL					
3. Floating Debris					
(see Volume II - Treatment Plant SOPs)					

APPENDIX D

SPECIFICATION FOR FINISH GRADING, TOPSOIL, AND SEEDING

SECTION 02990

FINISH GRADING, TOPSOIL AND SEEDING

PART 1 - GENERAL

1.01 Work Specified

A. The work specified herein includes the material, equipment, and labor necessary to provide finish grading and to place topsoil, fertilizer, seed, mulch, and erosion control fabric. The mulch and erosion control fabric shall be placed as follows:

1. Mulch - shall be utilized on all slopes.
2. Natural erosion control fabric - shall be utilized as indicated on the Drawings.

B. Related work specified in other sections:

1. Section 01500 - Temporary Facilities and Field Office
2. Section 01564 - Erosion Control
3. Section 02222 - Excavation
4. Section 02260 - Landfill Cover Construction
5. Section 02269 - QA/QC for Landfill Cover Soil Material

1.02 Submittals

A. Materials and Products: Submit for approval data.

1. Topsoil Source: The Contractor shall submit for approval by the Engineer, a written statement giving location of topsoil source. If soil amendments are proposed, submit amendment types, quantities, mixes and test results.
2. Grass Seed Vendors Certificate: The Contractor shall submit the seed vendor's certified statement for the grass seed mixture required, stating common name, percentage by weight, and percentages of purity, and germination.
3. Fertilizer: Submit manufacturer's product data showing contents and test results.
4. Hydroseeders: The Contractor shall submit for approval by the Engineer, all data concerning hydroseeding equipment (if used) including all material application rates.
5. Erosion Control Fabrics: The Contractor shall submit for approval by the Engineer, the erosion control fabric manufacturer's literature, samples and specifications.

B. Installer - Submit the name of subcontractors (if used) and Qualification Statements.

C. Manufacturer's Certification - Certify that products meet or exceed specified requirements.

1.03 Quality Assurance

A. All plants shall conform to or surpass minimum quality standards as defined by the American Association of Nurserymen. All plant materials must be clearly labeled with genus, species, and common name. These plants may be inspected for conditions of root ball, disease, insects, or injury. All rejected plant materials must be removed immediately from the job site and must be replaced by

the Contractor at no cost to the Owner within 5 working days. The Engineer has the right to inspect and reject plant materials up to the final acceptance.

B. Certificates. In addition to any other certificates specified, the Contractor shall furnish a certificate with each delivery of material, in containers or bulk, the analysis of the material, together with the date of delivery. All certificates shall be delivered to the Engineer, who will inspect the materials prior to its use.

C. Seeding. Seed shall be labeled in accordance with USDA Rules and Regulations under the Federal Seed Act and applicable State seed laws. Seed shall be furnished in sealed bags or containers bearing the date of the last germination which shall be within a period of six (6) months prior to commencement of planting operations. Seeding material shall be inspected upon arrival at the job site, and unacceptable material shall be removed from the job site. Seed shall be from same or previous year's crop; each variety of seed shall have a purity of not less than 85%, a percentage of germination not less than 90%, shall have a weed content of not more than 1% and contain no noxious weeds.

PART 2 - PRODUCTS

2.01 Topsoil

A. Topsoil shall be natural, friable, fertile soil of loamy character, capable of sustaining healthy plant life, and reasonably free from subsoil, roots, heavy or stiff clay, stones larger than 2 inches in greatest dimension, noxious weeds, sticks, brush, litter, and other deleterious matter. Topsoil as delivered to the site or stockpiled shall meet the following requirements:

a. shall be well graded with a maximum particle size of 2 inches, 85 to 100 percent passing 1 inch, 65 to 95 percent passing 1/4 inch, and 20 to 80 percent passing a Number 200 sieve. Clay content of material passing the Number 200 sieve shall not be greater than 30 percent, as determined by hydrometer analysis;

b. pH between 6.0 and 7.5;

c. shall contain not less than 3 percent organic matter nor more than 20 percent as determined by loss of ignition of moisture-free samples dried at 100° to 110° Celsius;

d. free of pest larvae; and

e. soluble salt content not greater than 500 ppm.

B. Quality Control

1. The Company shall provide the services of an Engineer and an independent soils testing laboratory to conduct quality assurance testing.

2. The following material property test methods and frequency shall be conducted for soil:

Material Property	Test Method	Frequency
Grain-size Analysis with Fines	ASTM D-422	10,000 cubic yards
Soil pH	ASTM D-4972	10,000 cubic yards
Organic Content	ASTM D-2974	10,000 cubic yards

3. Additional testing will required if alternate sources are proposed or utilized.

C. Fertilizer

All soil placed for riverbank restoration and wetland creation shall be amended with fertilizer. Fertilizer shall be a starter fertilizer of commercial stock, of neutral character, with elements derived from organic sources. It shall be a complete, prepared and packaged material and shall contain a minimum of 8% nitrogen, 20% phosphoric acid and 10% potash. Each bag of fertilizer shall bear the manufacturer's guaranteed statement of analysis.

2.03 Grass Seed

The seed mixture will consist of the following proportions or approved equal.

Common Name	% By Weight
Red, Chewing, and Tall Fescue	40
Perennial Ryegrass	25
Annual Ryegrass	15
Cliomax Timothy	15
White Clover	05

2.04 Fertilizer

A. Fertilizer shall be a starter fertilizer of commercial stock, of neutral character, with elements derived from organic sources. It shall be a complete, prepared and packaged material and shall contain a minimum of 18 percent nitrogen, 24 percent phosphoric acid, and 6 percent potash. Other fertilizer mixes may be acceptable provided the application rate is adjusted to provide equal quantities. Each bag of fertilizer shall bear the manufacturer's guaranteed statement of analysis.

1. Product and Manufacturers:
    a. Scotts Starter Fertilizer by Scott and Son
    b. or equal

2.05 Mulch

A. Straw Mulch

Mulch shall be comprised of clean, threshed straw of oats, wheat, barley, or rye that is free from noxious weeds, mold or other objectionable material. The straw mulch shall contain at least 50 percent by weight of material to be 10 inches or longer. Straw shall be in an air-dry condition and suitable for placement with blower equipment.

B. Hydromulch

Hydromulch - Wood Cellulose Fiber Pulp.

a. Provide a specially prepared wood cellulose fiber, processed to contain no growth or germination inhibitor factors, and dyed an appropriate color to facilitate visual metering of application of the materials.

b. Hydromulch manufactured from recycled paper products will be acceptable.

c. Product and Manufacturer:
    1. Conwed Virgin Wood Fiber Mulch by Conwed, Inc.
    2. Silva Fiber by Weyerhaeuser Co.
    3. or equal

2.06 Natural Erosion Control Fabric

A. The natural erosion control fabric shall be a machine-produced mat of 100 percent biodegradable material.

1. Straw matting

a. The material shall contain straw at 0.5 pounds per square yard with netting on one side only.

b. Product and Manufacturer:

1. Erosion Mat S75 by North American Green

2. or equal

2. Wood Excelsior Blanket

a. Provide a specially prepared machine produced mat of curled and barbed wood excelsior. 80 percent of the fibers shall be 6-inches or longer. Fibers shall be evenly distributed through the blanket and secured by a photodegradable plastic mesh. The fibers shall not contain growth or germination inhibitors.

b. Product and Manufacturer:

1. Curlex Blanket by American Excelsior Co.

2. or equal

3. Jute Mesh

a. Provide a mesh blanket of coired coconut fiber twine.

b. Product and Manufacturer:

1. Bio D-Mat 90 by Rolanka International, Inc.

2. or equal.

B. The wire staples for securing erosion control fabrics shall be U-shaped and formed of 11-gauge plain iron wire with dimensions of 6-inch minimum length and 2-inch minimum width.

PART 3 - EXECUTION

A. All final grade surfaces shall receive six (6) inches minimum of compacted topsoil, seeding, mulch/or erosion control fabric, and fertilizer in accordance with this section.

B. All final grade surfaces outside the cover limits that have been disturbed or damaged during completion of the work shall be reseeded using a mixture of seed which shall produce similar vegetative growth as existed prior to commencement of the work.

C. The Contractor shall place mulch or erosion control fabric as follows:

1. Mulch on all slopes less or equal to 15 percent.

2. Natural erosion control fabric on all disturbed or constructed slopes greater than 15 percent or as indicated on the Drawings, whichever is more stringent.

3.01 Application Procedures

A. Topsoil

1. The Contractor shall place a minimum of six (6) inches of compacted topsoil over excavated areas, the landfill cover area, and the disturbed areas as directed by the Engineer.

2. The underlying soil shall be tilled to a depth of 2 inches by disking or harrowing before topsoil placement. Tillage shall be parallel to contours, and shall not be performed when the cover is frozen or excessively wet.

3. Topsoil shall be placed to a depth sufficiently greater than required so that after compaction, the complete work will conform to the lines, grades, and elevations indicated on the Drawings and the six (6) inch minimum requirement. No topsoil shall be spread in water or while frozen or muddy.

4. The topsoil shall then be rolled or compacted with a cultipacker weighing not more than 100 pounds per foot of width. During the rolling, all depressions caused by settlement of rolling shall be filled with additional topsoil, and the surface shall be regraded and rolled until a smooth and even finished grade is created.

B. Fertilizer

1. The fertilizer shall be applied with a mechanical spreader at a minimum rate of 200 lbs/acre or in accordance with the manufacturer's suggested rate.

2. After topsoil has been spread and the fertilizer applied, it shall be carefully prepared by scarifying or harrowing to a depth of 2 inches and left in a roughened condition for seeding. All stiff clods, lumps, roots, litter and other foreign material shall be removed from the area and disposed of by the Contractor.

C. Seeding

1. The seed mixture shall be applied uniformly upon the prepared surface with a hand or mechanical spreader at a minimum rate of 100 lbs/acre. The seed shall be raked lightly into the surface and rolled. Seeding shall be conducted from April 1 to May 30 or from August 15 to October 1.

D. Mulch and Erosion Control Fabrics

1. Mulch or erosion control fabric shall be placed immediately after the application of fertilizer and seed.

2. Areas that have been seeded and have a slope less than or equal to 15 percent shall be protected from erosion by the placement of straw mulch or hydromulch. Straw mulch shall be applied with a mulch blower at a uniform rate of 1500 lbs/acre and anchored by use of a tackifier.

3. Natural erosion control fabrics shall be installed in lieu of the mulch in areas that have a slope greater than 15 percent or as indicated on the Drawings.

E. Watering

1. Following applications of the mulch or erosion control fabric, the seed bed shall be moistened. A muddy soil condition will not be acceptable. Seeded areas shall be watered as often as required to obtain germination and to obtain and maintain a satisfactory growth. Watering shall be done in such a manner to prevent washing out of seed.

2. The stand of grass resulting from the seeding shall not be considered satisfactory until accepted by the Owner. If areas are determined to be unacceptable, the remaining mulch or erosion control fabric will be removed and all areas shall be reseeded, refertilized and remulched and erosion control fabric replaced as per the above application procedures at the Contractor's expense.

3.02 Maintenance

A. The Contractor shall begin a maintenance period immediately after planting of grass and landscape materials.

B. The Contractor shall maintain grass areas, for the periods required to establish an acceptable growth, but not less than 60 days, after seeding. If seeded in the fall and not given a full 60 days of maintenance, or if not considered acceptable by the Owner and the Engineer at that time, continue maintenance during following spring until acceptable grass stand is established.

C. Seeded areas shall be watered as often as required to obtain germination and to obtain and maintain a satisfactory sod growth. Watering shall be in such a manner as to prevent washing out of seed.

3.03 Warranty

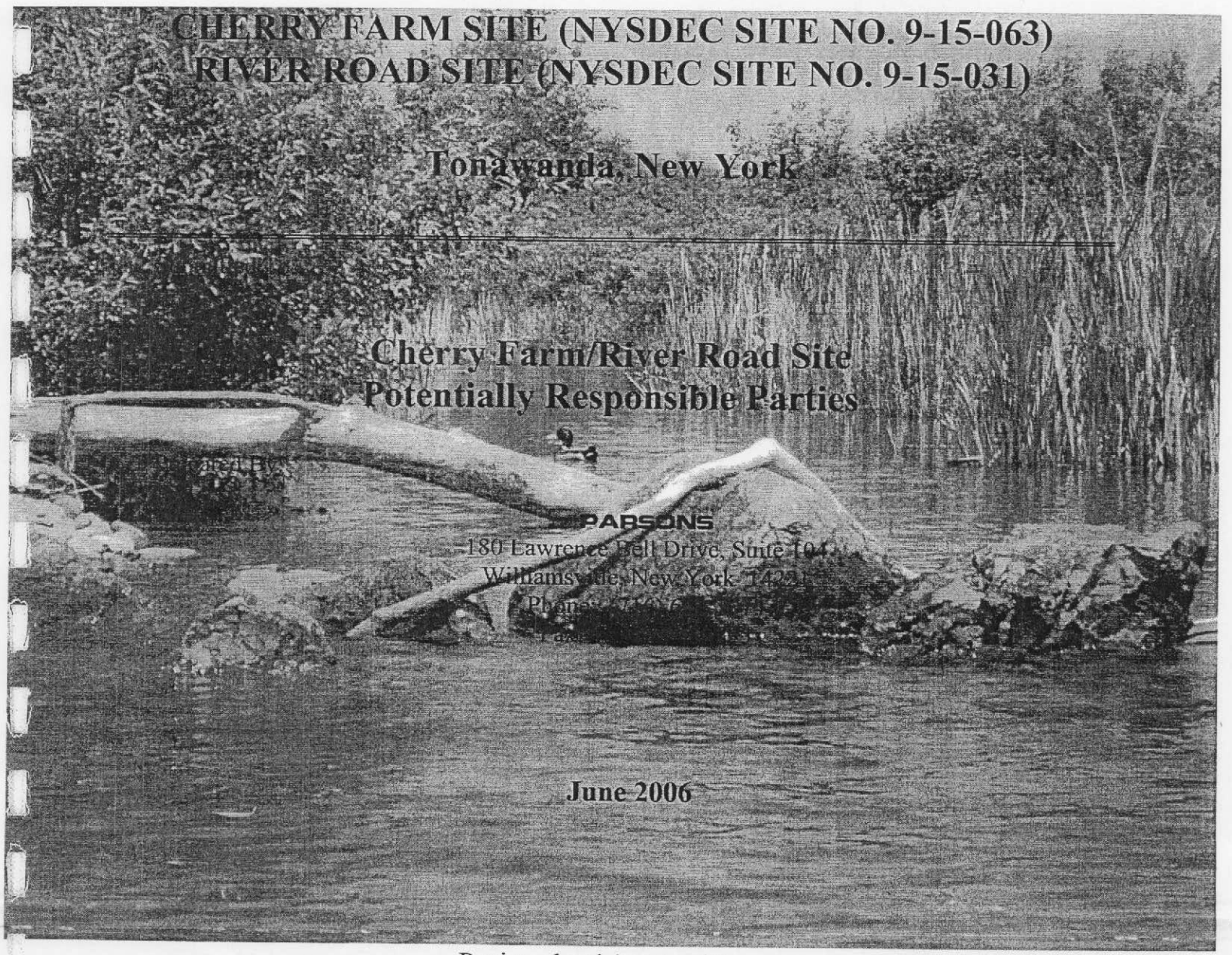
A. The warranty period shall be one year from the date of substantial completion or correction period. Areas of erosion shall be immediately repaired, re-seeded, re-mulched and maintained until an acceptable grass stand is established. Areas to be repaired shall also include areas failing to produce a full, uniform strand of grass.

– END OF SECTION 02990 –

APPENDIX E

OPERATIONS, MAINTENANCE, AND MONITORING PROJECT SAFETY PLAN

PROJECT SAFETY PLAN
FOR POST-REMEDIAL CONSTRUCTION OPERATIONS, MAINTENANCE, AND MONITORING AT



CHERRY FARM SITE (NYSDEC SITE NO. 9-15-063)
RIVER ROAD SITE (NYSDEC SITE NO. 9-15-031)

Tonawanda, New York

Cherry Farm/River Road Site
Potentially Responsible Parties

Prepared By:

PARSONS
180 Lawrence Bell Drive, Suite 104
Williamsville, New York 14221
Phone: 716-6
Fax:

June 2006

Reviewed and Approved By:

Name	Signature	Date
Mark Raybuck Project Manager	Mark S. Raybuck	6/15/06

EMERGENCY CONTACTS

This page shall be conspicuously posted.

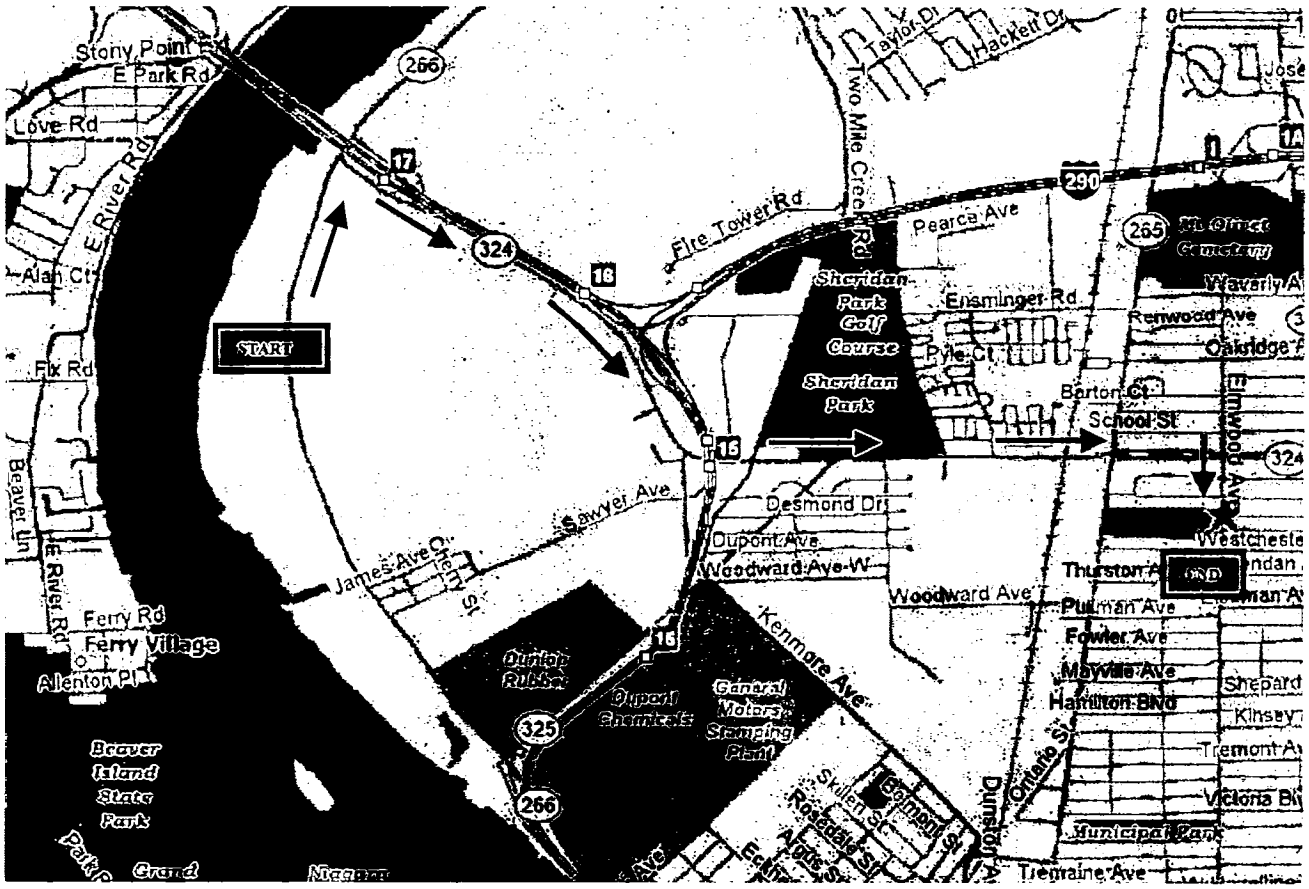
Agency/Location	Phone Number
Nearest phone located onsite	(716) 875-9374 (treatment plant, can only call out)
Police and Fire Department (emergency)	911
Sheridan Volunteer Fire Company	(716) 873-1111
Town of Tonawanda Police (non-emergency)	(716) 876-5300
Ambulance	911
Hospital (Kenmore Mercy, 2950 Elmwood Ave., Kenmore, NY, 14217)	(716) 879-6121 (emergency) (716) 879-6100 (information)
Town of Tonawanda WWTP (24 hours a day)	General No. (716) 693-4900 Bill Mucci cell phone (716) 208-0061 Bill Mucci pager no. (716) 369-2761
Poison Control Center	(800) 888-7655
Oil or Toxic Chemical Spills	(800) 424-8802
UFPO (Underground Utilities)	(800) 962-7962
Utility Emergencies (Electric):	(800) 637-2770
Utility Emergencies (Gas):	(800) 627-6466
Parsons Contract Physician (Healthworks)	(716) 874-7474
NYSDOH (Cameron O'Conner)	(716) 847-4502
NYSDEC (Michael Hinton)	(716) 851-7220

PRP Group Contacts

National Grid	Terry Young (through October 2006) William Jones (starting November 2006) 300 Erie Boulevard, West Syracuse, New York 13202 (315) 428-6614 (Young) (315) 428-5690 (Jones)
Honeywell	Tim Metcalf 101 Columbia Road Morristown, New Jersey 07962 Office: (973) 455-4107 Mobile: (973) 722-2586
General Motors	Ed Peterson GM Building Facilities Group Remediation Team Pontiac Centerpoint Campus Central Pontiac, Michigan 48341-3147 Phone: (248) 753-5849
Stephens and Stephens, LLP	Hugh Stephens 410 Main St. Buffalo, NY 14202-3702 Phone: 716-852-7590

Directions

1. Turn left out of Site onto River Road (Route 266).
2. North 0.2 miles, turn right onto Grand Island Boulevard.
3. Southeast 1.5 miles, bear left onto Sheridan Drive (east).
4. 1.25 miles, turn right onto Elmwood Avenue.
5. Two blocks, hospital and emergency room entrance are on the right.



Cherry Farm/River Road Site

Route to Hospital Map from Cherry Farm/River Road Site

SOURCE: 2006 MapQuest, Inc.

PARSONS
180 Lawrence Bell Drive, Suite 104, Williamsville, N.Y. 14221, Phone: (716) 633-7195

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SECTION 1
INTRODUCTION

1.1 PURPOSE AND REQUIREMENTS

The purpose of this Project Safety Plan (PSP) is to establish minimum standards, practices, and procedures related to personnel protection and safety during the post-remedial construction operations, maintenance, and monitoring (OM&M) period at the Cherry Farm/River Road Site. This plan assigns responsibilities for onsite personnel; defines the potential hazardous and associated risks that may exist at the site; describes monitoring procedures and action levels for the use and upgrading of personal protective equipment (PPE); and identifies the proper use of work zones to be delineated during the conduct of hazardous activities at the site. The provisions of this plan are mandatory for all onsite personnel performing post-remedial construction operations, monitoring, and maintenance, as well as any visitors to the site.

Safety plans must also be prepared by subcontractors working on the Site; subcontractor plans must conform to the requirements of this plan as a minimum. All personnel who engage in project activities must be familiar with this plan and comply with its requirements. All field personnel must sign-off on the Plan Acceptance Form (Attachment 1) prior to beginning work on the site. The Plan Acceptance Form must be submitted to and maintained by the Site Health and Safety Officer, and a copy kept in the project file.

Additional information related to operations at the groundwater treatment plant, including safe handling of chemicals, is contained in Volume II of the Cherry Farm/River Road OM&M Manual, Standard Operating Procedures (SOPs) for Groundwater Remediation System. All personnel who have responsibility for the treatment plant must be familiar with this HASP, and also the treatment plant SOPs.

1.2 SITE DESCRIPTION

The Cherry Farm/River Road Site is located between River Road and the Niagara River in the Town of Tonawanda. The Cherry Farm Site is an inactive landfill encompassing 56 acres, 80 percent of which is covered by fill material. Fill materials include foundry sand, slag, and cinders. The River Road Site occupies approximately 23 acres directly south of the Cherry Farm site. Refuse disposed of at the River Road site includes construction rubble, flyash, bottom ash, foundry sand, slag, and liquid boiler cleaning waste.

1.3 APPLICABILITY

As described in Volume I of the May 2006 Operations, Maintenance, and Monitoring Manual, on-going field tasks to be conducted at the site include:

- Routine site inspections;
- Maintenance of drainage systems, groundwater treatment facility, and the landfill cap/cover system; and
- Groundwater, treatment plant effluent, and surface water sampling.

All OM&M field tasks are to be conducted using proper health and safety protocols and PPE. Appropriate levels of personal protective equipment for various field activities are identified in Section 4 of this Plan.

There will be no chemical or physical hazards present on the Cherry Farm/River Road Site in non-secure areas which could potentially threaten human health or the environment. Secure areas in which hazards are present include acid and caustic storage tank systems within the groundwater treatment plant.

In the event of an emergency situation which involves any potential chemical exposures or other threat to human health, the hazardous areas of the site will be evacuated to a safe distance in accordance with the Contingency Plan described in Section 6.

The River Road Site contains a groundwater treatment plant, where chemicals will be stored. Public access will be limited on the River Road Site due to the presence and use of these chemicals. Access to the treatment plant is restricted by security fencing.

1.4 PROJECT TEAM ORGANIZATION

Individuals working on the project shall have appropriate training in first aid; safe handling procedures for hazardous chemicals/waste, and the proper selection, fitting, and use of personal protective equipment. They shall also be experienced with the types of field operations to be conducted at the Site. The names of principal onsite OM&M personnel associated with this project are as follows:

Project Manager: Mark S. Raybuck

Treatment Plant Operator(s): Sara M. Chmura, Daniel Lipp, James Schuetz, Michael Billi

Site Health and Safety: Sara M. Chmura, Daniel Lipp, James Schuetz, Michael Billi

Subcontractors

1. Arrow Contracting (annual lawn mowing, snow plowing, and miscellaneous landfill repairs, when necessary).
2. CIR Electrical Construction Corporation (electrical work at treatment plant, sumps, etc.)

1.5 SITE SPECIFIC TRAINING

The Site Health and Safety Officer(s) will be responsible for developing and conducting a site specific occupational hazard training program for all personnel that will work at the site. This training will consist of the following topics:

- Names of personnel responsible for implementing the Site safety and health program.
- Safety, health, and other hazards at the site.
- Proper selection and use of personal protective equipment.
- Work practices by which the employee can minimize risk from hazards.
- Safe use of engineering controls and equipment on the site.
- Acute effects of compounds at the site.
- Decontamination procedures.
- Evacuation routes and gathering locations.
- Neighboring industry alarms.
- Sign-in procedures.
- Communication methods, including hand signals and radio or cell phone communication.

Primary operations and safety personnel, and their general safety related training (HAZWOPER, 8-hour refresher, etc.) are shown on Table 1.1.

Table 1.1 Personnel Training Summary

Name	Job Title	40-hr HAZWOPER	8-hr HAZWOPER Supervisor	8-hr HAZWOPER Expires	Other Training (i.e. excavation, confined space)
Daniel Lipp	Technician	1/27/94	11/1/02	5/2/06	Department of Transportation (3/5/02), Excavation and Trenching (4/26/96), Confined space (10/22/95)
Sara M. **Chmura**	Geologist	May 17, 2002	April 28, 2005	April 18, 2007	Excavation Competent **Person, CPR/First Aid, Defensive Driver Training,**
James Schuetz	**Sr. Geologist**	**March 21, 2002**	**November 1, 2002**	**April 30, 2007**	**Excavation Competent Person, CPR/First Aid**
Michael Billi	Sr Designer	8/29/03	"Not applicable"	4/30/07	Excavation Competent Person 3/29/04

SECTION 2
RISK ANALYSIS

2.1 CHEMICAL HAZARDS

The entire site is capped, such that potential direct contact with contaminants has been essentially eliminated for most OM&M activity. Potential exposure is only applicable under the following circumstances:

- When personnel are conducting groundwater/surface water sampling;
- When conducting maintenance activities on the groundwater sumps and monitoring wells
- When intrusive work into the soil cap is being conducted to repair the cap, or replace a damaged well.
- When working in groundwater treatment plant building.

Potential contaminants which may be encountered under the circumstances listed above include phenols, cyanide, polycyclic aromatic hydrocarbons (PAHs), lead, PCBs, naphthalene and light non-aqueous phase liquids (LNAPL). Relevant physical characteristics of these compounds are described in Table 2.1. Additionally, solvents used for the preservation of water samples and for decontamination of sampling equipment are potentially hazardous to human health and the environment.

Sulfuric acid (93 percent) and sodium hydroxide (50 percent) are used in the groundwater treatment system. These chemicals are housed in a groundwater treatment plant located on the River Road Site. There is no public access to the River Road Site, and access to the treatment plant is restricted by security fence with locking gate.

Routes of entry, descriptions of the hazards, first-aid procedures, and PPE requirements for methanol, sulfuric acid, and sodium hydroxide are described on the Material Safety Data Sheets (MSDS) included in Attachment 2. All MSDSs will be maintained onsite by the field team supervisor.

2.2 PHYSICAL HAZARDS

2.2.1 Heat Stress

The use of Level C protective equipment, or greater, may create heat stress. Monitoring of personnel wearing personal protective clothing should commence when the ambient temperature is 72°F or above. Monitoring frequency should increase as ambient temperature increases or as slow recovery rates are observed. Refer to Table 2.1 to assist in assessing when the risk for heat related illness is likely. To use this table, the ambient temperature and relative humidity must be obtained. Heat stress monitoring should be performed by the Site Health and Safety Officer, who shall be able to recognize symptoms related to heat stress.

To monitor the workers, be familiar with the following heat-related disorders and their symptoms:

- **Prickly Heat (Heat rash):** Painful, itchy red rash. Occurs during sweating, on skin covered by clothing.
- **Heat Cramps:** Painful spasm of arm, leg or abdominal muscles, during or after work.
- **Heat Exhaustion:** Headache, nausea, dizziness. Cool, clammy, moist skin. Heavy sweating. Weak, fast pulse. Shallow respiration, normal temperature.
- **Heat Fatigue:** Weariness, irritability, loss of skill for fine or precision work. Decreased ability to concentrate. No loss of temperature control.
- **Heat Syncope (Heat Collapse):** Fainting while standing in a hot environment.
- **Heat Stroke:** Headache, nausea, weakness, hot dry skin, fever, rapid strong pulse, rapid deep respirations, loss of consciousness, convulsions, coma. **This is a life threatening condition.**

  Do not permit a worker to wear a semi-permeable or impermeable garment when they are showing signs or symptoms of heat-related illness.

2.2.2 Prevention of Heat Stress

Proper training and preventative measures will aid in averting loss of worker productivity and serious illness (see Table 2.2). Heat stress prevention is particularly important because once a person suffers from heat stroke or heat exhaustion, that person may be predisposed to additional heat related illness. To avoid heat stress the following steps should be taken:

- Adjust work schedules.
  - Mandate work slowdowns as needed.
  - Perform work during cooler hours of the day if possible or at night if adequate lighting can be provided.
- Provide shelter (air-conditioned, if possible) or shaded areas to protect personnel during rest periods.
- Maintain worker's body fluids at normal levels. This is necessary to ensure that the cardiovascular system functions adequately. Daily fluid intake must approximately equal the amount of water lost in sweat, i.e.., eight fluid ounces (0.23 liters) of water must be ingested for approximately every eight ounces (0.23 kg) of weight lost. The normal thirst mechanism is not sensitive enough to ensure that enough water will be drunk to replace lost sweat. When heavy sweating occurs, encourage the worker to drink more. The following strategies may be useful:
  - Maintain water temperature 50° to 60°F (10° to 16.6°C).

- Provide small disposable cups that hold about four ounces (0.1 liter).
- Have workers drink 16 ounces (0.5 liters) of fluid (preferably water or dilute drinks) before beginning work.
- Urge workers to drink a cup or two every 15 to 20 minutes, or at each monitoring break. A total of 1 to 1.6 gallons (4 to 6 liters) of fluid per day are recommended, but more may be necessary to maintain body weight.

- Train workers to recognize the symptoms of heat related illness.

2.2.3 Cold-Related Illness

In the winter months, thermal injury due to cold exposure can be a potential concern for field personnel. Systemic cold exposure is referred to as *hypothermia*. Local cold exposure is generally termed *frostbite*.

- Hypothermia. Hypothermia is defined as a decrease in a persons core temperature below 96°F. The body temperature is normally maintained by a combination of central (brain and spinal cord) and peripheral (skin and muscle) activity. Interferences with any of these mechanisms can result in hypothermia, even in the absence of what normally is considered a "cold" ambient temperature. Symptoms of hypothermia include: shivering, apathy, listlessness, sleepiness, and unconsciousness.
- Frostbite. Frostbite is both a general and medical term given to areas of local cold injury. Unlike systemic hypothermia, frostbite rarely occurs unless the ambient temperatures are less than freezing and usually less than 20°F. Symptoms of frostbite are: a sudden blanching or whitening of the skin; the skin has a waxy or white appearance and is firm to the touch; tissues are cold, pale, and solid.

To monitor workers for cold stress conduct oral temperature monitoring at the job site:

- at the Field Team Leader's discretion, based on changes in a worker's performance or mental status;
- at a worker's request;
- as a screening measure, two times per shift, under unusually hazardous conditions (i.e., wind-chill less than 20°F, or wind-chill less than 30°F with precipitation); or
- as a screening measure whenever any one worker on the site develops hypothermia.

Any person developing moderate hypothermia (a core temperature of 92°F) cannot return to work for 48 hours.

2.2.4 Prevention of Cold-Related Illness

To minimize the potential for cold-related illness to occur, the following precautions should be taken:

- Educate workers to recognize the symptoms of frostbite and hypothermia
- Identify and limit known risk factors
- Provide an enclosed, heated environment on or adjacent to the site.
- Ensure the availability of dry changes of clothing.
- Develop the capability for temperature recording at the site.
- Provide warm drinks for onsite personnel.

TABLE 2.1
RELEVANT PROPERTIES OF VOLATILES AND SEMI-VOLATILES KNOWN OR SUSPECTED AT THE CHERRY FARM SITE

Compound	OSHA PEL(1) (ppm)	IDLH (ppm)	LEL (%)	Odor Threshold(2) (ppm)	Odor Characteristic	Vapor Pressure (mmHg)	Physical State	Detectable w/10.6eV lamp PID (I.P.)	
Phenol	5	250	1.7	1.0	Acid/Creosote	0.4	Combustible Solid	Yes	(8.50)
Polycyclic Aromatic Hydrocarbons (PAHs)	0.2mg/m^3	80mg/m^3 [A]	varies	varies	varies	very low	Combustible Solid	NA	
Cyanide (as HCN)	5mg/m^3	50 ppm	5.6	5.0	almond-like (bitter)	630	Flammable Liquid	No	(13.6)
Lead	0.05mg/m^3	100mg/m^3	NA	NA	NA	0	Non-combustible solid	No	
Naphthalene	10 ppm 15 [STEL]	250	0.9	0.64	mothballs	0.08	combustible solid	Yes	8.12
Arochlor 1248 (chlorophenyl)	1mg/m^3	5mg/m^3	NA	NA	NA	.001	Non-flammable liquid	No	
Arochlor 1260 (chlorophenyl)	0.5mg/m^3	5mg/m^3	NA	NA	NA	.00006	Non-flammable liquid	No	

(1) 29 CFR 1910, July1, 1989 (8-hour Time weighted average unless otherwise specified).

(2) ACGIH 1989 Highest reported value of acceptable odor threshold range.

IDLH Immediately dangerous to life and health.

CA **Suspect carcinogen - Minimize all possible exposures.**

STEL **15 minute short Term Exposure Limit**

Table 2.2
Heat Stress Risk

HEAT INDEX

	ENVIRONMENTAL TEMPERATURE (Fahrenheit)										
	70	75	80	85	90	95	100	105	110	115	120
RELATIVE HUMIDITY	APPARENT TEMPERATURE*										
0%	64	69	73	78	83	87	91	95	99	103	107
10%	65	70	75	80	85	90	95	100	105	111	116
20%	66	72	77	82	87	93	99	105	112	120	130
30%	67	73	78	84	90	96	104	113	123	135	148
40%	68	74	79	86	93	101	110	123	137	151	
50%	69	75	81	88	96	107	120	135	150		
60%	70	76	82	90	100	114	132	149			
70%	70	77	85	93	106	124	144				
80%	71	78	86	97	113	136					
90%	71	79	88	102	122						
100%	72	80	91	108							

*Combined Index of Heat and Humidity...what it "feels like" to the body
Source: National Oceanic and Atmospheric Administration

How to use Heat Index:
1. Across top locate Environmental Temperature
2. Down left side locate Relative Humidity
3. Follow across and down to find Apparent Temperature
4. Determine Heat Stress Risk on chart at right

Note: Exposure to full sunshine can increase Heat Index values by up to 15 degrees F.

Apparent Temperature	Heat Stress Risk with Physical Activity and/or Prolonged Exposure
90-105	Heat Cramps or Heat Exhaustion Possible
105-130	Heat Cramps or Heat Exhaustion Likely, Heat Stroke Possible
>130	Heatstroke Highly Likely

SECTION 3
AIR MONITORING

3.1 INTRODUCTION

Airborne contaminants can present a significant threat to worker health and safety. Thus, identification and quantification of these contaminants through air monitoring is an essential component of the health and safety program. Reliable measurements of airborne contaminants are useful for:

- Selecting personal protective equipment.
- Delineating areas where protection is needed.
- Assessing the potential health effects of exposure.
- Determining the need for specific medical monitoring.

This section delineates the factors to consider when conducting air monitoring. It presents strategies for assessing airborne contamination and describes instruments and methods for measuring exposures.

3.2 MONITORING REQUIREMENTS

Air monitoring for organic vapors is required only when intrusive activities into or below the soil cap are required, or for permit-required confined space entries (see Section 7.3). Based on the results of the first four quarters of post-construction groundwater and surface monitoring, air monitoring is not required for groundwater monitoring or sampling activities, or for surface water monitoring (see October 1998 Annual Report for Post-Construction Groundwater Monitoring at Cherry Farm Site/River Road Site for details).

Air monitoring for organic vapors in the breathing zone, when such intrusive work is being conducted, will be conducted with a Photovac MicroTIP, photoionization detector (PID) or equivalent.

Monitoring equipment, when needed, shall be maintained and calibrated in accordance with the manufacturer's recommendations and protocols. The limitations and possible sources of errors for each instrument must be understood by the operator. It is important that the operator ensures that the instrument responds properly to the substances it was designed to monitor. Portable air quality monitoring equipment that measures total ionizables present, such as the Photovac MicroTIP HL-2000, must be calibrated at least once each day. Combustible gas/oxygen/%LEL meters (explosimeters) such as the MSA Model 360, must be calibrated at least once each week. The specific instructions for calibration and maintenance provided for each instrument should be followed.

3.3 VARIABLES OF SITE EXPOSURE

Complex, multisubstance environments pose significant challenges to accurately and safely assessing airborne contaminants. Several independent and uncontrollable variables, most notably temperature and weather conditions, can affect airborne concentrations. These factors must be considered when developing an air monitoring program and when analyzing data. Some demonstrated variables include:

- **Temperature**. An increase in temperature increases the vapor pressure of most chemicals.
- **Windspeed**. An increase in wind speed can affect vapor concentrations near a free-standing liquid surface. Dusts and particulate-bound contaminants are also affected.
- **Rainfall**. Water from rainfall can essentially cap or plug vapor emission routes from open or closed containers, saturated soil, or lagoons, thereby reducing airborne emissions of certain substances.
- **Moisture**. dusts, including finely divided hazardous solids, are highly sensitive to moisture content. This moisture content can vary significantly with respect to location and time and can also affect the accuracy of many sampling results.
- **Vapor Emissions**. The physical displacement of saturated vapors can produce short-term, relatively high vapor concentrations. Continuing evaporation and/or diffusion may produce long-term low vapor concentrations and may involve large areas.
- **Work Activities**. Work activities (i.e. drilling) often require the mechanical disturbance of contaminated materials, which may change the concentration and composition of airborne contaminants.

3.4 MEDICAL RECORDS

Proper recordkeeping is essential at the site because of the nature of the work and risks. OSHA regulations mandate that, unless a specific occupational safety and health standard provides a different time period, the employer must:

- Maintain and preserve medical records on exposed workers for 30 years after they leave employment (29 CFR 1910.20).
- Make available to workers, their authorized representatives, and authorized OSHA representatives the results of medical testing and full medical records and analyses (29 CFR 1910.20).
- Maintain records of occupational injuries and illnesses and post a yearly summary report (29 CFR 1904).

SECTION 4
PERSONAL PROTECTIVE EQUIPMENT

4.1 INTRODUCTION

The Site will not be a hazardous site under normal circumstances during the post-remedial construction OM&M period. Therefore, visitors will not require any special PPE or training to enter the site. Field personnel, however, must utilize appropriate PPE when conducting environmental sampling or site groundwater treatment plant maintenance activities. Operators handling chemicals in the treatment facility on the River Road Site must be trained in the proper selection and use of PPE.

4.2 PERSONAL PROTECTIVE EQUIPMENT AND ACTION LEVELS

Various levels of PPE and the circumstances under which protective equipment should be donned are described in the following paragraphs. A summary of field activities and associated personal protective equipment is presented in Table 4.1. PPE for handling of chemicals in use at the treatment plant is discussed in the treatment plant SOPs, contained in Volume II of the OM&M Manual.

4.2.1 Conditions for Level D Protection

Level D protection consists of a standard work uniform for the activities being performed. Level D will be worn for initial site entry whenever OM&M field activities are being conducted. The following physical site conditions must be met for Level D PPE to be acceptable.

- Volatile Organic Compounds

The level of volatile organic compounds must be less than 5 ppm above background.

- Non-Volatile and Semi-Volatile Organic Compounds

Hydrogen cyanide Draeger^{tm} tube readings must be less than 5 ppm.

- Equipment Required For Level D includes:
  - Coveralls;
  - Safety boots;
  - Nitrile outer and latex inner gloves (must be worn during all sampling activities);
  - Hard hat (must be worn during drilling activities); and
  - Safety glasses (splash goggles must be worn if a splash hazard is present).

Modified Level D will be worn if the potential for a splash hazard exists, or when entering the Niagara River to conduct sediment sampling. Modified level D may include:

- Tyvek suit or equivalent
- Life jacket
- For work in the onsite treatment plant where a splash hazard or contact with acid or caustic is possible, Modified Level D will include (in addition to standard Level D equipment), protective apron, face shield, and safety glasses or splash goggles. A hard hat is not required for most activities within the treatment plant.

4.2.2 Conditions for Level C

Level C PPE will be worn during any test pitting or drilling operations on the River Road Site in areas where LNAPL is known to exist. Additionally, during any OM&M activities requiring Level D Protection under normal conditions, the level of PPE will be upgraded to Level C if any of the following conditions are present:

- Volatile Organic Compounds
  The level of volatile organic compounds exceeds 5 ppm above background, but is below 50 ppm.
- Non-volatile and Semi-volatile Organic Compounds
  Hydrogen Cyanide Draeger^{tm} readings less than 5 ppm. Readings greater than 5 ppm require Level B PPE.
- PCBs and Airborne Semi-Volatile Organic Compounds
  It is not possible to directly monitor the concentrations of airborne semi-volatile compounds or PCBs, which might be generated as a result of wind dispersion of soils. Therefore, to avoid any potential exposure, workers will wet down the surrounding area with water when work is being conducted in a non-vegetated area or downwind of a non-vegetated area on a windy day. If the site Health and Safety Officer or any member of the field team suspects that these measures are insufficient to provide adequate personal protection, then workers may don a full-face air-purifying respirator equipped with HEPA cartridges.
- Equipment Required For Level C
  - Full-face air-purifying respirator with combination dust/organic vapor cartridges
  - Tyvek overall suit or equivalent
  - Nitrile outer and latex inner gloves
  - Safety boots
  - Hard hat (must be worn during drilling activities)

4.3 OSHA REQUIREMENTS FOR PERSONAL PROTECTIVE EQUIPMENT

All personal protective equipment used during the course of OM&M field work must be approved in accordance with the following standards:

Type of Protection	Regulation	Source
Eye and Face	29 CFR 1910.133	ANSI Z87.1-1968
Respiratory	29 CFR 1910.134	ANSI Z88.1-1980
Head	29 CFR 1910.135	ANSI Z89.1-1969
Foot	29 CFR 1910.136	ANSI Z41.1-1967

- ANSI = American National Standards Institute

Both the respirator and cartridges specified for use in Level C protection must be fit tested prior to use in accordance with OSHA regulations (29 CFR 1910.1025; 29 CFR 1910.134). Documentation of fit testing should be maintained onsite by the site Health and Safety Officer.

Air purifying respirators cannot be worn under the following conditions:

- Oxygen deficiency
- Monitored concentrations including: readings of greater than 50 ppm Hydrogen Cyanide (indicated by Draeger. tube); or greater than 50 ppm organic vapors (indicated by PID).
- High relative humidity
- If contaminant levels exceed designated use concentrations on respirator cartridges.

4.4 SELECTION OF EQUIPMENT

The individual components of clothing and equipment must be assembled into a full protective ensemble that both protects the worker from the site-specific hazards and minimizes the hazards and drawbacks of the PPE ensemble itself.

The MSDSs provided in Attachment 2 contain recommendations regarding the types of PPE to use when dealing with each chemical. The MSDSs can be used as a starting point for ensemble creation; however, each ensemble must be tailored to the specific situation in order to provide the most appropriate level of protection. For example. if work is being conducted in an area where the potential for contamination is high, it may be advisable to wear a disposable covering, such as Tyvek coveralls or PVC splash suits, over the protective ensemble. It may be necessary to slit the back of these disposable suits to fit around the bulge of an encapsulating suit and SCBA.

The type of equipment used and the overall level of protection should be reevaluated periodically as the amount of information about the Site increases, and as workers are required to perform different tasks. Personnel should be able to upgrade or downgrade their level of protection with concurrence of the Site Safety Officer.

Reasons to upgrade:

- Known or suspected presence of dermal hazards.
- Occurrence of likely occurrence of gas or vapor emission.
- Change in work task that will increase contact or potential contact with hazardous materials.
- Request of the individual performing the task.

Reasons to downgrade:

- New information indicating that the situation is less hazardous than was originally thought.
- Change in site conditions that decreases the hazard.
- Change in work task that will reduce contact with hazardous materials.

Care must be taken to ensure that the PPE being used is compatible with the chemical being handled. For example, if chemically protective gloves show signs of deterioration or stiffening, they are probably not compatible with all of the chemicals being handled, and another type of protective glove should be selected.

TABLE 4.1
ACTION LEVEL/PPE SUMMARY TABLE

Level D

Activities/Action Levels:

- General site reconnaissance, maintenance, and other non-intrusive activities.
- PID readings in ambient air less than 5 ppm (based on presence of phenol).
- Hydrogen Cyanide Draeger^{tm} tube readings less than 5 ppm (when sampling on or near the River Road Site).

Personal Protective Equipment:

- Standard work uniform including inner and outer gloves, overalls, safety glasses, and hard hat (during drilling operations).

Modified Level D

Activities/Action Levels:

- When conducting groundwater sampling, or working with chemicals in the treatment plant, protection against splash hazards is required, or
- When conducting sediment sampling in the river, special health and safety equipment is required.

Personal Protective Equipment:

- Tyvek suit
- Splash apron/face shield/safety glasses for working with chemicals in treatment plant. Safety glasses for sampling groundwater.
- Life jacket

Level C

Activities/Action Levels:

- When PID readings in ambient air exceed 5 ppm, but are below 50 ppm and Hydrogen Cyanide Draeger^{tm} tube readings are below 5 ppm on the River Road Site.
- If PID readings in ambient air exceed 5 ppm for more than 15 minutes, all activities in the area of the readings must cease. Personnel will then consult the Health and Safety Officer and Site Contingency Plan for guidance.

Personal Protective Equipment:

- full face air purifying respirator with combination dust/organic vapor cartridges;
- tyvek overall suit or equivalent;
- nitrile outer and latex inner gloves;
- safety boots; and
- hard hat.

Note: Specific PPE for handling of chemicals in use at the treatment plant is discussed in the treatment plant SOPs, contained in Volume II of the OM&M Manual.

SECTION 5
COLLECTION & SHIPMENT OF SAMPLES

5.1 INTRODUCTION

The information contained in this Plan is to provide guidance to ensure adequate protection of human health and the environment during the collection and transportation of environmental and waste samples at the site. The frequency of sample collection, types of analyses to be conducted, and additional sampling protocol are specified in Volume I, Section 2 of the OM&M Manual and in Volume II, SOP-7 and SOP-10.

5.2 ENVIRONMENTAL SAMPLES

Environmental samples refer to groundwater, surface water, and sediment samples. Personal protective equipment will be worn by field personnel for sampling activities as described in Table 4.1 These samples will be packaged and shipped according to the following procedure:

Packaging

1. Place sample container, properly identified and with a sealed lid, in a polyethylene bag, and seal bag;
2. Place sample in a fiberboard container or plastic cooler which has been lined with a large polyethylene bag.
3. Pack with enough noncombustible, absorbent, cushioning material to minimize the possibility of the container breaking.
4. Seal large bag.
5. Seal or close outside container

Marking/Labeling

Sample containers must have a completed sample identification label and the outside container must be marked "Environmental Sample". The appropriate side of the container must be marked "This End Up" and arrows should be drawn accordingly. No specific DOT labeling is required.

Shipping Papers

No DOT shipping papers are required, but laboratory chain-of-custody forms must be signed prior to releasing the package to the carrier.

Transportation

There are no DOT restrictions on mode of transportation.

5.3 HAZARDOUS SAMPLES

The OM&M Manual requires potential sampling of LNAPL. LNAPL samples will be shipped as DOT Hazardous Materials. The designation "Flammable Liquid" will be used. Refer to International Air Transport Association Guidelines for shipping dangerous goods if the carrier will move the package by air. A completed airway bill must accompany the package and all appropriate labels must be attached to the package.

The samples will be transported as follows:

1. Collect sample in a 16-ounce or smaller glass or polyethylene container with nonmetallic teflon-lined screw cap. Allow sufficient air space (approximately 10 percent by volume) so container is not liquid full at 54°C (130°F). If collecting a solid material, the container plus contents should not exceed 1 pound net weight. If sampling for volatile organic analysis, fill VOA container to septum, but place the VOA container inside a 16-ounce or smaller container so the required air space may be provided. Large quantities, up to 3.786 liters (1 gallon), may be collected if the sample's flash point is 23 °C (75°F) or higher. In this case, the flash point must be marked on the outside container (i.e. carton, cooler), and shipping papers should state that "Flash point is 73°F or higher".
2. Seal sample and place in a 4-mil thick polyethylene bag, one sample per bag.
3. Place sealed bag inside a metal jerrican with noncombustible, absorbent cushioning material (i.e. vermiculite or earth) to prevent breakage, one bag per can. Pressure-close the can and use clips, tape or other positive means to hold the lid securely.
4. Mark the can with:
    - Name and address of originator
    - "Flammable Liquid N.O.S., UN 1993"
    - "No Passenger Aircraft"

    NOTE: UN numbers are now required in proper shipping names.
5. Place one or more metal cans in a strong outside container such as an approved plastic cooler or DOT labeled fiberboard box. Preservatives are not used for hazardous waste site samples.
6. Prepare for shipping:
    - "Flammable Liquid, N.O.S., UN 1993" or "Flammable Solid, N.O.S., UN 1325"; "Cargo Aircraft Only (if more than 1 quart net per outside package); "Limited Quantity" or "Ltd. Qty."; "Laboratory Samples"; "Net Weight ~" or "Net Volume ~" (of hazardous contents) should be indicated on shipping papers and on outside of shipping container. "This Side Up" or "This End Up" should also be on the container. Sign the shipper certification.

7. Stand by for possible carrier requests to open outside containers for inspection or to modify the packaging. It is wise to contact the carrier before packing to ascertain local packaging requirements, and not to leave area before the carrier vehicle (aircraft, truck) is on its way.

5.4 SHIPPING PAPERS

A blank Parsons shipping paper is included in Attachment 1 to this HASP. This form should be filled out and maintained within the driver's reach, whenever a Parsons employee carries hazardous materials in a vehicle. Such materials may include:

- Gasoline (for use in a generator UN1203, Guide #27;
- Methanol (for use in decontamination procedures) UN 1230 Guide #28
- Nitric Acid (for use in decontamination procedures) UN 1760, Guide #60
- Hydrochloric Acid (for use in decontamination procedures) UN 1789, Guide #60
- Compressed Gas (calibration gas for the PID, or breathing air for Level B work)
- Other hazardous materials as defined by the DOT.

Appropriate MSDSs should be maintained with the shipping papers and/or the pocket DOT Emergency Response Guidebook.

SECTION 6
ACCIDENT PREVENTION AND CONTINGENCY PLAN

6.1 INTRODUCTION

The objective of this Accident Prevention and Contingency Plan is to establish procedures for handling events which occur outside the scope of the routine maintenance and minimize hazards to human health, and the environment. The contingency plan, which outlines response actions, should be implemented following the identification of a site condition which is not covered by the routine maintenance plan.

Natural occurrences such as storms, drought, and subsidence should be considered "expected occurrences" and are addressed under the routine maintenance program. Certain problems which cannot be reasonably expected to occur, such as earthquakes, are not addressed in this contingency plan.

The following guidelines are offered to determine when the contingency plan should be implemented and to evaluate possible corrective actions when responding to an emergency. All corrective actions, where appropriate, will be executed in a timely fashion; and must include notification of the appropriate regulatory agencies.

6.2 ACCIDENT PREVENTION

All field personnel will receive health and safety training prior to the initiation of any site activities and will be briefed on daily sign-in procedures. A daily sign-in log will be maintained by the field team leader. On a day-to-day basis, individual personnel should be constantly alert for indicators of potentially hazardous situations and for signs and symptoms in themselves and others that warn of hazardous conditions and exposures. Rapid recognition of dangerous situations can avert an emergency. Before daily work assignments, regular meetings should be held. Discussion should include:

- Tasks to be performed.
- Time constraints (e.g., rest breaks, cartridge changes).
- Hazards that may be encountered, including their effects, how to recognize symptoms or monitor them, concentration limits, or other danger signals.
- Evacuation routes and safe zones, which may change from day to day depending upon location of work to be performed.
- Communication protocols including use of two-way radios and/or cell phones and standard hand signals.
- Emergency procedures.

All field personnel shall adhere to the standard safe work practices (see Attachment 4) as the primary means for accident prevention.

6.3 CONTINGENCY PLAN IMPLEMENTATION

6.3.1 Responsible Personnel

The Project Manager for this Site has primary responsibility for ensuring that this plan is implemented as described. At all times, there will be at least one employee (the "Response Coordinator") either at the facility or on call, responsible for coordinating all emergency response measures. The Response Coordinator must be familiar with all aspects of the operations onsite, location, and characteristics of all materials handled, and emergency resources available. The Response Coordinator must be thoroughly familiar with all facets of this plan. The Response Coordinator may be any employee designated by the Project Manager, who has received adequate training in H&S procedures and contingency plan implementation including: the field team leader, site safety officer, or other qualified onsite employee. All OM&M personnel who work at the facility must be familiar with the provisions of this plan.

6.3.2 Procedures

The Project Manager will designate a Response Coordinator, who will be responsible for ensuring proper execution of the Emergency Response Plan.

a. Responsibilities of the Response Coordinator BEFORE an emergency include the following:

   1. Ensure there is an Alternate Response Coordinator ready to take over in his absence who is capable of assuming control in emergency situations;
   2. Become familiar with the physical layout of the site, and the operations carried out;
   3. Develop an understanding of the emergency response organization; and

b. Responsibilities of the Response Coordinator DURING an emergency include the following:

   1. Direct and coordinate all response activities;
   2. Request assistance from local response agencies, as needed;
   3. Coordinate the efforts of onsite personnel with offsite emergency response agencies;
   4. Supervise the evacuation of non-essential personnel from the area of the emergency;
   5. Assess possible hazards to human health and the environment that may result from a chemical release, fire, or explosion; including the effects of the release, fire, or explosion. The assessment will include considerations on the effects of toxic, irritating or asphyxiating gases, hazardous surface runoff due to water or chemical agents used to control fires, etc. If it is determined through these assessments that off-site areas may need to be evacuated, the Response Coordinator will consult and assist with the appropriate local authorities to accomplish this; and

6. Supervise emergency surveillance of the area for leaks, pressure build-ups, gas generation or ruptures in valves, pipes, and other equipment if the facility stops operations.

c. Responsibilities of the Response Coordinator AFTER an emergency include the following:

1. Ensure that all aspects of the situation have been addressed including an immediate and thorough examination of the entire emergency area, and all equipment which may have been involved in the incident;

2. Supervise post-emergency surveillance of the area to ensure that an emergency situation does not redevelop;

3. Establish normal facility operation; if this is not possible, ensure that alternate options are developed;

4. Supervise post-emergency clean-up and provide for testing, storing, and disposing of recovered waste, plus contaminated materials used to mitigate the emergency situation;

5. Supervise the redevelopment of emergency equipment and material back into a state of readiness;

6. Determine the cause of the emergency;

7. Develop or modify operating procedures and equipment to prevent future emergencies from similar causes;

8. Modify existing emergency response procedures, if required;

9. Notify the appropriate regulatory agencies as required (coordinate this activity with the Closed Site Project Manager); and

10. Prepare a report for the operating record which includes: date and time, who responded, type of incident, details of areas/materials involved, procedures used, post-emergency response, personnel injuries, etc. (see Incident Investigation Report form in Attachment 4). The incident reporting form also gives instructions for online reporting using the Parsons PWEB.

6.3.3 Arrangements with Emergency Authorities and Contractors

The appropriate local authorities and contractors who may be called upon for assistance during an emergency must be apprised of that possibility and provided a copy of this plan. Transmittal of the Contingency Plan to local response agencies and hospitals must be documented by the Response Coordinator. Refer to the Emergency Contacts list at the beginning of this project safety plan for a listing of local authorities and contractors.

6.4 RESPONSE ACTIONS

6.4.1 General

The response actions outlined in the following sections contain general guidelines in the event of an emergency situation at the facility. These guidelines provide the information necessary to inform appropriate company personnel and outside agencies of the potential hazards and response actions that may be required in an emergency. The communication system(s) available at the facility are identified in Table 6.1.

Emergency conditions are considered to exist if:

- Any member of the field crew is involved in an accident or experiences any adverse effects or symptoms of exposure while on site.
- A condition is discovered that suggests the existence of a situation more hazardous than anticipated.

In the event that an emergency occurs, the procedures delineated herein are to be immediately followed:

- Notify the paramedics and/or fire department, as necessary;
- Signal the evacuation procedure previously outlined and implement the entire procedure;
- Isolate the area;
- Stay upwind of any fire;
- Keep the area surrounding the problem source clear after the incident occurs;
- Complete online incident report, and complete incident report form (Attachment 4), distribute to appropriate personnel.

6.4.2 Fire and Explosions

Fires and gas explosions at the facility must be immediately reported to the local fire department (see Emergency Contacts list) for assistance. Any trained emergency response personnel may extinguish the fire if conditions permit this to be accomplished safely. Appropriate response measures, including personnel safety, will be the responsibility of the fire department. Fires will be extinguished according to approved fire department protocol. The Response Coordinator will coordinate evacuation of the impacted area and account for all personnel onsite. At the earliest possible time, the Project Manager must be notified of the situation. Damage to the surface drainage system or cap will be repaired and documented.

6.4.3 Release of Hazardous Material

Anyone discovering a release of hazardous (or unknown) material at the facility must immediately contact the Response Coordinator. The Response Coordinator must identify the material involved and direct all containment, cleanup, and remedial efforts according to information in the MSDS (Attachment 2). At the earliest possible time, the Project

Manager must be notified of the situation. If necessary, actions will be implemented to assess potential groundwater or surface water contamination and/or emissions. If required, the appropriate regulatory agencies must be notified of the release (refer to Emergency Contacts list).

6.4.4 Release of Non-Hazardous Material

Anyone discovering a release of an identified non-hazardous material at the facility must immediately contact the Response Coordinator. The Response Coordinator will direct all containment, cleanup, and remedial efforts to be performed. If necessary, any follow-up assessments or notifications will be made by the Response Coordinator. At the earliest possible time, the Project Manager must be notified of the situation.

6.4.5 Unauthorized Dumping and Disposal

Unauthorized dumping or waste disposal will be reported to the Response Coordinator who will notify the NYSDEC and local enforcement officials. Appropriate measures will be taken to determine the waste characteristics, containment requirements, and the necessary removal techniques. The waste will be removed and disposed of at an approved disposal facility, as appropriate. Efforts will be taken to eliminate further dumping by restricting subsequent entry to the site.

6.4.6 Medical Emergency

In the event of a medical emergency, personnel must immediately contact appropriate local response agencies (as shown on Emergency Contacts list). At the earliest possible time, the Response Coordinator must be notified. The Response Coordinator will be responsible for ensuring that follow-up procedures are completed. See route to hospital map at beginning of this PSP.

6.4.7 Chemical Exposure

If a member of the field crew demonstrates symptoms of chemical exposure, the procedures outlined below should be followed:

- Another team member (buddy) should remove the individual from the immediate area of contamination. The buddy should communicate to the Field Team Leader (via voice and hand signals) of the chemical exposure. The Field Team Leader should contact the appropriate emergency response agency.
- Precautions should be taken to avoid exposure of other individuals to the chemical.
- If the chemical is on the individual's clothing, the chemical should be neutralized or removed if it is safe to do so.
- If the chemical has contacted the skin, the skin should be washed with copious amounts of water.
- In case of eye contact, an emergency eye wash should be used. Eyes should be washed for at least 15 minutes.

- All chemical exposure incidents must be reported in writing to the Office Health and Safety Representative. The Site Health and Safety Officer or Field Team Leader is responsible for completing the Parsons incident investigation report (see Attachment 4).

6.4.8 Evacuation Procedures

- The Field Team Leader will initiate evacuation procedure by signaling to leave the site.
- All personnel in the work area should evacuate the area and meet in the common designated area, as determined by Field Team Leader based on wind conditions and other criteria.
- All personnel suspected to be in or near the contract work area should be accounted for and the whereabouts of missing persons determined immediately.
- Further instruction will then be given by the Field Team Leader.

6.4.9 Vehicle Accident

In the event of an off-site vehicle accident, the local police must immediately be contacted to file a report. If an accident occurs onsite involving a non-site owned vehicle or an injury (regardless of the vehicle involved), personnel must immediately contact the local police department (as listed in Emergency Contacts at beginning of Project Safety Plan) to file a report. If an onsite accident involves only a site owned vehicle, an internal investigation report must be prepared. In any of these situations, the Response Coordinator must be notified as soon as possible. The Response Coordinator will be responsible for ensuring that follow-up procedures and documentation are completed.

6.4.10 Personal Injury

In case of personal injury at the site, the following procedures should be followed:

- Another team member (buddy) should signal the Field Team Leader that an injury has occurred.
- A field team member trained in first aid can administer treatment to an injured worker.
- The victim should then be transported to the nearest hospital or medical center (see route to hospital map at beginning of this PSP). If necessary, an ambulance should be called to transport the victim.
- For less severe cases, the individual can be taken to the site dispensary.
- The Field Team Leader or Site Health and Safety Officer is responsible for making certain that an incident report form is completed (see Attachment 4). This form is to be submitted to the Parsons Health and Safety Representative. Follow-up action should be taken to correct the situation that caused the accident.

6.4.11 Property Damage and/or Theft

Any property damage and/or theft discovered at the facility will immediately be reported to the local police department (as shown on Emergency Contacts list) to file a report. At the earliest possible time, the Response Coordinator and Project Manager must be notified. The Project Manager will be responsible for ensuring that follow-up procedures and documentation are completed.

6.5 MAINTENANCE AND/OR REVISIONS TO PLAN

6.5.1 Maintenance

The Response Coordinator must review this plan on an annual basis, at a minimum, and document the review in the site's operating record. The Plan must also be reviewed after implementation in an emergency to determine if any changes in the Plan are needed to improve its effectiveness. Should any aspect of the Site's operations (including personnel changes), equipment, or arrangements with local authorities or contractors change, the plan must be revised accordingly.

6.5.2 Revisions

The Project Manager must ensure that any revisions made to the plan are distributed for insertion into all copies of the plan. Documentation that all affected personnel have been made familiar with the revisions must be maintained by the Response Coordinator.

TABLE 6.1
ONSITE EMERGENCY EQUIPMENT

This table provides the location and description of emergency equipment.

a. Entrances (keys) - Keys are maintained by the OM&M contractor (Parsons).

b. Communication System - Telephone is in the treatment plant control room ((716) 875-9374). All operators have a cellular phone that can be used in the event of an emergency while the operator is out of the building. Note that the plant phone can only call out.

c. Fire Extinguishing Equipment (in treatment plant)

d. Spill Control Equipment - Kits are available in the treatment plant for control of small acid/base spills.

e. First Aid Station (in treatment plant)

f. Eye Wash Station (in treatment plant)

g. Safety Shower (in treatment plant)

h. Personal Protective Equipment - Available in treatment plant: inner gloves, outer gloves, acid-resistant apron with arms, full-face splash shield.

i. Monitoring Equipment - Permanent LEL meter inside treatment plant to monitor for explosive conditions.

j. Copy of Emergency Response Plan (in treatment plant)

SECTION 7
WORK ZONES, DECONTAMINATION, AND CONFINED SPACES

The establishment of site work zones will not be necessary for the anticipated Site OM&M activities. However, if intrusive work that penetrates the soil cover system is conducted, work zones may need to be established on a case-specific basis. The procedures listed below will be applied as needed when this type of intrusive work is conducted.

7.1 SITE WORK ZONES

To reduce the spread of hazardous materials by workers from contaminated areas of the site to clean areas, work zones must be delineated at the site; and the flow of personnel between the zones must be controlled. The establishment of the work zones will help ensure that: personnel are properly protected against the hazards present where they are working; work activities and contamination are confined to the appropriate areas; personnel can be located and evacuated in an emergency; and site visitors and personnel non-essential to cleanup activities are protected from the hazard present. Communications between zones will be accomplished using portable two-way radios and standard hand signals.

7.1.1 Exclusion Zone

In the event that volatile organics are detected in the breathing zone as discussed in Section 3, all personnel within the exclusion zone must don Level C protection. Exclusion zones will also be established during any activity when Level C protection is established as a result of conditions discussed in Section 3.

All personnel within the exclusion zone will be required to use the specified level of protection. No eating, drinking, or smoking will be allowed in the exclusion or decontamination zones.

7.1.2 Decontamination Zone

Should it be necessary to establish an exclusion zone, the decontamination zone will be utilized. This zone will be established between the exclusion zone and the support zone, and will include the personnel and equipment necessary for decontamination of equipment and personnel (discussed below). Personnel and equipment in the exclusion zone must pass through this zone before entering the support zone. This zone should always be located upwind of the exclusion zone.

7.1.3 Support Zone

The support zone will include the remaining areas of the job site. Break areas, operational direction and support facilities (to include supplies, equipment storage and maintenance areas) will be located in this area. No equipment or personnel will be

permitted to enter the support zone from the exclusion zone without passing through the personnel or equipment decontamination station. Eating, smoking, and drinking will be allowed only in this area.

7.2 DECONTAMINATION

Due to the low level of contaminants expected, any water used in decontamination procedures will be disposed of onsite.

7.2.1 Decontamination of Personnel

Decontamination will not be necessary when only Level D protection is used. However, disposable gloves used during sampling activities should be removed and bagged; personnel should be encouraged to remove clothing and shower as soon as practical at the end of the day. All clothing should be machine-washed. All personnel will wash hands and face prior to eating, and before and after using the restroom.

Decontamination will be necessary if Level C protection is used. The following OSHA-specified procedures include steps necessary for complete decontamination prior to entry into the support zone, and steps necessary if a worker only needs to change a respirator or respirator canister. All spent PPE will be placed in a drum specified for PPE and sampling equipment only.

Modification can be made to the twelve station decontamination process by the site health and safety officer depending upon the extent of contamination.

Station 1: Segregated Equipment Drop

Deposit equipment used on the site (tools, sampling devices and containers, monitoring instruments, clipboards, etc.) on plastic drop cloths or in different containers with plastic liners. Each will be contaminated to a different degree. Segregation at the drop reduces the probability of cross-contamination. All documentation including field books and field forms will be transferred to support personnel until the decontamination procedure is completed.

Station 2: Suit/Safety Boot and Outer-Glove Wash

Thoroughly wash chemically resistant suit, safety boots and outer gloves. Scrub with long-handle, soft-bristle scrub brush and copious amounts of Alconox/water solution.

Necessary equipment includes:

1. Wash tub (30 gallon or large enough for person to stand in)
2. Alconox/water solution
3. Long-handle soft-bristle scrub brushes

Station 3: Suit/Safety Boot and Outer-Glove Rinse

Rinse off Alconox/water solution using copious amounts of water. Repeat as many times as necessary.

Necessary equipment includes:

1. Wash tub (30 gallon or large enough for person to stand in)
2. Spray unit
3. Water
4. Long-handle, soft-bristle scrub brushes

Station 4: Outer Gloves Removal

Remove the outer gloves and deposit in individually marked plastic bags.

Necessary equipment includes:

1. Plastic bag

Station 5: Canister or Mask Change

If a worker leaves the exclusion zone to change a canister (or mask), this is the last step in the decontamination procedures. The worker's canister is exchanged, new outer glove donned, and joints taped. Worker returns to duty. Otherwise the worker proceeds to Station 6.

Necessary equipment includes:

1. Canister (or mask)
2. Tape
3. Gloves

Station 6: Removal of Chemically Resistant Suit

With assistance of helper, remove suit. Deposit in container with plastic liner.

Necessary equipment includes:

1. PPE drum

Station 7: Inner-Glove Wash

Wash inner gloves with Alconox/water solution that will not harm skin. Repeat as many times as necessary.

Necessary equipment includes:

1. Alconox/water solution
2. Wash tub
3. Long-handle, soft-bristle brushes

Station 8: Inner-Glove Rinse

Rinse inner gloves with water. Repeat as many times as necessary.

Necessary equipment includes:

1. Water
2. Wash tub

Station 9: Respirator Removal

Remove face-piece. Avoid touching face. Wash respirator in clean, sanitized solution, allow to dry and deposit face-piece in plastic bag. Store in clean area.

Necessary equipment includes:

1. Plastic bags
2. Sanitizing solution
3. Cotton

Station 10: Inner-Glove Removal

Remove inner gloves and deposit in container with plastic liner.

Necessary equipment includes:

1. PPE drum

Station 11: Field Wash

Wash hands and face.

Necessary equipment includes:

1. Water
2. Soap
3. Tables
4. Wash basins or buckets
5. Clean towels

Station 12: Redress

If re-entering exclusion zone put on clean field clothes (e.g., Tyvek, gloves, etc.).

Necessary equipment includes:

1. Table
2. Clothing

7.2.2 Decontamination of Equipment and Sample Bottles

Should the exterior of monitoring equipment and sample bottles become grossly contaminated, they will be decontaminated using a phosphate free detergent solution, such as Alconox and potable water rinse. Under no circumstances will contaminated equipment or supplies be allowed to contact the grass cover, ground surface, or any other surface that is above the plane of the landfill cap.

7.3 CONFINED SPACE ENTRY

Confined spaces present at the Site are listed below, with their classifications. Confined space entry is discussed in more detail in SOP-12 contained in Volume II of the Cherry Farm/River Road OM&M Manual.

Area or Space	Type of Confined Space
Well Vaults RW-4 and RW-5	Non-permit required confined space. Allow vault to naturally ventilate for 1 minute with both access doors open prior to entry.
Sumps S-1 through S-4	Permit required confined space. Comply with SOP-12, Sections 12.3.3 through 12.3.9.
Tank T-1	Permit required confined space. Comply with SOP-12, Sections 12.3.3 through 12.3.9.
Tank OWS-1	Permit required confined space. Comply with SOP-12, Sections 12.3.3 through 12.3.9.
Tank T-2	Permit required confined space. Comply with SOP-12, Sections 12.3.3 through 12.3.9.
Acid Storage Tank ST-1	Permit required confined space. Comply with SOP-12, Sections 12.3.3 through 12.3.9.
Caustic Storage Tank ST-4	Permit required confined space. Comply with SOP-12, Sections 12.3.3 through 12.3.9.

ATTACHMENT 1

FORMS FOR HEALTH AND SAFETY-RELATED ACTIVITIES

Note: The OSHA Job Safety and Health Protection Poster must be posted prominently during field activities. The following page is an example of the poster to be used in the field. The actual poster must be an 11 inch by 17 inch size version of this page.

PROJECT SAFETY PLAN

AND WORK PLAN ACCEPTANCE FORM

I have read and agree to abide by the contents of the Operations, Maintenance, and Monitoring Manual, and the Project Safety Plan for the following project:

Cherry Farm/River Road Site Operations, Maintenance, and Monitoring

Furthermore, I have read and am familiar with the work plan or proposal which describes the field work to be conducted and the procedures to be utilized in the conduct of this work.

Name	Signature	Date

Place in project Health and Safety File after names/signatures are entered.

SITE-SPECIFIC HEALTH AND SAFETY TRAINING

(For onsite employees and onsite subcontractor employees)

I hereby confirm that site-specific health and safety training has been conducted by the site health and safety officer which included:

- Names of personnel responsible for site safety and health
- Safety, health, and other hazards at the site
- Proper use of personal protective equipment
- Work practices by which the employee can minimize risk from hazards
- Safe use of engineering controls and equipment on the site
- Acute effects of compounds at the site
- Decontamination procedures

For the following project:

Cherry Farm/River Road Site Operations, Maintenance, and Monitoring

Name	Signature	Date

Place in project Health and Safety File after signatures are obtained.

ATTACHMENT 2

MATERIAL SAFETY DATA SHEETS

MATERIAL SAFETY DATA SHEET

PRODUCT: SULFURIC ACID

SECTION 1 - MANUFACTURER INFORMATION

MANUFACTURER/DISTRIBUTOR:

PVS CHEMICALS SOLUTIONS, INC.

12260 S. Carondolet Ave.

Chicago, Illinois 60633

telephone: (773) 913-7700 (product information and emergencies)

fax: (773) 933-0957

*****FOR TRANSPORTATION EMERGENCY ONLY, DAY OR NIGHT, CALL*****

*****CHEMTREC, 1-800-424-9300*****

PREPARATION/REVISION DATE: 3-1-96

CONTACT: Manager of Environmental Affairs

SECTION 2 -- PRODUCT IDENTITY/HAZARDOUS INGREDIENTS INFORMATION

Product name: Sulfuric Acid

Chemical name/synonyms: Sulfuric Acid, Oil of Vitriol

Chemical formula: H_2SO_4

CAS number: 7664-93-9

Product Code: N/A

HAZARDOUS INGREDIENTS: Yes

Component	CAS No.	% by wt.
Sulfuric Acid	7664-93-9	75-100%

Exposure limits:

OSHA PEL: 1 mg/m^3, 8-hr TWA

ACGIH TLV: 1 mg/m^3, 8-hr TWA

3 mg/m^3, STEL

80 mg/m^3, IDLH

OTHER: This is a toxic chemical subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

NON-HAZARDOUS INGREDIENTS: Yes

Component CAS No. % by wt.

Water 7732-18-5 1-25%

OSHA 29 CFR 1910.1200 EVALUATION: Hazardous

SECTION 3 -- PHYSICAL/CHEMICAL CHARACTERISTICS

APPEARANCE AND ODOR: Clear to slightly cloudy, oily liquid;

Odorless to slightly pungent.

BOILING POINT: 77.7% = 193 ^{0}C; 93% = 279 ^{0}C; 96% = 308 ^{0}C; 98% = 327 ^{0}C; 99% = 310 ^{0}C

FREEZING POINT: 77.7% = -11.4 ^{0}C; 93% = -29 ^{0}C; 96% = -14 ^{0}C; 98% = -1 ^{0}C; 99% = 4.4 ^{0}C

VAPOR PRESSURE (REID): 93.2% = 0.0016 mm Hg; 98% = 0.002 mm Hg

VAPOR DENSITY (AIR = 1): no information

SPECIFIC GRAVITY (WATER = 1): 77.7% = 1.706; 93.2% = 1.835;

96% = 1.843; 98% = 1.844; 99% = 1.842

PERCENT VOLATILE BY WEIGHT: no information

EVAPORATION RATE (BUTYL ACETATE = 1): <1

pH: <1

SOLUBILITY IN WATER: Completely miscible

SECTION 4 -- FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP METHOD): Not flammable. May ignite combustible materials.

FLAMMABLE LIMITS IN AIR, % BY VOLUME: N/A

LOWER: N/A UPPER: N/A

EXTINGUISHING MEDIA: Use dry chemical or CO_2 fire extinguishers to fight surrounding fire. Do not use water on acid itself. Apply from farthest possible distance.

SPECIAL FIRE FIGHTING PROCEDURES: Wear self-contained breathing apparatus and full protective clothing. Cool exterior of storage tanks.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Violent reaction with water. Evolution of explosive hydrogen gas on contact with most metals. Will react with organic material with evolution of heat and dense white fumes.

SECTION 5 -- REACTIVITY DATA

STABILITY: Stable

HAZARDOUS POLYMERIZATION: will not occur

INCOMPATIBILITY (CONDITIONS AND MATERIALS TO AVOID): Material is stable when properly handled. Reactive with materials such as metals, metal oxides, hydroxides, nitrates, amines, carbonates and other alkaline materials. Reactions can generate a great deal of heat as does the dilution of acid with water. Concentrated acid is a strong oxidizing agent. May cause ignition of combustible materials on contact with generation of sulfur dioxide fumes. Avoid open flames or sparks.

HAZARDOUS DECOMPOSITION PRODUCTS: Explosive hydrogen gas is generated by the action of acid on most metals and may accumulate in metal containers. Releases Sulfur Dioxide at extremely high temperatures.

SECTION 6 -- HEALTH HAZARD DATA

PRIMARY ROUTES OF ENTRY: Inhalation, ingestion, direct contact

HEALTH EFFECTS (ACUTE AND CHRONIC):

INHALATION: Inhalation of concentrated vapor or mist may damage respiratory tract.

INGESTION: Swallowing may be fatal.

DIRECT CONTACT: Contact with liquid, mist, or vapor can cause immediate irritation or corrosive burns to all human tissue. Severity of the burn is generally determined by the concentration of the solution and duration of exposure.

EYE CONTACT: Contact with eyes may result in permanent visual loss unless removed quickly by thorough irrigation with water.

TOXICITY DATA (ANIMAL):

Oral LD_{50}, rat: 2140 mg/kg

Skin and eye irritation (rabbit): (FHSA)

Corrosive

Inhalation 1 hour LC_{50}, rat: 347 ppm

The International Agency of Research on Cancer (IARC) has classified "strong inorganic acid mists containing sulfuric acid" as a Category 1 carcinogen, a substance that is "carcinogenic to humans". This classification is for inorganic acid mists only and does not apply to sulfuric acid or sulfuric acid solutions.

CARCINOGENS (NTP, IARC, OR OSHA): None of the components of this material is listed by IARC, NTP, OSHA, or ACGIH as a carcinogen.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Repeated skin contact with dilute solutions may cause dermatitis. May cause dental erosion.

SECTION 7 -- **FIRST AID**

INHALATION: Remove victim to fresh air. If not breathing, perform artificial respiration. Get medical attention.

INGESTION: Drink copious amounts of water or milk. Do not induce vomiting. Get immediate medical attention. Never give anything by mouth to an unconscious person.

DIRECT CONTACT: Wipe off excess. Flush immediately with water for at least 15 minutes while removing contaminated clothing. Get immediate medical attention. Wash clothing before re-use. Destroy contaminated shoes.

DIRECT EYE CONTACT: Flush immediately with water for at least 15 minutes. Forcibly hold eyelids apart to ensure complete irrigation of eye/lid tissue. Get immediate medical attention.

SECTION 8 -- **PRECAUTIONS FOR SAFE STORAGE, HANDLING AND USE**

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE: Store away from sources of ignition. Do not add water to concentrated acid. When diluting, slowly add acid to water while stirring, to avoid spattering, boiling, and eruption. Keep container closed and protect from contact with water. Protect container from physical damage. Do not strike containers or fittings with tools. Wash thoroughly after handling. Emptied container will retain vapor and product residue.

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Utilize full protective clothing, including boots and protective equipment. Contain spill in order to prevent contamination of sewage system or waterway. Pump into marked containers for reclamation or disposal. If possible, neutralize on a dry basis with suitable alkali such as lime or soda ash; then flush with water in accordance with applicable regulations.

WASTE DISPOSAL METHODS: Dispose of spilled, neutralized, or waste

product, contaminated soil and other materials in accordance with all local, state and federal regulations.

SECTION 9 -- **EXPOSURE CONTROL INFORMATION**

VENTILATION: Provide ventilation to control exposure levels below airborne exposure limits. Use local exhaust ventilation. Reference NFPA Standard 91 for design of exhaust systems.

RESPIRATORY PROTECTION: Use NIOSH/MSHA approved, full face respirator with canister approved for sulfuric acid vapor and mist. Consult respirator manufacturer to determine appropriate equipment. If concentrations are high or unknown, use self-contained breathing apparatus.

PROTECTIVE GLOVES: Wear gloves made of butyl rubber, Saranex (PVSDC/PE), Teflon, polyethylene, or other suitable material as recommended by manufacturer.

EYE PROTECTION: Wear splash proof chemical safety goggles. Eyewash fountains recommended in all storage and handling areas. Do not wear contact lenses.

OTHER PROTECTIVE EQUIPMENT: Wear protective clothing to prevent skin contact. Full face shield and rubber footwear should be used. Acid-resistant hood and full body suit recommended. Safety shower recommended in all storage and handling areas.

WORK/HYGIENIC PRACTICES: Avoid breathing fumes. Use gloves when handling. Remove and change contaminated clothing immediately.

OTHER PRECAUTIONS: None

SECTION 10 -- REGULATORY INFORMATION

DOT:

Proper shipping name: Sulfuric acid

Hazard Class: 8

UN Number: UN1830

Packing Group: II

SARA TITLE III HAZARD CLASSIFICATIONS:

ACUTE: Yes

CHRONIC: Yes

FIRE: No

PRESSURE: No

REACTIVITY: Yes

Sulfuric Acid is a toxic chemical subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

OTHER RATINGS:

(hazard index key: 4=severe, 3=serious, 2=moderate, 1=slight, 0=minimal)

HMIS: Health=3, Flammability=0, Reactivity=2

NFPA: Health=3, Flammability=0, Reactivity=2

OTHER INFORMATION:

SULFURIC ACID:

CERCLA: RQ = 1000 lbs.

SARA TPQ: 1000 lbs.

WHMIS: 1%

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MATERIAL SAFETY DATA

Product Name: Sodium Hydroxide Solution (50%)
Revision Date: March 10, 2004
Revision No.: 3

OCEAN NETWORK EMERGENCY PHONE 1-888-2891-911

THIS MATERIAL SAFETY DATA SHEET (MSDS) HAS BEEN PREPARED IN COMPLIANCE WITH THE FEDERAL OSHA HAZARD COMMUNICATION STANDARD, 29 CFR 1910.1200. THIS PRODUCT MAY BE CONSIDERED TO BE A HAZARDOUS CHEMICAL UNDER THAT STANDARD. (REFER TO THE OSHA CLASSIFICATION IN SEC.I.) THIS INFORMATION IS REQUIRED TO BE DISCLOSED FOR SAFETY IN THE WORKPLACE. THE EXPOSURE TO THE COMMUNITY, IF ANY, IS QUITE DIFFERENT.

I - PRODUCT IDENTIFICATION

Product Name:	**Sodium Hydroxide Solution (50%)**
Synonyms:	Caustic Soda, Caustic, Alkali, Lye, Caustic Lye
Chemical Family:	Alkali, Base
Formula:	NaOH
Use Description:	Neutralizing agent, sodium source
Hazard Classification:	Corrosive, eye and skin hazard, lung toxin
Product Code:	105016, 105017, 105018, 105187, 105188, 105365
File No.:	MSDS0200M

II - COMPONENT DATA

This Product Composition information presented here describes the major components and their concentrations found in this product and other information as required by OSHA. This is not, and should not be interpreted, or used as, a Product Specification or a detailed chemical analysis.

Established Federal OSHA PEL is provided. OSHA Agreement State PEL may be different.

Product Composition

CAS or Chemical Name:	Sodium Hydroxide
CAS Number:	1310-73-2
Percentage Range:	45-50%
Hazardous Per 29 CFR 1910.1200:	Yes

Exposure Standards:		OSHA (PEL) *		ACGIH(TLV)	
		ppm	mg/M^3	ppm	mg/M^3
	TWA:	N/A	2	N/A	None
	CEILING:	N/A	None	N/A	2
	STEL:	N/A	None	N/A	None

* Federal OSHA PEL. An Agreement State OSHA PEL may be different.

Product Name: Sodium Hydroxide Solution (50%)
Revision Date: March 10, 2004
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CAS or Chemical Name:	Water
CAS Number:	7732-18-5
Percentage Range:	45-55%
Hazardous Per 29 CFR 1910.1200:	No
Exposure Standards:	None established.

III - Precautions for Safe Handling and Storage

DO NOT TAKE INTERNALLY. AVOID CONTACT WITH SKIN, EYES AND CLOTHING. UPON CONTACT WITH SKIN OR EYES, WASH OFF WITH WATER. AVOID BREATHING VAPOR OR MIST.

STORAGE CONDITIONS:

DO NOT STORE AT TEMPERATURES ABOVE: 130° C (266° F)

PRODUCT STABILITY AND COMPATIBILITY:

SHELF LIFE LIMITATIONS:	Indefinite if in closed container.
INCOMPATIBLE MATERIALS FOR PACKAGING:	Aluminum, zinc, tin, wood, paper
INCOMPATIBLE MATERIALS FOR STORAGE OR TRANSPORT:	Acids, nitrogen containing organics, phosphorous, explosives, organic peroxides, aluminum, zinc, tin, halogenated hydrocarbons

IV - Physical Data

Appearance:	Clear, viscous liquid
Freezing Point:	10-12° C (50-54° F)
Boiling Point:	130-140° C (266-284° F)
Decomposition Temperature:	None
Specific Gravity:	1.482-1.53
Bulk Density:	Not Applicable
pH @ 25° C:	13 (0.5% Solution)
Vapor Pressure @ 25° C:	Approximately equal to water
Solubility in Water:	Miscible
Volatiles, Percent by Volume:	45-55
Evaporation Rate:	No Data
Vapor Density:	No Data
Molecular Weight:	40.01 (Active agent)
Odor:	None
Coefficient of Oil/Water Distribution:	No Date

Product Name: Sodium Hydroxide Solution (50%)
Revision Date: March 10, 2004
Revision No.: 3

V - Personal Protective Equipment Requirements

Personal Protection for Routine Use of Product:

Respiratory Protection:	If mists, or aerosols are generated and are not controlled below the TLV with ventilation wear a NIOSH approved dust/mist respirator.
Ventilation:	Use Local exhaust ventilation to maintain levels to below the TLV.
Skin and Eye Protection:	Wear gloves, boots, face shield with chemical goggles, apron or impermeable suit to avoid skin and eye contact.
Other:	Emergency eye wash and safety showers must be made available in the immediate work area.

Equipment Specifications (When Applicable):

Respirator Type:	NIOSH N95 filter respirator, or better.
Protective Clothing Type: (This includes: gloves, boots, apron, protective suit.)	GLOVE TYPE: Neoprene BOOT TYPE: Neoprene APRON TYPE: Neoprene PROTECTIVE SUIT: Neoprene

VI - Fire and Explosion Hazard Information

Flammability Data:

Explosive:	
Flammable:	No
Combustible:	No
Pyrophoric:	No
Flash Point:	Not Applicable
Autoignition Temperature:	Not Applicable
Flammable Limits at Normal Atmospheric Temperature and Pressure (Percent Volume in Air):	Not Applicable

NFPA Ratings:

Health:	3
Flammability:	0
Reactivity:	1

HMIS Ratings:

Health:	3
Flammability:	0
Reactivity:	1

Extinguishing Media:

Not Applicable - Choose extinguishing media suitable for surrounding materials.

Fire Fighting Techniques and Comments:

Use water to cool containers exposed to fire. Contact with reactive metals, e.g., aluminum may result in the generation of flammable hydrogen gas. See Section XI for protective equipment for fire fighting. Sodium Hydroxide may react with water. (See Section 7). On small fires, use dry chemical, carbon dioxide, water spray, or foam. On large fires, use water-flooding quantities as a fog.

VII - REACTIVITY INFORMATION

Conditions Under Which This Product May Be Unstable:

Temperatures Above:	None
Mechanical Shock or Impact:	No
Electrical (Static) Discharge:	No
Other:	Contact with carbohydrates, aluminum, zinc, and tin.
Hazardous Polymerization:	Will not occur
Incompatible Materials:	Acids, nitrogen containing organics, explosives, carbohydrates, phosphorous, organic peroxides, halogenated hydrocarbons
Hazardous Decomposition:	Contact with carbohydrates can produce carbon monoxide. Contact with aluminum, zinc, or tin can produce hydrogen gas.

Summary of Reactivity:

Explosive:	No
Oxidizer:	No
Pyrophoric:	No
Organic Peroxide:	No
Water Reactive:	No
Corrosive:	Yes

VIII - FIRST AID

Eyes

Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Seek medical attention at once.

Skin

Immediately flush with water for at least 15 minutes. Seek medical attention. If clothing, shoes and/or jewelry come in contact with the product, they should be removed immediately and laundered before re-use.

Ingestion

Immediately drink large quantities of water. DO NOT induce vomiting. Seek medical attention at once. DO NOT give anything by mouth if the person is unconscious or if having convulsions.

Inhalation

If person experiences nausea, headache or dizziness, person should stop work immediately and move to fresh air until these symptoms disappear. If breathing is difficult, administer oxygen, keep the person warm and at rest. Seek medical attention. In the event that an individual inhales enough vapors to lose consciousness, person should be moved to fresh air at once and seek medical attention immediately. If breathing has stopped, artificial respiration should be given immediately. In all cases, ensure adequate ventilation and provide respiratory protection before the person returns to work.

IX - Toxicology and Health Information

Routes of Absorption

Inhalation, skin and eye contact, ingestion

Warning Statements and Warning Properties

HARMFUL IF SWALLOWED. CAUSES SKIN, EYE, DIGESTIVE TRACT AND RESPIRATORY TRACT BURNS. CAN CAUSE LUNG DAMAGE.

Human Threshold Response Data

Odor Threshold:	No data.
Irritation Threshold:	No data.
Immediately Dangerous to Life or Health:	10 mg/M^3.

Signs, Symptoms and Effects of Exposure

Inhalation

Acute:	Inhalation of this material is irritating to the nose, mouth, throat and lungs. It may also cause burns to the respiratory tract, which can result in shortness of breath, wheezing, choking, chest pain, and impairment of lung function. Inhalation of high concentrations can result in permanent lung damage.
Chronic:	Chronic (repeated) inhalation exposure may cause impairment of lung function and permanent lung damage.

Skin

Acute:	Dermal exposure can cause severe irritation and/or burns characterized by redness, swelling and scab formation. Prolonged skin exposure may cause permanent damage.
Chronic:	Effects from chronic skin exposure would be similar to those from single exposure except for effects secondary to tissue destruction.

Eye

Severe irritation and/or burns can occur following eye exposure. Direct contact may cause impairment of vision and corneal damage.

Ingestion

Acute:	Irritation and/or burns can occur to the entire gastrointestinal tract, including the stomach and intestines, characterized by nausea, vomiting, diarrhea, abdominal pain, and bleeding and/or tissue ulceration. Ingestion causes severe damage to the gastrointestinal tract with the potential to cause perforation.
Chronic:	There are no known or reported effects from chronic exposure. Chronic ingestion of significant amounts of this product is unlikely because of its acute corrosive action.

Medical Conditions Aggravated by Exposure

Asthma, respiratory and cardiovascular disease

Interactions with Other Chemicals Which Enhance Toxicity

There are no chemicals known to enhance the toxicity of the product.

Animal Toxicology

Acute Toxicity

Inhalation LC 50: No Data
Oral LD 50: Believed to be 300 - 500 mg/kg. (rat); harmful if swallowed
Dermal LD 50: Believed to be > 2 g/kg. (rabbit)
Irritation: Causes burns to eyes and skin.

Acute Target Organ Toxicity

This product is corrosive to all tissues contacted and upon inhalation, may cause irritation to mucous membranes and respiratory tract.

Chronic Target Organ Toxicity

There are no known or reported effects from repeated exposure except that secondary to burns.

Reproductive and Developmental Toxicity

There are no known or reported effects on reproductive function or fetal development from exposure to this product.

Carcinogenicity

This product is not known or reported to be carcinogenic by any reference source including IARC, OSHA, NTP, or EPA.

Ingestion of massive doses of sodium hydroxide has led to the development of tumors of the esophagus. The relevance of these findings to cancer is unknown due to repeated tissue destruction and scar formation as a result of the corrosive nature of sodium hydroxide.

Mutagenicity

Sodium hydroxide has been tested and was found to be non-mutagenic in the Ames

assay, a bacterial DNA-repair test and in the Syrian hamster embryo (SA7/SHE) cell transformation assay.

Aquatic Toxicity

Caustic soda is not lethal to fully developed fish in natural fresh waters until the pH becomes greater than 9.0:
Lethal pH for Goldfish: 10.9
Lethal pH for Bluegill sunfish: 10.5

Gambusia affinis (mosquito fish), 96 hr. LC50: 125 mg/l
Bluegill, 48 hr. LC50: 99 mg/l

X - TRANSPORTATION INFORMATION

THIS MATERIAL IS REGULATED AS A DOT HAZARDOUS MATERIAL.

DOT Description from the Hazardous Materials Table 49 CFR 172.101:

Land (U.S. DOT):	SODIUM HYDROXIDE SOLUTION, 8, UN1824, PG II
Water (IMO):	SAME AS ABOVE
Air (IATA/ICAO):	SAME AS ABOVE
Hazard Label/Placard:	CORROSIVE
Reportable Quantity:	1000 lbs. (Per 49 CFR 172.101, Appendix)
Emergency Guide:	154

XI - SPILL AND LEAKAGE PROCEDURES

FOR ALL TRANSPORTATION ACCIDENTS, CALL CHEMTREC AT 800-424-9300.	
Reportable Quantity:	1000 lbs. (Per 40 CFR 302.4)

Spill Mitigation Procedures:

Hazardous concentrations in air may be found in local spill area in the form of a mist, which may cause skin irritation and breathing problems. Stop source of spill as soon as possible, if safe to do so.

Air Release:	Will normally be found in a mist form and evacuation from the mist area is the only advisable approach. Correction of the source of mist is of the utmost importance.
Water Release:	This material is heavier than and is soluble in water. This material is subject to emulsification and must be removed via a vacuum system or neutralized and absorbed as necessary, with various commercial absorbents, which are available. Notify all downstream industrial, municipal and public operation of this spill and advise them to monitor until otherwise notified.
Land Spill:	Dike or divert flow of material to a diked area as soon as possible. If necessary create an excavation large enough to contain the spill and associated neutralization materials. To reduce environmental damage, line the excavated surface with a material to which it is compatible and begin neutralization process or remove by vacuum, or pumping.

Product Name: Sodium Hydroxide Solution (50%)
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Spill Residues:

Dispose of per guidelines under Section 12, WASTE DISPOSAL.

This material may be neutralized for disposal; you are requested to contact OCEAN at 888-2891-911 before beginning any such operation.

Personal Protection for Emergency Spill and Firefighting Situations:

In case of fire use normal fire fighting equipment (including self contained breathing apparatus: SCBA).

A hazardous physical characteristic of this product is: corrosive

XII - WASTE DISPOSAL

If this product becomes a waste, it meets the criteria of a hazardous waste as defined under 40 CFR 261 and would have the following EPA hazardous waste number: D002.

If this product becomes a waste, it will be a hazardous waste, which is subject to the Land Disposal Restrictions under 40 CFR 268 and must be managed accordingly.

As a hazardous liquid waste, it must be disposed of in accordance with local, state and federal regulations in a permitted hazardous waste treatment, storage and disposal facility by treatment.

CARE MUST BE TAKEN TO PREVENT ENVIRONMENTAL CONTAMINATION FROM THE USE OF THIS MATERIAL. THE USER OF THIS MATERIAL HAS THE RESPONSIBILITY TO DISPOSE OF UNUSED MATERIAL, RESIDUES AND CONTAINERS IN COMPLIANCE WITH ALL RELEVANT LOCAL, STATE AND FEDERAL LAWS AND REGULATIONS REGARDING TREATMENT, STORAGE AND DISPOSAL FOR HAZARDOUS AND NONHAZARDOUS WASTES.

XIII - ADDITIONAL REGULATORY STATUS INFORMATION

TOXIC SUBSTANCES CONTROL ACT:
This substance is listed on the Toxic Substances Control Act inventory.

NSF LIMITS: NSF Maximum Drinking Water Use Concentration - 100 mg/l

SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT TITLE III:
HAZARD CATEGORIES, PER 40 CFR 370.2:
HEALTH:
Immediate (Acute)
PHYSICAL:
None

EMERGENCY PLANNING AND COMMUNITY RIGHT TO KNOW, PER 40 CFR 355, APP.A:
EXTREMELY HAZARDOUS SUBSTANCE - THRESHOLD PLANNING QUANTITY:
None Established
SUPPLIER NOTIFICATION REQUIREMENTS, PER 40 CFR 372.45:
None Established

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MATERIAL SAFETY DATA

Product Name: Sodium Hydroxide Solution (50%)
Revision Date: March 10, 2004
Revision No.: 3

XIV - ADDITIONAL INFORMATION

XV - MAJOR REFERENCES

1. DeFlora, Silvio, et al., Genotoxic Activity and Potency of 135 Compounds in the Ames Reversion Test and in a Bacterial DNA-Repair Test. Mutation Research, Vol. 133, pp. 161-198, 1984.
2. ACGIH Documentation of the Threshold Limit Values and Biological Exposure Indices, Sixth Edition, 1997. American Conference of Governmental Industrial Hygienists, Inc., Cincinnati, OH.
3. Federal Register, Vol. 53, No. 237, Friday, December 8, 1988, 49688-49690. 40 CFR Part 372, Sodium Hydroxide: Toxic Chemical Release Reporting, Community Right-to-Know.
4. AQUIRE Database (aquatic toxicity), Chemical Information Systems, Inc. (a division of PSI International, Inc.), Towson, MD.
5. TOXNET Database, U.S. National Library of Medicine, Bethesda, MD .
6. Forsberg, K., and S.Z. Mansdorf, Quick Selection Guide to Chemical Protective Clothing, Second Edition, Van Nostrand Reinhold, N.Y., 1993.
7. 3M 1995 Respirator Selection Guide. 3M Occupational Health and Environmental Safety Division, St. Paul, MN., 1995.

Other References are available upon request.

THE INFORMATION IN THIS MATERIAL SAFETY DATA SHEET SHOULD BE PROVIDED TO ALL WHO WILL USE, HANDLE, STORE, TRANSPORT, OR OTHERWISE BE EXPOSED TO THIS PRODUCT. THIS INFORMATION HAS BEEN PREPARED FOR THE GUIDANCE OF PLANT ENGINEERING, OPERATIONS AND MANAGEMENT AND FOR PERSONS WORKING WITH OR HANDLING THIS PRODUCT. OLIN BELIEVES THIS INFORMATION TO BE RELIABLE AND UP TO DATE AS OF THE DATE OF PUBLICATION, BUT MAKES NO WARRANTY THAT IT IS. ADDITIONALLY, IF THIS MATERIAL SAFETY DATA SHEET IS MORE THAN THREE YEARS OLD, YOU SHOULD CONTACT OLIN AT THE PHONE NUMBER LISTED BELOW TO MAKE CERTAIN THAT THIS SHEET IS CURRENT.

ORC MSDS Control Group
Olin Chlor Alkali
1186 Lower River Road
P. O. Box 248
Charleston, TN 37310
Phone Number: (888)-658-MSDS (6737)

ATTACHMENT 3

ACTIVITY HAZARD ANALYSES

PARSONS

Activity Hazards Analysis

Marine Vessel Operation

AHA No. 009

Project Name & Number: Cherry Farm/River Road Site	**AHA No.** 0009	**Date:** June 6, 2006	**New:** Yes
Location: 4100 River Road, Tonawanda, Erie County, New York	**Contractor:** Parsons and Subcontractor and/or DEC	**Analysis by:** S. Chmura	**Date:** June 6, 2006
Required Personal Protective Equipment:	Level D- Long pants, safety glasses, hard hat, steel-toed boots, personal floatation device, gloves (project dependent)	**Reviewed by:** M. Raybuck	**Date:** June 15, 2006
Work Operation: Using a canoe/boat for site inspection	**Superintendent/Competent Person:** Dan Lipp, Sara Chmura, Jim Schuetz	**Approved by:** M. Raybuck	**Date:** June 15, 2006

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Putting canoe/boat into the water and boarding.	General	▪ Be cautious when boarding vessel. With one hand on the boat, quickly lower straight down into the center of the craft. ▪ If others are boarding, have them step along the fore-and aft centerline of the boat while the boat is held in place along the pier. ▪ Avoid directly carrying anything aboard. Load the items off the pier or have someone hand them to you one by one. ▪ Keep weight toward center of the boat. ▪ Distribute equipment evenly on vessel. ▪ Have someone on shore assist with steadying vessel and handing equipment over.	
	Slips, Trips, Falls - fall off boat	▪ Workers will be aware of potentially slippery surfaces and tripping hazards. ▪ Wear personal floatation device. ▪ Workers will keep all areas clean and free of debris to deter any unnecessary trips and falls. ▪ Clean up all spills immediately. ▪ Be aware of obstacles on deck. ▪ Personnel will notify the SSO of any unsafe conditions.	

PARSONS

Activity Hazards Analysis

Marine Vessel Operation

AHA No. 009

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
	Muscle strain/injuries from improper lifting	▪ Personnel will utilize proper lifting techniques or ask for assistance with moving/lifting objects.	
Navigate	Boat traffic	▪ Maintain a safe operating distance from shoreline, other vessels, etc. Follow Marine Safety Standard Operating Procedures.	
	Heat and Cold Stress	▪ Implement the cold/heat stress control program as appropriate to conditions.	
	Slips, Trips, Falls- fall off boat	▪ Workers will be aware of potentially slippery surfaces and tripping hazards. ▪ Wear personal floatation device. ▪ Workers will keep all areas clean and free of debris to deter any unnecessary trips and falls. ▪ Clean up all spills immediately. ▪ Be aware of obstacles on deck. ▪ Personnel will notify the SSO of any unsafe conditions.	
	Waves, surges, currents.	▪ Be aware of sudden surges caused by incoming waves, unstable waters, and currents.	
Mobilize personnel to disembark boat and leave work site	Slip, Trips and Falls	▪ Secure boat. ▪ Step carefully off boat. ▪ Use rails or assistance form someone on the dock. ▪ Avoid carrying anything off the boat.	
	Muscle strain/injuries from improper lifting	▪ Personnel will utilize proper lifting techniques or ask for assistance with moving/lifting objects. ▪ Load items off from the boat or have someone hand them to you one by one.	
	Fatigue	▪ Do not let fatigue or tiredness associated with the day's activity compromise attention to proper health and safety.	

Training Requirements:

All employees and subcontractors are required to familiarize themselves with the contents of this AHA before starting the work activity, and to review it with their Supervisor during their Daily Safety Huddle.

PARSONS

Activity Hazards Analysis

Conveyance Pipeline Flushing

AHA No. 008

Project Name & Number: Cherry Farm/River Road O&M 442205	**AHA No.** 008	**Date:** May 30, 2006	**New:** Yes
Location: 4100 River Road, Tonawanda, Erie County- New York	**Contractor:** Parsons	**Analysis by:** S. Chmura	**Date:** May 30, 2006
Required Personal Protective Equipment:	Level D- Long pants, safety glasses, steel-toed boots, gloves (leather and latex/nitrile)	**Reviewed by:** M. Raybuck, A. Miller	**Date:** June 12, 2006
Work Operation: Conveyance Pipeline Flushing	**Superintendent/Competent Person:** TBD	**Approved by:** M. Raybuck	**Date:** June 15, 2006

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Setting up equipment / Preparatory work Flushing the Pipelines	Slips, Trips, Falls	▪ Workers will be aware of potentially slippery surfaces and tripping hazards. ▪ Work slowly during transit. Jumping, running, and horseplay are prohibited. ▪ Workers will keep all areas clean and free of debris to deter any unnecessary trips and falls. ▪ Clean up all spills immediately. ▪ Personnel will notify the SSO of any unsafe conditions	▪ Inspect job site and staging area and identify any concerns. ▪ Inspect job site daily.
	Site Hazardous Material Exposure	▪ Training and safety awareness of potential exposure to hazardous materials at the site. ▪ Training of personnel decontamination procedures. ▪ Appropriate PPE will be worn. ▪ Must sign off on health and safety plan.	
	Biological Hazards (ticks, bees, mosquitoes, snakes, etc.)	▪ Personnel will be aware of potential exposure to biological hazards. ▪ Wear appropriate clothing (hat, long-sleeve shirt, long pants, gloves, boots etc.) and insect repellant.	
	Pinch Points	▪ Maintain awareness when opening /closing sumps	
	Cold and Heat Stress	▪ Workers will dress accordingly to prevent injuries from extreme heat, or cold. ▪ SSO will monitor for cold/heat stress symptoms.	

PARSONS

Activity Hazards Analysis

Conveyance Pipeline Flushing

AHA No. 008

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
	Variable Weather	▪ Have proper PPE (i.e. rain gear) available, be aware of puddles and slip hazards ▪ Have sunscreen available for ultraviolet protection. Have water and other cold fluids available for proper hydration.	
	Operation of the hoses and water pump	▪ Operators will be trained in the operation of the pump. ▪ Only the proper connectors/fittings will be used when reducing or increasing to a different hose diameter.	
	Hose Blow-outs	▪ A pressure gauge will be used to ensure that the maximum pressure is not exceeded. ▪ Workers will have two way radios and/or cell phones so that they are in constant communication with each other.	
	Back injury, muscle strain/stress	▪ Personnel will utilize proper lifting techniques or ask for assistance when lifting/moving objects.	

Training Requirements:

Assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity and to review it with their Supervisor during their Daily Safety Huddle.

PARSONS

Activity Hazards Analysis

Chemical Handling / Chemical Storage

AHA No. 007

Project Name & Number: Cherry Farm/River Road O&M 442205	**AHA No.** 007	**Date:** May 30, 2006	**New:** Yes
Location: 4100 River Road, Tonawanda, Erie County- New York	**Contractor:** Parsons	**Analysis by:** S. Chmura	**Date:** May 30, 2006
Required Personal Protective Equipment:	Modified Level D- Long pants, safety glasses, steel-toed boots, splash shield, chemical apron, chemical boots, nitrile gloves	**Reviewed by:** M. Raybuck, A. Miller	**Date:** June 12, 2006
Work Operation: Chemical Handling/Storage	**Superintendent/Competent Person:** TBD	**Approved by:** M. Raybuck	**Date:** June 15, 2006

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Receiving Chemical Shipments Transferring Chemicals from drums to the storage tanks	Slips, Trips, Falls	▪ Workers will be aware of potentially slippery surfaces and tripping hazards. ▪ Work slowly during transit. Jumping, running, and horseplay are prohibited. ▪ Workers will keep all areas clean and free of debris to deter any unnecessary trips and falls. ▪ Clean up all spills immediately. ▪ Personnel will notify the SSO of any unsafe conditions	▪ Inspect job site and staging area and identify any concerns. ▪ Inspect job site daily.
	Chemical Exposure / Chemical Splashing	▪ Training and safety awareness of chemicals being used ▪ Appropriate PPE will be worn ▪ MSDS sheets will be reviewed and available at the site ▪ Training of personnel decontamination procedures ▪ Be sure all drums are properly sealed before moving them ▪ Do not open a drum that appears to be under pressure ▪ Safety showers and eye wash stations are onsite in the event of a splash. ▪ Work slowly to minimize the chance of splashing when moving drums or transferring chemicals	

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
	Back injury, muscle strain/stress	▪ Personnel will utilize proper lifting techniques when transferring the drum pump to/from drums ▪ Personnel will use a cart/dolly to move full drums around the treatment plant. If drum is still too heavy, worker will wait to move drum until assistance can be provided.	
	Pinch Points	▪ Maintain awareness of activities when moving drums, exercising caution related to hand placement, prevent pinching of hands and other extremities between drums.	

Training Requirements:

Personnel engaged in chemical handling activities that expose or potentially expose them to health hazards shall receive appropriate training as required by 29 CFR 1910.120(e), including, but not limited to initial 40-hour, 8-hour Supervisor, and annual 8-hour refresher training.

Assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity and review it with their Supervisor during their Daily Safety Huddle.

PARSONS

Activity Hazards Analysis

Confined Space

AHA No. 006

Project Name & Number: Cherry Farm/River Road O&M 442205	**AHA No.** 006	**Date:** May 30, 2006	**New:** Yes
Location: 4100 River Road, Tonawanda, Erie County- New York	**Contractor:** Parsons and Subcontractor	**Analysis by:** S. Chmura	**Date:** May 30, 2006
Required Personal Protective Equipment:	Level D- Long pants, safety glasses, hard hat, steel-toed boots, gloves. The following safety equipment is project dependent: respirator, goggles, tyvek.	**Reviewed by:** M. Raybuck, A. Miller	**Date:** June 12, 2006
Work Operation: Confined Space	**Superintendent/Competent Person:** TBD	**Approved by:** M. Raybuck	**Date:** June 15, 2006

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Confined Space Work in Sump Vault	Slips, Trips, Falls	▪ Workers will be aware of potentially slippery surfaces and tripping Hazards. ▪ Work slowly during transit ▪ Clean up all spills immediately ▪ Personnel will notify the SSO of any unsafe conditions ▪ Constant communication will be kept between the entrant, attendant, entry supervisor, and rescue team during confined space activities. ▪ The entrant will wear a safety harness that will be attached to a tripod at all times while inside the confined space. This will be used in the event that the entrant needs to be removed quickly.	
	Vapors/Airborne particles	▪ Attendant will monitor atmospheric conditions regularly and record the readings on a field log or in a field book. ▪ If any adverse conditions arise during intrusive work, the attendant will immediately inform the entrant to cease activities. ▪ Constant communication will be kept between the entrant, attendant, entry supervisor, and rescue team during confined space activities. ▪ The entrant will wear a safety harness that will be attached to a tripod at all times while inside the confined space. This will be used in the event that the entrant needs to be removed quickly.	Atmospheric testing will be performed by the entry supervisor or attendant for oxygen deficiency and explosive and toxic gases.

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
	Electrical / Mechanical Hazards	▪ Workers will isolate the space from all other systems to ensure that injury does not take place ▪ Blanks will be placed in all related pipelines ▪ Circuit Breakers/Disconnects will be locked out/tagged out according to OSHA standards (see 29 CFR part 1910.147).	
	Sharp Edges	▪ Workers will be aware of areas having sharp edges ▪ Sharp edges will be removed (if possible) or have a protective cover placed over it.	
	Site Hazardous Material Exposure	▪ Training and safety awareness of potential exposure to hazardous materials at the site. ▪ Training of personnel decontamination procedures (if applicable) ▪ Appropriate PPE will be worn dependent on site conditions and action levels ▪ Must Sign off on health and safety plan.	

Training Requirements:

All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity and review it with their Supervisor during their Daily Safety Huddle.

ONLY PERSONNEL **TRAINED AND CERTIFIED** FOR CONFINED SPACE ENTRY ARE ALLOWED TO PERFORM ANY NECESSARY WORK WITH THE CONFINED SPACE.

PARSONS

Activity Hazards Analysis

Site Area- Electrical Work

AHA 004

Project Name & Number: Cherry Farm/River Road O&M 442205	**AHA No.** 004	**Date:** May 30, 2006	**New:** Yes
Location: 4100 River Road, Tonawanda, Erie County- New York	**Contractor:** Parsons and Contractors	**Analysis by:** S. Chmura	**Date:** May 30, 2006
Required Personal Protective Equipment:	Level D-Long pants, safety glasses, hard hat (non conductive) non-conductive metal free boots, gloves (rubber gloves for electrical work).	**Reviewed by:** M. Raybuck, A. Miller	**Date:** June 12, 2006
Work Operation: Site Area- Electrical Work	**Superintendent/Competent Person:** TBD	**Approved by:** M. Raybuck	**Date:** June 15, 2006

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Electrical Repairs to the Sumps and/or Treatment Plant (including the Control Room).	Electrical shock, Electrical burns	▪ Follow OSHA's Lockout Tag-Out Procedures when working with live electricity. ▪ Wear proper PPE (e.g., non-conductive hard had, metal free non-conductive boots, safety glasses, rubber gloves, etc.) ▪ Use proper engineering controls when working with electricity (i.e., grounding, bonding, insulation, guarding, etc.) ▪ Restrict access to work area.	
	Electrical Fires	▪ Use proper engineering controls when working with electricity (i.e., grounding, bonding, insulation, guarding, etc.) ▪ Have a carbon dioxide, or CO2 and halon extinguishers available. ▪ Check insulation of wiring. ▪ Install circuit protection devices (e.g. fuses, ground fault interrupters, circuit breakers, thermal sensors, etc.)	
	Rain	▪ Be aware of work conditions and do not work in wet areas with live electricity	
	Lightning	▪ Do not begin or continue work until lightning subsides for 20 minutes.	

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
	Slips, Trips, Falls	▪ Workers will be aware of potentially slippery surfaces and tripping hazards. ▪ Work slowly during transit. Jumping, running, and horseplay are prohibited. ▪ Workers will keep all areas clean and free of debris to deter any unnecessary trips and falls. ▪ Clean up all spills immediately. ▪ Personnel will notify the SSO of any unsafe conditions.	
	Injury from Hand Tool Operation	▪ Ensure that all tools used onsite are in proper working order and are in good condition, clean, oil free, and have insulated grips. ▪ Do not leave hand tools lying around where they could become a hazard. ▪ Personnel to inform SSO or Project Manger if tools require repair or replacement. ▪ Keep tools in non-conductive container and be aware of metal on tool belts.	
	Injury from Power Tool Operation	▪ All tools will be in good working order and properly grounded. ▪ No damaged equipment will be issued until repaired or replaced. ▪ When power operated tools are designed to accommodate guards, the guard must be in place on the tool. ▪ Do not overload electrical circuits and use a GFCI.	▪ Follow operations and maintenance procedures for each piece of equipment used on site.

Training Requirements:

Personnel engaged in the working/installing of electrical wiring and conduits will have knowledge and experience working with electricity. All assigned personnel will have appropriate licensing and certification requirements relevant to State and local requirements. Assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity and review it with their Supervisor during their Daily Safety Huddle.

PARSONS

Activity Hazards Analysis

Operation- Heavy Equipment or Machinery

AHA 005

Project Name & Number: Cherry Farm/River Road O&M 442205	**AHA No.** 005	**Date:** May 30, 2006	**New:** Yes
Location: 4100 River Road, Tonawanda, Erie County- New York	**Contractor:** Parsons and Subcontractors	**Analysis by:** S. Chmura	**Date:** May 30, 2006
Required Personal Protective Equipment:	Level D – Long pants, safety glasses, hard hat, steel toed boots, leather gloves (as appropriate)	**Reviewed by:** M. Raybuck, A. Miller	**Date:** June 12, 2006
Work Operation: Operations of Heavy Equipment or Machinery	**Superintendent/Competent Person:** TBD	**Approved by:** M. Raybuck	**Date:** June 15, 2006

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Lawn Mowing the Landfill and Snow Plowing Access roads	Equipment Maintenance	▪ The equipment must be maintained in a proper functioning condition. ▪ All motors must be shut off. Electrical, mechanical and hydraulic components locked when making repairs. ▪ Safety shut-off system must be tested daily and not disabled. ▪ Bleed off pressure on hydraulic lines before undoing fittings. ▪ Do not leave tools or parts loose on the equipment after maintenance has been performed.	▪ Follow the maintenance manual recommended procedures for each piece of equipment.
	General Use	▪ All equipment must be inspected daily prior to use. ▪ Equipment must be operated and maintained in accordance to manufacturer's guidelines. ▪ Any equipment that is unattended must be immobilized and secured against accidental movement. ▪ All heavy equipment will have a back up alarm	
	Fire Hazard	▪ All motors must be shut off during refueling. • Smoking in the vicinity of the drilling rig is not permitted. • An A-B-C fire extinguisher must be maintained on the drilling rig and associated motorized equipment. • Fuel containers will not be stored within 10' of the drilling rig motor. • Fuel will be stored in UL approved safety containers with contents clearly label.	

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Activity Hazards Analysis

Operation- Heavy Equipment or Machinery

AHA 005

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
	Operation of Motorized Equipment	▪ Operators of motorized equipment will be trained in the proper operation of that apparatus.	
	Tip Over / Struck By Pinch Points	▪ Equipment will be shut off and stabilized accordingly. ▪ All personnel will be aware of moving machinery and parts and wear appropriate PPE when near machinery (e.g., hard hat, safety glasses, gloves etc.).	
	Noise Exposure	▪ Hearing protection will be worn in hazardous noise areas or working around heavy machinery or equipment. ▪ Wear earplugs when noise level from equipment exceeds 90 decibels (dBA) averaged over an eight-hour day.	

Training Requirements:

All personnel engaged in the operation of heavy equipment and machinery will have knowledge and experience in working with and operating the equipment. All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity and review it with their Supervisor during their Daily Safety Huddle.

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Activity Hazards Analysis

Site Visit or Site Walk

AHA No. 003

Project Name & Number: Cherry Farm/River Road O&M 442205	**AHA No.** 003	**Date:** May 30, 2006	**New:** Yes
Location: 4100 River Road, Tonawanda, Erie County- New York	**Contractor:** Parsons	**Analysis by:** S. Chmura	**Date:** May 30, 2006
Required Personal Protective Equipment:	Level D- Long pants, safety glasses, hard hat (in presence of heavy equipment), steel-toed boots. The following safety equipment is project dependent: gloves, goggles.	**Reviewed by:** M. Raybuck, A. Miller	**Date:** June 12, 2006
Work Operation: Site Visit or Site Walk	**Superintendent/Competent Person:** TBD	**Approved by:** M. Raybuck	**Date:** June 15, 2006

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Site visit/walk	Slips, Trips, Falls	▪ Workers will be aware of potentially slippery surfaces and tripping hazards. ▪ Work slowly during transit. Jumping, running, and horseplay are prohibited. ▪ Workers will keep all areas clean and free of debris to deter any unnecessary trips and falls. ▪ Clean up all spills immediately. ▪ Personnel will notify the SSO of any unsafe conditions	▪ Inspect job site and staging area and identify any concerns. ▪ Inspect job site daily.
	Rain	▪ Have proper PPE (i.e. rain gear, footwear, etc) available. Be aware of slip hazards, puddles, etc.	
	Sunshine	▪ Have sunscreen available for ultraviolet protection. Have water for dehydration.	
	Snow	▪ Have warm clothes available for cold temperatures.	
	Lightning	▪ Do not begin or continue work until lightning subsides for 20 minutes.	
	High winds, dust storm	▪ Wear goggles if dust/debris is visible.	
	Cold and Heat Stress	▪ Visitors will dress accordingly to prevent injuries from extreme heat, or cold. ▪ SSO will monitor for cold/heat stress symptoms.	

PARSONS

Activity Hazards Analysis

Site Visit or Site Walk

AHA No. 003

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
	Biological Hazards (ticks, bees, mosquitoes, snakes, etc.)	▪ Personnel will be aware of potential exposure to biological hazards. ▪ Wear appropriate clothing (hat, long-sleeve shirt, long pants, gloves, boots etc.) and insect repellant.	
	Site Hazardous Material Exposure	▪ Training and safety awareness of potential exposure to hazardous materials at the site. ▪ Training of personnel decontamination procedures (if appropriate to visit). ▪ Appropriate PPE will be worn dependent on site conditions and actions levels. (if appropriate to visit) ▪ Must sign off on health and safety plan. ▪ Visitor will be escorted around site by a 40-hour trained individual unless cleared with the SSO.	

Training Requirements:

Visitors will report to the Site Safety Officer who will give a short health and safety orientation and require sign-off on the PSP. The SSO will determine if the visitor can access the site based on verification of 40-hour training or 8-hour Supervisor training or if the visitor(s) will need to be escorted by a 40-hour trained individual onsite.

Personnel engaged in hazardous substance removal or other activities that expose or potentially expose them to hazardous substances or health hazards shall receive appropriate training as required by 29 CFR 1910.120(e), including, but not limited to initial 40-hour, 8-hour Supervisor, and annual 8-hour refresher training.

Medical qualification, training and fit testing must be received on an annual basis for individuals that wear a respirator. If an individual wears a respirator more than 30 days per year, or they are exposed at or above the Permissible Exposure Limit (PEL) of a chemical for more than 30 days in a year, then they must participate in a Medical Surveillance Program as required by 29 CFR 1910.120 (f). Assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity and review it with their Supervisor during their Daily Safety Huddle.

PARSONS

Activity Hazards Analysis

Operation- Motor Vehicle

AHA No. 002

Project Name & Number: Cherry Farm/River Road O&M 442205	**AHA No.** 002	**Date:** May 30, 2006	**New:** Yes
Location: 4100 River Road, Tonawanda, Erie County, New York	**Contractor:** Parsons	**Analysis by:** S. Chmura	**Date:** May 30, 2006
Required Personal Protective Equipment:	Wear seat belt at all times; make sure that clothing will not interfere with driving.	**Reviewed by:** M. Raybuck, A. Miller	**Date:** June 12, 2006
Work Operation: Operation of Motor Vehicle	**Superintendent/Competent Person**	**Approved by:** M. Raybuck	**Date:** June 15, 2006

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Driving to and from the job site	Vehicle Accident	▪ All employees shall complete the ParsonsU safety module on Defensive Driving. ▪ Plan your travel route and check maps for directions or discuss with colleagues. ▪ Complete a Vehicle Inspection Report before driving and check for proper equipment/supplies. ▪ Clean windows and mirrors as needed throughout the trip. ▪ Have sun glasses available to reduce sun glare and wear as needed. ▪ Follow vehicle maintenance schedule to reduce possibilities of breakdown while driving.	
	Distraction while driving	▪ Stop driving a vehicle, regardless of the speed (i.e. even 5 mph) or location (i.e. private road), when the potential of being distracted by conversation exists. ▪ Drivers are prohibited from using communication devices (e.g., cell phones) while operating any motor vehicle.	
	Fatigue/Falling asleep	▪ Get adequate rest prior to driving. ▪ Pull over and rest if experiencing drowsiness ▪ Change seat position, stretch, open the window, adjust radio if experiencing drowsiness.	

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
	Weather /Road conditions	▪ Check road and weather conditions prior to driving. ▪ Be prepared to adjust driving if conditions change. ▪ Travel in daylight hours if possible. ▪ Give yourself plenty of time to allow for slow downs due to construction, accidents, or other unforeseen circumstances. ▪ Use lights at night and lights/wipers during inclement weather.	

Training Requirements:

All drivers are required to have a current valid driver's license and all vehicles must have the required State vehicle registration and/or inspection documentation. It is company policy that all wireless device use, whether "hand-held" or "hands free", ***is prohibited*** while driving any vehicle at any time as follows: for business use *at any time*; or for *personal use* during business hours; and as defined by law.

All employees operating a Company vehicle are required to familiarize themselves with the contents of the AHA before starting a work activity.

PARSONS

Activity Hazards Analysis

Activities- Field

AHA No. 001

Project Name & Number: Cherry Farm/River Road O&M 442205	**AHA No.** 001	**Date:** May 30, 2006	**New:** Yes
Location: 4100 River Rd., Tonawanda, Erie County, New York	**Contractor:** Parsons	**Analysis by:** S. Chmura	**Date:** May 30, 2006
Required Personal Protective Equipment:	Depending on environment at project site: blanket, sunscreen, cold/hot drink, extra clothing.	**Reviewed by:** M. Raybuck, A. Miller	**Date:** June 12, 2006
Work Operation: Field Activities	**Superintendent/Competent Person :** TBD	**Approved by:** M. Raybuck	**Date:** June 15, 2006

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Outdoor, physical activity	Heat Stress ▪ Prickly Heat (heat rash) ▪ Heat Cramps ▪ Heat Exhaustion ▪ Heat Fatigue ▪ Heat Collapse ▪ Heat Stroke	▪ Adjust work schedules. ▪ Mandate work slowdowns as needed. ▪ Perform work during cooler hours of the day if possible or at night if adequate lighting can be provided. ▪ Provide shelter (air-conditioned, if possible) or shaded areas to protect personnel during rest periods. ▪ Maintain worker's body fluids at normal levels. ▪ Train workers to recognize the symptoms of heat related illness	▪ Monitor workers physical conditions ▪ Monitor outside temperature versus worker activity.
	Rain	▪ Have proper PPE (i.e. rain gear, footwear, etc) available. Be aware of slip hazards, puddles, etc.	
	Sunshine	▪ Have sunscreen available for ultraviolet protection. Have water for dehydration.	
	Snow	▪ Have warm clothes available for cold temperatures.	
	Lightning	▪ Do not begin or continue work until lightning subsides for 20 minutes.	
	High winds, dust storm	▪ Wear goggles if dust/debris is visible.	
	Pollen	▪ Take medication (i.e. anti-histamine) to minimize allergic reaction to pollen. Wear dust mask, if necessary.	

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
	Streams	▪ Observe depth of stream and speed of current before proceeding.	
	Walking on uneven or wet terrain (i.e. slopes, leaves, covered objects, holes, etc)	▪ Wear steel toe rubber boots versus over-the-shoe rubber boots. Use walking stick or other object for additional support/balance and to check for animal burrows/holes.	
	Insects, rodents, animals, etc.	▪ Wear Tyvek coveralls. Apply bug repellant spray or lotion to exposed skin.	
	Vegetation	▪ Create a clear path or route with mechanical equipment, whenever possible. Wear appropriate PPE for the vegetation (i.e. leather gloves, Carhart coveralls, and a face shield for vegetation that could cause cuts/punctures and/or is higher than waist level.	
Working around water Outdoor activities	Cold Related Injuries Frostbite Hypothermia	▪ Educate workers to recognize the symptoms of frostbite and hypothermia ▪ Identify and limit known risk factors: ▪ Assure the availability of enclosed, heated environment on or adjacent to the site. ▪ Assure the availability of dry changes of clothing. ▪ Assure the availability of warm drinks.	Start (oral) temperature recording at the job site: ▪ At the Field Team Leader's discretion when suspicion is based on changes in a worker's performance or mental status. ▪ At a worker's request. ▪ As a screening measure, two times per shift, under unusually hazardous conditions (e.g., wind-chill less than 20°F, or wind-chill less than 30°F with precipitation). ▪ As a screening measure whenever any one worker on the site develops hypothermia.

Training Requirements:

All assigned employees are required to familiarize themselves with the contents of this AHA before starting a work activity and to review it with their Supervisor during their Daily Safety Huddle.

ATTACHMENT 4

INCIDENT INVESTIGATION REPORTING

PARSONS - PARCOMM®

PROCEDURES FOLLOWING A PARSONS/SUBCONTRACTOR INCIDENT

Incident Definition: any unexpected or unplanned event involving the above. This includes near-misses, personal injuries, property damage or environmental releases. NOTE: Personal injuries involving medical treatment and incidents resulting in more than $1K shall be verbally reported and submitted on the PWeb within four (4) hours.

Within four (4) hours, verbally notify the following:

- Program Manager, Project Manager and Safety Manager

Within 72 hrs of an incident (except as noted otherwise):

- Enter incident information on the PWeb (PARCOMM Home Page) using the Online Safety Reporting System.
- Complete an incident investigation report to determine root causes and corrective actions to prevent recurrence. 04/05

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ADDITIONAL INSTRUCTIONS AND PHONE NUMBERS

If the incident is known or believed to be life threatening, immediately notify the following by telephone/in-person:

- President - Chuck Harrington: (704) 905-4363
- Division Manager – Mike Walsh: (704) 307-6924
- Safety Director – Brad Barber: (704) 231-4532
- Human Resources – Andy Berger: (803) 493-1800

Within 24 hours, report all near-misses, first aid cases and other incidents resulting in less than $1K to:

- Safety Manager – Greg Beck: (908) 887-1973

PARSONS Emergency Contact Numbers:

- US/Canada: (866) 727-1411; International: (775) 326-4594

PARSONS INCIDENT INVESTIGATION REPORTING FORM

Return Completed Report to Industrial Division Safety Manager or FAX (732) 868-3110 within 24 hours of incident.

Date of Incident:	Client:		Client Contact:
Project Name:	Project Location:		Project Manager:
Time of Incident:	Job/WBS:	Incident Reported by:	
Type of Incident (check one): ? Near-miss incident ? Personal Injury ? Property damage ? Environmental spill/release		Name of Company/Subcontractor:	
Name of Individual(s) Involved:			Trade/Function:
WAS THE INDIVIDUAL INVOLVED WITH THE INCIDENT PERFORMING THEIR REGULAR JOB? IF "NO", EXPLAIN WHY:	Date of Site Safety Orientation:		Last Formal/Documented Safety Meeting Attended:
Description of incident according to the individual(s) involved or injured (including what happened and how the incident occurred):			
According to the individual(s) involved with the incident or injured, what could have been done differently to prevent this incident from occurring? Why weren't these done prior to the incident?			
Describe any First Aid or Medical Treatment Provided On Site and/or at a Medical Facility.			
Did the Individual Return to Work by the next day?	Any Work Restrictions or Lost Time?	If "Yes", describe:	

COMPLETE THE INFORMATION BELOW WITH AN INVESTIGATION TEAM, IF APPROPRIATE.

Team Investigation – List the Possible Causes of the Incident Below (specify **Personal Factors** (1 = lack of skill/knowledge, 2 = following correct procedure takes more time, 3 = supervisor reinforces unsafe behavior, 4 = did it this way before without adverse consequences), **Job Factors** (5 = lack of or inadequate procedure, 6 = inadequate communication of expectations or procedure, 7 = inadequate tools or equipment) or **External Factors**).

1.
2.
3.
4.

For Each Possible Cause Listed Above, Reply "Why" or "Why not" the Cause Occurred.

1.
2.
3.
4.

Corrective Action(s) for Each Cause - List Person(s) Responsible and Target Date:

1.
2.
3.
4.

Investigation Team Members:

Approval (Individual Involved/Injured):	Signature:	Date:
Supervisor Approval (Print Name):	Signature:	Date:

APPENDIX F

VENDOR AND EQUIPMENT CATALOG CUTS AND SPECIFICATIONS

SECTION 01650

FACILITIES STARTUP

PART 1 GENERAL

1.01 Summary

A. Except as specifically noted in individual technical Sections, this Section governs the requirements for facilities and system startup.

B. Exceptions in an individual technical Section modify only the individual Article and topic; other topics and Articles in this Section remain in force unless specifically deleted by the technical Section.

C. Section Includes:

1. Section 01300 - Submittals.
2. Section 01310 - Progress Schedule.
3. Section 01400 - Quality Assurance andQuality Control.
4. Section 01700 - Project Closeout.

1.02 Definitions

A. Acceptance: The act of the Engineer in receiving submittals and finding no obvious reason for its rejecting, but not to indicate certification that Contractor's estimated performance can be achieved.

B. Approve: To accept and to certify.

C. Certify: After ascertaining the facts and making oneself informed, to guarantee the accuracy of the facts according to the requirements of the Conditions of the Contract.

D. Component: An individual item, piece of equipment, or equipment group as specified in a single Section.

E. Facilities Startup Plan: A single and complete plan incorporating all requirements of this Section.

F. Subsystem: A series of components that can be tested together to assure specified performance.

G. System: The complete dynamic components, and associated passive components, of the Work.

H. Validate: To support, substantiate, and authenticate specified operation on a sound or authoritative basis.

1.04 System Description

A. Design Requirements:

1. Design temporary connections and utility lines to meet the specified design requirements of the component, subsystem, and system to which they are connected.
2. Include required restraints.
3. Do not place structural loads on permanent facility elements beyond their design load capacity.

4. Provide dielectric unions on temporary connections wherever dissimilar metals connect.

5. Provide safety valves and similar safety devices on temporary connections wherever they would be required if the connections were permanent.

6. Divide subsystems according to the P&ID ladder diagrams wherever practical.

B. Performance Requirements:

1. Performance requirements for components, subsystems, and the system are specified in individual Sections.

1.05 Submittals

A. Provide submittals according to Section 01300.

B. Facilities Startup Plan:

1. Provide a Facility Startup Plan for acceptance not less than 10 days prior to startup, incorporating the requirements of this Section.

2. The Facilities Startup Plan is the responsibility of the Contractor who is solely responsible for its means, methods, techniques, sequences, procedures, coordination, completeness, accuracy, and validity.

3. Individual sections of the Startup Plan may be accepted by Engineer, with Engineer's prior approval, but must be incorporated into the final accepted Startup Plan.

4. Rejection of individual sections of the Startup Plan by Engineer is not a cause for a claim of delay.

5. Identify each person or organization who will have a functional part in the startup, and identify their duties and responsibilities.

6. Provide for contingencies on validation failure.

C. Temporary Connections:

1. Provide complete information on temporary connections in the form of shop drawings or a complete written description or a combination of both.

2. Provide separate drawings or descriptions, or both for each item or subsystem identified in the startup plan.

D. Validation procedures:

1. Provide a complete written description of each test, simulation, and startup, including:

a. Schedule.

b. Listing of components included.

c. Listing of individuals or organizations involved, and assigned responsibilities.

d. Test equipment required, accuracy, and calibration information.

e. Detailed listing of procedures necessary to demonstrate compliance with performance requirements specified in technical Sections.

E. Validation reports: Provide validation reports indicating compliance with performance requirements in technical Sections for Engineer's certification.

1.06 Quality Assurance

A. Qualifications:

1. Provide complete foremen's qualifications for Owners approval, indicating 3 years of experience operating and maintaining this type of equipment, or academic and factory training to operate and maintain this type of equipment, or another acceptable combination of relevant training and experience. Owner reserves the right to reject foremen who, in their sole opinion, are not qualified by experience and training to operate and maintain the equipment.

B. Regulatory Requirements:

1. Include information relating to regulatory requirements for operation and maintenance of equipment.

C. Certifications:

D. Pre-Installation Conference:

1. Arrange for a pre-installation conference scheduled not less than 10 days prior to training.
2. Conference to be attended by Owner, Engineer, Contractor, Contractor's startup and installation foremen, and other responsible parties.
3. Prepare an agenda for approval prior to conference, to include as a minimum:
   a. Startup and demonstration schedule.
   b. Facilities examination.
   c. Problem resolution.

1.07 Sequencing and Scheduling

A. Facilities Startup Schedule:

1. Provide as a sub-schedule of the main project schedule.
2. After acceptance, submit Facilities Startup Schedule updates at same interval required for the main project schedule in Section 01310.
3. Include submittal, and approval of submittals required for components.
4. Address each subsystem individually.

1.08 Maintenance

A. Provide maintenance on components through completion of the Reliability Demonstration.

PART 2 PRODUCTS

2.01 Temporary Connections

2.02 Chemical and Operating Fluids

A. Provide chemicals and operating fluids required for validation and Reliability Demonstration. These are in addition to chemicals and fluids required to be provided to Owner separately under the Specifications.

B. Provide maintenance and replacement parts required during the Reliability Demonstration.

PART 3 EXECUTION

3.01 Component Validation

A. Validate each component by one or more of the following procedures, as approved:

1. Testing to show compliance with specifications.
2. Simulation of actual operation by a method certified as acceptable and valid by both the component manufacturer and the Engineer.
3. Certification by an independent testing laboratory that the component type meets a specified industry standard.
4. Where procedures are specified in individual Sections, substitute procedures will not be accepted without prior written approval.

B. Validate components at component or subsystem level prior to system startup and testing.

C. Component validation must include:

1. Full range of operation of each component.
2. Emergency procedures.
3. Normal start-up and shutdown procedures.
4. Out-of-parameter correction.
5. Validate components individually and as part of a subsystem test.

3.02 Examination

A. Prior to validating components or subsystems, verify that:

1. Startup submittals have been accepted.
2. Manufacturers' have certified component installations wherever required.
3. Coordination with manufacturers' representatives for required field services is completed.
4. Facility is enclosed weather-tight.
5. Auxiliary systems are in proper operation.
6. No safety defects remain unresolved.
7. Provisions have been made for disposal of solids and liquids generated.
8. Both hand and automatic operation of equipment is operational.
9. Equipment is lubricated and serviced, and is ready for continuous operation.

3.03 Preparation

A. Protection:

B. Temporary connections:

1. Provide temporary connections as indicated on approved submittals.
2. Test temporary connections by the same method that would be required if the connections were permanent.

C. Effluent collection, removal, and disposal:

3.04 Testing Requirements

A. Conduct tests using non-process, clean fluids prior to process fluid testing.

B. Effluent from testing not meeting specified system effluent quality are the property of Contractor, who is responsible for legal disposal.

3.05 **Testing of System**

A. Validate subsystems and components before beginning system validation.

B. Perform system tests only to certify system, not to certify components or subsystems.

C. System performance is based on specified component performance and system output boundary conditions.

3.06 **Reliability Demonstration**

A. Operate and maintain the system for not less than 5 days continuously and at full capacity to demonstrate that the system performs according to specifications.

B. Any system operation outside of specified operating boundary conditions requires a restart of the Reliability Demonstration period for a time specified by the Engineer up to the original time period.

C. Document actions taken and procedures developed that are not covered in the operations manuals, and provide as an appendix to the operating manuals.

D. Where required in individual specification Sections, at the end of the Reliability Demonstration, replace or clean filters, replace fluids, and perform other replacement and adjustment requirements.

3.07 **Field Quality Control**

A. Tests:

1. Calibrate test equipment used to validate compliance immediately prior to testing.
2. Check calibration of testing equipment immediately after validation tests.
3. Revalidation, including the requirements of this Article, is required whenever test equipment is out of calibration at the completion of the validation testing.

B. Inspection:

C. Manufacturer's Field Service:

3.08 **Adjusting and Cleaning**

A. After the successful completion of the demonstration period, perform the following:

1. Lubricate and service dynamic equipment in accordance with manufacturer's instructions.
2. Clean facility surfaces to a "like-new" condition.
3. Clean equipment inside and out to a "like-new" condition. Dynamic equipment in the process stream such as screw conveyors, pumps, and valves do not require the interior to be cleaned.
4. Preform other cleaning, adjusting, and replacement requirements included in other sections of these specifications.

--END OF SECTION 01650--

FLOWLINE

Smart Trak™ Mounting System
LM10 Series
Owner's Manual

Version 1.0

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Manual #LM900001

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Unpacking and Inspection:

One Smart Trak kit (LM10-1201, 1401, or 1601) includes the following parts (illustrated on page 9):

1 Track
1 Locking pin
1 Top compression fitting
1 Wire gasket
1 2" NPT fitting
1 Track end cap
2 Wire retainer clips
1 Instruction Manual
1 Warranty Card (please fill out and return the LM10 series warranty card immediately to Flowline, Inc.)

One sensor car kit (included) consists of the following parts:

1 Sensor car
1 Locking screw
1 Locking bolt
1 O-ring
1 Bayonet adapter

Part Number Information:

Part #	Track Material	Size
LM10-1201	PP	2" L x 1" sq. W
LM10-1401	PP	4" L x 1" sq. W
LM10-1601	PP	6" L x 1" sq. W

Safety Precautions

Specifications:

Mounting method:	2" NPT tank adapter or flange (user-supplied) or Flowline LM50 series side mount bracket
Side mount bracket mounting method:	Bolted or welded to the side wall of the tank
Mounting orientation:	Vertical
Wetted materials:	Polypropylene (PP) and PCTFE See page 5.
Max. temperature rating:	90 degrees Celsius (194° Farenheit)
Mixer rating:	Radial velocities up to 1.5 feet per second
Max. number of sensors:	Up to four (one per side of track)
Adjustability:	Along the entire length of Smart Trak
Dimensions:	1" square wide, 2', 4' or 6' long

Introduction

About Smart Trak™

Flowline's Smart Trak™ is an adjustable mounting system for installing up to four liquid level sensors vertically within a tank. Smart Trak's totally new mounting concept allows simple installation and adjustment of sensor position, making process changes affordable and uncomplicated. Mounted through a single point at the top of the tank, up to four different sensors can be located at any depth on Smart Trak. Flowline's LC05 terminal housing, and LC10 or LC11 controllers are designed to be mounted directly to the 3/4" NPT fitting at the top of the assembly. Smart Trak mounts vertically through a standard 2" NPT tank adapter, or on a side mount bracket (such as the LM50-1001). Unlike prefabricated "trees" or pipes, Smart Trak allows you to experiment with sensor position to account for variations in the point of actuation of each sensor during process testing.

Smart Trak Components

The Smart Trak system consists of the following components:

Track

The track itself is approximately 1" square, and is from 2' to 6' (0.61 to 1.83 meters) long depending on model. The track may be cut to length if desired. Four separate grooves run the length of the track, one on each side of the square. These grooves hold the *sensor cars* that attach to Flowline sensors, and also serve to

Safety Precautions

About this Manual:

PLEASE READ THE ENTIRE MANUAL PRIOR TO INSTALLING OR USING THIS PRODUCT. This manual includes information on three different models of Smart Trak: LM10-1201, LM10-1401, and LM10-1601. The units are identical except for the length of the track.

User's Responsibility for Safety:

Flowline manufactures a wide range of liquid level sensors, controllers, and mounting systems. It is the user's responsibility to select components that are appropriate for the application, install them properly, perform tests of the installed system, and maintain all components. The failure to do so could result in property damage or serious injury. The symbol on the left appears in the manual to call special attention to instructions that affect the safe installation and use of the product.

Proper Installation and Handling:

Use a proper sealant with all installations. Never overtighten the components. Always check for leaks prior to system startup.

Material Compatibility:

The track, end cap, wire retainer clips, bayonet adapter and sensor car of LM10 models 1201, 1401, and 1601 are made of PP (Polypropylene, a polyolefin), glass filled for extra strength. The sensor car locking bolt and screw are made of PCTFE (polychlorotrifluoroethylene, a fluoroplastic), the top compression fitting and 2" NPT fitting are made of PP, and the O-ring is made of Viton (a fluorocarbon). Make sure that the application liquids are compatible with the materials that will be wetted. To determine the chemical compatibility between the components and its application liquids, refer to the Compass Corrosion Guide, available from Compass Publications (phone 619-589-9636).

Temperature and Pressure:

Smart Trak is designed for use in application temperatures up to 90 degrees C (194° F). It is not designed for pressurized applications due to the wiring that must travel through a gasket at the head.

Wiring and Electrical:

Electrical wiring of any liquid level control system should be performed in accordance with all applicable national, state, and local codes. Take care not to cut or break the outer insulation jacket of wiring that may be immersed while routing cables in the Smart Trak system. Such breaks of the liquid seal of the sensor system may lead to component failure. The symbol on the left appears next to passages in the manual that affect the safe electrical operation of this product.

Flammable, Explosive and Hazardous Applications:

Smart Trak may be used within flammable or explosive applications only if the associated components are rated intrinsically safe for such use. In hazardous applications, use redundant measurement and control points, each having a different sensing technology.

Assembly

Step One: Attach the sensor(s) the the sensor car(s)

1. Thread the sensor wire through the bayonet to 3/4" NPT adapter, making the approach from the threaded side.

2. Screw the bayonet adapter onto the sensor until the cap of the sensor seats against the lip inside the adapter.

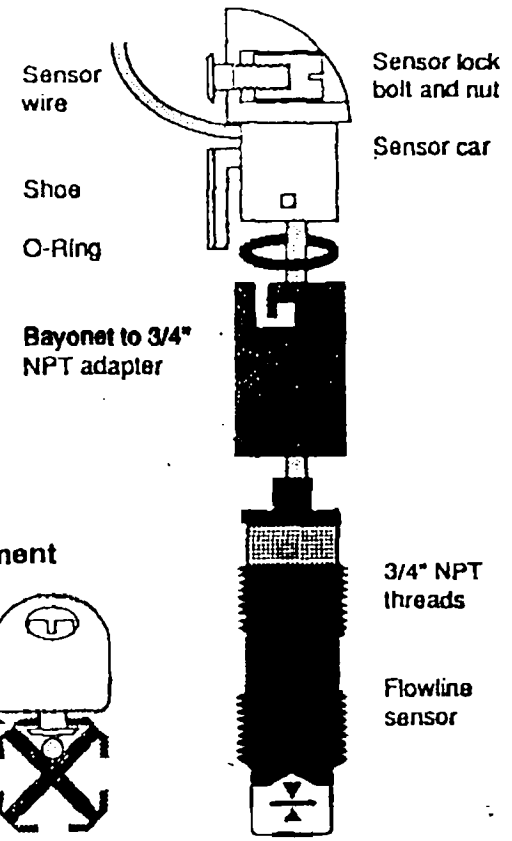
3. Thread the black O-ring onto the sensor wire and push it **into the bayonet side of the bayonet adapter, seating it** firmly into the adapter.

4. **Thread the sensor wire into the sensor car** and out through the hole between the sensor car shoe and the locking bolt.

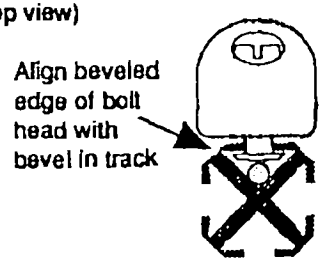
Note: **The sensor wire insulation is made from polypropylene** or perfluoroalkoxy to ensure chemical compatibility. This **makes it stiffer than conventional wire. Take care not to bend the wire too sharply to the point where the insulation is broken.** Such a break could cause liquid to **enter the wiring, damaging the sensor.**

5. **Pull the sensor wire** through the hole while pushing the sensor and bayonet towards the sensor car until the bayonet **is in position. Align the slots on the bayonet with the pins on the sensor car, and firmly push the two together.** When

Sensor car assembly
Model LM30-1001



Sensor lock bolt alignment
(top view)



contain the sensor wire. The bottom of the track is capped with an *end cap*. About 3/8" from the top of the track is a hole for a *locking pin* that holds the track in position in the top fitting.

Sensor car and bayonet adapter

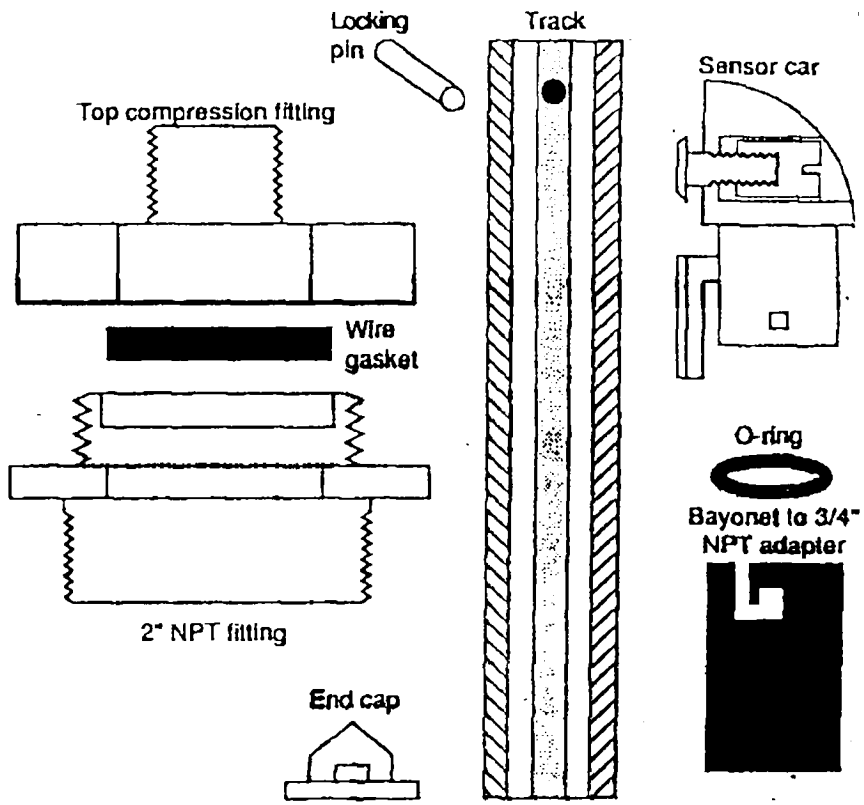
The *sensor car assembly* is the heart of the Smart Trak system. It slides in the grooves of the track, and is locked into position by a plastic bolt and screw. The *bayonet to 3/4" NPT adapter* has a female 3/4" NPT fitting on one end where the sensor (not included) will screw in, and a bayonet fitting on the other end that attaches it onto the sensor car with a slight turn, with an O-ring inbetween to provide tension for the push-and-turn connection.

2" NPT to Smart Trak fitting

The track slides into the square center of a large fitting which has coarse threads on the top, and 2" NPT-standard threads on the bottom. A slot inside the fitting mates with the locking pin to hold the track in position.

Top compression fitting and wire gasket

Once the track is in the 2" fitting, the wires pass through a thick rubber gasket, and the assembly is held firmly in place by a top compression fitting that screws onto the course threads. The top fitting has a 3/4" NPT threaded outlet for connecting to conduit or for direct mounting of a Flowline LC05 terminal strip housing, LC10, or LC11 series controller.



the pin is in the correct position, turn the bayonet until it is in the locked position.

Step Two: Slide the first sensor car into the track

1. Place the sensor car locking bolt (with the square tapered head) through the hole on the flat side of the sensor car, and place the slot-head nut through the other side. Screw them together several turns, but do not tighten them all the way yet.

2. One end of the track has a hole drilled horizontally through it. This is the top of the track. Slide the shoe (the lower end closest to the sensor) of the sensor car into the track at this end. Just before the locking bolt is ready to slide into the track, turn the bolt head so that the beveled edges are aligned with the beveled edges of the track (see illustration previous page).

   Alternatively, you may slide the sensor car into the bottom of the track by removing the end cap from the track and inserting the sensor car locking bolt first.

3. Slide the sensor to the desired position/depth. Tighten the sensor car lock screw with a screwdriver. Do not overtighten. Route the wire inside the track. Slide wire clips into the track to hold the wire in the track. Do not cut the wire to length yet.

Procedure for two or more sensors:

If more than one sensor will be installed on the track, repeat the procedures above for each sensor. However, don't mount the sensors too closely together because two sensors on different sides of the track cannot fit through a 2" NPT fitting at the top of the tank. If adjacent mounting is necessary you may need to install the other sensors in temporarily staggered positions, sliding them into the correct position after Smart Trak has been mounted in the tank.

Step Three: Connect the track to the top fitting

1. Thread the sensor wire(s) through the bottom of the 2" NPT to Smart Trak fitting. The bottom of the fitting is the side with the smaller threads (2" NPT); it should be nearest the sensors.

2. Before actually sliding the fitting onto the track, note the position of the horizontal hole through the track, and orient the fitting so that the slot in the top of the fitting will be aligned with the hole. Slide the fitting onto the track, a few inches down from the top.

3. Insert the locking pin into the hole in the track.

   If there are wires in either or both of the two tracks the locking pin passes through, make sure the wires are pinned into the inside of the slot by the locking pin(see illustration).

Assembly

Hint: Start by inserting the locking pin into the top of the track vertically, parallel with the wire; then when its end nears the alignment hole, push the pin in, prying the wire into the edge of the slot as you do.

4. Pull the fitting up to the top of the track until the locking pin is seated firmly in the slot and the top of the track is flush with the fitting.

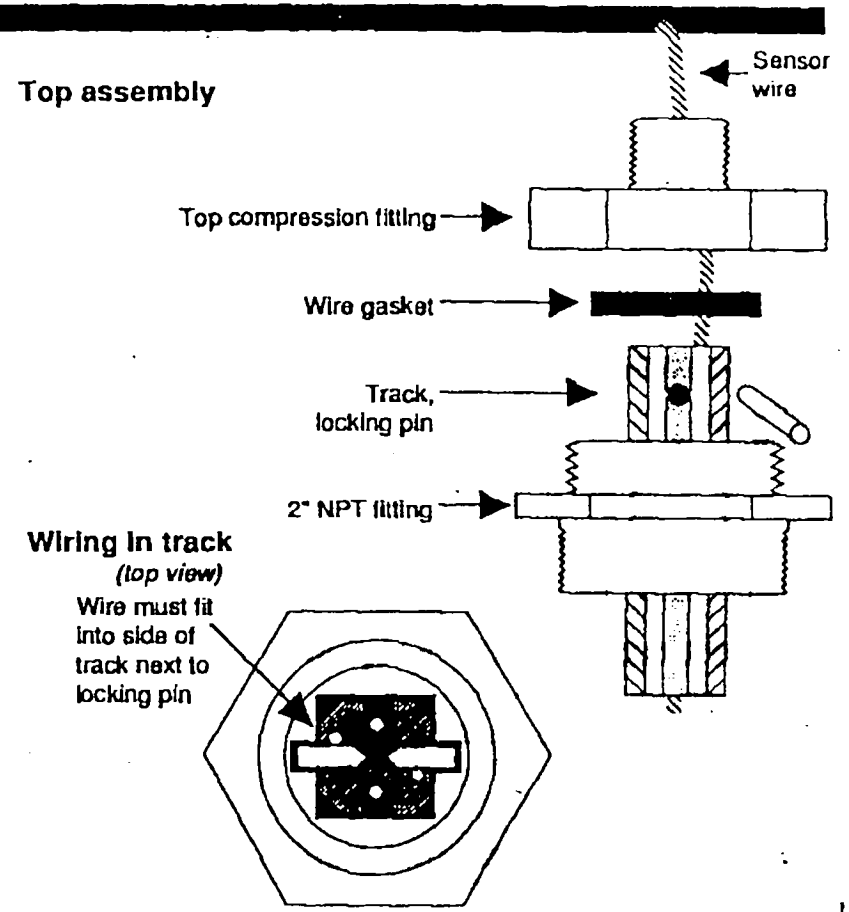
5. Thread the wires through the slots in the wire gasket. Push the gasket down until it seats into the top of the 2" fitting.

6. Thread the wires through the 3/4" NPT opening of the top compression fitting, with the approach made from the large threaded side.

7. Screw the top compression fitting onto the 2"-to-Smart Trak fitting until hand-tight.

Step Four: Attach the termination hardware

At this point, a terminal strip housing (Flowline model LC05) or Smart Trak Mount Controller (Flowline model LC10 or LC11) may be screwed onto the top of the assembly, and wiring attachments made following the instructions in its manual.



Determine the proper wire length:

Don't make the mistake of trimming the sensor wires too short before the process is tested. If the sensors might need to be lowered in the future, leave sufficient slack in the wires to allow for future adjustment. This extra wire may be stored in the bottom of the terminal strip housing, or elsewhere above the compression fitting.

In-Tank Mounting

Selecting a location

Smart Trak should be mounted vertically at a point in the tank where it will not be exposed to excessive stress (such as radial mixing velocities in excess of 1.5 feet per second). When mounting in a tank with a mixer, mount Smart Trak close to the tank wall where velocities are lowest. Choose a mounting location where the sensors will function correctly (away from inlet pipes that may spray on the sensors causing false readings) and where the sensor technologies function best (for example, it may be better to mount an optical sensor away from intense ambient light).

It is the user's responsibility to identify the proper placement and method of installation for the specific application.

Tank top mounting:

1. Install a standard 2" NPT tank adapter through the top of the tank at the desired location. If the tank top is not flat, use a 2" NPT rotational tank adapter. Make sure the threads of the adapter are not damaged or worn. If damaged, use a new adapter.

2. Insert the assembled Smart Trak through the tank adapter. If several sensors are too close together to fit through the tank adapter, slide them to different locations so that only one sensor is going through the adapter at a time.

3. To ensure a proper seal, apply an appropriate sealant to the threads of Smart Trak. Screw the Smart Trak assembly into the tank adapter.

4. Make adjustments as required to the sensor position.

5. Connect the external wiring and conduit to the terminal strip or controller, following the instructions in that manual.

Side Mount Bracket Mounting:

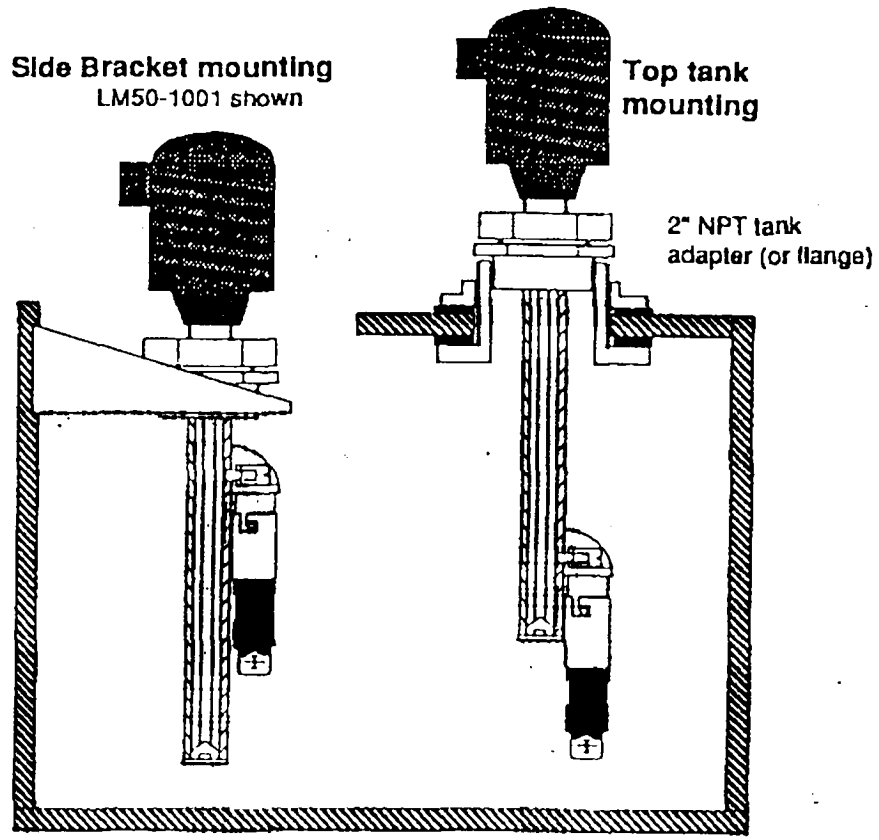
1. Install the side mount bracket (Flowline model LM50-1001) at the desired location. Make sure the threads of the bracket are not damaged or worn. If damaged, use a new bracket.

2. Insert the assembled Smart Trak into the bracket. If several sensors are too close together to fit through the hole in the bracket, slide them to different locations so that only one sensor is going through the adapter at a time.

3. Screw the Smart Trak assembly into the bracket.

4. Make adjustments as required to the sensor position, and to the bracket tilting arm.

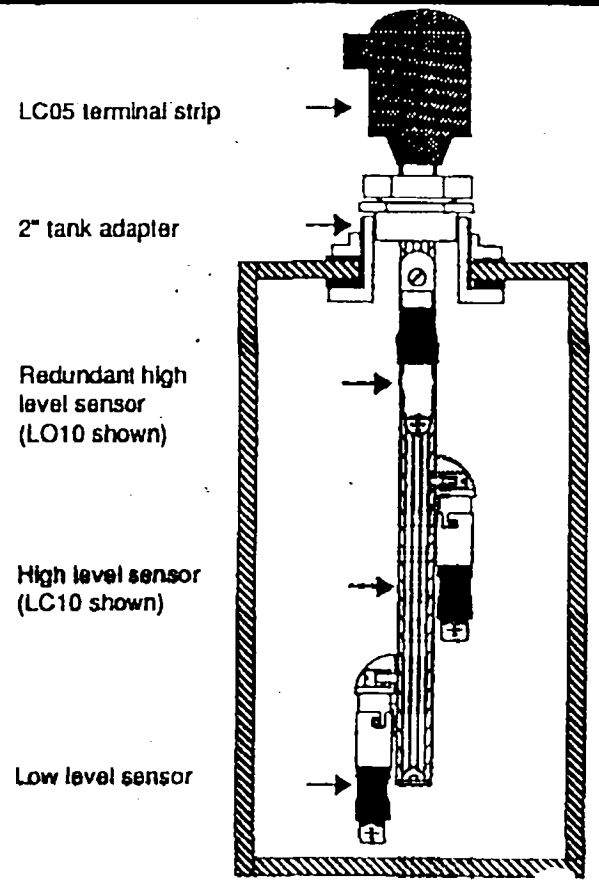
5. Connect the external wiring and conduit to the terminal strip or controller, following the instructions in that manual.



Application Example

On the facing page is an illustration of a Smart Trak fitted with three sensor cars and three sensors. Two of the sensors are ultrasonic (Flowline LU10 series); one near the bottom of the tank, and one in the middle. These two are connected via a terminal strip (Model LC05) to the A and B inputs of a three-input DIN rail controller (Model LC42), and control an automatic fill or empty operation. At the top of the track is an optical sensor (Flowline LO10 series) which is connected to the third input of the controller, controlling a separate relay which will sound an alarm if liquid reaches this point.

This is shown for example only. For further details, consult the manual for the controllers and sensors.



Warranty

Flowline warrants to the original purchaser of its products that such products will be free from defects in material and workmanship under normal use and service for a period which is equal to the shorter of one year from the date of purchase of such products or two years from the date of manufacture of such products.

This warranty covers only those components of the products which are non-moving and not subject to normal wear. Moreover, products which are modified or altered, and electrical cables **which are cut to length during installation are not covered by** this warranty.

Flowline's obligation under this warranty is solely and exclusively limited to the repair or replacement, at Flowline's option, of the products (or components thereof) which Flowline's examination proves to its satisfaction to be defective. FLOWLINE SHALL HAVE NO OBLIGATION FOR CONSEQUENTIAL DAMAGES TO PERSONAL OR REAL PROPERTY, OR FOR INJURY TO ANY PERSON.

This warranty does not apply to products which have been subject to electrical or chemical damage due to improper use, accident, negligence, abuse or misuse or products which are damaged during shipment back to Flowline's factory or designated service center or are returned without the original casing on the products. Moreover, this warranty becomes

(continued next page)

immediately null and void if anyone other than service personnel authorized by Flowline attempts to repair the defective products.

Products which are thought to be defective must be shipped prepaid and insured to Flowline's factory or a designated service center (the identity and address of which will be provided upon request) within 30 days of the discovery of the defect. Such defective products must be accompanied by proof of the date of purchase.

THERE ARE NO WARRANTIES WHICH EXTEND **BEYOND THE DESCRIPTION ON THE FACE OF THIS** WARRANTY. This warranty and the obligations and liabilities of Flowline under it are exclusive and instead of, and the original purchaser hereby waives, all other remedies, warranties, guarantees or liabilities, express or implied. EXCLUDED FROM THIS WARRANTY IS THE IMPLIED WARRANTY OF FITNESS OF THE PRODUCTS FOR A PARTICULAR PURPOSE OR USE AND THE IMPLIED WARRANTY OF MERCHANTABILITY OF THE PRODUCTS.

This warranty may not be extended, altered or varied except by a written instrument signed by a duly-authorized officer of Flowline, Inc.

Warranty Service and Repair:

To register your product with the manufacturer, fill out the enclosed warranty card and return it immediately to:

Flowline Inc.
3010 Old Ranch Parkway, Suite 250
Seal Beach, CA 90740-2750.

If for some reason your product must be returned for factory service, **contact Flowline Inc. to receive a Return Material Authorization number (RMA#) first,** providing the following information:

1. Part Number, Serial Number
2. Name and telephone number of someone who can answer technical questions related to the product and its application.
3. Return Shipping Address
4. Brief Description of the Symptom
5. Brief Description of the Application

Once you have received a Return Material Authorization number, ship the product prepaid in its original packing to:

Flowline Inc.
Factory Service Dept.
1178 E. Valencia Dr.
Fullerton, CA 92631

To avoid delays in processing your repair, write the RMA# on the shipping label. Please include the information about the malfunction with your product. This information enables our service technicians to process your repair order as quickly as possible.

FLOWLINE

Addendum to Owner's Manual

Version 1.0
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Part # LP900003

FLOWLINE
3010 Old Ranch Parkway, Box 250
Seal Beach, CA 90740-2750
(310) 598-3015 / Fax (310) 431-8507

Flowline's new FET Switching output:

All Flowline DC powered sensors now come standard with Flowline's unique FET (Field Effect Transistor) output.

The following are updates to your present manual which reflect these new features.

Specifications:

FET switch rating:	36V, 0.1 Amps maximum
FET switch polarity:	Normally closed (dry) if power is wired + to red, - to

Electrical Installation

FET switching allows the sensor to switch a small current or voltage on or off directly, using all three wires. Model LXXX-XXX2 is an NPN type switch, which switches the negative side of the load; model LXXX-XXX3 is a PNP type switch for applications where the switch must be on the positive side of the load. In both FET models, the normally-open/normally-closed status is set by the polarity of the voltage feeding the red and black wires, and the white wire connects to the load.

Wiring direct to a load, Normally Closed operation:

LXXX-XXX2 (NPN model) only:

1. Connect the red wire to the positive (+) terminal of a 12 to 36 VDC sensor power supply, and the black wire to the negative (-) terminal.

2. Connect the white wire to the negative side of the load (maximum load 0.1 amps).

3. Connect the positive side of the load directly to its (+) power supply.

4. Connect the negative terminals of the two power supplies. (See illustration)

This method will turn the load off when the sensor is wet, by cutting the negative supply to the load.

Wiring direct to a load, Normally Closed operation:

LXXX-XXX3 (PNP model) only:

1. Connect the red wire to the positive (+) terminal of a 12 to 36 VDC sensor power supply, and the black wire to the negative (-) terminal.

2. Connect the white wire to the positive side of the load (maximum
load 0.1 amps).

3. Connect the negative side of the load directly to its (-) power supply.

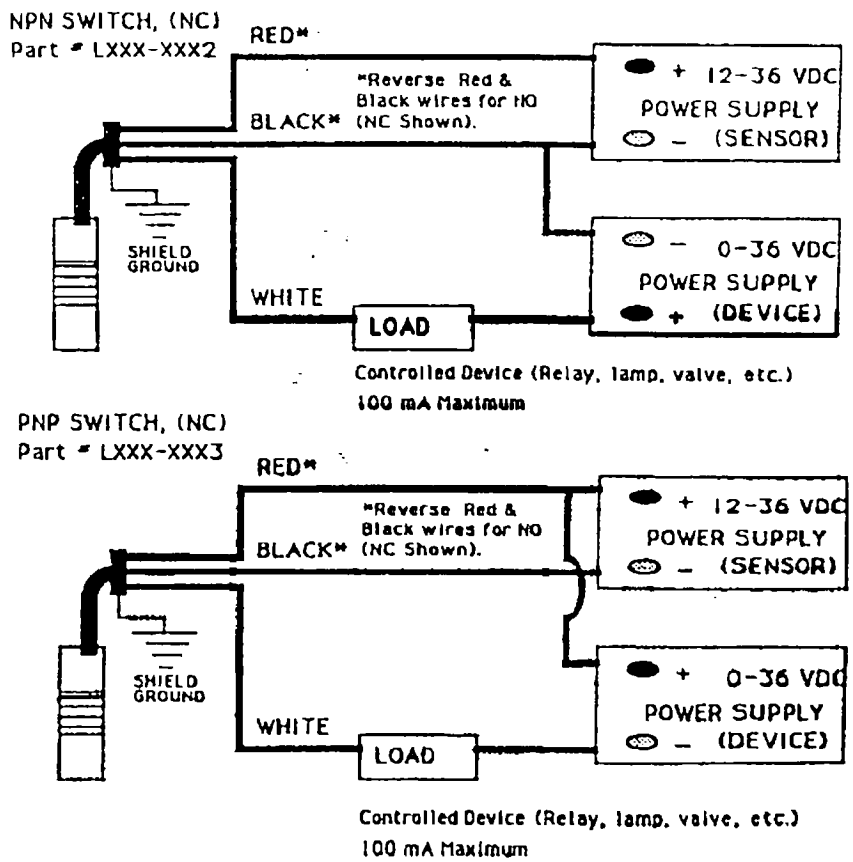
4. Connect the positive terminals of the two power supplies. (See illustration)

This method will turn the load off when the sensor is wet, by cutting the positive supply to the load.

Wiring direct to load, Normally Open operation:

LXXX-XXX2 and -XXX3 (FET models) only:

This is the same as the wiring for Normally Closed operation, except the polarity of the red and black connections to the sensor is reversed. Connect the red sensor wire to the negative (-) terminal of its supply, and the black wire to the positive (+) terminal. Other connections remain the same; the sensor and device power supplies remain tied in the same polarity as before.



Ultrasonic Level Switch

Features

- ☑ Reliable level detection of light to medium coating or scaling type liquids
- ☑ Offered in general purpose or intrinsically safe configurations
- ☑ All plastic construction with PP or PFA materials for corrosive environments
- ☑ Probe and cable rated IP68 or NEMA 6 for submersible operation in tanks and sumps
- ☑ Reliable FET switch output for interface with PLC or relay control devices
- ☑ Selectable normally open or closed output states

Specifications

Accuracy:	± 1 mm in water
Repeatability:	± .5 mm in water
Frequency:	1.5 MHz.
Supply voltage:	12-36 VDC
Consumption:	**Dry:** 5 mA Wet: 19 mA
FET switch voltage:	36 VDC max.
FET switch current:	100 mA max.
FET switch output:	Selectable NO or NC states
Temperature range:	F: -40°to 194° C: -40° to 90°
Pressure range:	150 psi (10 bar) @ 25°C., derated @ 1.667 psi (.113 bar) per °C. above 25° C.
Probe material:	PP or PFA
Probe rating:	NEMA 6/IP68
Mounting threads:	3/4" NPT
Cable type:	8 ft., 3-wire, 22 gauge with ground, shield & PP or PFA jacket
Certificate number:	LR 79326-4

Application

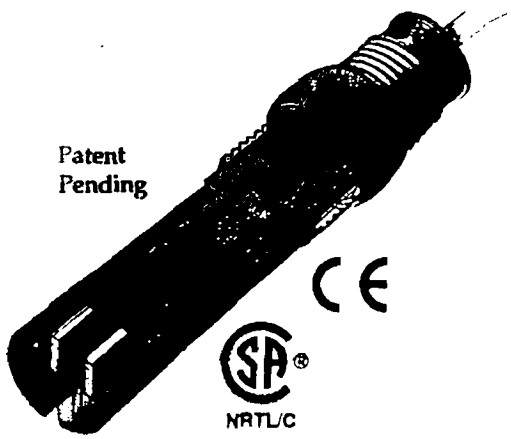
Industrial liquid examples include printing ink, lubricating oil and paint

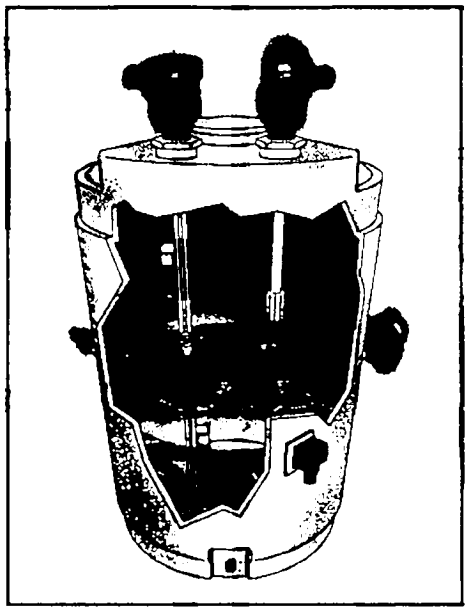
	Variable	Yes	No
Liquid	Foam	✔	
	Bubbles		✔
	Conductive	✔	
	Non-conductive	✔	
	Translucent	✔	
	Opaque	✔	
	Clean	✔	
	Dirty	✔	
	Turbulent	✔	
	Non-coating	✔	
	Light coating	✔	
	Medium coating	✔	
	Heavy coating		✔
Tank	Metallic	✔	
	Non-metallic	✔	
	Hazardous*	✔	

**Intrinsically safe configuration*

Technology

Two piezoelectric crystals are separated by an air gap in the fork shaped tip of the probe. One crystal vibrates at a nominal frequency of 1.5 MHz. and transmits an acoustic signal into the center of the gap. As the probe tip becomes immersed in liquid, the crystals acoustically couple and the FET switch changes state.

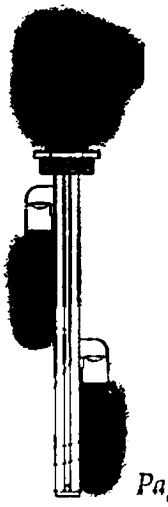




Packages

The switch is also available in the following packages.

Smart Trak



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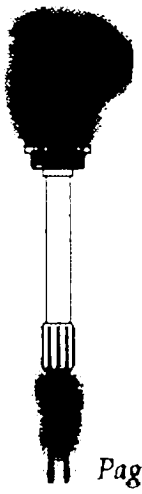
Switch Pak



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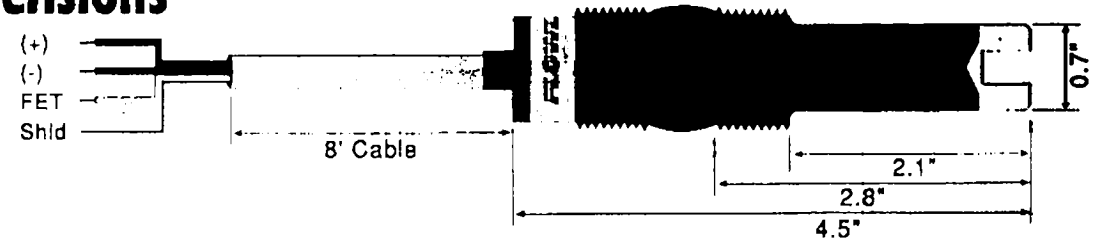
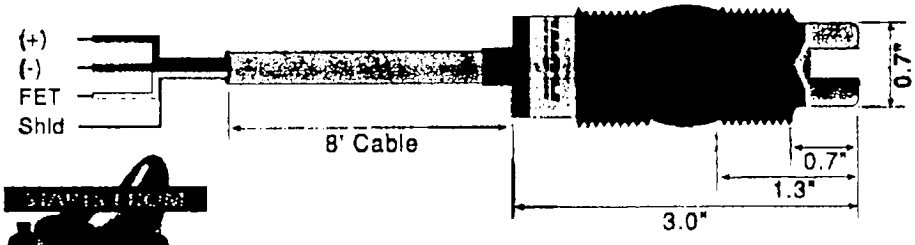
Wiring and Dimensions





Ordering Information

Part Number	Select the Length, Material and Output Description [1] [2]	Length	Material	Output	Price From
LU10-1302	Ultrasonic Switch	Short	PP	FET (N-Channel)	$250.00
LU10-1303	Ultrasonic Switch	Short	PP	FET (P-Channel)	$250.00
LU10-2302	Ultrasonic Switch	Short	PFA	FET (N-Channel)	$350.00
LU10-2303	Ultrasonic Switch	Short	PFA	FET (P-Channel)	$350.00
LU10-1402	Ultrasonic Switch	Long	PP	FET (N-Channel)	$260.00
LU10-1403	Ultrasonic Switch	Long	PP	FET (P-Channel)	$260.00
LU10-2402	Ultrasonic Switch	Long	PFA	FET (N-Channel)	$360.00
LU10-2403	Ultrasonic Switch	Long	PFA	FET (P-Channel)	$360.00

[1] Intrinsically safe models add $30.00. Weather resistant models add $30.00. Explosion proof models add $200.00. CSA approved models add $40.00.

[2] Includes 8' integral cable. Prices are based on the general purpose switch configuration. To order the CSA approved intrinsically safe configuration, place CSA at the end of the part number (example: LU10-1302-CSA) and add $40.00. The intrinsically safe switch is rated for use in Class I, Groups A, B, C and D; Class II Groups E, F and G; Class III. To order the CE approved switch configuration, place CE at the end of the part number (example: LU10-1302-CE) and add $20.00. The CE approved configuration complies with EN50081-2(1992) emission and EN50082-2 (1995) immunity standards.

FLOWLINE®

Din Rail and Panel Mount Isolation Controller LC90 Series

Owner's Manual

Version 1.0
Manual # LC900010
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Unpacking and Inspection:

The following items are included in this package:

- One LC90, LC91, or LC92 controller
- Instruction Manual
- Warranty Card

Please fill out and return the warranty card immediately to Flowline, Inc.

Part Number Information:

Part #	Description
LC90-1001	One sensor input, one relay
LC91-1001	Two sensor inputs, one relay
LC92-1001	Three sensor inputs, two relays

LR79326-4

Associated Equipement/Appareillage Connexe [Exia]

Outputs suitable for use in Hazardous Locations:

Class I Groups A, B, C & D
Class II Groups E, F and G
Class III

Entity Parameters:

V_{oc} = 17.47 VDC
I_{sc} = 0.4597 A
C_a = 0.494 µF
L_a = 0.119 mH

Volt/Ohm Parameters:

17.5 V 40 Ohms

Power rating: 5.0 Watts max.

See Instruction Manual for Installation Information

Warning: substitution of components may impair Intrinsic Safety

Avertissement: la substitution de composants peut compromettre le Securite Intrinseque

Controller must be installed per drawing LCD1

P/N: XXXX-XXXX
S/N: XXXXXX

Safety Precautions

About This Manual:

PLEASE READ THE ENTIRE MANUAL PRIOR TO INSTALLING OR USING THIS PRODUCT. This manual includes information on three different models of DIN and Panel Mount Isolation Controllers from Flowline. Many aspects of installation and use are similar between the three models. Where they differ, the manual will note it. Please refer to the part number on the controller you have purchased as you read.

User's Responsibility for Safety:

Flowline manufactures several controller models, in different mounting and switching configurations. It is the user's responsibility to select a controller model that is appropriate for the application, install it properly, perform tests of the installed system, and maintain all components. The symbol on the left appears in the manual to call special attention to instructions that affect the safe installation and use of the product.

Safety Precautions

Improper installation, modification, or use of the LC90 in an installation requiring intrinsically safe equipement may cause property damage, bodily injury or death. Flowline, Inc. will not be responsible for any liability claims due to improper installation, modification, repair or use of the LC90 series by other parties.

Electrical Shock Hazard:

It is possible to contact components on the controller that carry high voltage, causing serious injury or death. **All power to the controller and the relay circuit(s) it controls should be turned OFF prior to working on the controller. If it is necessary to make adjustments during powered operation, use extreme caution and use only insulated tools.**

The symbol on the left appears in the manual next to passages that affect the safe electrical operation of this product. Wiring should be performed by qualified personnel in accordance with all applicable national, state, and local electrical codes.

Install In a Dry Location:

The controller housing is not designed to be immersed. It should be mounted in such a way that it does not come into contact with liquid. Its case is made out of PP (polypropylene). Refer to an industry reference such as the Compass Corrosion Guide to ensure that compounds that may splash onto the controller housing will not damage it. Such damage is not covered by the warranty.

Relay Contact Rating:

The relay is rated for a **10 amp** resistive load. Many loads (such as a motor during startup or incandescent lights) may have an inrush current characteristic that may be 10 to 20 times their steady-state load rating. The use of a contact protection circuit or a stepper relay may be necessary for your installation if the 10 amp rating does not provide an ample margin for such inrush currents.

Safety Precautions

Make a Fail-Safe System:

Design a fail-safe system that accommodates the possibility of relay or power failure. If power is cut off to the controller, it will de-energize the relay. Make sure that the de-energized state of the relay is the safe state in your process. For example, if controller power is lost, a pump filling a tank will turn OFF if it is connected to the Normally Open side of the relay.

While the internal relay is reliable, over the course of time relay failure is possible in two modes: under a heavy load the contacts may be "welded" or stuck into the energized position, or corrosion may build up on a contact so that it will not complete the circuit when it should. In critical applications, redundant back-up systems and alarms must be used in addition to the primary system. Such back-up systems should use different sensor technologies where possible.

While this manual offers some examples and suggestions to help explain the operation of Flowline products, such examples are for information only and are not intended as a complete guide to installing any specific system.

Specifications

Voltage Rating:	Selectable, 120 or 240 volts AC, 50-60 Hz, 5 Watts
Max. current consumption:	.25 amps
Relay output:	Isolated single pole double throw (SPDT) relay, Form C
Switching mode:	Selectable, NO or NC
Relay Rating:	250 VAC, 10 Amps, 1/2 hp

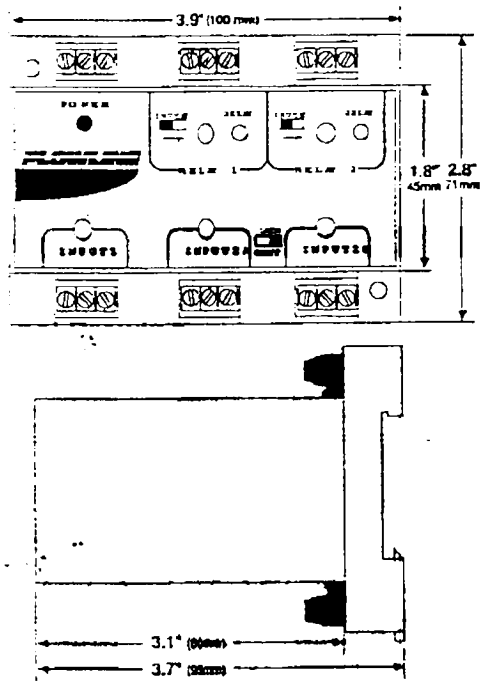
Provides intrinsically safe outputs with entity parameters per channel when installed in accordance with drawing No. LCD1 as follows:

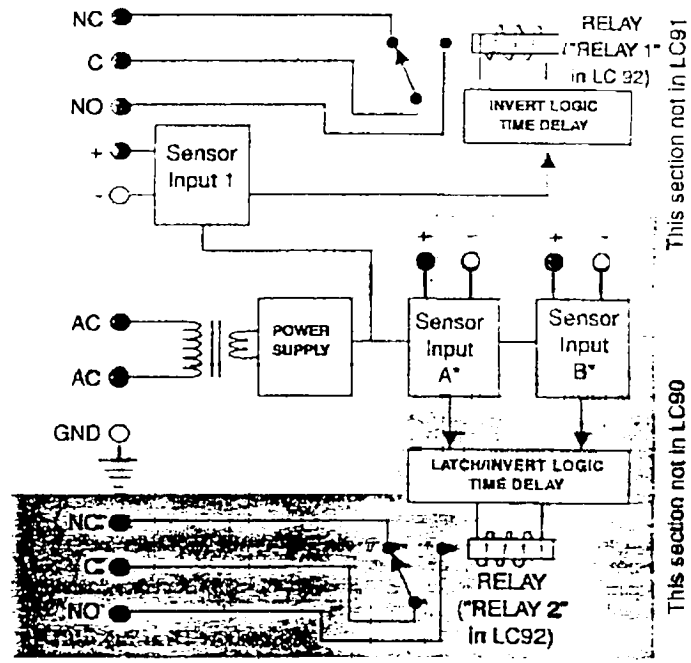
	V_{oc} = 17.47 VDC
	I_{sc} = 0.4597A
	C_a = 0.494 µf
	L_a = 0.119mH
Contact resistance	30 milliohms initially (at rated current voltage drop method)
Time delay:	Adjustable from 0.15 to 60 seconds
Sensor voltage supply:	Nominal 13.5 volts DC, 27 mA maximum
Sensor trigger point:	11 to 13 mA
Enclosure mounting:	EN 50 022 standard 35 mm DIN rail, or panel mount
Enclosure material:	Polypropylene, flame retardant (U.L. 94VO)
Dimensions:	100mm x 70mm x 85mm(3.9" x 2.8" x 3.7"). See drawing p. 12.

For U.L. or other agency-approved ratings, contact Flowline Inc. or your distributor.

Specifications

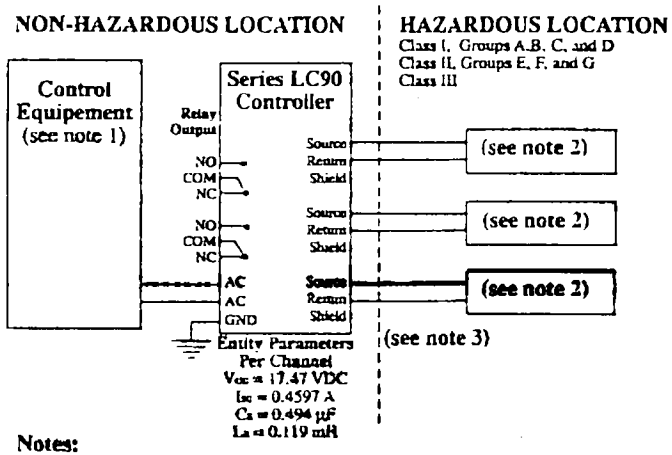
Dimensional Drawing





*Labeled "INPUT 1A, 1B" in LC91; "INPUT 2A, 2B" in LC92

Specifications



Notes:

1. Control equipment connected to series LC90 controller must not use or generated more than 250V.
2. CSA certified equipment with entity parameters connected in accordance with manufactures instructions or switches, thermocouples, LEDs, or RTDs.
3. Sepafation must be maintained between wiring of separate channels.
4. Installation should be in accordance with CEC Part I.

Controller Drawing: LCD1
Rev. No Change 6-13-94

Introduction

DIN Rail and Panel Mount controllers

The Flowline LC90 series of DIN rail and panel mount controllers is designed for use with standard DC-powered liquid sensors. There are three different models in the series:

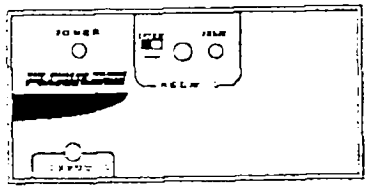
- **LC90-1001:** One input, one relay: a single point switch typically used for high/low level alarms
- **LC91-1001:** Two inputs, one relay: with a latching capability allowing an automatic fill or automatic empty operation
- **LC92-1001: Three inputs, two relays: both of the above combined in one housing**

All are similar in that they receive signals from one or more liquid sensors, indicating whether the sensor is wet or dry. In response, the controller turns one or more controlled devices (such as valves, pumps, or alarms) on or off, depending on the logic of the system.

The controller is typically mounted on a panel or DIN rail system at some distance from the sensors themselves. A system may consists of many different controllers receiving signals from different sensors and controlling a variety of processes.

Introduction

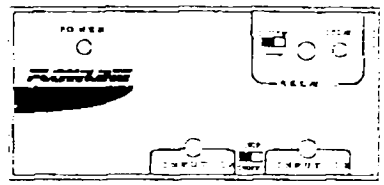
Features of the LC90 Single Input Controller



The Flowline LC90-1001 controller is designed to receive a signal from a single liquid sensor. It turns its internal relay ON (or OFF, as set by the invert switch) in response to the presence of liquid, and changes the relay status back again when the sensor is dry. The relay is a single pole, double throw type; the controlled device can be connected to either the normally open or normally closed side of the relay. A time delay from 0.15 to 60 seconds can be set before the relay responds to the sensor input.

Typical applications for a single input controller are high level or low level switch/alarm operations (opening a drain valve whenever liquid level rises to a sensor point, sounding an alarm when a leak is detected, etc.).

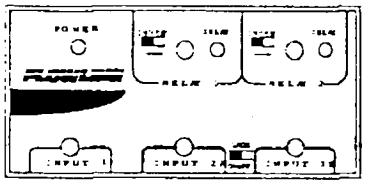
Features of the LC91 Dual Input Controller



The Flowline LC91-1001 controller has all the features of the LC90, plus a second sensor input for a latching capability. The inputs are labeled "1A" and "1B". When LATCH is OFF, the relay will be energized in response to input A alone, just like the single input controllers. When LATCH is ON, it will change and hold the relay in the energized or de-energized state only when **both** inputs sense the same condition (for example, both dry = pump ON, **both wet** = pump OFF). With this feature, the LC91 can control an automatic fill or empty operation.

Introduction

Features of the LC92 Two Relay, Three Input Controller



The Flowline LC92-1001 controller combines an LC90 and an LC91 in the same housing. This provides a latching automatic fill or automatic empty operation controlled by two sensors, with an **additional high level or low level switch/alarm responding to a third sensor.**

Guide to Controls

WARNING: Hazardous voltages are present at the terminal strips and within the controller housing. **Turn off all power to the controller and controlled device(s) before installation or servicing.**

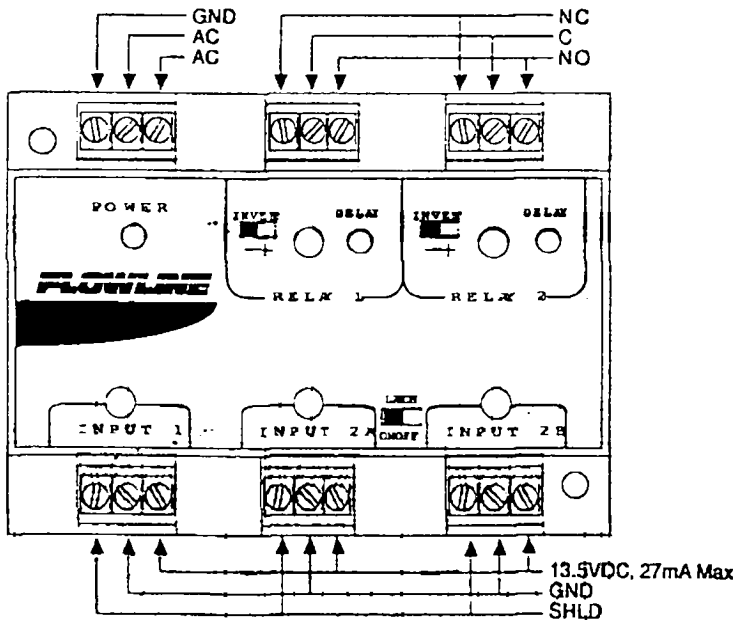
Power indicator: This green LED lights when AC power is ON.

Relay indicator: This red LED will light whenever the controller energizes the relay, in response to the proper condition at the sensor input(s) and after the time delay.

Relay 2 indicator (LC92 only): This red LED will light whenever the controller energizes the relay, in response to the proper condition at the sensor inputs and after the time delay.

AC Power terminals: Connect 120 VAC power to two of the terminals of this strip. The setting for voltage is marked under the terminal strip and may be changed to 240 VAC if desired (see p. 31). Polarity (neutral and hot) does not matter. Connect any ground wire to the GND terminal on the strip.

Guide to Controls



Relay terminals (NC, C, NO): Connect the device you wish to control (pump, alarm etc.) to these terminals: supply to the C (COM) terminal, and the device to the NO (normally open) or NC (normally closed) terminal as required. The switched device should be a noninductive load of not more than 10 amps; for reactive loads the current must be derated or protection circuits used. When the Red LED is ON and the relay is in the energized state, the NO terminal will be closed (connected to C) and the NC terminal will be open.

Time Delay: After the input(s) change(s) state, this control sets a delay from 0.15 to 60 seconds before the relay will respond. This keeps the controller from responding to temporary conditions (splashing, foaming etc.), or allows time for other processes to take place before the relay opens or closes. Use a small insulated screwdriver to make the adjustment. Turn full counter-clockwise for no delay and full clockwise for maximum delay.

Guide to Controls

Input indicator(s): The bi-color LED(s) will light Orange whenever the sensor attached to the corresponding sensor terminals detects liquid, and will turn Green when it is dry. If the wiring in the sensor loop is disconnected, the LED will be off. The input electronics are current sensing; the LED will be off if current is less than 3.5 mA, Green from 3.5 mA to 12 mA, and Orange above 12 mA.

Invert switch(es): This switch reverses the logic of the relay control in response to **the sensor(s): conditions that used to** energize the relay will make it turn off and vice versa. INVERT is ON in the "+" position (to the right). INVERT is OFF in the "-" position (to the left).

In the single input controllers, when INVERT is OFF the RELAY LED status will match that of the INPUT LED; when the input is Orange (typically, when the sensor is wet), the relay is energized. When INVERT is ON, the relationship between the input and the relay is reversed: the relay is energized when the sensor INPUT LED is Green (dry).

The operation of INVERT in the dual input controllers is shown in the chart on the next page.

Latch switch (LC91 and 92 only): This switch determines how the relay will be energized in response to the two sensor inputs designated A and B. When LATCH is OFF, the relay responds to the "A" input only; when LATCH is ON, the relay will turn on or off only when both sensors (A and B) are in the same condition (wet or dry). The relay **will remain latched until both sensors change states.**

For example: When both A & B inputs are wet (INPUT LEDs orange), the relay will be energized (Red LED on) after the adjustable time delay. After that, if one sensor becomes dry, the relay will remain energized. Only when both A and B sensors become dry (both INPUT LEDs green) will the controller de-energize the relay. The relay will not energize again until both sensors are wet.

Note that in the LC92, LATCH affects RELAY 2 only.

Logic Tables for two-input relay status

(LC91 and LC92 Only)

Invert Off, Latch Off:

INPUT A	INPUT B	RELAY
ON	No Effect	ON
OFF	No Effect	OFF

INVERT ON, Latch Off:

INPUT A	INPUT B	RELAY
ON	No Effect	OFF
OFF	No Effect	ON

Invert Off, LATCH ON:

INPUT A	INPUT B	RELAY
ON	ON	ON
OFF	ON	No Change
ON	OFF	No Change
OFF	OFF	OFF

INVERT ON, LATCH ON:

INPUT A	INPUT B	RELAY
ON	ON	OFF
OFF	ON	No Change
ON	OFF	No Change
OFF	OFF	ON

Input terminals: Connect the wiring from the sensors to these terminals. Note the polarity: "+" is a 13.5 VDC power supply (to be connected to the Red wire of a Flowline sensor), and "-" is the return path from the sensor (to be connected to the black wire of a Flowline sensor). If polarity is reversed, the sensors will not work.

Relay (not shown): Inside the housing, the relay itself is a plug-in type designed for easy field replacement if necessary.

Input power jumpers (not shown): On the internal PCB are jumpers allowing the input AC voltage to be changed from 120 VAC to 240 VAC. (See p. 31)

Installation

All power to the system must be off before installing the controller.

Step One: Mount the base on a DIN rail or panel

The following procedure should be used when mounting the controller on an approved 35 mm DIN rail compatible with the EN 50 022 standard.

Hang the top groove in the base on the top of the rail while the bottom is slightly away from the rail. Pull the unit down until the latch catches behind the bottom of the rail.

Panel mounting

Hold the controller in the desired position and make a mark through the two mounting holes (upper left and lower right). Remove the controller and drill pilot holes as required. Screw the controller to the panel, using a screw no larger than .16" diameter and an appropriate washer as required.

Step Two: Connect the sensor input wires

Note: Wires leading to sensors in hazardous areas must be installed in accordance with national and local codes, using required methods to separate the hazardous area where the sensor is installed from the non-hazardous area where the controller is installed.

The following instructions assume the sensor has already been properly installed, with a length of wire approaching the controller.

1. Using a 10 gauge wire stripper, strip the white outer layer of insulation from the last 1-1/4" of the sensor wire. Trim off and discard the exposed foil shield flush with the insulation jacket. The shield wire may be attached to a grounding terminal, or trimmed off flush with the insulation as well.

2. Using a 20 gauge wire stripper, strip the last 2/10" of insulation from the Red and Black signal wires.

3. Using a small screwdriver, loosen the small terminal screws. Check your system design to see which inputs each sensor should be connected to. Insert the Red wire into the "+"

terminal on the side of the terminal strip, and tighten its terminal screw. Attach the Black wire to the "-" terminal in the same way. Connect other sensor wires to the other inputs if the installation requires it. The White wire on the Flowline sensors (models LP10, LP50, LU10 & LO10) will not be used with the LC90 series of controllers.

If the installation requires wiring other devices in series with the sensor, they must present a very low resistance for proper operation. **The total resistance including wire should be less than** 60 ohms. **Such other devices must also be rated intrinsically safe.**

Step Three: Connect the controlled device(s) to the relay(s)

The controlled device must have its own power connection and neutral; the controller relay merely serves as a switch on the hot lead in the circuit.

Before making connections, make sure all power to the controller and to all controlled devices (motor, valve, alarm etc.) is OFF with a safety lockout on the circuit breaker.

1. Strip 2/10" of insulation from the ends of the two wires. If it is a two-relay unit, check the system design to see which device connects to which relay.

2. Loosen the terminal screws (C, NC, or NO).

3. Insert the hot (supply) wire (usually Black) to the C terminal of the RELAY block. Insert the switched lead (connecting to the motor or alarm, etc., usually colored) to **either the NO or NC terminal, as required for your installation** (see "Design a Fail-Safe System" in Safety Precautions). **Do not connect any device or supply to the unused terminal** unless you are sure that doing so will not cause an overvoltage situation in case of relay failure.

4. Tighten the terminal screws.

NOTE: In some cases, additional user-provided components may need to be attached to the relay terminals. See "About Relay Loads" on page 33.

Step Four: Connect the AC power

Warning: The input AC power to the controller should not exceed 120 or 240 VAC, as specified. All wiring must be performed by qualified personnel in accordance with applicable national and local electrical codes, in addition to recommendations by Underwriter's Laboratories and other agencies. **All connections must be made with power off, and a safety lockout at the circuit breaker.**

1. Strip 2/10" of insulation from the ends of the incoming AC power wires.

2. Insert the bare ends of the wires into the two AC terminals. Polarity does not matter. If there is a Green safety ground wire, it may be connected to the GND terminal.

3. Tighten the terminal screws.

120/240 VAC setting

WARNING: Alterations or improper repair of the LC90 series could compromise its rating for intrinsically safe applications and create a danger to life and property. Only persons familiar with intrinsically safe design should preform the following proceedure.

If it is necessary to change the input AC voltage of the controller from the factory setting of 120 VAC to 240 VAC, follow this **procedure:**

1. **If the controller has already been installed, turn off all AC power to the controller and controlled device.** Remove the controller from the panel or rail. Disconnect the AC, relay, and sensor input cables. Place the unit bottom down on a table. **Make sure the sensor cables do not contact any live circuit by taping the ends with insulating tape.** Place the unit bottom down an a table.

2. Remove the two Philips head screws from the back of the base that hold the housing to the base. Remove the base.

3. The two circuit cards are in tracks in the housing. Gently slide them both out, while holding the housing down if necessary. You may need to tip the housing toward you and press gently on the switches on the front panel. Do not disconnect or break the wire loom that attaches the two cards. Turn one card over so they both lie flat on the table, not on each other.

4. Towards the bottom of the circuit card that holds the power transformer **are two black jumpers (labeled JWB and JWC** on the circuit card). Remove both jumpers.

5. For 240 VAC operation, place one of the jumpers across the pins marked JWA only. The other jumper is not used.

For 120 VAC operation, the jumpers should be across JWB and JWC.

6. **For reinstallation,** slide the circuit cards back into the tracks in the housing. Make sure the cards are in the right alignment (the relay and AC terminals should be on the top) and are in the tracks, with the proper controls facing the openings at the front of the housing. Reverse steps 1-3 above.

About relay loads and protection circuits

The relay in the controller is rated for a noninductive load without a startup surge. Other types of load may be connected to the relay if a proper protection circuit is used to minimize arcing and the effects of inrush currents on the relay. This typically involves placing user-provided components (capacitator, resistor, diode, varistor, etc.) across the load or switch. Refer to an industry reference or to the manual of the controlled device for more information about such circuits.

Operation

Testing

1. If possible, turn OFF AC power to the controlled device (motor, alarm circuit). Turn ON AC power to the controller at the switch or circuit breaker. The Green Power LED should light.

2. Immerse the sensor(s). The INPUT LED(s) should turn turn from Green to Orange immediately when liquid is sensed.

3. Turn the TIME DELAY pot full counterclockwise for immediate response from the relay. Depending on the setting of the INVERT switch (and the LATCH switch if applicable), the red relay LED should come on at the desired sensor conditions. You can hear a slight click when the relay is turned on and off.

4. Turn on power to the controlled device (motor, etc.) and test to make sure that the relay circuit performs as expected.

Maintenance

Flowline controllers require no periodic maintenance except cleaning as required. The longevity of the internal relays depend upon the frequency of use and the relay load.

Testing sensor inputs

If the controller is not responding to a sensor, a simple test will allow you to determine whether the sensor or the controller is at fault. Disconnect any sensors from the controller; the INPUT LED should turn OFF. **Connect the two sensor terminals with a** jumper wire to see if the INPUT LED turns Orange. If it doesn't, the fault must lie with the controller.

Application Examples

The following examples are offered to help you understand the basic principles behind the installation and operation of the controllers. Your installation may vary.

Warning: Any system should be designed by qualified personnel and should include active and passive fail-safe backup systems (such as overflow tubes, etc.) as needed. Any applications that can cause damage to persons or property must use redundant measurement and control points. Secondary systems **should use a sensing technology that is different from the primary** system but still compatible with the application liquid in order to provide that added safety of different failure modes. Such backup systems are not shown in the following examples for clarity.

The relay is a single pole, double throw type. The two terminals NO and NC (normally open and normally closed) will be used in different applications. Remember that the "normal" state is when the relay coil is de-energized and the red relay LED is OFF. To avoid confusion, we use "energized" and "de-energized" to describe the state of the relay instead of "ON" and "OFF". This is because the relay may be energized to turn OFF a device attached to its NC terminal.

Low-Level Alarm (LC90)

The goal is to make sure that the liquid level does not fall below a certain point. If it does, an alarm is supposed to sound, alerting the operator of a low-level condition.

A sensor is installed "outside-in" through the tank wall using a standard 3/4" NPT tank fitting. The controller is mounted on a panel nearby.

Connecting to the proper relay terminal

If power is accidentally cut to the controller, the sensor's ability to notify the operator of a low-level condition could be lost. The system must alert the operator not only to low fluid level, but to controller power loss.

To do this, connect the hot lead of the alarm to the NC (Normally Closed) side of the relay terminal of the controller. If power is lost, the relay will be de-energized, and the alarm will sound (if there is still power to the alarm circuit itself). The alarm circuit should have a non-interruptible power supply or some other indicator or back-up alarm to warn of a power failure in the alarm circuit.

Setting the INVERT switch

In this application, the normal status of the sensor at the bottom of the tank will be wet, and the relay will be energized holding the alarm circuit open. Both the red relay LED and orange input LED will be on simultaneously, so for this application, INVERT should be set to the OFF position.

High Level Alarm

In the same manner, a sensor and controller can be used to sound an alarm when fluid reaches a high level, with just a change in the location of the sensor and the setting of the INVERT switch.

- The alarm is still connected to the NC side of the relay to allow for a power failure alarm.

- The sensor is normally dry. In this dry condition, we want the relay to be energized so the alarm does not sound: i.e., the red relay LED should be on whenever the Input LED is Orange. So we turn INVERT ON. If the fluid level rises to the high sensor point, the sensor goes on, the relay de-energizes, and the alarm sounds.

Automatic Fill or Automatic Empty Operation (LC91, 92)

This application uses two sensors as inputs to a controller, to control the filling of a tank. Note that typically other components, not under control of the controller are involved, such as mixers, heaters, valves, drains etc. Your application will probably differ, but the principles should be similar.

Automatic Fill

This system consists of a tank with a high level sensor, a low level sensor, and a pump that is controlled by the controller. When the pump is on, it pumps fluid from an outside source into the tank, making this an *active fill* operation in which the tank will not overflow if power is lost to the pump.

Application Examples

Connecting the pump to the proper relay terminal

Part of a proper fail-safe design for this particular system is that if power is lost to the controller for any reason, the pump filling the tank must be turned off. Therefore, we connect the pump to the Normally Open side of the relay. When the relay is energized, the pump will turn on and fill the tank. The relay indicator will correspond directly to the on/off status of the pump.

NOTE: If the pump motor load exceeds the rating of the controller's relay, a stepper relay of **higher capacity must be used** as part of the system design.

Determining the settings of LATCH and INVERT

This is the way the system must operate:

- When both the high and low sensors are dry, the pump should turn ON, starting to fill the tank.
- When the low sensor gets wet, the pump should stay ON.
- When the high sensor gets wet, the pump should turn OFF.

LATCH: In any two-sensor control system, LATCH must be ON.

INVERT: Referring to the logic chart on p. 25, we look for the setting that will de-energize the relay (turn off the pump) when both inputs are wet (indicators on). In this system, INVERT should be ON.

Caution: Some sensors may have their own inverting capability, i.e., when they are wet they send an OFF signal. This will change the logic of the invert switch. Check your system design.

Determining A or B input connections

When LATCH is ON, there is no effective difference between Input A and B, since both sensors must have the same signal in order for status to change.

When wiring any two-input relay section, the only consideration for connecting a particular sensor to A or B is if LATCH will be OFF. In this example, the high sensor is the "trigger" that would be used to turn the pump on and off (since the lower sensor is more often immersed), so it would be typically connected to input A. In this case, the high sensor will still turn the pump on and off if desired (with INVERT ON, it will turn the pump OFF when liquid is sensed, and the moment it is dry it will turn the pump back on).

Application Examples

Automatic Empty

Note that a similar system logic can be used for an automatic empty operation simply by controlling a pump that pumps fluid out of the tank instead of into it. However, note the importance of fail-safe design. If the tank is being passively filled, and a pump must be used to actively empty it, a power failure to either the controller or the pump circuits will cause overflow.

Alternatively, an electrically-controlled drain valve could be used. In this case, the valve should be a type that will automatically open if power is lost: in other words, power must be used to hold it closed. The valve would be connected to the Normally Open side of the relay—if power is lost to the controller, the relay de-energizes, the valve loses the power that was holding it shut, and fluid will drain from the tank into some other safe containment until power is restored. In this system, whenever the Red relay LED of the controller is ON, the drain is closed, allowing fluid to rise.

In this case, INVERT should be ON: when both sensors are wet, the relay de-energizes, the switch to the valve opens, and the tank will drain.

Automatic Fill/Empty Operation with High Level Alarm (LC92 only)

This system is exactly like the previous one, except an additional sensor is mounted higher in the tank, and wired to Input 1, controlling Relay 1 whose NC terminal is wired to an alarm, and whose NO terminal acts as a secondary power cutoff to the pump. INVERT of Relay 1 is set to ON, so that the relay will be energized (holding the alarm relay open and keeping power to the pump) as long as the high level sensor stays dry. Under normal operating conditions, this sensor never gets wet, so it will only be activated if the system below it malfunctions. At this higher level, scaling and coating will not be a factor to cause sensor failure. Note that if power is lost to the controller, the pump will stop and the alarm will sound, even if the fluid level is not at the high sensor, because the pump is wired to the NO terminal of its relay and the alarm is wired to the NC terminal.

Note: that the alarm circuit and the pump loads and voltages must be of a type that will not cause an overvoltage condition inside the relay, to avoid relay failure.

Warranty

Flowline warrants to the original purchaser of its products that such products will be free from defects in material and workmanship under normal use and service for a period which is equal to the shorter of one year from the date of purchase of such products or two years from the date of manufacture of such products.

This warranty covers only those components of the products which are non-moving and not subject to normal wear. Moreover, products which are modified or altered, and electrical cables which are cut to length during installation are not covered by this warranty.

Flowline's obligation under this warranty is solely and exclusively limited to the repair or replacement, at Flowline's option, of the products (or components thereof) which Flowline's examination proves to its satisfaction to be defective. FLOWLINE SHALL HAVE NO OBLIGATION FOR CONSEQUENTIAL DAMAGES TO PERSONAL OR REAL PROPERTY, OR FOR INJURY TO ANY PERSON.

This warranty does not apply to products which have been subject to electrical or chemical damage due to improper use, accident, negligence, abuse or misuse. Abuse shall be assumed when indicated by electrical damage to relays, reed switches or other components. The warrenty does not apply to products which are damaged during shipment back to Flowline's factory or designated service center or are

returned without the original casing on the products. Moreover, this warranty becomes immediately null and void if anyone other than service personnel authorized by Flowline attempts to repair the defective products.

Products which are thought to be defective must be shipped prepaid and insured to Flowline's factory or a designated service center (the identity and address of which will be provided upon request) within 30 days of the discovery of the defect. Such defective products must be accompanied by proof of the date of purchase.

THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE OF THIS WARRANTY. This warranty and the obligations and liabilities of Flowline under it are exclusive and instead of, and the original purchaser hereby waives, all other remedies, warranties, guarantees or liabilities, express or implied. EXCLUDED FROM THIS WARRANTY IS THE IMPLIED WARRANTY OF FITNESS OF THE PRODUCTS FOR A PARTICULAR PURPOSE OR USE AND THE IMPLIED WARRANTY OF MERCHANTABILITY OF THE PRODUCTS.

This warranty may not be extended, altered or varied except by a written instrument signed by a duly-authorized officer of Flowline, Inc.

Warranty

Warranty Service and Repair:

To register your product with the manufacturer, fill out the enclosed warranty card and return it immediately to:

Flowline Inc.
3010 Old Ranch Parkway, Suite 400
Seal Beach, CA 90740-2750.

If for some reason your product must be returned for factory service, **contact Flowline Inc. to receive a Material Return Authorization number (MRA#) first,** providing the following information:

1. Part Number, Serial Number
2. Name and telephone number of someone who can answer technical questions related to the product and its application.
3. Return Shipping Address
4. Brief Description of the Symptom
5. Brief Description of the Application

Once you have received a Material Return Authorization number, ship the product prepaid in its original packing to:

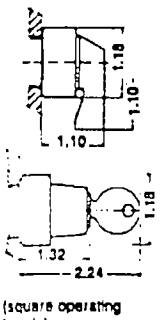
Flowline Inc.
Factory Service Dept.
1178 E. Valencia Dr.
Fullerton, CA 92631

To avoid delays in processing your repair, write the MRA# on the **shipping label. Please include the information about the malfunction** with your product. This information enables our service technicians to process your repair order as quickly as possible.

selector switches non-illuminated with 3 positions

22mm
miniature
oiltight & watertight

round operating heads
collar* chrome-plated ABS



(square operating heads)

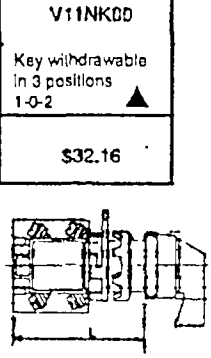
POSITIONS	Black knob handle**	Black lever handle**	Ronis key 1424 A or 455 withdrawable in position O
			key withdrawable in other positions on request
2x45°	V11MA03	V11MR03	V11NA00
	V11MB03	V11MS03	V11NB00
45°+ 45° with spring return	V11MC03	V11MT03	V11NC00
2x45° with ng return	V11MD03	V11MU03	V11ND00
2x90°	V11MK03	V11MW03	V11NK00
			Key withdrawable in 3 positions 1-0-2 ▲
LIST PRICE	$11.31	$12.08	$32.16

square operating heads
collar* black ABS

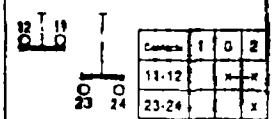
Black knob handle**	Black lever handle**	Ronis key 1424 A or 455 withdrawable in position O
		key withdrawable in other positions on request
REFERENCE	REFERENCE	REFERENCE
V42MA03	V42MR03	V42NA00
V42MB03	V42MS03	V42NB00
V42MC03	V42MT03	V42NC00
V42MD03	V42MU03	V42ND00
V42MK03	V42MW03	V42NE00
		Key withdrawable in 3 positions 1-0-2 ▲
$13.19	$13.19	$29.93

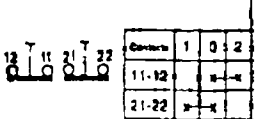
*collar, black ABS: reference V12 (instead of V11)
*collar, grey ABS: reference V13 (instead of V11)
*collar, chrome-plated brass: reference V14 (instead of V11)
From V11 to V14 add $3.34 List

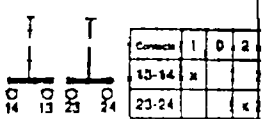
** handle, red: end of reference 01 (instead of 03)
** handle, grey: end of reference 08 (instead of 03)

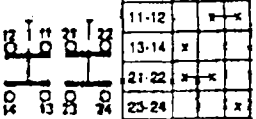


*collar, chrome-plated ABS: reference V41 (instead of V42)
*collar, grey ABS: reference V43 (instead of V42)
**handle, red: end of reference 01
**handle, grey: end of reference 08









	REFERENCE	REFERENCE	REFERENCE	REFERENCE
Screw and clamp terminals	M1AB1	M1AA1	M1BB1	M2CC1
S ...inals 1/4"	M1AB2	M1AA2	M1BB2	M2CC2
Dim...ions:	L = 2.0	L = 2.0	L = 2.0	L = 3.0

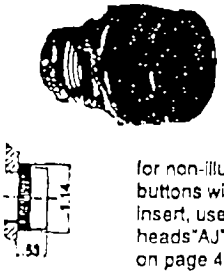
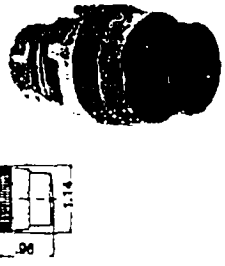
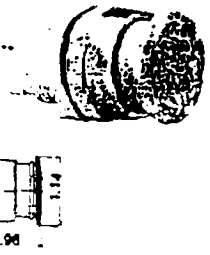
For different contact arrangements, please see page 76-82

SELECTOR SWITCHES From 4-12 Positions Available – see pages 90-93

For full details see BACO Rotary Cam Switch Catalog

22mm
miniature
oiltight & watertight
round operating heads
"push" function
collar* chrome-plated ABS

non-illuminated

	flush button		projecting button		mushroom-head button 29mm	
	 for non-illuminated buttons with legend insert, use the heads "AJ" on page 48					
COLOR	REFERENCE	LIST PRICE	REFERENCE	LIST PRICE	REFERENCE	LIST PRICE
Red	V11AA01	$6.21	V11AB01	$6.32	V11AC01	$8.87
Green	V11AA02	6.21	V11AB02	6.32	V11AC02	8.87
Black	V11AA03	6.21	V11AB03	6.32	V11AC03	8.87
Yellow	V11AA04	6.21	V11AB04	6.32	V11AC04	8.87
White	V11AA05	6.21	V11AB05	6.32		
Blue	V11AA06	6.21	V11AB06	6.32		
Orange	V11AA07	6.21	V11AB07	6.32		

* collar, black ABS: reference V12 (instead of V11)
* collar, grey ABS: reference V13 (instead of V11)
* collar, chrome-plated brass: reference V14 (instead of V11)
From V11 to V14 add $3.34 List

FOR DEEP SHROUD CHROME BRASS COLLAR on V11AA series specify V15
see also page 60 WA0202
For V15 add $8.66 List.

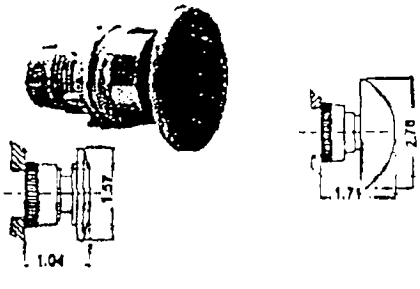
round operating heads
"pull" function
collar* chrome-plated ABS

for use with up to three contact blocks only

	mushroom-head button 40mm	N.B. these knobs have the following special feature: when operated by pulling, the electrical contacts work in the opposite direction the NC contact works as a NO contact the NO contact works as a NC contact however, to avoid errors of selection, we recommend the systematic use of 1NC+1NO or 2NC+2NO contact blocks.
COLOR	REFERENCE	LIST PRICE
Red	V11BD01	$15.08
Green	V11BD02	15.08
Black	V11BD03	15.08
Yellow	V11BD04	15.08

* collar, black ABS: reference V12 (instead of V11)
* collar, grey ABS: reference V13 (instead of V11)
* collar, chrome-plated brass: reference V14 (instead of V11)

mushroom-head button — "push" function



40mm		70mm (plastic)	
REFERENCE	LIST PRICE	REFERENCE	LIST PRICE
**V11AD01	$9.98	V11AE01	$21.95
V11AD02	9.98		
V11AD03	9.98	V11AE03	21.95
V11AD04	9.98	V11AE04	21.95
		Metallic Red V11AT01	42.13

**Available as "STOP-STOP-STOP," Add S to Ref. #.

ALLEN-BRADLEY
A ROCKWELL INTERNATIONAL COMPANY

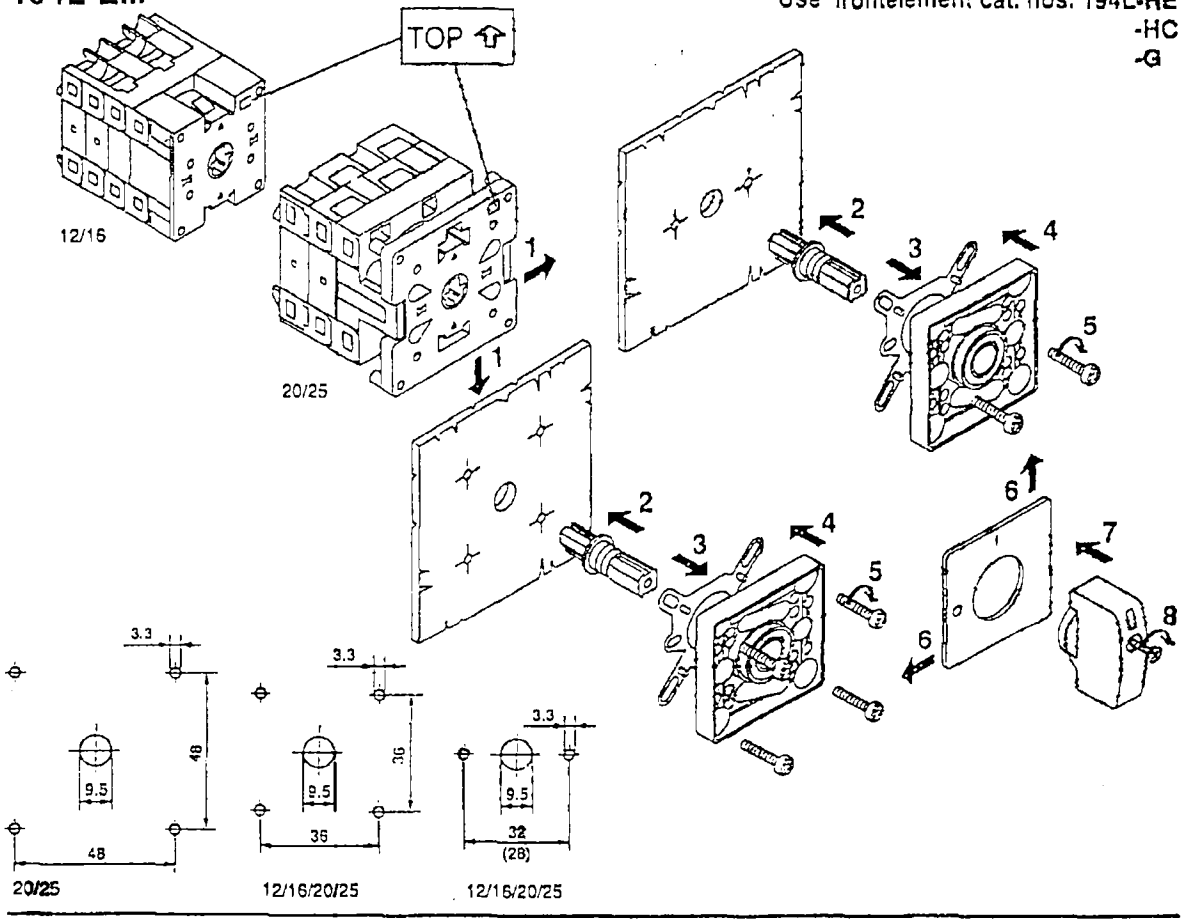
BULLETIN
194L

Montageanleitung
Mounting Instructions

Notice explicative de montage
Istruzioni di montaggio

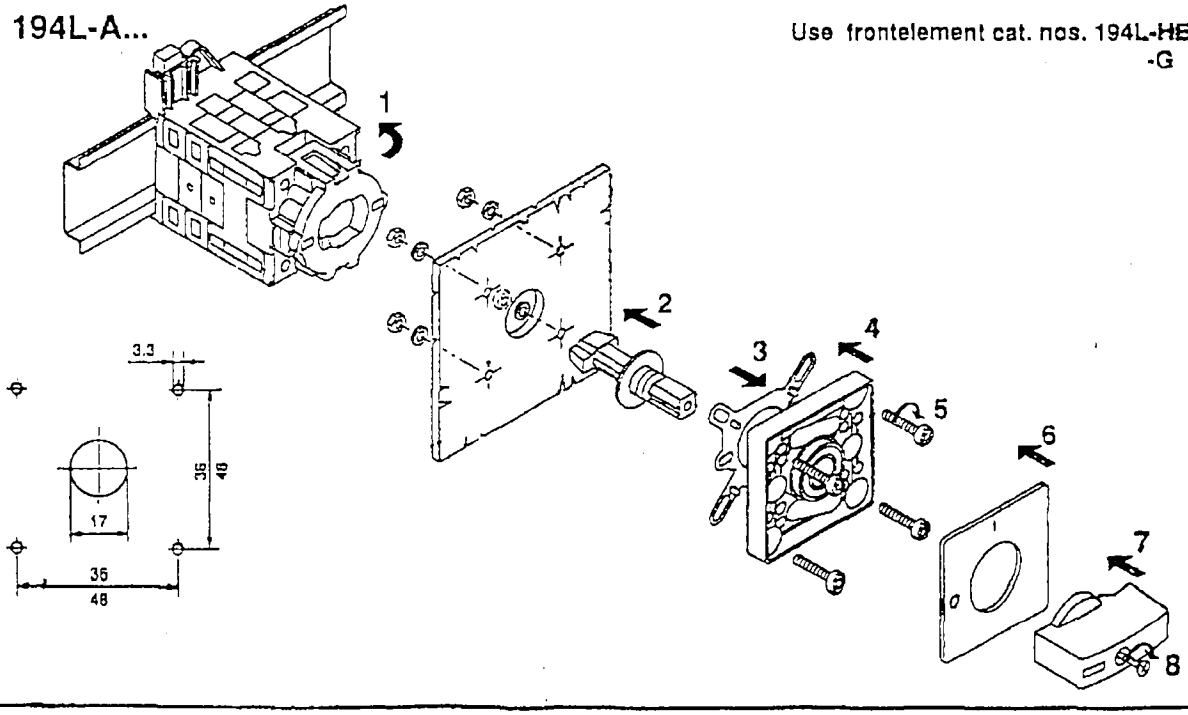
194L-E...

Use frontelement cat. nos. 194L-HE
-HC
-G



194L-A...

Use frontelement cat. nos. 194L-HE
-G



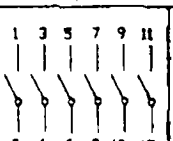
TYPE 194L	AC2 AC22A	IEC VDE BS	AC3 AC23				EEE 24	GENERAL USE	UL - CSA MOTOR STARTING					MAX FUSE *	These devices are suitable for use on a circuit capable of delivering not more then 5000 rms symmetrical amperes, 600V max. when protected by a * RK5 class fuse.	TORQUE	
-E12 -A12	660V 12A	UI 660V	V~ 220 380 500	kW 2.2 4 5.5			12 (8)A 500 Vac	12A 600 Vac	V~ 120 240 480 600	HP 1 2 5 5	3ph			25A		USE Cu WIRE 60/75°C ONLY	9 lb-in 1 Nm
-E16 -A16	660V 16A	UI 660V	V~ 220 380 500	kW 3 5.5 7.5			16 (10)A 500 Vac	16A 600 Vac	V~ 120 240 480 600	HP 1.5 3 7.5 7.5	3ph			30A			
-E20 -A20	660V 20A	UI 660V	V~ 220 380 500	kW 4.5 7.5 10			16 (10)A 500 Vac	20A 600 Vac	V~ 120 240 480 600	HP (FLA) 2(13.6) 4(12.4) 9(11.6) 10(11)	3ph			35A			10.6 lb-in 1.15 Nm
-E25 -A25	660V 25A	UI 660V	V~ 220 380 500	kW 5.5 11 13			20 (10)A 500 Vac	25A 600 Vac	V~ 120 240 480 600	HP (FLA) 3(19.2) 6(18) 12(17) 15(17)	3ph			45A			

ANSCHLUSSPLAN
WIRING DIAGRAMS

SCHEMA DES CONNEXIONS
SCHEMI DI COLLEGAMENTO

ON - OFF
0-1
OFF - ON

90°
1751 1752 1753 1754 1755 1756

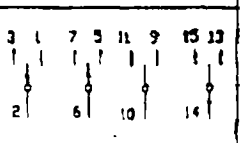


CHANGEOVER without 0
1-2

60°
2503 2504

CHANGEOVER with 0
1-0-2
MAN-0-AUT

60°
3503 3504

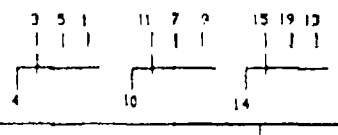


90°
3753

MULTISTEP without 0

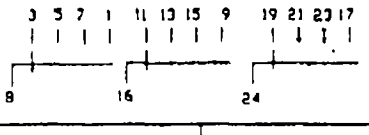
1-2-3

60°
4501 4502 4503



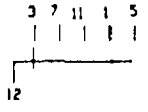
1-2-3-4

60°
4511 4512 4513



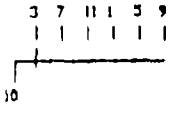
1-2-3-4-5

60°
4521



1-2-3-4-5-6

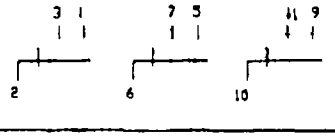
60°
4531



MULTISTEP with 0

0-1-2

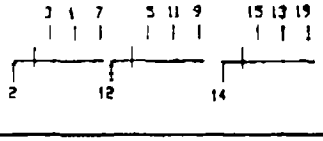
60°
5501 5502 5503



0-1-2-3

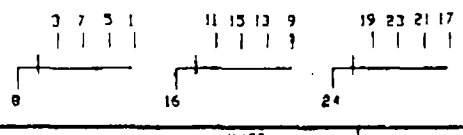
60°
5511

60°
5512 5513



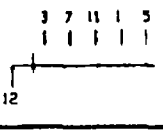
0-1-2-3-4

60°
5521 5522 5523



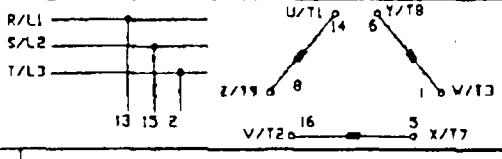
0-1-2-3-4-5

60°
5531



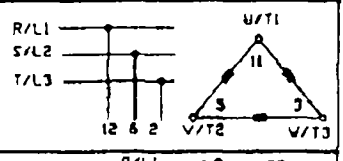
STAR-DELTA
0 - Y - Δ

60°
7503



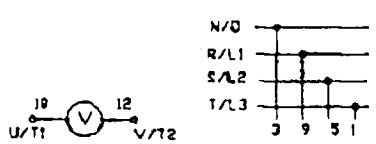
REVERSING
1-0-2
1>0<2

60°
7543



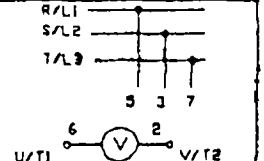
V-METER-SWITCH
L3 L2 L1 L1 L2 L3
L1 L3 L2 N N N
TR-ST-RS-0-RN-SN-TN

45°
8251



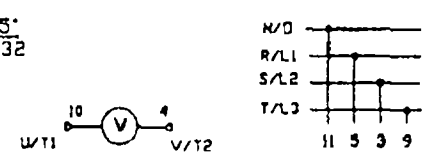
0-RS-ST-TR-0
0-RS-ST-TR

45°
8271



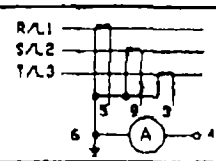
RN-0-RS-ST-TR
L1 L1 L2 L3
N L2 L3 L1

45°
8332

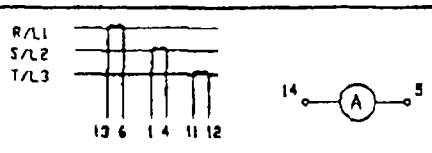


A-METER-SWITCH
0-1-2-3
(3 Curr. Trans.)

90°
8751

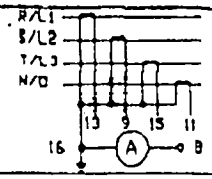


90°
8752



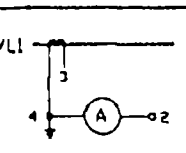
0-1-2-3
(4 Cur. Trans.)

90°
8761



0-1
(1 Curr. Trans.)

90°
8771



4030 12/93

C-2000™ Push Buttons

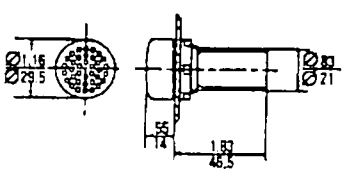
600 Volts Max. AC/300 Volts Max. DC
10 Amps. Continuous AC/2.5 Amps. Continuous DC

Special Operators (continued)

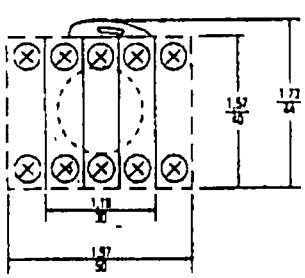
Buzzer (Piezoelectric Transducer)

(85 dB at 1 meter output)

Style	Voltage	Catalog No.
● Round Engineered Plastic	24V AC/DC	P9XBD
	110-240V AC/DC	P9XBM
□ Square Engineered Plastic	24V AC/DC	P9SBD
	110-240V AC/DC	P9SBM



Round Buzzer



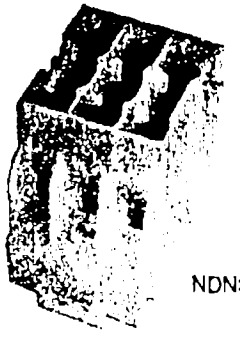
Typical Back Side View

COOPER
USD Products

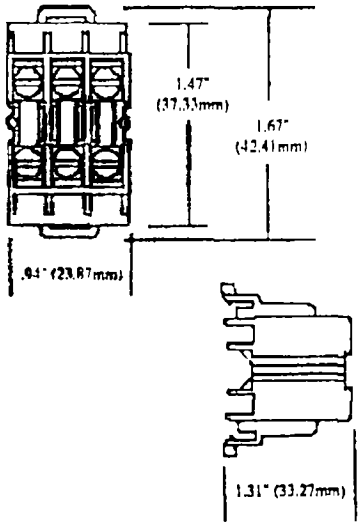
USD Rail Mounted Terminal Blocks

NDN3

SPECIFICATIONS
Rating: 40A, 600V; UL/CSA
Center Spacing: .300" (7.62mm)
Number of Poles: 3
Circuits Per Foot: 38
Circuit Jumper: JNDN3, 2 circuits
Wire Size: AWG#10-22 CU
Screw Size: #6-32
Mounting Options: 35mm DIN Rail, C-Rail
Marking Tape: MT12.5



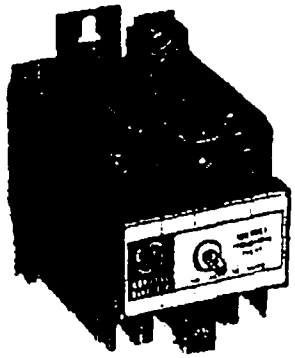
NDN3



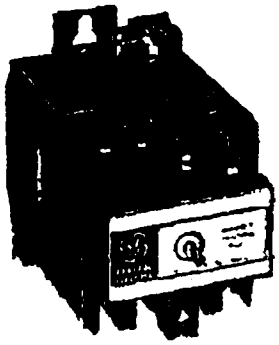
• 35mm DIN Rail Mounting • Compact Design

CR120B Machine-Tool and Industrial Relays

600 Volts
10 Amperes Continuous
60 Hertz



CR120B standard ac relay



CR120BD standard dc relay

Application

The CR120B, CR120BL, CR122B and CR122BT Series A, multi-circuit industrial relays are designed to meet most panel application requirements. They are available as standard, latched, or time-delay relays.

Industrial relays may be ordered as complete devices from the pricing tables with the NO and NC pole combination desired. The relay components may also be purchased separately and assembled in standard, latched, or timer forms (see Standard Components, pages 11-6, 11-7).

All forms of the relay mount on the same base, and in the same small panel-mounting area. Relays may be arranged in any configuration, or modified on a panel without altering the mounting area.

Features

- **Bifuracated contacts assure positive make** – unique bifurcated contacts assure positive make at all voltages and give excellent fidelity even in harsh environments.
- **Transparent Lexan® contact cartridges** – allows inspection of contacts.
- **Convertible contacts** – allows conversion from normally open to normally closed, or vice versa. Just change the terminal screws and invert the contact module.
- **Quick-change coil** – can be changed without removing any screws.

Ordering Directions

Specify by complete Catalog Number, including coil suffix in place of ** or ††.

Example: For a six-pole relay with four-NO and two-NC poles, a coil operating on 120 Volts, 60 Hertz, order CR120B04202 (complete relay), at $132.00, GO-10G4. Or order the following components for customer mounting: CR120B00002 (base relay assembly), at $48.00, GO-10G4; CR120BX3 (adder deck), at $12.00, GO-10G4; and five CR120BX1 (contacts), at $12.00 (each), GO-10G4.

NEMA Type 1 enclosures are available for CR120B relays. For pricing, see page 11-8.

Forms listed in the tables include captive terminal clamps and convertible contact modules.

No. of Poles ①			Catalog Number	List Price, GO-10G4
Total	NO	NC		

CR120B Open AC Relays

2	2	0	CR120B020**	$ 72.00
	1	1	CR120B011**	84.00
	0	2	CR120B002**	84.00
3	3	0	CR120B030**	84.00
	2	1	CR120B021**	96.00
	1	2	CR120B012**	96.00
	0	3	CR120B003**	96.00
4	4	0	CR120B040**	96.00
	3	1	CR120B031**	108.00
	2	2	CR120B022**	108.00
	1	3	CR120B013**	108.00
	0	4	CR120B004**	108.00
6	6	0	CR120B060**	120.00
	5	1	CR120B051**	132.00
	4	2	CR120B042**	132.00
	3	3	CR120B033**	132.00
	2	4	CR120B024**	132.00
	1	5	CR120B015**	132.00
	0	6	CR120B006**	132.00
8	8	0	CR120B080**	144.00
	7	1	CR120B071**	156.00
	6	2	CR120B062**	156.00
	5	3	CR120B053**	156.00
	4	4	CR120B044**	156.00
	3	5	CR120B035**	156.00
	2	6	CR120B026**	156.00
	1	7	CR120B017**	156.00
	0	8	CR120B008**	156.00
10	10	0	CR120B100**	168.00
	8	2	CR120B082**	180.00
	6	4	CR120B064**	180.00
	4	6	CR120B046**	180.00
	2	8	CR120B028**	180.00
12	12	0	CR120B120**	192.00
	10	2	CR120B102**	204.00
	8	4	CR120B084**	204.00
	6	6	CR120B066**	204.00
	4	8	CR120B048**	204.00

CR120BD Open DC Relays

2	2	0	CR120BD020††	108.00
	1	1	CR120BD011††	120.00
	0	2	CR120BD002††	120.00
3	3	0	CR120BD030††	120.00
	2	1	CR120BD021††	132.00
	1	2	CR120BD012††	132.00
	0	3	CR120BD003††	132.00
5	5	0	CR120BD050††	144.00
	4	1	CR120BD041††	156.00
	3	2	CR120BD032††	156.00
	2	3	CR120BD023††	156.00
	1	4	CR120BD014††	156.00
	0	5	CR120BD005††	156.00
7	7	0	CR120BD070††	168.00
	6	1	CR120BD061††	180.00
	5	2	CR120BD052††	180.00
	4	3	CR120BD043††	180.00
	3	4	CR120BD034††	180.00
	2	5	CR120BD025††	180.00
	1	6	CR120BD016††	180.00
	0	7	CR120BD007††	180.00
9	9	0	CR120BD090††	192.00
	7	2	CR120BD072††	204.00
	5	4	CR120BD054††	204.00
	3	6	CR120BD038††	204.00
	2	7	CR120BD027††	204.00
11	11	0	CR120BD110††	216.00
	8	3	CR120BD083††	228.00
	6	5	CR120BD065††	228.00
	4	7	CR120BD047††	228.00

**, †† Insert coil number from appropriate suffix table on page 11-3 to complete Catalog Number.

① An additional pole is automatically included in the coil circuit of dc relays.

Prices and data subject to change without noti

QUACKENBUSH CO., INC.
MECHANICAL CONTRACTORS
505 Franklin Street, Buffalo, New York 14202
☐Phone 716-886-4355 ☐Fax 716-883-8277

SECTION 7

11302 - OIL WATER SEPARATOR

Supplier: Geoguard
536 Orient St., PO Box 149
Medina, NY 14103

Phone: (800) 393-4773

Fax: (716) 798-0147

Contact: Ms. Debbie Beach

Service: Pan American Environmental
2385 Hammond Dr., #5
Schaumberg, IL 60173

Phone: (847) 882-5855

Fax: (847) 882-5630

Contact: Mr. Scott Spalding

Installation, Operation & Maintenance Manual
For OS Series Oil/Water Separators

Customer: Quakenbush Co., Inc
Project: Cherry Farm Remediation
Tonawanda,NY

System: OS16-F oil/water separator
ES-16 elevation stand

Customer PO# 01674
PAE Job number: 912746

Shipped: 10/11/96

Pan America Environmental
2385 Hammond Dr. Ste 5
Schaumburg, IL 60173
847/882-5855 Fax: 847/882-5630

Equipment Provided:

OS16-F, oil/water separator, fiberglass construction with following options:
- Retpak, secondary coalescing media
- Influent/effluent FF flanges
- 1) 2" sludge valve
- 1) 1" oil reservoir water decant valve
- Oil transfer/sight glass assembly plumbed from oil outlet to oil reservoir fittings
- Tank anchor brackets
- ES16 elevation stand

Installation, Operation & Maintenance Manual

For Models OS2 through OS16
Fiberglass Oil/Water Separators

Pan America Environmental

Oil/Water Separators And Industrial Wastewater Treatment Systems

Manual number: OSF01-1095

Contents

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Service 1
Model information 1
Parts & Features 2
Equipment Installation/anchoring 3
Startup instructions 4
Equipment Plumbing/sludge removal 5
Sludge removal/cleaning the OS 6
General Arrangement Drawing 7
Flopak media information 8
Oil skimmer details 8
Oil reservoir/Tank construction 9
Troubleshooting guide 10

OUR AREA CODE HAS CHANGED
847-882-5855
847-882-5630 FAX

Backcharges

Pan America Environmental will not accept any backcharges for modifications, adjusting, servicing or any other work performed on this equipment that s not been authorized in writing by Pan America Environmental prior to such actions. This authority will only be given when satisfactory proof is submitted and the authority will only be issued providing the price and actions are agreed upon. **ANY BACKCHARGES SUBMITTED CONTRARY TO THIS AGREEMENT WILL BE REJECTED IN TOTAL.**

Inspection On Arrival

Inspect all equipment upon arrival for missing or damaged components during shipping. Record missing or damaged components on Bill of Lading and contact Pan America immediately at: 708-882-5855 Fax: 708/882-5630

Warranty

Pan America Environmental warrants its products to be free of defect in materials and workmanship for a period of one year from the date of shipment.

Service Assistance & Parts

If you need service help or parts, call our local representative for your area or call Pan America Environmental directly.

To order replacement parts

When requesting parts, have the following information ready:

- Equipment model number
- Part name and/or part number

Contact: Pan America Environmental
2385 Hammond Dr #5
Schaumburg, IL 60173
708/882.5855 Fax: 708/882.5630

Equipment Indentification Section

Model Number: _____

Additional Options/Equipment:

_____

_____

_____

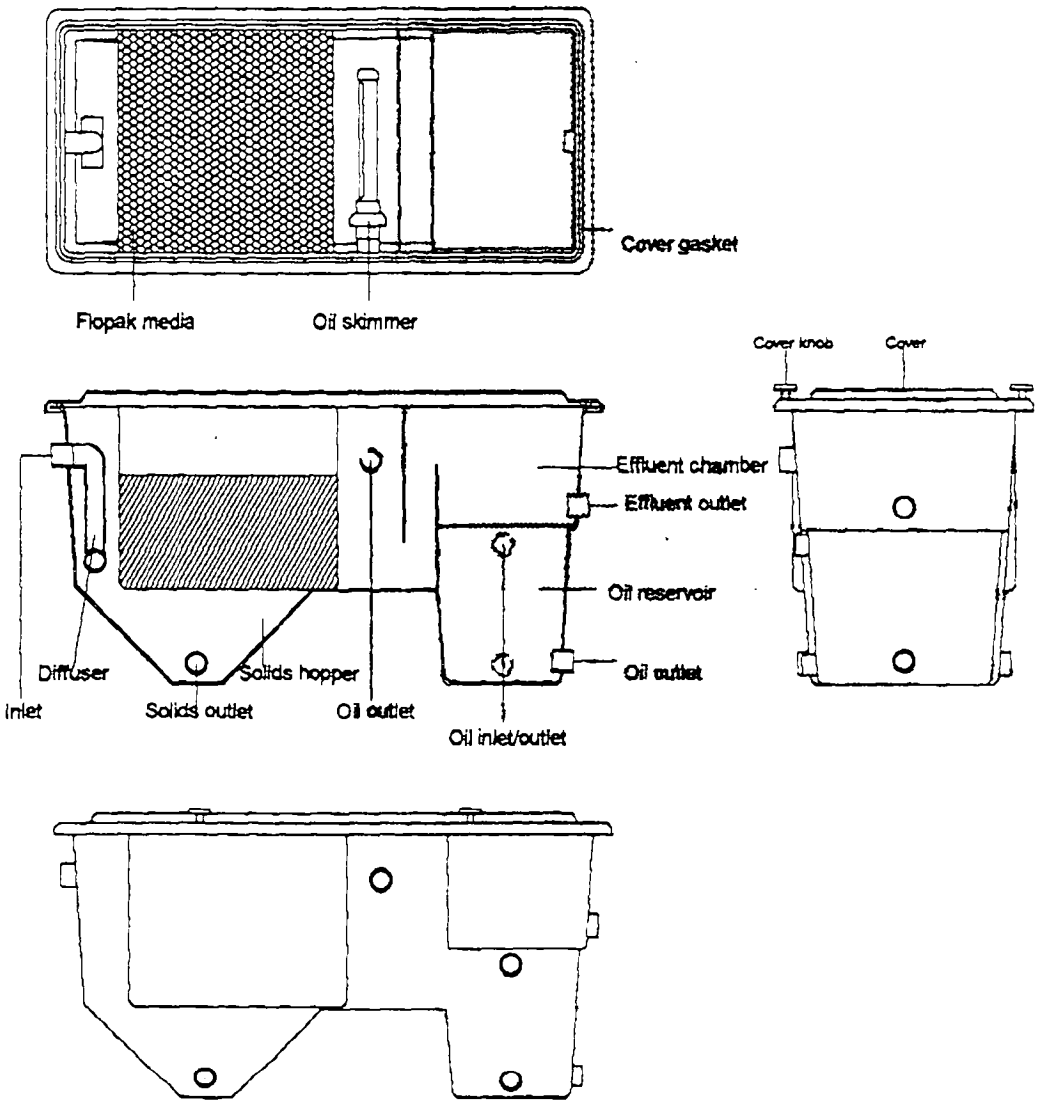
_____

_____

_____

Ship Date: _____

Parts & Features



The above listed parts and features will familiarize you with the design of our fiberglass constructed OS Series oil-water separators. Review this drawing for your reference. When calling for replacement parts refer to this drawing and/or the General Arrangement Drawing in this manual.

If any special modifications were provided on your particular model record those modifications here for your permanent record.

Modifications provided by factory: _____

_____

_____

_____

Storage

If you are not ready to install this equipment after receiving it, store it in an area away from traffic. The ground should be level and free of any sharp objects that might damage the fiberglass or coating. Store the equipment with all factory packing left intact until ready for installation. Store the equipment indoors. If this is not possible make sure the equipment does not fill with water and debris. We recommend you cover the equipment with a tarp. Also, store any pumps and/or any other optional equipment provided within protective areas or structures or according to manufacturer's recommendations.

Equipment Installation/Anchoring

Locate the OS Series oil-water separator on a site that has been properly prepared or designed for the equipment provided. Place the unit on a hard surface.

1. Upon arrival, check tank for damage. Report any damages.

2. Remove tank from the delivery trailer with a crane, fork lift(s) or overhead gantry
WHEN LIFTING WITH THE LIFTING LUGS (if provided) LIFT VERTICALLY FROM THE TOP OF IE LUG (DIRECTLY ABOVE THE LUG). IF YOU LIFT FROM ANY OTHER ANGLE FROM THE LUG YOU MAY CAUSE UNDUE STRESS AND EXCESSIVE LOADING OF THE LIFTING LUGS WHICH MAY LEAD TO TANK DAMAGE.

3. Check site for pebbles or other debris that could puncture the fiberglass tank when filled with water. Set the unit on the site. Locate anchoring holes (if anchor brackets were provided), remove tank, drill holes, insert bolts, relocate tank and tighten hardware. Use 1/2" diameter x 4" minimum wedge bolt or embedded anchor bolts. Local code may also determine proper hold down hardware.

4. Level tank to within **+/- 1/4"** end to end, **+/- 1/64"** per foot from side to side with a maximum of **+/- 1/8"** total. Be sure adjustable water weir(s) are level. Place shim stock under hopper bottom, effluent chamber and anchor brackets footpads if necessary. When shimming be sure a shim is used the full length and width of the tank bottom that contacts the installation surface for max. weight distribution.

5. Check water weir for proper adjustment if your unit was provided with an adjustable water weir (see water weir adjustment for your unit). This weir is adjusted from the factory for your maximum flow rate, but should be checked before or after filling tank.

6. Identify all connections for proper placement of the tank prior to installation. **Refer to tank drawing.**

7 Connect inlet & outlet piping. **See plumbing section.** Leveling procedure is very important due to . need to create a flat water flow over the water weir and proper oil layer creation in the separation chamber for skimming.

Start-up Instructions

Before beginning startup determine which type of oil skimmer configuration was provided with your OS model separator. See General Arrangement drawing for configuration type. You will have one of the following types:

- Fixed oil weir with internal oil reservoir
- Cylindrical, rotating, adjustable skimmer

Adjustment of fixed oil skimmer with oil reservoir

1) Fill tank with clean water until it flows out the effluent outlet.
2) Check the level of the oil skimming weir, making sure that it is level with the water within +/- 1/8" total side to side. If it is not within this dimension the tank was not leveled properly. Perform leveling per the leveling instructions on page 3.
3) The relationship between the oil skimming weir and the effluent water weir is critical to the proper functioning of this piece of equipment

To verify proper water weir adjustment: (for fixed oil weir with internal reservoir)

a) Allow maximum rated flow of clean water to flow through separator.
b) Check the fixed oil skimming weir. Operating water level should be 3/8" maximum, 1/4" minimum below the top of the weir at the separator maximum rated flow. If water level differs from these dimensions you will need to readjust the water weir. If it is below the 1/4" the water weir needs to be lowered, if it is greater than the 3/8" the water weir needs to be raised.
c) Stop flow through the separator
d) Inspect water weir, make sure it is level, within 1/16" from side to side. Readjust this weir by loosening the nuts, moving the weir plate up or down and retightening the nuts.
4) Check all piping for leaks
5) Equipment anchoring should now be performed if it has not already been done. Expansion bolts may be used as anchors per anchoring section on page 3.

Adjustment of cylindrical oil skimmer

Follow 1, 2, 3 & 3a as directed above.
To adjust the water weir with the cylindrical oil skimmer: Adjust the water weir up or down so you have 1" of water above the coalescing media pack. ie.. if Flopak media bundle is 36" high adjust weir plate to 37" from tank bottom (see above directions (3d) for proper weir plate adjustment). Rotate the **cylindrical oil skimmer until you have 1/4" minimum or 3/8" maximum distance from the bottom lip of the skimmer and the top of the operating water level.**

If the water weir is the fixed, non-adjustable type adjust the cylindrical skimmer as directed above.

Equipment Plumbing

PIPING SUPPORT: Do not use the tank fittings as piping support when plumbing the separator as this may lead to tank fatigue and damage. Pan America Environmental can not be held liable for damage caused by using the equipment fittings as pipe supports.

PIPE SIZES: Refer to the General Arrangement drawing provided with this manual for proper fitting purpose and location. Do not reduce the size of the effluent fitting as this may create a backup condition in the separator. We highly recommend a pitch of at least 1/16" per foot in the effluent discharge piping. Do not increase the size of the influent connection as this may create a hydraulic overload condition when faced with flow rates greater than that specified for your separator.

OIL PIPING: Connection of the oil outlet piping: If gravity flowing from the internal oil reservoir or the cylindrical oil skimmer provide sufficient external storage, pipe pitch or pump flow rate to accomodate the anticipated volume of oils to be removed.
Whenever using an internal or external oil storage chamber we recommend provision of a high high level alarm and/or feed pump shutdown function to prevent the overflow of that storage chamber.

SLUDGE PIPING: When plumbing the sludge outlet(s) we recommend the installation of butterfly valves and a tee at the end of the sludge piping to allow ease of cleanout in the event the sludge line ...igs with sludge. When plumbing an OS separator with dual sludge chambers we recommend plumbing in the pump to the middle of a manifold connected to both sludge outlets so the pump will draw evenly from either outlet.

PIPE TYPE: Sch. 40 or 80 PVC pipe is an excellent choice for most applications due to it's ease of use, flexibility and cost.
PIPE SEALANT: Use a silicone sealant when plumbing to fiberglass fittings. Teflon tape tears easily due to sharp threads. When handling be careful, fiberglass threads are very sharp.

Sludge Removal

The sludge should be periodically drawn off so it is not allowed to build up and interfere with operation of the **FLOPAK** coalescing media.

Two methods for sludge removal are generally recommended.

- Gravity flow
- Pumpout

The gravity flow method will require a valve on the sludge outlet that will allow you to easily stop/start and finely control the discharge. When using gravity drain you will be using the head pressure existing in the tank to basically "blow" the sludge chamber contents out. This method of course has limits such as distance and height of discharge. Be sure you take into consideration where you have to send the sludge on discharge. Pumpout systems will allow you to discharge wherever you choose.

Sludge Removal cont'd

1) Refer to the General Arrangement drawing provided with this manual to determine the sludge hopper volume, outlet locations and sizes. We recommend plumbing in a short section of clear PVC pipe to allow you to see when the sludge is depleted.
2) After full operation of the system has been established you will need to determine sludge removal frequency. After 3-5 days draw off sludge. If a smaller volume is removed than anticipated then you will be able to wait longer for sludge draw off. If the volume is greater than anticipated increase the frequency.
3) A record should be kept as to time interval and volume of sludge removed.
4) Determine proper disposal of your sludge. You may find dewatering of the sludge may be necessary or advantageous prior to disposal.

Important Sludge Removal Information:
When drawing off the sludge we recommend it be drawn off while the separator is under operation. If the sludge is drawn off while the separator is not operating and the water level in the tank is dropped sufficiently you will run the risk of coating the tank walls with separated product. Once operation is resumed and the oils coat the walls at the end of the separation chamber and in between the oil/water baffles higher concentrations of free product may exit the tank over a period of time. This can show up as continuously higher hydrocarbon discharge levels until the oils have been swept off the tank walls.

Note: Please consult your local city and state regulatory agency regarding specific requirements on the proper disposal of the sludge generated in your process.

If you need assistance with equipment to remove and dewater the sludge from your OS separator please call your local Pan America Environmental (PAE) representative or PAE directly. We will be happy to recommend possibilities and alternatives for the removal and treatment of your sludge.

Cleaning the OS

Over time your unit may accumulate enough solids to interfere with its operation. Use to following for cleaning the tank and Flopak media.

1) Stop the flow to the separator and empty the tank. You may or may not need to empty the effluent reservoir as most solids will drop out in the solids chamber.
2) Remove the oil separation media (be careful not to damage it)
3) If the media is plugged clean out the solids with hot or warm water under pressure. Be careful not to use excessive water pressure as it may damage the media. The media can be placed in or sprayed with a detergent solution if it is grimey enough. If a detergent is used thoroughly rinse the media. If the detergent is allowed to stay on the media it may help to emulsify oils that impinge on the media.

The media will function best when it has clean surfaces for the oils to clinge to. By allowing solids or other organic matter to accumulate on the media the separation efficiency may drop. A regular scheduled visual inspection should be peformed.

Pan America Environmental — OS Series Fiberglass Oil-Water Separators

DIMENSIONS & CAPACITIES — *OS Series Fiberglass Oil/Water Separators*

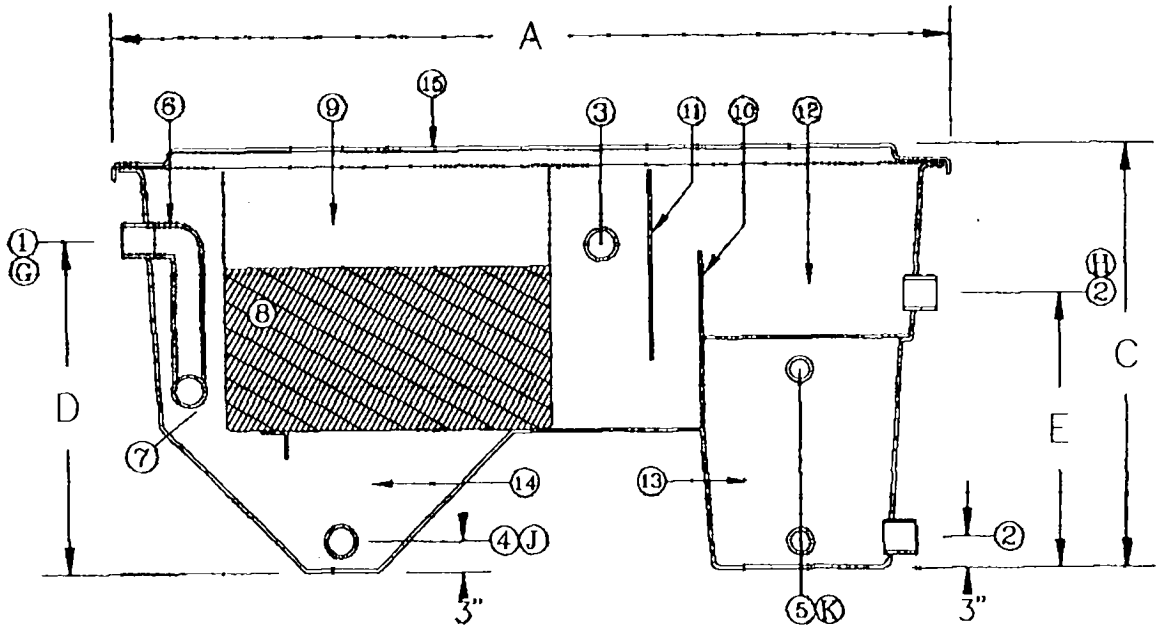
Model	Dimensions L A	W B	H C	Elevations (inches) D	E	F	Fitting Sizes (inches) G	H	I	J	K	Weight (lbs) Empty	Full	Media Sq. Ft.	Tank Vol Gal	Water Res Vol. Gal.	Oil Res Vol. Gal.	Sludge Volume Gal.	Model
OS-2	62	17	31	24	20	23	2	2	2	2	2	65	428	136	25	12	8	6.5	OS-2
OS-4	62	29	31	24	20	23	2	2	2	2	2	95	930	272	51	36	25	13	OS-4
OS-8	72	29	43	36	28	36	2	2	2	2	2	130	1740	544	125	55	40	13	OS-8
OS-12	72	40	43	36	28	36	3	3	3	3	2	250	2668	816	180	85	60	25	OS-12
OS-16	72	52	43	36	28	36	3	3	3	3	2	330	3590	1088	240	114	80	37	OS-16

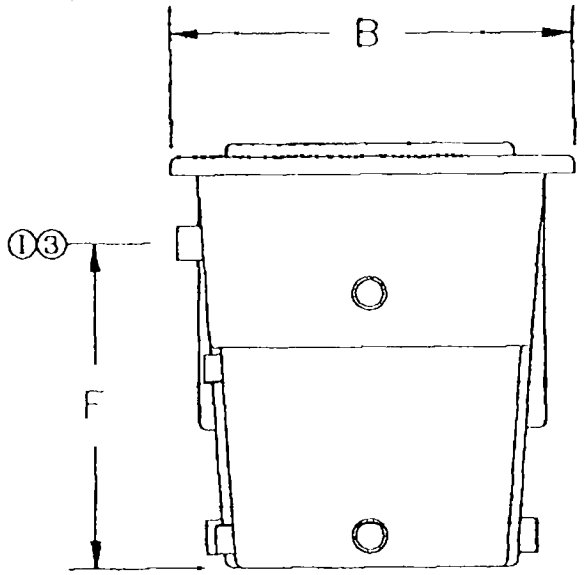
ITEM	QTY	DESCRIPTION
1	1	WASTEWATER INLET
2	1	EFFLUENT OUTLET
3	1	OIL OUTLET
4	2	SLUDGE OUTLET
5	2	OIL RESERVOIR RETURN/OUTLET

ITEM	QTY	DESCRIPTION
6	1	INFLUENT DIFFUSER
7	1	INFLUENT CHAMBER
8	1	MEDIA BUNDLE
9	1	SEPARATION CHAMBER
10	1	WATER OVERWEIR

ITEM	QTY	DESCRIPTION
11	1	OIL BAFFLE
12	1	EFFLUENT CHAMBER
13	1	OIL RESERVOIR
14	1	SLUDGE CHAMBER
15	1	COVER

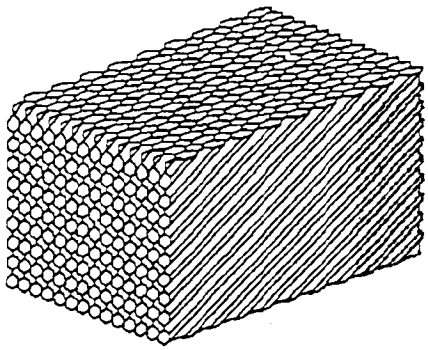
The water reservoir volume shown reflects total expanded volume. To determine unexpanded volume subtract oil reservoir volume from water reservoir volume.





Flopak Coalescing Media Information

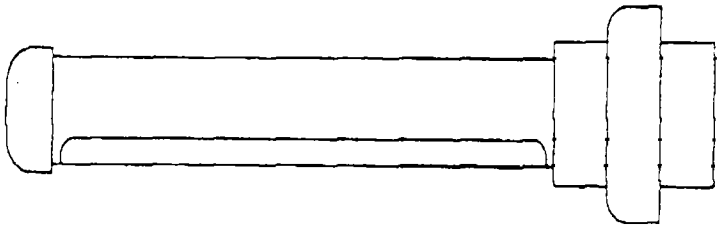
The Flopak coalescing media bundle provided with your OS separator is designed to impede the movement of oil droplets. Due to the nature of the construction materials the oils and the media are attracted to each other. The media can be refered to as oleophilic. Settleable solids are also removed by the media. Once solids are removed they slide down the corrugations in the media and fall into the hopper located under the media.



We can provide different materials of construction PVC, CPVC, polypropylene and stainless steel. The standard media material provided is PVC. The corrugated media plates are bound together via a thermal or adhesive method. When handling the media be careful not to damage the plates. The media is packed into the separator tank in pieces that are generally 12" x 12" x 24"L.

Oil Skimmer Details

Oil removal is accomplished after the oils have accumulated on the water surface by skimming the oil layer that rises higher than the water surface. We have provided a cylindrical, adjustable skimmer for this purpose. To adjust simply rotate the skimmer collar, adjust the bottom lip of the skimmer pipe slot to a 1/4" minimum or 3/8" maximum from the top of the operating water level and while still holding the skimmer pipe retighten the collar. The collar should be hand tight.



The skimmer assembly is made of PVC with a viton o-ring to seal the skimmer head to the collar base. This assembly allows you to remove and replace the skimmer head module quickly and easily for cleaning. The skimmer is located directly after the Flopak media and is horizontally mounted to the inside of the oil outlet coupling.

Oil Reservoir

The fiberglass OS Series separators are designed with a built-in oil reservoir. This oil reservoir can be modified in different ways to accomodate your application needs. By standard, the OS tanks are provided with the oil reservoir configuration as shown in Fig. 2. Depending on the application we may have provided one of the three configuration shown below. Various optional fittings may have been included and should be recorded by you on page 2 of this manual.

Fig. 1

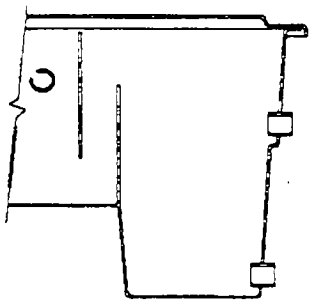
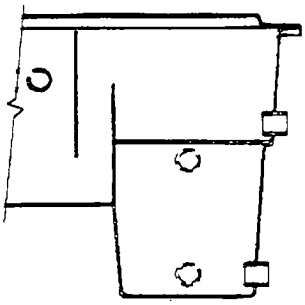


Fig. 2



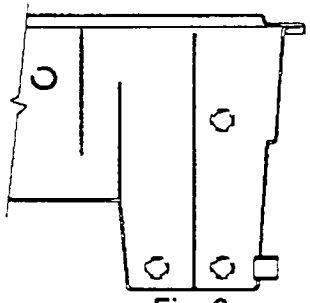


Fig. 3

The drawings shown above show three configurations. **Figure 1:** expanded effluent chamber, generally provided for direct connection of your effluent pump. **Figure 2:** standard design, effluent & oil reservoir with horizontal separation and **Figure 3:** effluent/oil chambers with vertical separation.

Tank Construction

The OS separator tank, cover, baffles and female threaded couplings are all constructed of DION 6694/95/FR resin mixed with fiberglass fiber. The FNPT fittings are integrally bonded to the tank via DION resin to provide a maintenance free, permanent, leak free coupling. The exterior of the tank is coated with a layer of white, ultraviolet stabilized gel coat. If touchup gel coating is needed please contact .E.

Quality of Effluent Troubleshooting Guide

Monitor the quality of the effluent on a regular basis. If the quality declines check the following things for system correction.

1) Has flow rate of separator been exceeded? Reset to rated flow if beyond separator flow rating. Check oil skimmer and water weir adjustment.

2) Is the method of oil removal plugged? Make sure the oil outlet is clear or the oil pump is functioning properly.

3) Is sludge being removed on a regular basis? If the sludge is allowed to build up and interfere with the coalescing media this can reduce water quality. If sludge has plugged the media flush it out. If it can't be flushed you may need to remove the media to clean it.

4) Check the wastestream for chemical emulsifiers and surfactants. If you are pumping into the separator are you using a high shear pump that is emulsifying the oils?

5) Oil is not being skimmed by oil weir: measure operating water level to top of oil weir. If this dimension does not meet criteria indicated in start up section readjust water weir or oil skimmer per instructions.

6) Solids may combine with and carry oils out the effluent. Check for suspended solids in the effluent. If present you may need effluent polishing filtration.

7) Sludge removal: If you pumpout the sludge when the separator is not in operation and you pump a large volume of water you may drop the internal water level sufficiently to coat the tank walls and the space in between the water and oil baffles. If this has occured and you resume operation any oils clinging to the tank walls or baffles may exit the separator. Solution: pumpout/drain sludge while separator is under operation. If this scenerio has taken place shutdown separator, clean, rinse well and place back into operation per startup instructions.

8) Has the oil you are separating been changed to a different type?

If your review of the above listed most common problems does not remedy the situation contact PAE to discuss and correct your problem.

EPG Companies Inc.

List of Equipment

Job # 96-3315

1	TSP2-2 SurePump, stainless steel submersible pump with 1/2HP 460VAC 3Ø motor with 10' jacketed motor lead.
3	TSP2-4 SurePump, stainless steel submersible pump with 1/2HP 460VAC 3Ø motor with 10' jacketed motor lead.
4	Guide Rail System, includes two(2) 3/4" x 7.5' stainless steel guide rails, guide rail foot, stand off bracket and 1.25" SPDS5 electroless nickel plated guide rail disconnect.

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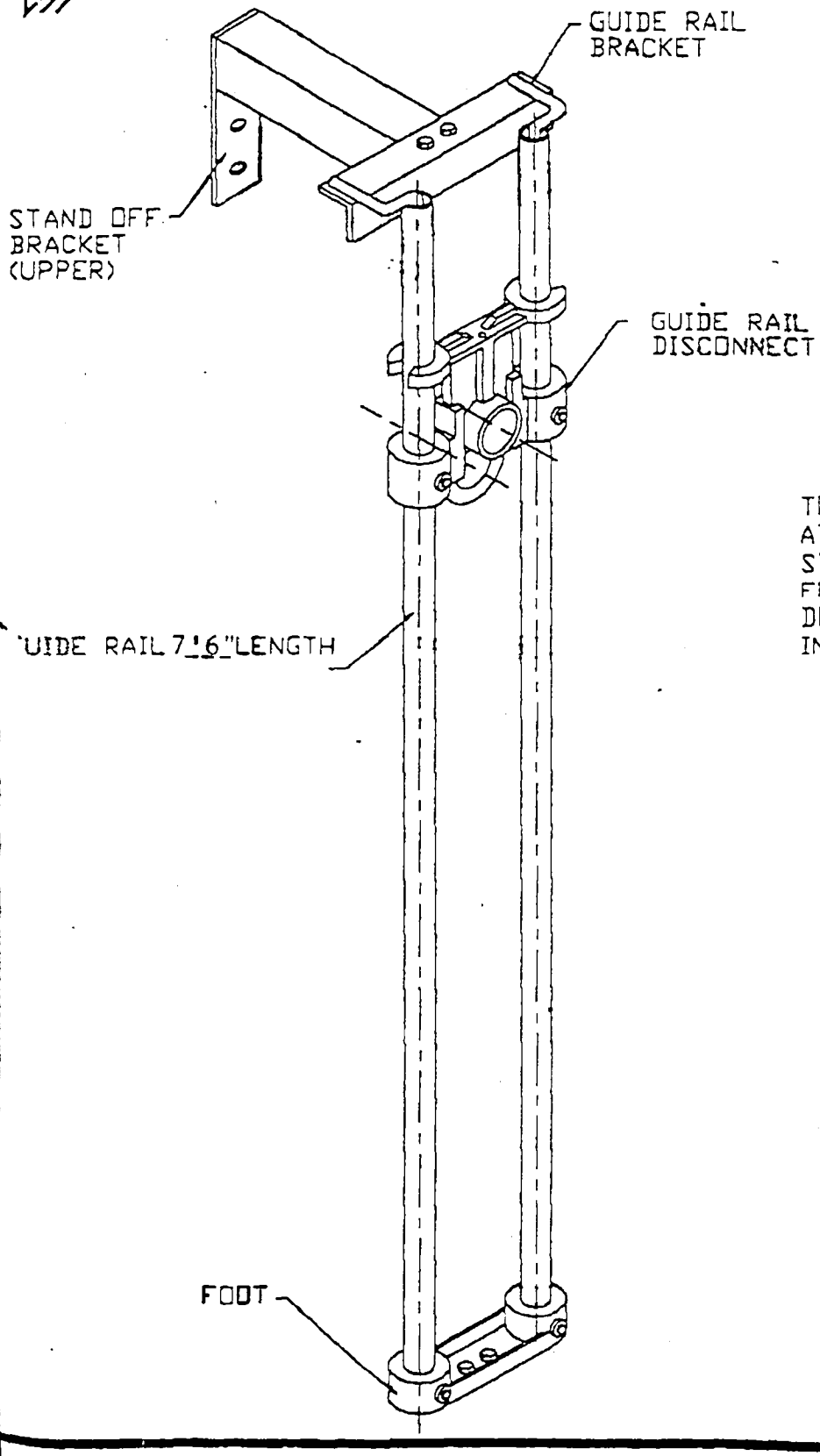
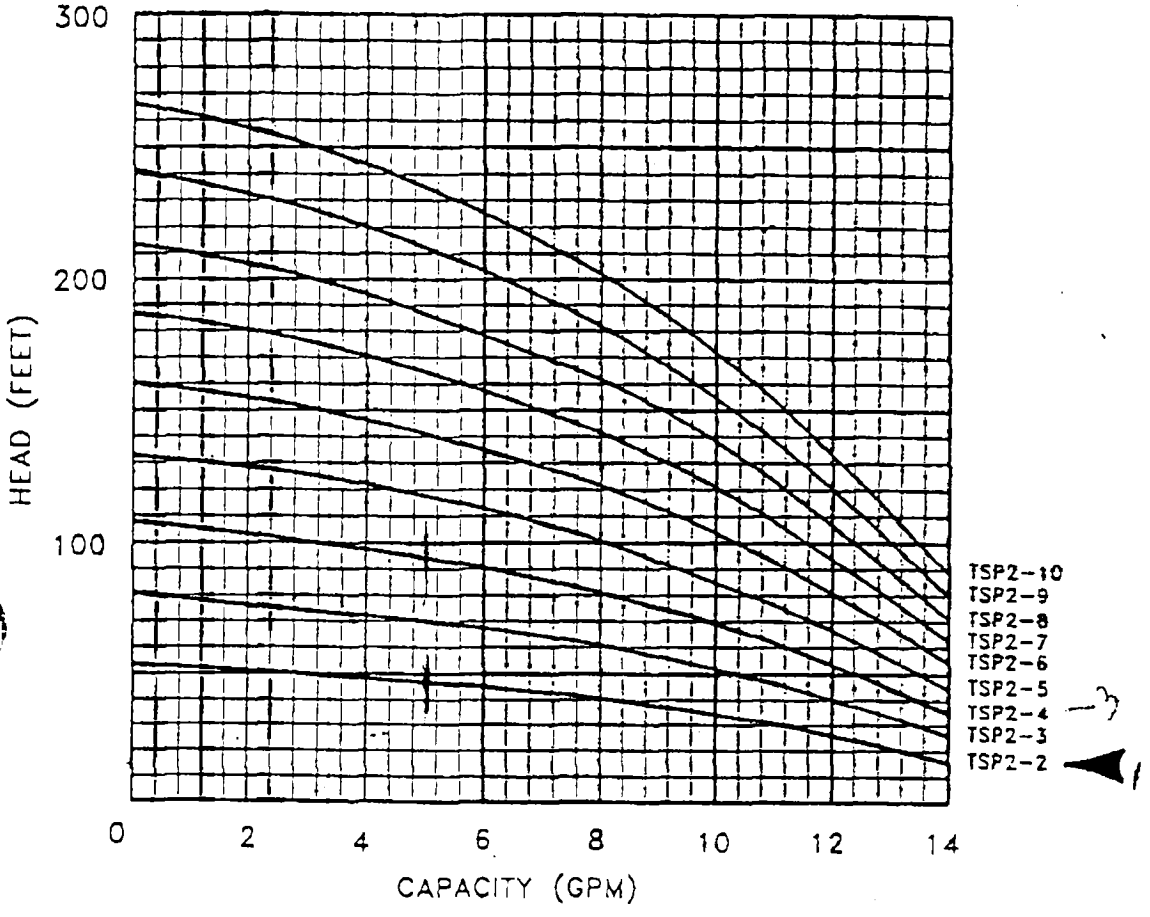
GUIDE RAIL DISCONNECT SYSTEM



TO INSTALL GUIDE RAILS START AT TOP OF SUMP PLACING UPPER STAND OF BRACKET ABOUT 2" FROM TOP OF SUMP. THEN MEASURE DOWN LENGTH OF GUIDE RAIL AND INSTALL FOOT.

TSP2 SurePump™ SUBMERSIBLE PUMP



PUMP MODEL	SINGLE PHASE		THREE PHASE		SHIPPING WEIGHT (LBS)	
	MOTOR HP	A (in)	MOTOR HP	A (in)	1ø	3ø
TSP2-2	0.33	16.50	0.50	17.25	25.0	27.2
TSP2-3	0.33	17.50	0.50	18.25	25.9	28.1
TSP2-4	0.33	18.50	0.50	19.25	26.9	29.1
TSP2-5	0.33	19.50	0.50	20.25	27.9	30.1
TSP2-6	0.50	20.50	0.50	21.25	30.2	31.2
TSP2-7	0.50	21.50	0.50	22.25	31.2	32.2
TSP2-8	0.50	22.50	0.50	23.25	32.3	33.3
TSP2-9	0.75	24.25	0.75	24.25	34.1	35.1
TSP2-10	0.75	25.25	0.75	25.25	35.1	36.1

SEE 0663-2 FOR HIGH HEAD MODELS.

Materials of Construction

EPG SurePump™

	STANDARD
Check Valve Housing	304 Stainless Steel
Check Valve	304 Stainless Steel
Check Valve Seat	Teflon
Diffuser Chamber	304 Stainless Steel
Impeller Seal Ring	Teflon
Impeller	304 Stainless Steel
Motor Adaptor	304 Stainless Steel
Inlet Screen	304 Stainless Steel
Pump Shaft	304 Stainless Steel
Coupling	329/420/431 Stainless Steel
Fasteners	304 Stainless Steel
Bearings	Eglide

FRANKLIN ELECTRIC MOTORS

	1/3 to 2 HORSEPOWER POLLUTION RECOVERY	3 to 10 HORSEPOWER NI-RESIST
End Bell Castings	304 Stainless Steel over Iron	Ni-Resist Type 1-B
Stator Shell	201 Stainless Steel	316 Stainless Steel
Shaft Extention	303 Stainless Steel	17-4 Stainless Steel
Fasteners	316 Stainless Steel	316 Stainless Steel
Seal Cover	Acetal	316 Stainless Steel
Shaft Seal	Viton	Viton, Carbon, Ceramic Face Seal
Diaphragm	Viton	Type 200 Hydrin
Diaphragm Plate	304 Stainless Steel	304 Stainless Steel
Diaphragm Spring	302 Stainless Steel	302 Stainless Steel
Diaphragm Cover	316 Stainless Steel	316 Stainless Steel
Slinger	Viton	Nitrile Rubber
Lead Sleeve	Nickel Plated Brass	316 Stainless Steel
Lead Jam Nut	316 Stainless Steel	316 Stainless Steel
Lead Potting	Epoxy	Epoxy
Lead Bushing	Viton	Viton

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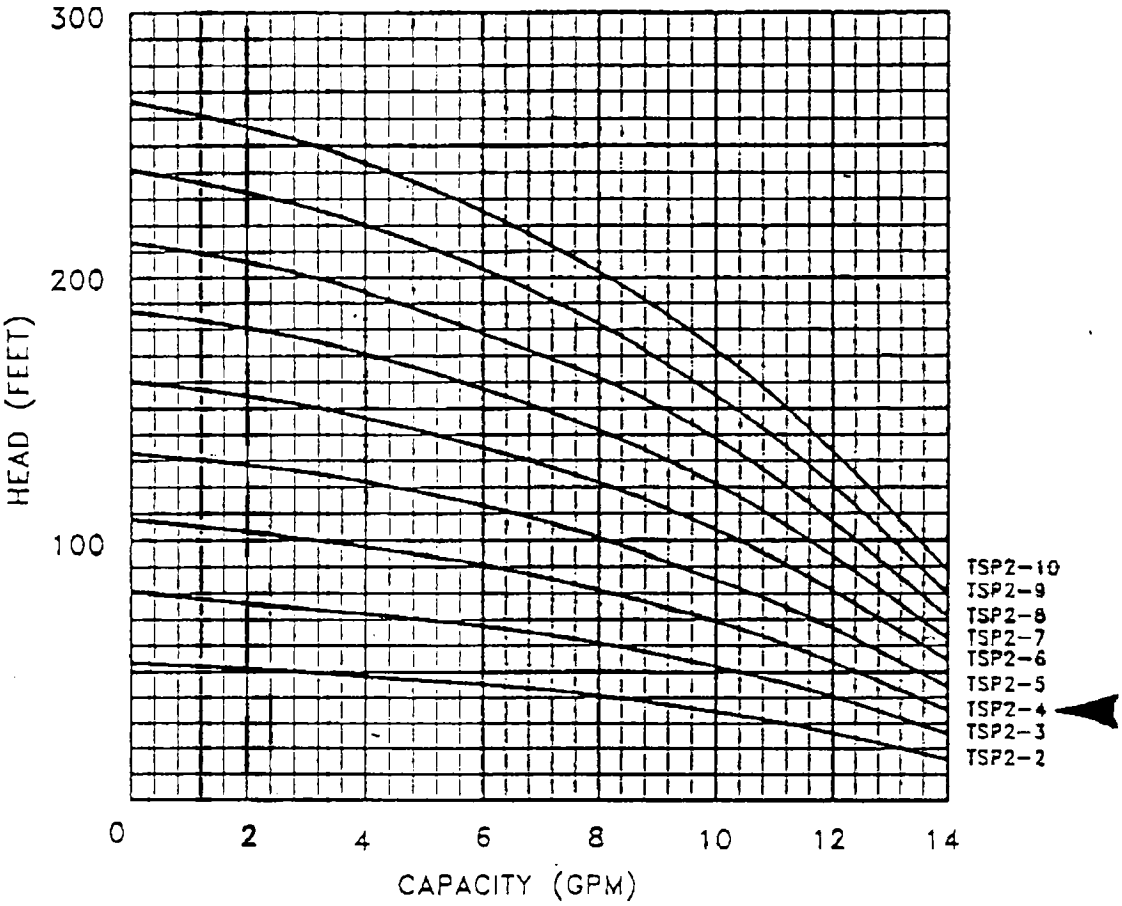
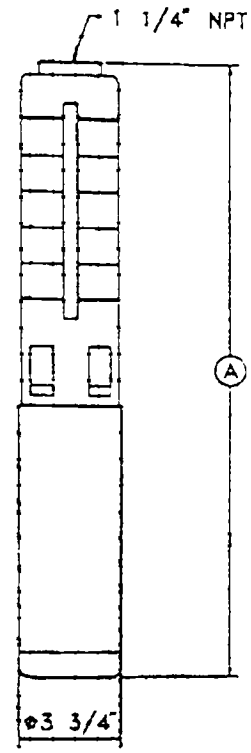
TSP2 SurePump™
SUBMERSIBLE PUMP





PUMP MODEL	SINGLE PHASE		THREE PHASE		SHIPPING WEIGHT (LBS)	
	MOTOR HP	A (in)	MOTOR HP	A (in)	1ø	3ø
TSP2-2	0.33	16.50	0.50	17.25	25.0	27.2
TSP2-3	0.33	17.50	0.50	18.25	25.9	28.1
TSP2-4	0.33	18.50	0.50	19.25	26.9	29.1
TSP2-5	0.33	19.50	0.50	20.25	27.9	30.1
TSP2-6	0.50	20.50	0.50	21.25	30.2	31.2
TSP2-7	0.50	21.50	0.50	22.25	31.2	32.2
TSP2-8	0.50	22.50	0.50	23.25	32.3	33.3
TSP2-9	0.75	24.25	0.75	24.25	34.1	35.1
TSP2-10	0.75	25.25	0.75	25.25	35.1	36.1

SEE 0663-2 FOR HIGH HEAD MODELS.

3. WARRANTIES

GRS
Groundwater
Recovery Systems, Inc.

WARRANTY

Groundwater Recovery Systems, Inc. (Manufacturer) warrants it's products to be free from defect in material and workmanship under normal use and service, the remedy under this warranty being exclusively limited to making good at Manufacturer's factory any part or parts thereof which shall be returned to it with transportation charges prepaid; and which it's examination shall disclose to it's satisfaction to have been thus defective, provided that such part or parts shall be so returned to it no later than 12 months after delivery of its product to the purchaser. THIS LIMITED WARRANTY IS BEING MADE IN PLACE OF ALL OTHER EXPRESS WARRANTIES AND IN PLACE OF ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS. THIS LIMITED WARRANTY IS IN LIEU OF ALL OBLIGATIONS OR LIABILITIES ON THE PART OF THE MANUFACTURER FOR DAMAGES INCLUDING, BUT NOT LIMITED TO, CONSEQUENTIAL AND INCIDENTAL DAMAGES ARISING OUT OF OR IN CONNECTION WITH THE USE OF THE PRODUCT.

299B National Rd., Exton, PA 19341 • 610-524-2790 • FAX 610-524-2795
With offices throughout the United States

LIMITED WARRANTY

This agreement shall be deemed to have been entered into in the State of Minnesota, and shall be construed in accordance with the laws of the State of Minnesota, including Minnesota's enactment of the Uniform Commercial Code. Buyer hereby stipulates and agrees that Hennepin County, Minnesota shall be the proper jurisdiction for adjudicating all claims and controversies arising from this agreement.

Products manufactured by EPG Companies Inc. are warranted for a period of 12 months from date of installation or eighteen(18) months from date of manufacture* to be free from defects of materials and workmanship. It is expressly agreed that the exclusive remedy under this warranty is limited solely to the repair or replacement, at the sole discretion of EPG, of the part that failed. The cost of labor for any field repairs is not covered by this warranty. EPG Companies will not be liable for any damage or wear due to abnormal conditions or improper installation.

Products not manufactured by EPG Companies Inc. are covered by the original manufacturer's warranty, which EPG Companies passes through to the purchaser. Warranty determination will be made by the actual manufacturer.

To have a defective part repaired or replaced, you must return the defective product to EPG Companies. Please call (800)762-8418 or (612) 424-2613 to obtain a Return Goods Authorization (RGA) number. Send defective product (freight prepaid) with RGA #, description of installation, installation data and failure date to EPG Companies Inc., 19900 County Rd. 81, Maple Grove, MN 55311.

EPG Companies will not be held liable for any incidental or consequential damages, losses or expenses incurred from installation, use or any other reason. THERE ARE NO OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING IMPLIED WARRANTIES OF EITHER FITNESS FOR A PARTICULAR PURPOSE OR OF MERCHANTABILITY, WHICH EXTEND BEYOND THOSE SPECIFICALLY LISTED HERE.

If equipment is to be stored for a period greater than six months, proper storage precautions must be taken if the warranty is to be maintained. Please call EPG Companies for specific requirements regarding product storage.

The following is a partial list of items which will void the warranty:

- Opening of a motor for any reason.
- Using undersized electrical wire.
- Making unauthorized circuit changes. Please call EPG Companies before making any changes.
- Operating a three phase submersible motor from single phase power through a phase converter unless 3-leg ambient-compensated quick trip overload protectors are used and complete details are sent in writing to EPG Companies.

* To qualify for the delayed installation warranty you must contact EPG Companies Inc., at (800)762-8418 or (612) 424-2613 within 60 days of purchase.

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QUACKENBUSH CO., INC.
MECHANICAL CONTRACTORS
505 Franklin Street, Buffalo, New York 14202
☐ Phone 716-886-4355 ☐ Fax 716-883-8277

SECTION 9

11364 - TANK MIXERS

Supplier: Alsop Engineering Company
c/o K-Tech Associates
1868 Niagara Falls Blvd.
Tonawanda, NY 14150

Phone: (716) 695-1038

Fax: (716) 695-7820

Contact: Mr. John DeLong

Service: K-Tech Associates (same as above)

ALSOP ENGINEERING COMPANY KINGSTON , N

OPERATING INSTRUCTIONS FOR THE ALSOP PORTABLE MIXERS

WITH CLAMP OR SADDLE PLATE

WARNING: READ INSTRUCTIONS PRIOR TO OPERATING OR WIRING YOUR ALSOP MIXER -- DAMAGE MAY RESULT IF THESE INSTRUCTIONS ARE NOT FOLLOWED.

INSTRUCTIONS

#1 EXAMINE MIXER VISUALLY FOR EVIDENCE OF DAMAGE IN TRANSIT. TAKE CARE NOT TO DAMAGE THE BALANCED PROPELLER AND SHAFT.

#2 CROSS CHECK MOTOR NAMEPLATE WITH THE TYPE OF ELECTRICAL SUPPLY IN YOUR PLANT FOR COMPATABILITY. IF AN AIR MOTOR IS SUPPLIED, SEE ATTACHED INSTRUCTIONS.

#3 VIEW THE FRONT OF THE MIXER BELL HOUSING AND LOCATE THE VERTICAL ACCESS SLOT WHICH APPEARS ON RIGHT HAND SIDE. THIS SLOT WILL HAVE AN ALLEN WRENCH AND A CLAMP NUT WRENCH INSERTED IN IT AND TAPED IN PLACE. REMOVE THE TAPE AND WRENCHES. LOOSEN, BUT TAKE CARE NOT TO REMOVE, THE BOTTOM THREE SET SCREWS ON THE COUPLING INSIDE THE MIXER HOUSING. THIS ALLOWS INSERTION OF THE MIXER SHAFT AS DESCRIBED IN STEP #4.

#4 INSERT THE END OF THE MIXER SHAFT THAT HAS THE FLAT ON IT, THROUGH THE OPENING IN THE BOTTOM OF THE MIXER HOUSING AND INTO THE COUPLING. MAKE CERTAIN THAT THE SET SCREWS WHICH WERE LOOSENED IN THE ABOVE STEP WILL BEAR DOWN ON THE FLAT WHEN TIGHTENED. THE SHAFT SHOULD SLIDE INTO THE COUPLING FOR ABOUT 4½" AND THEN STOP.

#5 TIGHTEN THE SET SCREWS ON THE COUPLING TO BEAR DOWN ON THE FLAT PORTION OF THE MIXER SHAFT WITH THE ALLEN WRENCH SUPPLIED.

#6 POSITION THE PROPELLER ON THE LOWEST POINT OF THE MIXER SHAFT. THE ARROW STAMPED ON THE PROPELLER HUB SHOULD POINT TO THE BOTTOM OF THE TANK. IF TWO PROPELLERS ARE SUPPLIED, LOCATE THE BOTTOM PROPELLER AS DESCRIBED, AND THE TOP PROPELLER APPROXIMATELY 1 TO 2 PROPELLER DIAMETERS ABOVE THE LOWER ONE. IN THE EVENT YOUR UNIT IS SUPPLIED WITH A STABILIZING RING ON THE PROPELLER, MOUNT THIS PROPELLER, WITH THE ARROW POINTING DOWNWARD, AT THE LOWEST POSITION ON THE MIXER SHAFT.

#7 POSITION AND SECURE YOUR MIXER TO THE TANK OR MIXER BRACKET YOU INTEND TO USE, ARRANGING THE MIXER SHAFT IN THE POSITION RECOMMENDED BY THE DIAGRAM ON THE SECOND PAGE OF THESE INSTRUCTIONS. IN MOST CASES, THIS WILL PROVIDE THE BEST DEGREE OF AGITATION. WE DO NOT RECOMMEND EXCEEDING 20° FROM A VERTICAL POSITION.

IF A SADDLE PLATE IS SUPPLIED INSTEAD OF "C" CLAMP, MAKE SURE IT IS SECURELY FASTENED TO BASE COMPONENT AND THAT THE PROPER SHAFT POSITION DESCRIBED BEFORE CAN BE MAINTAINED.

9-2

#8 IF YOUR UNIT WAS NOT WIRED AT THE FACTORY, PROCEED TO WIRE THE UNIT AT THIS POINT, INSURING THAT PROPELLER SHAFT ROTATION, AS VIEWED FROM THE MOTOR TOWARD THE PROPELLER, IS CLOCKWISE. THIS STEP IS OF THE UTMOST IMPORTANCE! IMPROPER ROTATION WILL NOT ONLY RESULT IN POOR MIXING ACTION, BUT CAN SERIOUSLY DAMAGE YOUR UNIT. FOR AIR DRIVEN MOTORS, MAKE SURE MOTOR IS PIPED INTO THE SYSTEM TO ASSURE ROTATION AS DEFINED ABOVE.

OPERATING

1) NEVER RUN MIXER WITHOUT FLUID IN THE TANK AS THIS MAY CAUSE EXCESSIVE VIBRATION.

2) AT THIS POINT, OPERATE YOUR MIXER IN THE NORMAL MANNER, CHECK FOR ANY EXCESSIVE SHAFT VIBRATION OR WHIPPAGE, WHICH, REGARDLESS OF SHAFT LENGT SHOULD NOT OCCUR. IF THIS SITUATION OF EXCESSIVE WHIPPAGE OCCURS, SHUT DOWN THE UNIT, AND RETRACE STEPS 3-5. IF THIS CONDITION PERSISTS, CONTACT YOUR LOCAL ALSOP REPRESENTATIVE OR THE HOME OFFICE.

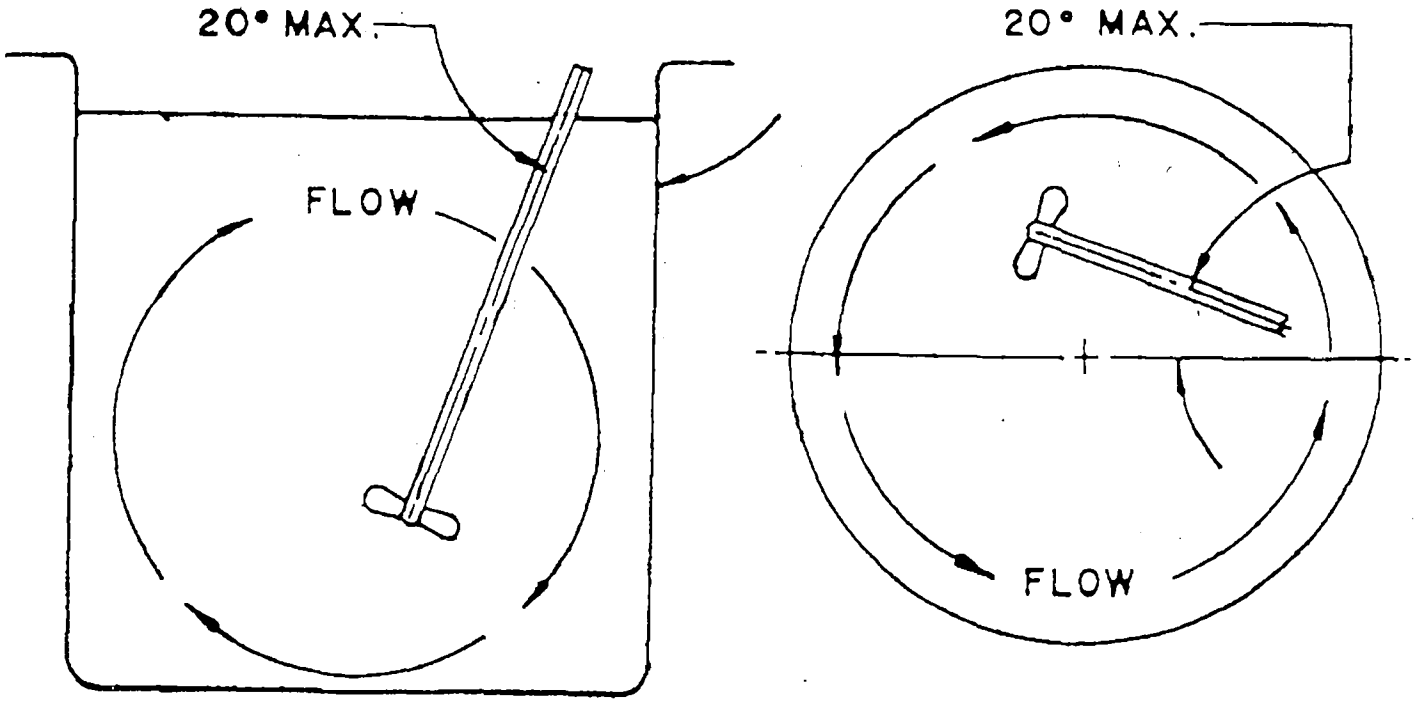
3) LIQUID CIRCULATION SHOULD BE AS SHOWN IN SKETCH BELOW. FOR AVERAGE CONDITIONS, LOCATE THE PROPELLER ABOVE THE TANK BOTTOM A DISTANCE EQUAL TO TWICE THE PROPELLER DIAMETER.

MAINTENANCE

1) ALL MIXERS, WHETHER GEARED OR DIRECT DRIVE, HAVE ALL INTERNAL PARTS PRE-LUBRICATED AND SEALED AT THE FACTORY FOR THE LIFE OF THE UNIT. NO LUBRICATION ON YOUR PART IS NECESSARY.

2) BE SURE TO SAVE AND USE THE LUBRICATING INSTRUCTIONS WHICH ARE ATTACHED TO THE ELECTRIC OR AIR MOTOR.

RECOMMENDED SHAFT POSITION



ALSOP ENGINEERING COMPANY KINGSTON, NY

OPERATING INSTRUCTIONS FOR THE ALSOP PORTABLE MIXERS

WARNING: READ INSTRUCTIONS PRIOR TO OPERATING OR WIRING YOUR ALSOP MIXER -- DAMAGE MAY RESULT IF THESE INSTRUCTIONS ARE NOT FOLLOWED.

INSTRUCTIONS

#1 EXAMINE MIXER VISUALLY FOR EVIDENCE OF DAMAGE IN TRANSIT. TAKE CARE NOT TO DAMAGE THE BALANCED PROPELLER AND SHAFT.

#2 CROSS CHECK MOTOR NAMEPLATE WITH THE TYPE OF ELECTRICAL SUPPLY IN YOUR PLANT FOR COMPATABILITY. IF AN AIR MOTOR IS SUPPLIED, SEE ATTACHED INSTRUCTIONS.

#3 VIEW THE FRONT OF THE MIXER HOUSING AND LOCATE THE VERTICAL ACCESS SLOT WHICH APPEARS ON RIGHT HAND SIDE. THIS SLOT WILL HAVE AN ALLEN WRENCH AND A CLAMP NUT WRENCH INSERTED IN IT AND TAPED IN PLACE. REMOVE THE TAPE AND WRENCHES. LOOSEN, BUT TAKE CARE NOT TO REMOVE, THE BOTTOM THREE SET SCREWS ON THE COUPLING INSIDE THE MIXER HOUSING. THIS ALLOWS INSERTION OF THE MIXER SHAFT AS DESCRIBED IN STEP #5.

#4 POSITION AND SECURE YOUR MIXER TO THE TANK OR MIXER BRACKET YOU INTEND TO USE.

#5 INSERT THE END OF THE MIXER SHAFT THAT HAS THE FLAT ON IT, THROUGH THE OPENING IN THE BOTTOM OF THE MIXER HOUSING AND INTO THE COUPLING. MAKE CERTAIN THAT THE SET SCREWS WHICH WERE LOOSENED IN STEP #3 WILL BEAR DOWN ON THE FLAT WHEN TIGHTENED. THE SHAFT SHOULD SLIDE INTO THE COUPLING FOR ABOUT 4-1/2" AND THEN STOP.

#6 TIGHTEN THE SET SCREWS ON THE COUPLING TO BEAR DOWN ON THE FLAT PORTION OF THE MIXER SHAFT WITH THE ALLEN WRENCH SUPPLIED.

#7 POSITION THE PROPELLER ON THE LOWEST POINT OF THE MIXER SHAFT. FOR AVERAGE CONDITIONS, LOCATE THE PROPELLER ABOVE THE TANK BOTTOM A DISTANCE EQUAL TO TWICE THE PROPELLER DIAMETER. THE ARROW STAMPED ON THE PROPELLER HUB SHOULD POINT TO THE BOTTOM OF THE TANK. IF TWO PROPELLERS ARE SUPPLIED, LOCATE THE BOTTOM PROPELLER AS DESCRIBED, AND THE TOP PROPELLER APPROXIMATELY 1 TO 2 PROPELLER DIAMETERS ABOVE THE LOWER ONE. IN THE EVENT YOUR UNIT IS SUPPLIED WITH A STABILIZING RING ON THE PROPELLER, MOUNT THIS PROPELLER, WITH THE ARROW POINTING DOWNWARD, AT THE LOWEST POSITION ON THE MIXER SHAFT.

#8 IF YOUR UNIT WAS NOT WIRED AT THE FACTORY, PROCEED TO WIRE THE UNIT AT THIS POINT, INSURING THAT PROPELLER SHAFT ROTATION, AS VIEWED FROM THE MOTOR TOWARD THE PROPELLER IS CLOCKWISE. THIS STEP IS OF THE UTMOST IMPORTANCE! IMPROPER ROTATION WILL NOT ONLY RESULT IN POOR MIXING ACTION, BUT CAN SERIOUSLY DAMAGE YOUR UNIT. FOR AIR DRIVEN MOTORS, MAKE SURE MOTOR IS PIPED INTO THE SYSTEM TO ASSURE ROTATION AS DEFINED ABOVE.

OPERATION

1) NEVER RUN MIXER WITHOUT FLUID IN THE TANK AS THIS MAY CAUSE EXCESSIVE VIBRATION.

2) AT THIS POINT, OPERATE YOUR MIXER IN THE NORMAL MANNER, CHECK FOR ANY EXCESSIVE SHAFT VIBRATION OR WHIPPAGE, WHICH, REGARDLESS OF SHAFT LENG SHOULD NOT OCCUR. IF THIS SITUATION OF EXCESSIVE WHIPPAGE OCCURS, SHU DOWN THE UNIT, AND RETRACE STEPS 3, 5, 6, & 7. IF THIS CONDITION PERSISTS, CONTACT YOUR LOCAL ALSOP REPRESENTATIVE OR THE HOME OFFICE.

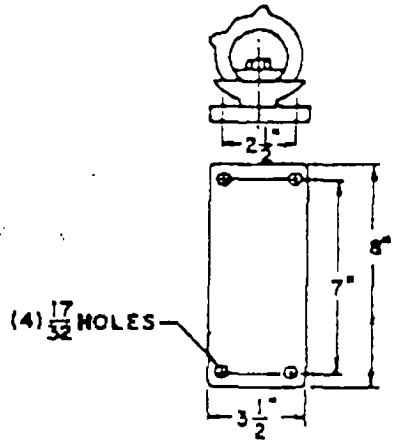
MAINTENANCE

1) ALL MIXERS, WHETHER GEARED OR DIRECT DRIVE, HAVE ALL INTERNAL PARTS PRE-LUBRICATED AND SEALED AT THE FACTORY FOR THE LIFE OF THE UNIT. NO LUBRICATION ON YOUR PART IS NECESSARY.

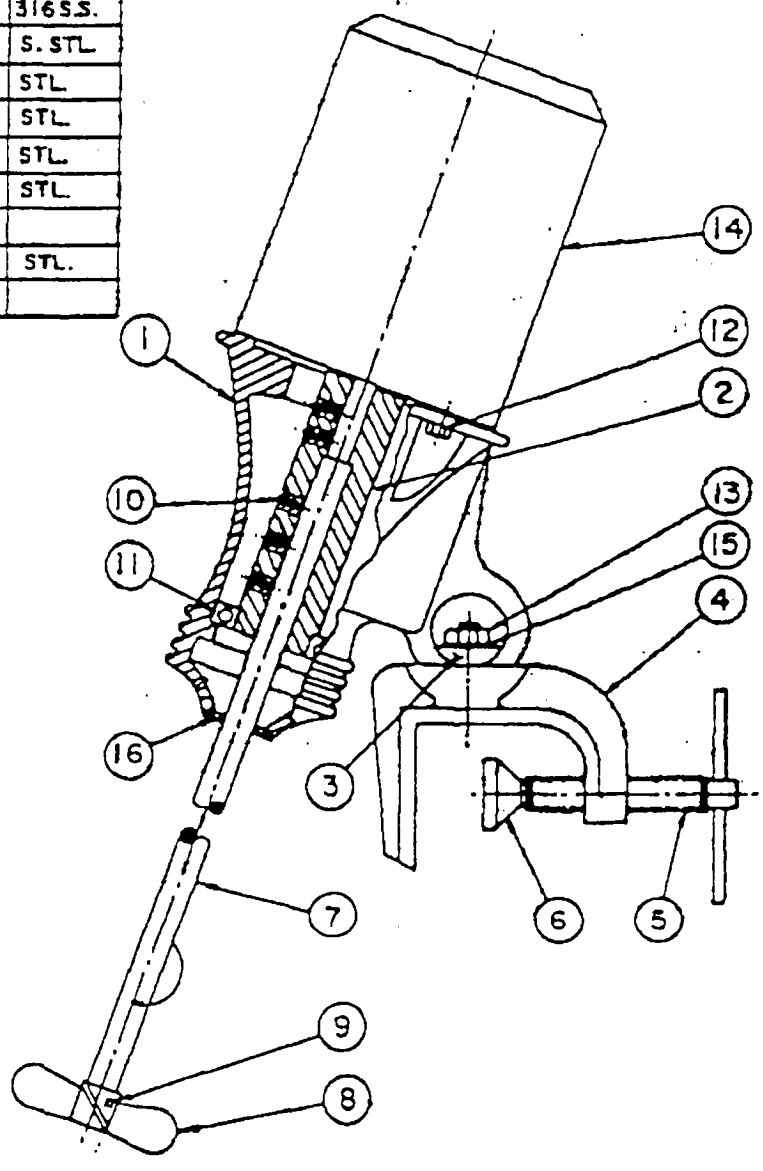
2) BE SURE TO SAVE AND USE THE LUBRICATING INSTRUCTIONS WHICH ARE ATTACHEI TO THE ELECTRIC OR AIR MOTOR.

PARTS LIST		
PART NO.	DESCRIPTION	MATL.
1	HOUSING	ALUM.
2	COUPLING	STL. PL.
3	GUIDE	ALUM.
4	CLAMP	C. STL.
5	SCREW AND HANDLE	STL.
6	SWIVEL	STL.
7	SHAFT	316 S.S.
8	PROPELLER	316 S.S.
9	SET SCREW	S. STL.
10	COUPLING SET SCREW	STL.
* 11	BEARING	STL.
12	HEX HEAD SCREW	STL.
13	HEX HD. BOLT & NUT	STL.
14	MOTOR	
15	WASHER	STL.
* 16	LIP SEAL	

WHEN ORDERING PARTS, SPECIFY
SERIAL NUMBER
MODEL NUMBER
PART NO. & DESCRIPTION



OPTIONAL
SADDLE PLATE



MODEL D D MIXER

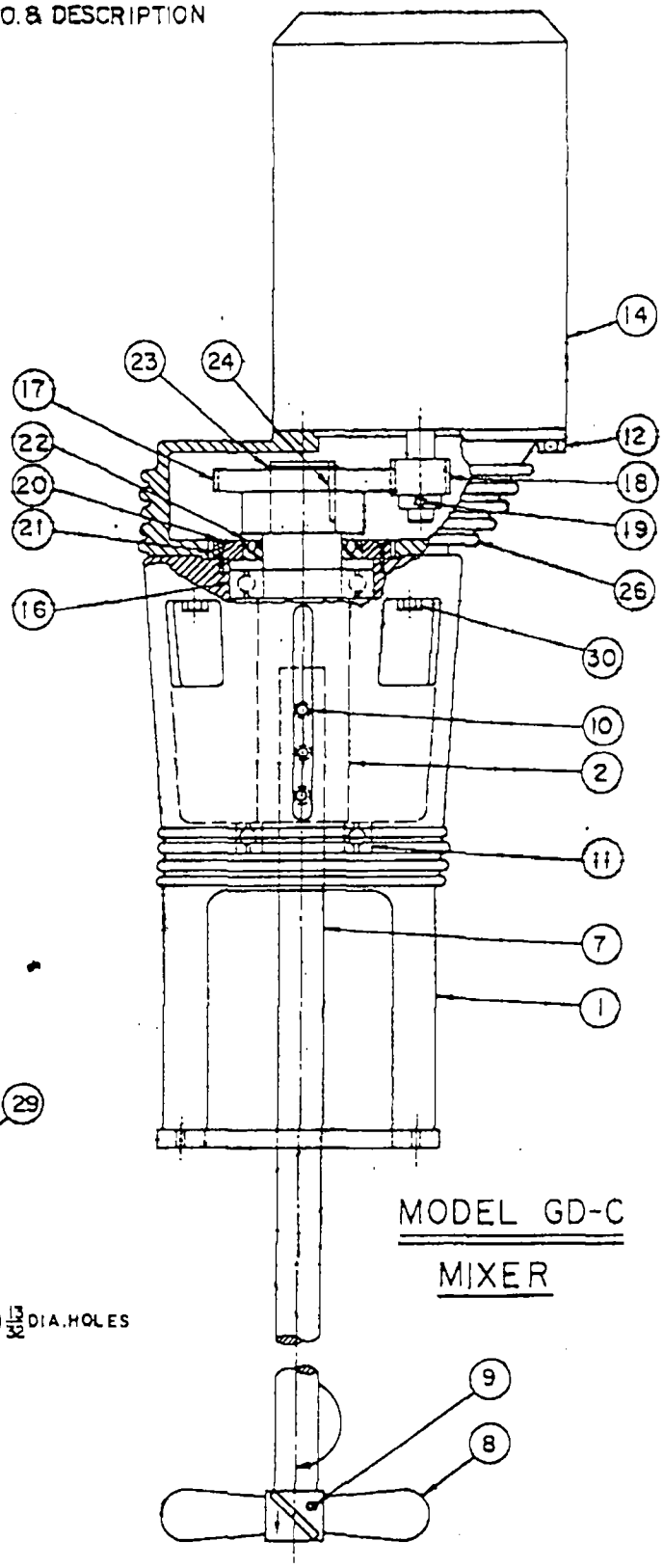
* RECOMMENDED SPARE PART.

ALSOP ENGINEERING COMPANY KINGSTON, N.Y.

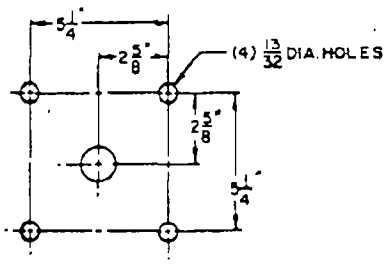
G r

PART LIST		
PART NO.	DESCRIPTION	MAT'L
1	HOUSING	ALUM.
2	COUPLING	LED LOY
7	SHAFT	316 S.S.
8	PROPELLER	316 S.S.
9	PROPELLER SET SCREW	S. STL.
10	COUPLING SET SCREW	STL.
* 11	BEARING (SMALL)	STL.
12	HEX HEAD SCREW	STL.
14	MOTOR	
* 16	BEARING (LARGE)	STL.
* 17	DRIVEN GEAR	STL.
* 18	PINION GEAR	STL.
19	GEAR SET SCREW	STL.
20	FLAT HD. MACH. SCREW	S. STL.
21	SEAL INSERT	ALUM.
* 22	LIP SEAL	
23	SNAP RING	STL.
24	DRIVEN GEAR KEY (SQ.)	STL.
25	MOTOR KEY (SQ.)	STL.
26	GEAR HOUSING	ALUM.
27R	ANGLE RISER (RIGHT)	ALUM.
27L	ANGLE RISER (LEFT)	ALUM.
29	HEX BOLT & NUT	STL.
30	HEX HEAD SCREW	STL.

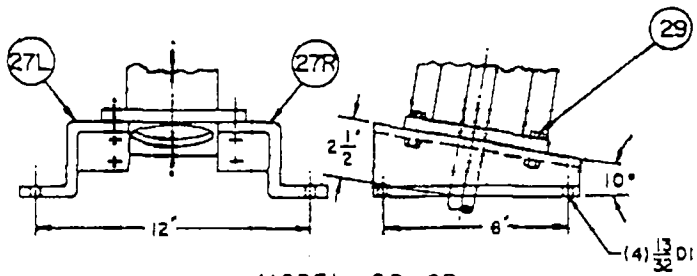
WHEN ORDERING PARTS, SPECIFY
SERIAL NUMBER
MODEL NUMBER
PART NO. & DESCRIPTION



MODEL GD-C
MIXER



MODEL GD-C
MOUNTING DIM'S.



MODEL GD-CR
WHEN MODEL GD-C IS USED WITH ABOVE RISER, MODEL THEN BECOMES GD-CR

* RECOMMENDED SPARE PART.

ALSOP ENGINEERING COMPANY KINGSTON, N.Y.

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QUACKENBUSH CO., INC.
MECHANICAL CONTRACTORS
505 Franklin Street, Buffalo, New York 14202
☐ Phone 716-886-4355 ☐ Fax 716-883-8277

SECTION 10

11531 - CHEMICAL FEED PUMPS

Supplier: R.L. Stone Co., Inc.
630 Cleveland Dr.
Buffalo, NY 14225-1098

Phone: (716) 834-2525

Fax: (716) 834-4082

Contact: Mr. Hal Wright

Service: R.L. Stone Co., Inc.

SERIES E7
METERING PUMPS

INSTRUCTIONS
MAINTENANCE
SERVICE

For file reference, please record the following data:

Model No.: _____

Serial No.: _____

Installation Date: _____

Installation Location: _____

_____

When ordering replacement parts for your LMI Metering Pump or accessory, please include the complete model number and serial number of your unit.

LMI
LIQUID METRONICS DIVISION
MILTON ROY

ISO9001 Certified • a unit of Sundstrand Corporation

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Catalog Sec. 6.0, pg. 1700
Replaces same of 1/94
1718.B 4/96

INSTALLATION

I. UNPACKING

A. Remove tubing, injection check and foot valve from the pump carton. Notify delivery carrier immediately if there are any signs of damage to the metering pump or parts.

II. LOCATION AND MOUNTING

CAUTION

When pumping solutions, make certain that all tubing is securely attached to the fittings. It is recommended that tubing or pipe lines be shielded to prevent possible injury in case of rupture or accidental damage. Always wear protective face shield and clothing when working on or near a chemical metering pump.

⚠ WARNING ⚠

LMI accessories used with the E Series of pumps must be placed in an explosion proof enclosure or located in an area where they will not be subjected to explosion hazard.

A. Locate the pump in an area that is convenient to both solution injection point and electrical supply. LMI E7 Series metering pumps have corrosion resistant housings, but should not be subjected to continuous high temperature (over 122°F or 50°C).

B. Mount pump on a shelf directly above solution tank. Secure pump with 5/16" bolts through the four holes in the pump base. Shelf must be able to support 50 lbs minimum (23 kg).

C. Diagrams (shown below) show typical metering pump installation methods. Note location of injection check valve which is most important. Refer to separate Liquid Handling Assembly Instructions Section A regarding installation of injection check valve.

D. BACK PRESSURE REQUIREMENTS

All electronically controlled magnetically driven pumps maintain maximum velocity on the discharge portion of their stroke regardless of the stroke frequency setting. If there is little or no resistance (back pressure), the velocity of the pumped fluid will be so great as to cause over-pumping. Because of this characteristic, back pressure equal to approximately 25 psi* must be supplied by an anti-syphon/back pressure valve if the system pressure at the injection point is not high enough to provide the needed back pressure.

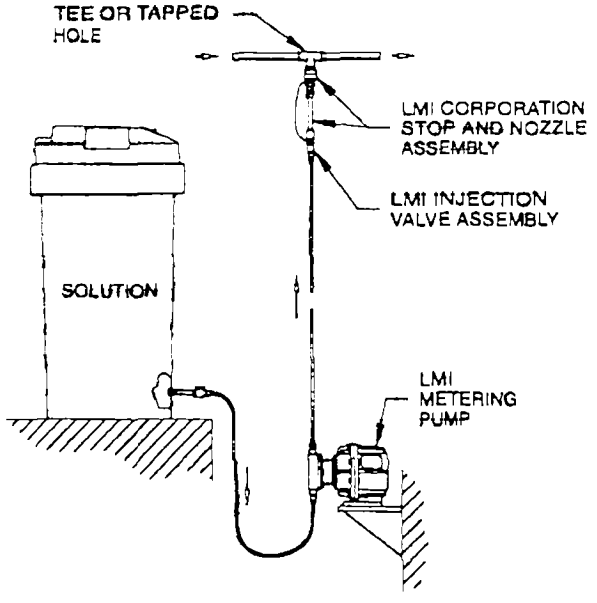
* 10 psi for E74 Series.

CAUTION

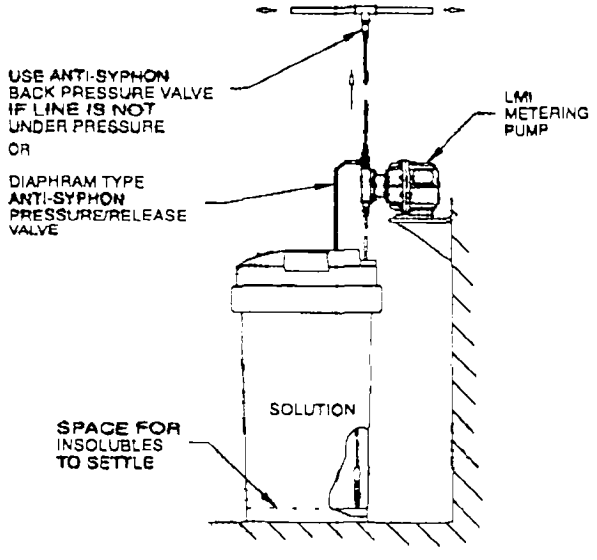
Be sure installation does not constitute a cross connection. Check local plumbing code.

FLOODED SUCTION INSTALLATION

helpful when pumping at very low rates

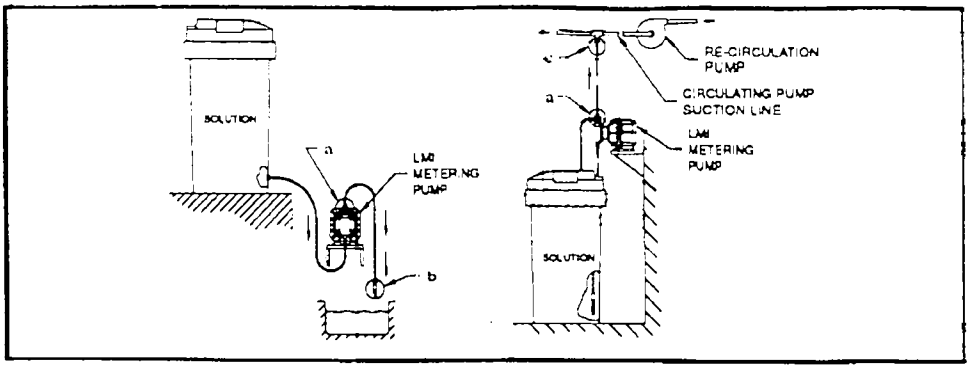


SUCTION LIFT INSTALLATION



PREVENT SYPHONING WHEN PUMPING

"Downhill" or into pump suction. Always use (a) a 4FV at pump discharge and (b) an injection check valve at injection point.

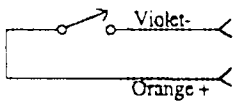


III. ELECTRICAL

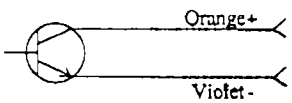
Note: Installation wiring must conform to U.L. listings and local electrical codes

Method of triggering an E Series pump

1. Switch Closure Switch closing triggers pump

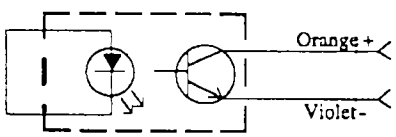


2. NPN Transistor Base goes high to trigger pump



3. PNP Transistor Base goes low to trigger pump

4. Opto Isolator

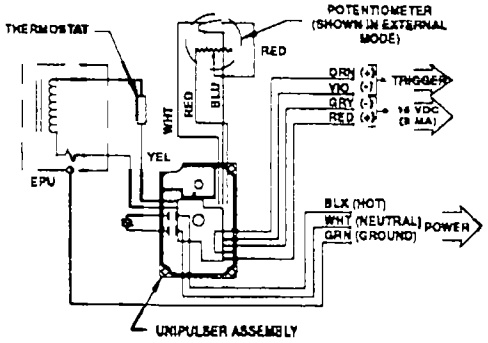


The external trigger circuit is isolated and has the same characteristics as the other LMI Control Code 7 Series metering pumps. Minimum time in low impedance state (on) is 50 milliseconds. Minumum time in high impedance state (off) is 100 milliseconds.

WIRING DIAGRAM

⚠ WARNING ⚠

LMI accessories used with the E Series of pumps must be placed in an explosion proof enclosure or located in an area where they will not be subjected to explosion hazard.



OUTPUT ADJUSTMENT

INITIAL APPROXIMATION

A. Speed control dial is graduated in approximate percent of maximum strokes per minute. Turning this knob clockwise ↻ increases pumping frequency.

Output Estimate - Total output of pump may be estimated by multiplying stroke frequency (percent of maximum) by stroke length setting (percent of maximum).

For example, if the stroke length knob is set at 100% of maximum and the stroke frequency if 20% of maximum, total pump output will be approximately 20%; if the stroke length knob is set at 30% of maximum and stroke frequency is 20% of maximum, total output will be approximately 6% of the pump's maximum rating. This is .2x.3=.06 or 6%.

B. To determine exact frequency in strokes per minute at any speed knob setting, count number of strokes for one minute.

C. Stroke length adjustment knob is the lower of the control panel knobs. Adjust by rotating to desired setting, while pump is stroking.

D. SETTING—Maximum output of the pump is obtained with stroke frequency knob set at maximum and stroke length knob set at maximum.

If pump is to be used at less than maximum output, best volumetric efficiency will be achieved if stroke length knob is left at maximum, and stroke frequency knob rotated counter-clockwise ↺ to reduce pump output. If more output reduction is required than can be achieved by reducing stroke frequency, reduce output by turning the stroke length knob counter-clockwise ↺.

E. After installation is complete and an initial approximation setting has been made, the pump should be

calibrated and the stroke frequency and/or stroke length settings adjusted.

F. Nominal output and pressure ratings at 100% settings of stroke frequency and stroke length.

Series	Max. Pressure Rating		Max Output	
	PSI	Bar	gph	lph
E70	300	20.7	1.3	4.9
E71	150	10.3	2.5	9.5
E72	100	6.9	4.0	15.2
E73	60	4.1	9.0	34.0
E74	25	1.7	20.0	76.0

PROCEDURE FOR ON-SITE VOLUMETRIC CALIBRATION E7 IN INTERNAL MODE

A. Make certain speed control knob is turned fully clockwise. Turn off power to pump.

B. With pump primed and discharge tubing connected to the injection point as it would be in normal service, place foot valve and strainer assembly in a graduated container with a volume of 500ml or more (so that the volume displaced by tubing and foot valve assembly is minimal in relation to volume of the solution in the container).

C. Turn pump on, and pump until air is exhausted from the suction line and pump head.

D. Turn pump off, note the solution level in the graduate. Refill graduate if necessary.

F. Turn off pump at the end of the calibration period, note volume pumped during the calibration period, and calculate volume of solution pumped in time unit you choose (minute, hour, day, etc.).

G. Adjust stroke frequency and/or stroke length knobs to your best estimate of required correction, and repeat calibration measurements as a check.

PROCEDURE FOR ON-SITE VOLUMETRIC CALIBRATION OF E7 IN EXTERNAL MODE

A. Since pump output is governed by an external device, only the output per stroke may be calibrated.

B. With pump primed and discharge tubing connected to the injection point as it would be in normal service, turn off pump and place foot valve and strainer assembly in a graduated container with a volume of 500ml or more.

C. Turn pump to internal mode with speed knob set at 100 and operate until air is exhausted from suction line and pump head.

D. Turn pump off and note solution level in graduated container. Refill graduate if necessary.

E. Turn pump on and count the number of strokes for exactly one minute. Then switch pump off.

F. Note volume pumped during the calibration period of one minute. Divide into this, the number of strokes to determine the volume of solution pumped per stroke.

Example: 50ml/100spm=0.5ml per stroke.

Multiply this by your expected stroke rate per minute, per hour or per day and compare with desired output requirements.

G. Adjust stroke length knob (lower knob) to your best estimate of required correction and repeat calibration procedure.

You may elect, for safety and convenience, to do the first calibration or operating test with water or other non-hazardous solution. If so, make certain the water or test fluid is removed from the Liquid End before pumping solutions that may react with the test fluid or be exothermic, such as sulfuric acid.

The final calibration adjustment should be made with pumping conditions identical to conditions of normal pumping service. This means that factors such as injection pressure, fluid viscosity, suction lift and others will automatically be accounted for in making the final adjustment of the pump.

TROUBLESHOOTING LIQUID END

I. LOW PUMP OUTPUT:

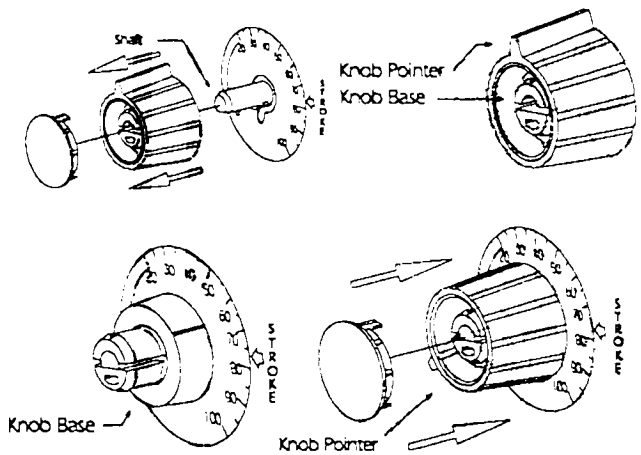
Low pump output can be caused by many things. Some of the more common ones are:

- Very low stroke setting, i.e. red zone setting of knob
- Trapped air in pump head (trapped air in discharge tubing has no effect)
- Air leak through valve seal rings
- Ruptured pumping Liquifram™ (diaphragm)
- Clogged Liquid End, or injection point connection

- Injection into pressure within 25* psi of pump's maximum pressure rating with anti-syphon spring in place (if so supplied)
- Injection into pressure in excess of pump rating-see chart on page 3.

* 10 psi for E74

A. **Very low stroke setting** - Check position of stroke length knob (lower knob) by rotating it counter-clockwise ↺ until Liquifram® (diaphragm) stops moving with the pump operating. The Liquifram® should not stop reciprocating (moving or clicking) until the knob points to zero. If it stops before zero, reset knob by grasping the knob and pulling it towards you. Pry the yellow cap off of the knob. Place the knob on a flat surface. Using needle nose pliers, squeeze the inner section together while lifting the outer section up (see figure below).



Push the inner section back onto the "D" shaped stroke shaft. With the pump running, zero the pump by turning the inner section of the knob counter clockwise. Position the outer section of the knob so that the pointer aligns with zero on the nameplate. Push down on the outer section of the knob (a snap sound will indicate that parts are locked together). Replace the yellow cap over the outer section of the knob, aligning the tabs on the cap with the slots on the knob.

B. **Trapped air in pump head**—May be caused by leaks in the suction line, where the suction line joins the suction fitting, or at the seal ring between suction fitting and pump head. It may also be caused by air or gases coming out of solution. Trapped air or bubbles in the discharge line have no effect on the pump's operation. They may be ignored.

To remove trapped air from the pump head, operate the pump with stroke frequency knob and stroke length knob set at 100.

It may be neccessary to pull on both knobs of the 4-FV, if so equipped. Follow "Priming" instructions in the Liquid Handling Assembly Sheet inserted in this instruction book and operate the pump for a few minutes to purge the head and valves of air or gas.

C. **Air leak through valve seal rings**- usually caused by worn or damaged seal rings or loose fittings. Tighten fittings by hand until they are very snug. If there is no improvement, replace both seal rings in pump head. See enclosed Liquid Handling Assembly Sheet.

D. **Ruptured pumping diaphragm**—If rupture is severe and pump is injecting into pressure, solution leak will be obvious through the 3/16" (5mm) diameter hole at the bottom of the spacer directly behind the pump head. Replace pumping Liquifram® (diaphragm). If rupture is a small pin hole, there may be oozing of solution through the 3/16" (5mm) diameter hole described above. Replacement of pumping Liquifram® (diaphragm) will be necessary.

E. **Clogged Liquid End**—will cause low pump output. Purge Liquid End. Disassemble Liquid End. Clean individual parts with water and detergent or appropriate cleaning solution.

F. **Injection into excessive pressure**—If discharge pressure is within 25 psi* of maximum pump rating, remove spring in injection check valve, if so supplied.

* 10 psi on E74 Series

II. EXCESSIVE PUMP OUTPUT:

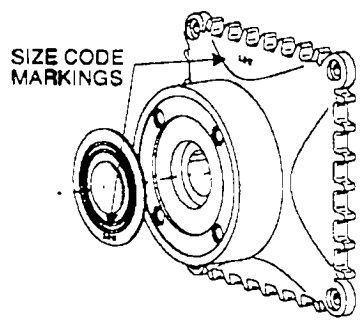
A. **Syphoning**—If your E Series pump has a Liquid End other than a high viscosity LE, its injection check valve assembly has a chemically resistant anti-syphon spring. Disassemble the injection check valve and check to be sure this spring is in place and undamaged. Replace if necessary. Note that the anti-syphon spring must be removed if injection is into a pressure within 25 psi* of pump's maximum pressure rating. Liquid Ends with a suffix "S" have, in addition, a diaphragm type anti-syphon valve, which prevents syphoning and over pumping.

*10 psi for E74 Series.

B. **Incorrect knob settings**—Check stroke length knob (lower knob) by rotating it counter-clockwise ↺ to zero position. The Liquifram® (pumping diaphragm) should stop reciprocating. If it does not, reset knob and continue counter-clockwise ↺ rotation until motion stops. Reset knob by grasping the knob and pulling it towards you. Pry the yellow cap off of the knob. Places the knob on a flat surface. Using needle nose pliers, squeeze the inner section together while lifting the outer section up (see figure on page 5). Push the inner section back onto the "D" shaped stroke shaft. With the pump running, zero the pump by turning the inner section of the knob counter clockwise. Position the outer section of the knob so that the pointer aligns with zero on the nameplate. Push down on the outer section of the knob (a snap sound will indicate that parts are locked together). Replace the yellow cap over the outer section of the knob, aligning the tabs on the cap with the slots on the knob.

III. CHANGING PUMPING LIQUIFRAM® (DIAPHRAGM):

A. Make sure size code marking (0.9 S.I., 1.8 S.I. or 3.0 S.I.) on spacer and Liquifram® (diaphragm) are the same. Liquifram® and spacer size code must match in order for the pump to function. The E74 Liquifram® size code is 6.0 S.I., (spacer is 3.0 S.I., but there is a large black spacer adapter).



Always wear protective clothing, gloves and face shield when working on or near chemical metering pumps.

B. Depressurize discharge line following steps outlines on the supplement "Liquid Handling Assembly Instructions". Lift foot valve from solution and let pump run pumping air for a few minutes. Then remove pump head.

C. Set stroke length knob (lower knob) to zero, rotate it counter-clockwise ↺ with the pump running, then stop the pump by turning stroke frequency knob (upper knob) to "off".

D. Lift edge of Liquifram® and rotate it counter-clockwise ↺ to unscrew the Liquifram®.

E. Before installing new pumping Liquifram®, turn pump on and rotate stroke length control knob (lower knob) to the proper setting per the table following.

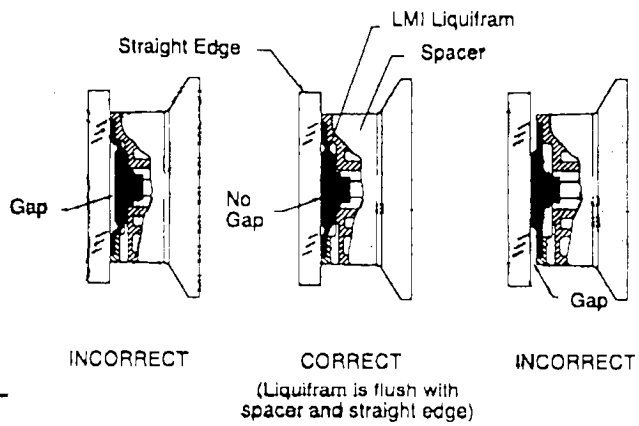
Model	Stroke Setting Length
E70, E71, E72	90%
E73, E74	70%

With pump stroking, screw on new Liquifram® until the center part begins to buckle inwards during the latter half of the stroke. Turn pump off and check Liquifram® position with a straight edge according to the illustration below.

If Liquifram® setting is not correct, restart pump then screw the Liquifram® in or out. Always stop pump electrically when checking Liquifram® setting. Repeat procedure if necessary.

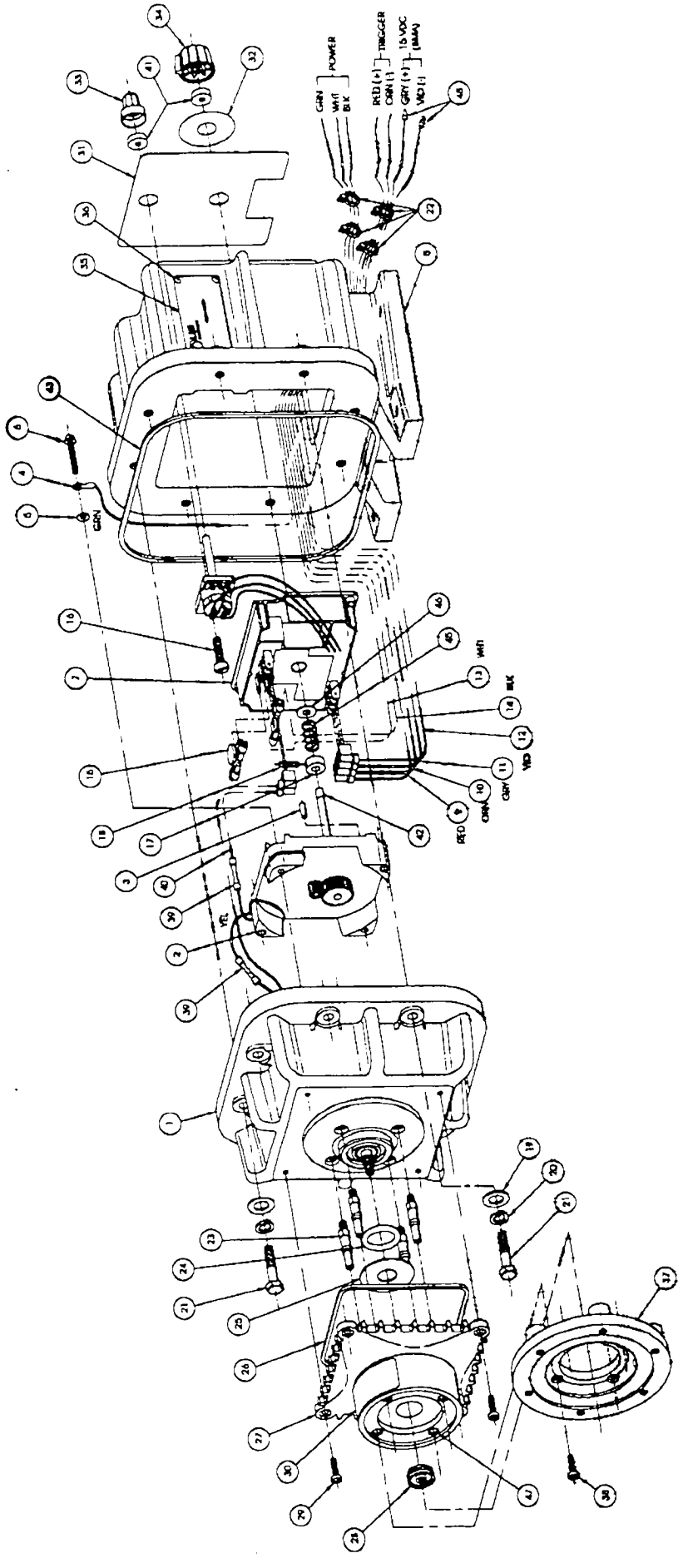
After Liquifram® is set properly, restart pump and turn stroke knob to 100%.

F. Reinstall pump head and tighten head mounting screws in criss-cross pattern.



KEY NO.	FOR MODEL NO.	PART NO.	DESCRIPTION	QUANTITY
1	E701, E711, E721, E731, E741	33055	EPU & Cover Asm., 120 V	1
	E702, E712, E722, E732, E742	33056	EPU & Cover Asm., 240 V	1
2	E7	32251	Stroke Bracket Asm.	1
3	E7	28817	Pin, .187" O.D.	1
4	E7	31726	Wire Asm., Green	4
5	E7	10415	Washer #10	4
6	E7	27551	Screw, 10-24 S.S.	1
7	E701, E711, E721, E731, E741	33057	Unipulser Asm., 120 V	1
	E702, E712, E722, E732, E742	33058	Unipulser Asm., 240 V	1
8	E7	31462	Housing	1
9	E7	33084	Wire Asm., Red	1
10	E7	33085	Wire Asm., Orange	1
11	E7	33086	Wire Asm., Grey	1
12	E7	33087	Wire Asm., Violet	1
13	E7	33082	Wire Asm., White	1
14	E7	33083	Wire Asm., Black	1
15	E701, E711, E721, E731, E741	10626	MOV Asm., 120 V	1
	E702, E712, E722, E732, E742	10627	MOV Asm., 200 - 240 V	1
16	E7	33092	Screw, 1/4-20	1
17	E7	25424	Collar	1
18	E7	25423	Set Screw, 10-32	1
19	E7	26150	Washer	8
20	E7	31713	Lock Washer	8
21	E7	31736	Screw, 5/16-18	8
22	E7	10916	Tie, Cable	4
23	E70, E71, E72	27641	Stud	4
	E73, E74	29605	Stud	1
24	E7	26983	O-Ring	1
25	E7	27586	Shim	1
26	E7	35269	Seal	1
27	E70	27515	Spacer, 0.9	1
	E71, E72	27516	Spacer, 1.8	1
	E73, E74	27517	Spacer, 3.0	1
28	E7	10973	Shaft Seal	1
29	E7	10598	Screw, 10-24 S.S.	4
30	E7	24452	Label	1
31	E7	31542	Nameplate	1
32	E70, E71	32465	Stroke Dial	1
	E72	32466	Stroke Dial	1
	E73	32467	Stroke Dial	1
	E74	32468	Stroke Dial	1
33	E7	25889	Knob Asm., Speed	1
34	E7	31891	Knob Asm., Stroke	1
35	E701, E711, E721, E731, E741	33225	Dataplate 120 V	1
	E702, E712, E722, E732, E742	33226	Dataplate 240 V	1
36	E7	30014	Screw, Drive	4
37	E74	25887	Adapter, 6.0SI	1
38	E74	10598	Screw, 10-24	4
39	E7	27694	Wire Connector	3
40	E7	33088	Wire Asm., Yellow	1
41	E7	30803	Gasket	2
43	E7	33223	Seal	1
45	E7	10139	Spring	1
46	E7	26169	Washer	1
48	E7	10240	Connector	2

Exploded View



LE-20S LE-26S
LIQUID HANDLING ASSEMBLY

CAUTION

When pumping solutions make certain that all tubing is securely attached to the fittings. It is recommended that tubing or pipe lines be shielded to prevent possible injury in case of rupture or accidental damage. Always wear protective clothing and face shield when working on or near your metering pump.

Note: See parts list for materials of construction

A. INSTALLING INJECTION CHECK VALVE

1. The purpose of the injection check valve is to prevent backflow from the treated line.
2. A 1/2" NPT female fitting with sufficient depth will accept the injection check valve.
3. To insure correct seating of the ball inside the injection check valve, the injection check valve should be installed upwards (vertically) into bottom of the pipe.

B. CONNECTING DISCHARGE TUBING

NOTE:
Cut tubing to length needed for discharge line.

1. Route tubing from the injection check valve to the metering pump, making sure it does not touch hot or sharp surfaces, or is bent so sharply that it kinks.
2. Slide the small end of the coupling nut onto tubing, then slide on the clamp ring.
3. Push tubing on the valve housing nozzle so that tubing flares out and butts up against valve housing and will not go any further.
4. Slide the clamp ring and coupling nut to the threads and engage. While pushing the tubing on to the valve housing nozzle, tighten the coupling nut by hand until tubing is held securely in place.

EXCESSIVE FORCE WILL CRACK OR DISTORT FITTINGS.
DO NOT USE PIPE WRENCH.

C. CONNECTING SUCTION TUBING

1. Cut suction tubing to a length so that the foot valve hangs just above the bottom of the solution container. Maximum recommended vertical suction lift is 5 ft. (1.5m).
2. Follow same procedure in connecting suction tubing to suction valve and foot valve (see B. Connecting Discharge Tubing).

D. PRIMING

1. Connect pressure relief tubing to pressure relief port on the four function valve.
2. Route tubing to solution reservoir and anchor with a plastic tie. Do not submerge tubing in solution.
3. Correct position of relief and anti-syphon knobs are: anti-syphon arrow must be vertical (word "anti-syphon" is upright). Relief arrow must be horizontal (word "relief" is upright).

NOTE:
At injection pressures below 25 psi (1.75 kg/cm²) a slight buzzing noise may be made by the anti-syphon valve during each stroke of the metering pump. This is normal.

4. Start pump. Set at 80% speed and 100% stroke.
5. When solution begins to flow through the return tubing, rotate relief arrow to the vertical position.
6. The pump is now primed.

NOTE:
(a) Pump is normally self-priming if suction lift is not more than 5 ft. (1.5m), valves in the pump are wet with water (pump is shipped from factory with water in pump head) and the above steps (D. Priming) are followed.
(b) If the pump does not self prime, remove discharge valve housing and ball and pour water or solution slowly into discharge port until head is filled. Follow step D. Priming thereafter.

E. DEPRESSURIZING DISCHARGE LINE

1. It is possible to depressurize the discharge line and pump head without removal of tubing or loosening of fittings.

Be sure injection check valve is properly installed and is operating. If a gate valve or globe has been installed downstrean of injection check valve, it should be closed. Be certain relief tubing from the four function valve is connected and run to solution reservoir.

2. Rotate both anti-syphon and relief arrows so they are in a horizontal position.
3. The discharge line is now depressurized.
4. If injection check valve is of higher elevation than pump head, disconnecting tubing at injection check valve end will allow air to enter and cause solution to drain back to tank.

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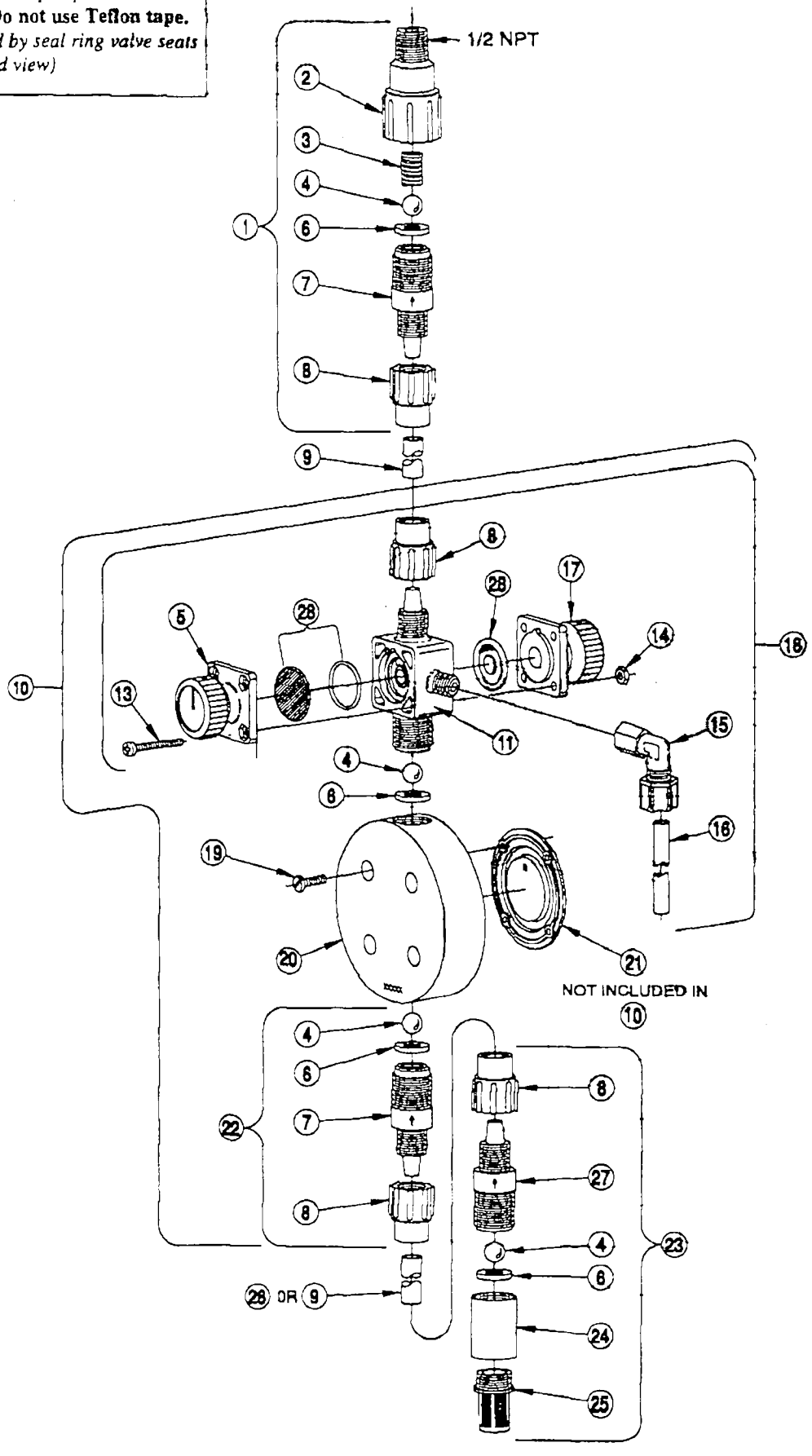
KEY NO.	PART NO.	DESCRIPTION	QUANTITY	
			LE-20S	LE-26S
1	26851	Injection Check Valve Assembly	1	
	26751	Injection Check Valve Assembly		1
2	25108	Injector Fitting, PVC	1	1
3	10339*+	Spring PVDF	1	1
4	10138*+	Ball, Ceramic .500	4	4
5	34615	Cap Assembly, Anti-Syphon	1	1
6	10128*	Seal Ring, Hypalon	4	
	10228+	Seal Ring, Viton		4
7	10206	Valve Seat, PVC	2	2
8	10411	Coupling Nut	4	4
9	10142-10	Tubing, Polyethylene, .5" O.D.	1	
	10142-16	Tubing, Polyethylene, .5" O.D.		1
10	10588	Head Assembly, LE-20S, Acrylic	1	
	10589	Head Assembly, LE-26S, PVC		1
11	34610	Valve Body, ASM, PVDF	1	1
13	34679	Screw, 10-24 x 1 5/8"	4	4
14	10143	Nut, 10-24	4	4
15	10587	Elbow Connector, Polypropylene	1	1
16	10342-10	Return Tubing, Polyethylene, .375" O.D.	1	1
17	32115	Cap Assembly Relief	1	1
18	34626	Anti-Syphon Valve Assembly	1	1
19	10340	Screw, 10-24 x 3/4", S.S.	4	4
20	10524	Head, 3.0 SI, Acrylic	1	
	10525	Head, 3.0 SI, PVC		1
21	31419*+	Liquifram, 3.0 SI, Fluorofilm	1	1
22	10562	Suction Valve Assembly	1	
	10564	Suction Valve Assembly		1
23	10153	Foot Valve Assembly	1	
	10253	Foot Valve Assembly		1
24	25600	Foot Valve Seat, Polypropylene	1	1
25	10123	Strainer, Polypropylene	1	1
26	10141-06	Tubing, Vinyl, .5" O.D.	1	
27	10273	Valve Housing, PVC	1	1
28	34613	Seal Repair Kit	1	1
	32700	Suction Tubing Straightener (Not Shown)	1	1

* Parts included in Spare Parts Kit 20S
+ Parts included in Spare Parts Kit SP-26S

NOTE:
Threaded connections into pump head are 1"-12 straight threads. **Do not use Teflon tape.** *These joints are sealed by seal ring valve seats (item 6 on the exploded view)*



QUACKENBUSH CO., INC.
MECHANICAL CONTRACTORS
505 Franklin Street, Buffalo, New York 14202
☐ Phone 716-886-4355 ☐ Fax 716-883-8277

SECTION 11

13020 - SAFETY SHOWER & EYEWASH

Supplier: Schaefer Plumbing Supply Co., Inc.
146 Clinton St.
Buffalo, NY 14203

Phone: (716) 853-2406

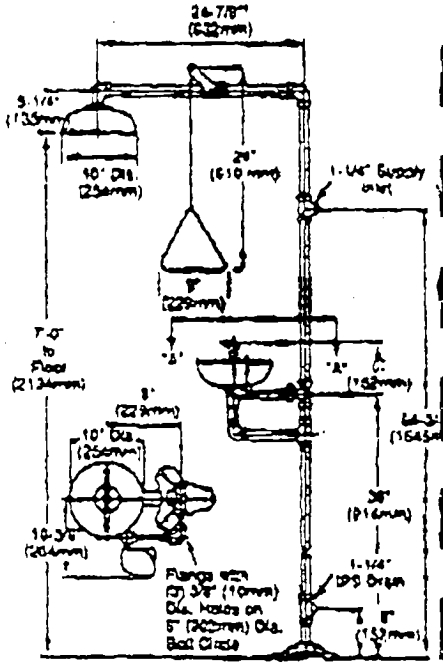
Fax: (716) 852-3732

Contact: Mr. Dave Kilijanski

Service: Schaefer Plumbing Supply Co., Inc.

Combination Drench Shower/Eye Wash Unit
Model S19-310SB

- Complies with American National Standard Z358. 1-1990
- Galvanized Steel Protected with BRADTECT™ Safety Yellow Coating
- Universal Identification Sign Included
- Full, One-Year Warranty



Specifications

Combination Drench Shower/Eye Wash Unit saves space and fits easily into any work environment. Shower valve operates quickly by a pull rod with a triangular handle. Eye wash operated by a large, highly visible push handle. Safe, steady water flow under varying water supply conditions is assured by integral flow control in the sprayhead assembly.

Construction

Impact-resistant plastic shower head is colored bright yellow for high visibility in emergency situations. Eye wash bowl and shower pull rod are stainless steel. Galvanized steel piping is additionally protected with BRADTECT™ safety yellow coating. Complies with American National Standard Z358. 1-1990.

Standard Equipment

Shower Head
10" (254mm) diameter yellow impact-resistant plastic.

Shower Valve
Chrome-plated brass 1" IPS stay-open ball valve. Operated by stainless steel pull rod with triangular handle.

Eye Wash Bowl
10" (254mm) diameter stainless steel.

Standard Sprayhead Assembly
Chrome-plated brass sprayhead assembly with twin, soft flow, eye wash heads and protective sprayhead covers. The integral flow control assures safe, steady flow under varying water supply conditions.

Eye Wash Valve
Chrome-plated 1/2" IPS stay-open ball valve. Hand operated by a large, highly visible safety yellow PVC push handle.

Pipe and Fittings
1-1/4" galvanized steel protected with BRADTECT™ safety yellow coating.

Water Supply
1-1/4" IPS.

Sample Specification

Fixture shall be Bradley Model S19-310SB Combination Drench Shower/Eye Wash. To include the following standard equipment:

- Shower head constructed of yellow impact-resistant plastic
- Eye wash bowl constructed of corrosion-resistant stainless steel
- Chrome-plated brass 1" IPS stay-open shower ball valve
- Chrome-plated brass 1/2" IPS stay-open eye wash ball valve
- Chrome-plated brass sprayhead assembly with twin, soft flow, eye wash heads and protective sprayhead covers

Pipe and fittings to be constructed of 1-1/4" galvanized steel protected with BRADTECT™ safety yellow coating. Water supply to be 1-1/4" IPS.

MODEL	
Model No.	Description
❑ S19-310SB	Combination Drench Shower/ Eye Wash Unit

This information is subject to change without formal notice.
Form No. W10-596

Bradley

P.O. Box 309, Menomonee Falls, WI 53052-0309
Phone 414-251-6000 FAX 414-251-5817
http://www.bradleycorp.com

QUACKENBUSH CO., INC.
MECHANICAL CONTRACTORS
505 Franklin Street, Buffalo, New York 14202
☐ Phone 716-886-4355 ☐ Fax 716-883-8277

SECTION 14

13290 - PRESSURE FILTRATION SYSTEM

Supplier: Ayer Sales Systems Division
6715 Joy Dr.
East Syracuse, NY 13057

Phone: (315) 437-2911

Fax: (315) 437-1129

Contact: Mr. Robert J. Metz

Service: Ayer Sales

BAG FILTER
INSTALLATION, OPERATION AND MAINTENANCE

INSTALLATION:

INSPECTION

UPON RECEIPT OF THE BAG FILTER, INSPECT IT FOR DAMAGE THAT MIGHT HAVE OCCURRED DURING TRANSIT. REPORT ANY DAMAGE TO THE CARRIER IMMEDIATELY.

LOCATION AND SUPPORT

THE HAYWARD BAG FILTER SHOULD BE INSTALLED NOT LESS THAN 24" DOWN STREAM OF A HAYWARD STRAINER. THE BAG FILTER MUST BE BOLTED TO THE FLOOR TO INSURE PROPER PIPING INSTALLATION. A INTEGRAL FLANGE ON THE BASE OF THE BAG FILTER WILL ACCEPT 3/4" STUDS.

PIPING INSTALLATION

FROM THE HAYWARD STRAINER, A 2" LINE IS REQUIRED TO THE INLET OF THE BAG FILTER. CONNECT 2" LINE TO A VALVE AND THEN TO THE UPPER 2" NPTF (INLET) OF THE BAG FILTER.

A 2" LINE MUST BE PIPED FROM THE BAG FILTER 2" NPTF BOTTOM PORT (OUTLET) TO A DETERMINED SUCTION SOURCE (SYSTEM PUMP SUCTION). A VALVE IS REQUIRED ON THIS OUTLET LINE.

IT IS RECOMMENDED THAT A 2" DRAIN VALVE BE INSTALLED ON THE UNUSED BOTTOM 2" NPT PORT

THE VENT FITTING MUST BE INSTALLED ON THE TOP OF THE UNIT. *DO NOT FORGET THE O-RING.* A 3/8" ID tube should be attached over the barb and secured with a hose clamp on the vent fitting. This hose will be used to direct the flow from the vent fitting.

THE TOP OF THE VENT FITTING IS NORMALLY PLUGGED. THIS PLUG CAN BE REMOVED AND REPLACED WITH A PRESSURE GAUGE THAT MEASURES INLET PRESSURE TO THE BAG FILTER. IT IS RECOMMENDED THAT A GAUGE GUARD BE INSTALLED BETWEEN THE FILTER VENT AND THE GAUGE.

OPERATION:

OPERATING INFORMATION

THE HAYWARD POLYPROPYLENE BAG FILTER IS DESIGNED AS AN INTEGRAL PART OF THE HAYWARD FILTRATION-BAG FILTER SYSTEM. INSTALLED DOWN STREAM OF THE HAYWARD STRAINER. THE HAYWARD BAG FILTER CONCENTRATES THE SOLIDS, AND PROVIDES CONVENIENT, ECONOMICAL REMOVAL OF THE SOLIDS FROM THE PROCESS WITH VERY LOW LIQUID LOSS.

LARGE SOLIDS ARE SEPARATED FROM THE LIQUID WITH THE HAYWARD STRAINER WHILE SMALLER SOLIDS ARE ACCUMULATED BY THE BAG FILTER . THE BAG FILTER CONCENTRATES THE SOLIDS IN A DISPOSABLE BAG, WHILE CLEAN LIQUID IS PIPED BACK TO THE PROCESS.

SYSTEM STARTUP

FOLLOW THE PROCEDURE BELOW FOR CHANGING THE BAG FOR INITIAL BAG INSTALLATION.

THE PIPING SYSTEM SHOULD BE PURGED OF AIR BEFORE FULL PRESSURE IS APPLIED.

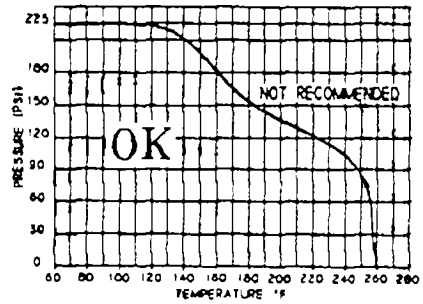
1. CLOSE THE VALVE ON THE OUTLET OF THE BAG FILTER .
2. OPEN THE VENT LOCATED ON THE TOP OF THE BAG FILTER.
3. SLOWLY AND PARTIALLY OPEN THE VALVE ON THE INLET OF THE BAG FILTER.
4. CAREFULLY VENT ALL THE AIR FROM THE BAG FILTER. CLOSE THE VENT WHEN LIQUID BEGINS TO DISCHARGE.
5. FULLY OPEN THE INLET VALVE.
6. FULLY OPEN THE OUTLET VALVE.

THE SYSTEM IS NOW IN OPERATION. SOLIDS WHICH ARE COLLECTED IN THE FILTER BAG NEED TO BE REMOVED PERIODICALLY. A PRESSURE DIFFERENTIAL GAUGE SHOULD BE USED SO THAT THE BAG IS CHANGED WHEN THE DIFFERENTIAL PRESSURE REACHES OR EXCEEDS 15 PSIG.

NEVER DISASSEMBLE THE BAG FILTER WHILE THERE IS FLUID IN IT. DRAIN ALL PROCESS FLUID BEFORE REMOVING THE COVER.

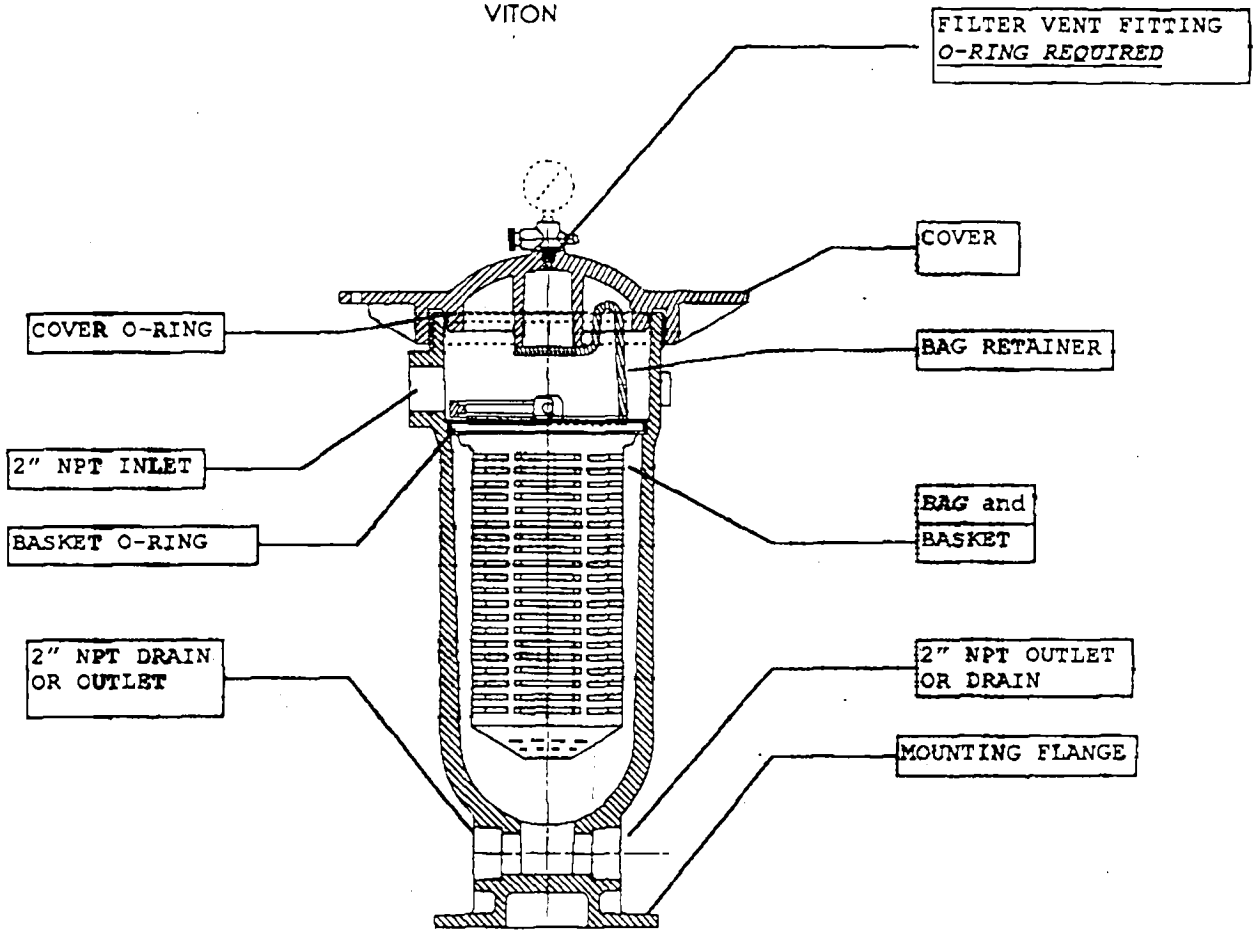
TO CHANGE THE BAG:

1. CLOSE THE INLET VALVE.
2. CLOSE THE OUTLET VALVE.
3. OPEN THE DRAIN ON THE BAG FILTER .
4. SLOWLY OPEN VENT TO FULLY DRAIN THE BAG FILTER.
5. REMOVE BAG FILTER COVER.
6. REMOVE THE POLYPROPYLENE BAG RETAINER AND THEN THE BAG.
7. INSTALL THE NEW BAG, THE POLYPROPYLENE BAG RETAINER AND THE COVER.
8. REPEAT STEPS 3-6 UNDER START-UP



SPECIFICATIONS

MAXIMUM WORKING PRESSURE		225 PSIG @ 70°F
MAXIMUM WORKING TEMPERATURE		240°F
MAXIMUM FLOW		100 GPM WITHOUT BAG
SHIPPING WEIGHT	FLT4201	48 POUNDS
SHIPPING WEIGHT	FLT4202	82 POUNDS
SOLIDS COLLECTION CAPACITY		25 POUNDS
INLET/OUTLET/DRAIN		2" NPT
VENT		3/8" Male tube fitting
50 Micron FILTER BAG	FLT4201	7" X 16" FB331050
50 Micron FILTER BAG	FLT4202	7" X 32" FB332050
SEALS		VITON



Chapter 3 Programming Guidelines

INTRODUCTION

This chapter discusses the sampling features of the 3700FR Sampler in detail and covers the procedures used to program the sampler.

We recommend that you have a sampler with you when you read this chapter. The most effective way to learn how to program the 3700FR Sampler is to read this chapter and experiment. The sampler cannot be harmed by improper programming, so there is nothing to be lost by experimenting. A few minutes spent in actually programming the sampler and observing its operation usually proves to be a worthwhile investment of time. Simply "playing" with the sampler is the best way to become familiar with programming, and may help avoid costly delays or problems when the sampler is used in the field.

If you are already familiar with the sampling capabilities of the 3700FR Sampler, you may prefer to begin with *Programming Introduction,* on page 20. This section introduces the specifics of programming the sampler.

Chapter Organization

A description of sampling operations, sample events and the sampling cycle is placed in *Description of Sampling Operations,* on page 16.

The types of samples available with the 3700FR Sampler are listed and discussed in *Types of Samples,* on page 17.

A programming introduction and a discussion of the sampler's program structure is placed in *Programming Introduction,* on page 20. The basic and extended programming modes are introduced.

The three operating states of the sampler are discussed in *Operating States,* on page 20.

The interactive operating state, used to program the sampler, is discussed in *Interactive State,* on page 21.

The programming procedure is outlined in *Introduction to the Programming Procedure,* on page 23.

Using the keypad to program the sampler is discussed in *Using the Keypad to Respond to Displays,* on page 24, *Keypad Description,* on page 24, and *Displays,* on page 26.

Programming examples for the basic programming mode are placed in *Basic Programming Mode Introduction.*

The configure sequence, used to tailor the sampler to your specific application, is discussed in *Configure Sequence,* on page 44.

The extended programming mode and several extended programming examples are discussed in *Extended Programming Mode,* on page 57.

Adjusting the sampler for foreign languages and metric units of measure is discussed in *Foreign Languages and Metric Units of Measure,* on page 73.

The standby state is discussed in *Standby State,* on page 88.

Run state is discussed in *Run State,* on page 94.

DESCRIPTION OF SAMPLING OPERATIONS

This information serves to acquaint you with the 3700FR Sampler's operation during a typical sampling routine. It introduces you to the types of sampling performed by the sampler and the terminology used to describe those capabilities.

SAMPLE EVENTS AND THE SAMPLING CYCLE

A sample event is the process of taking a sample or a series of samples. It includes the full sampling cycle. Although the sampling cycle varies somewhat according to the program settings which define the sampling routine, the cycle described here follows the typical sequence. This information is presented here to provide you with a frame of reference for the remainder of this chapter.

1. A sample event is initiated when the interval following the previous sample has expired. For time based intervals, the samples are taken when the internal clock reaches the time of the sampling event. For flow-paced intervals, the interval is set to the programmed number of pulses received from a flow meter or flow logger; the sample event begins when the pulses are counted down to zero.
2. When the time or pulse interval countdown reaches zero, the distributor moves to the bottle which is to receive the sample.
3. The pump rotates in the reverse direction for the pre-sample purge. The pre-sample purge is an air purge of the suction line and inlet which clears the line of any accumulated debris and residual liquid to avoid cross-contamination of samples.

4. The pump direction changes, pumping in the forward direction to fill the suction line up to the liquid detector.
5. After the suction line has been filled to the liquid detector and liquid has been detected, the sample volume measuring portion of the sampling cycle begins. The pump continues to rotate in the forward direction until the programmed volume of liquid has been delivered to the appropriate sample bottle. In this manual, the amount of liquid delivered to the bottle is referred to as the "sample volume."
6. The pump direction again changes, pumping in the reverse direction for the post-sample purge. Like the pre-sample purge, the post-sample purge is an air purge of the suction line. After the post-sample purge, the pump then shuts off.
7. The sample interval is reset and the cycle begins again at step 1.

TYPES OF SAMPLES

The 3700FR Sampler is principally designed to collect sequential (discrete) samples. However, it may be programmed to collect a number of other types of samples. As noted in Chapter 1, the 3700FR Sampler has two programming modes: basic and extended. The basic programming mode is used for conventional routines which include the types of sampling described and introduced in this section. A discussion of the types of sampling available through the extended programming mode is placed in *Types of Sampling Available Through the Extended Programming Mode,* on page 18 and *STORM Programming,* on page 20.

Sample types can be characterized by sample distribution and by sample pacing. Sample distribution is the order in which the samples are placed in the bottles. Sample pacing refers to the interval between samples.

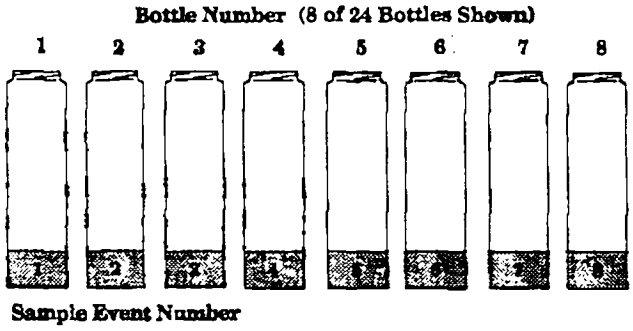
Types of Sample Pacing

There are two types of sample pacing: time-pacing and flow-pacing. In time-paced sampling, the interval between samples is a time interval. In flow-paced sampling, the interval between samples is a certain volume of liquid which has passed a measuring point in a flow stream. Flow-paced sampling requires a flow meter or flow logger. The 3700FR Sampler can also be interfaced with certain non-Isco flow meters. The flow instruments measure the flow quantity and sends a pulse for every predetermined flow quantity to the sampler. The sampler totalizes the number of pulses received from the flow instrument and collects a sample when the total reaches a programmed number.

Types of Sample Distribution

There are two primary types of sample distribution: sequential and composite sampling. In a sequential sample, each bottle receives one sample. A sequential sample represents a "snapshot" of the flow stream at a particular point in time. **Figure 14** shows a diagram of sequential sample distribution. In a composite sample, the individual samples are combined – "composited" – into a single container. A composite sample represents an average of the characteristics of the flow stream over the total elapsed time of sampling.

Figure 14 Sequential Sample Distribution



Note: The 3700FR Sampler is fully programmable for both sequential and composite sampling; however, in addition to programming the sampler for composite sampling, you must convert the sampler mechanically for single bottle compositing. This requires the composite conversion kit which contains the extra equipment needed to adapt the sampler for composite sampling. Conversion procedures are discussed in the instruction sheets provided with the conversion kit.

The types of sample pacing and sample distribution can be combined. Thus, you can take time- or flow-paced sequential samples and time- or flow-paced composite samples. Each combination is noted below.

Time-Paced Sequential: In a time-paced sequential sample, samples are collected at equal increments of time. Each bottle receives one sample.

Flow-Paced Sequential: In a flow-paced sequential sample, samples are collected at equal increments of flow volume, as measured by an associated flow meter. Each bottle receives one sample.

Time-Paced Composite: In a composite time sample, the individual samples are combined – "composited" – into a single container. Samples are collected at equal increments of time.

Flow-Paced Composite: In a composite flow sample, the individual samples are combined into a single container. Samples are collected at equal increments of flow volume, as measured by an associated flow meter.

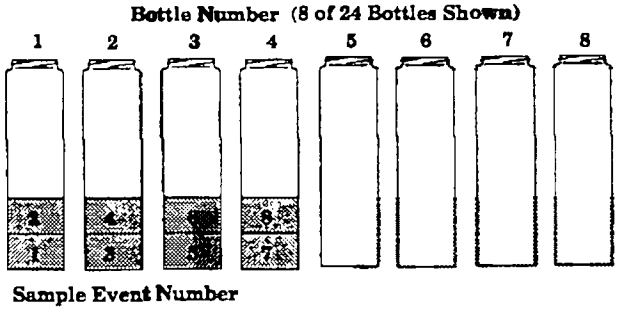
Multiplexing

Both time-paced and flow-paced sequential samples can be multiplexed. Multiplexing places more than one sample in a bottle at different sample events or places a sample in several bottles at the same sample event. Two types of multiplexing are commonly used: samples-per-bottle multiplexing and bottles-per-sample multiplexing.

Samples-per-Bottle Multiplexing

In samples-per-bottle multiplexing, a number of individual samples are deposited in the same bottle. Samples-per-bottle multiplexing is useful when you need to collect a series of small composite samples. In sample-per-bottle multiplexing, the normal sampling cycle (relocate distributor, pre-sample purge, sample delivery, post-sample purge) is modified by altering the number of times the distributor is relocated. Because a bottle will receive more than one sample from more than one sample event, the distributor does not relocate to a new bottle at each sample event. At the first sample event, the distributor relocates, if necessary, to the appropriate bottle. The normal sampling cycle is completed. At the next sample event, the distributor does not relocate, and a second sample is deposited into the same bottle.

Figure 15 Samples-Per-Bottle Multiplexing

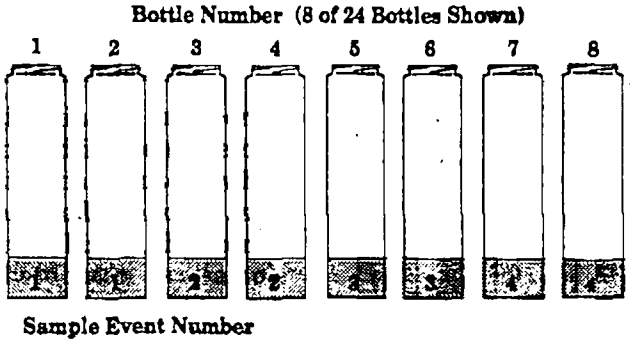


Compositing multiple samples continues up to the programmed number of samples. After the last sample is deposited in the bottle, the sampler pauses until another sample event occurs, the distributor then rotates to the new bottle position, and multiple samples are deposited into the new bottle. **Figure 15** illustrates sample-per-bottle multiplexing.

Bottles-per-Sample Multiplexing

In bottles-per-sample multiplexing, a programmed number of bottles is filled at each sample event. (The programmed number of bottles is called a bottle set; up to 24 bottles can be included in a set.) Bottles-per-sample multiplexing is useful when you need a sample larger than the 350 ml or 1000 ml bottles will contain. It is also useful when you need sets of identical samples; for example when you are using more than one preservative.

Figure 16 Bottles-Per-Sample Multiplexing



When you use bottles-per-sample multiplexing, the normal sampling cycle (relocate distributor, pre-sample purge, sample delivery, post-sample purge) is modified by delaying the complete post-sample purge until sample volumes have been delivered to each bottle of the set. Instead, the pump reverses until the pump tubing is purged just beyond the liquid detector. When the purged liquid passes the detector, the distributor moves to the next bottle, and the pump begins pumping forward to deliver the next sample. This is repeated until each bottle of the set is filled. A full post-sample purge is completed at the end of the sample event. The sampler then pauses until the next sample event occurs, at which time the cycle is repeated for the following bottle set. **Figure 16** illustrates bottles-per-sample multiplexing.

Types of Sampling Available Through the Extended Programming Mode

The extended programming mode expands the variations of sample pacing and distribution. The extended features listed below are used in more complex sampling routines.

Note, however, that the sampling capabilities described above, in *Types of Samples*, on page 17, are available in both the basic and the extended programming modes. STORM programming is available only in the extended programming mode.

Nonuniform Time Intervals

The 3700FR Sampler, through the extended programming mode, can take samples at nonuniform time intervals. With nonuniform time intervals, samples are taken at irregular time intervals, rather than at equal time intervals.

Nonuniform time intervals are typically used in run-off studies (often in conjunction with a Model 1640 Liquid Level Actuator). Nonuniform time intervals permit a number of samples to be collected at short intervals after a rainfall or other event occurs and remaining samples to be collected at widening intervals. For example, when the sampler is used with the Actuator in a runoff study, the Actuator turns the sampler on when the liquid level of the flow stream rises to contact the Actuator's probe. Nonuniform time intervals allow the sampler to collect samples frequently when the flow rate is highest, and to sample less frequently as the flow rate decreases. Nonuniform times can also be used to simulate flow-paced sampling; when the flow rate varies predictably, using nonuniform time intervals allows you to take samples at equal flow volumes. As the flow rate increases, you can take samples at equal flow volumes by decreasing the time interval. As the flow rate decreases, you can increase the time interval.

When you use nonuniform times, the time interval between each sample event is individually programmable. You can enter nonuniform times in two ways: in minutes or in clock times. The first method, minutes, allows you to enter the number of sample events spaced at intervals defined in minutes: 12 samples at 5-minute intervals, 6 samples at 10-minute intervals, 4 samples at 15-minute intervals, and so on. You can also enter a specific time and date for each sample event: sample event 1 at 6:00 on April 20, sample event 2 at 6:30 on April 20, sample event 3 at 7:15 on April 20, and so on. You can specify as many as 999 sample events spaced in nonuniform minutes, or up to 99 events specified as clock times. (If a routine requires a large number of nonuniform times, you can save the routine with the program storage feature so that you do not have to reenter the nonuniform times again.) Nonuniform time intervals can be used with sequential, multiplexed, and composite sampling.

Extended Multiplexing

Multiplexing is somewhat more flexible in the extended programming mode. In the extended mode, you can switch multiplexed bottles or bottle sets after a programmed number of samples have been deposited, or after a programmed period of time has elapsed. Under most conditions, we recommend you switch bottles or sets after a programmed number of samples have been deposited. This allows you to control the number of samples in each bottle precisely. When you switch bottles or sets on a time basis, the total volume of each bottle or bottle set may vary in samples-per-bottle or bottles-per-sample multiplexing.

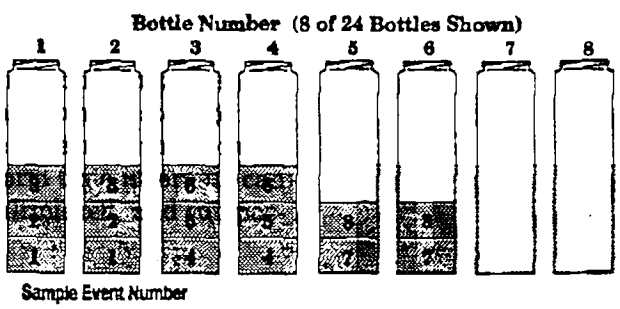
Multiple Bottle

The extended programming mode offers a third multiplexing possibility: multiple bottle compositing. Multiple bottle compositing combines samples per bottle and bottles per sample multiplexing by depositing multiple samples in a bottle set. At each sample event, the sampler places a sample into each bottle of a set. This is repeated until each bottle of the set contains a programmed number of samples. **Figure 17** illustrates multiple bottle compositing. The bottle sets can be switched after a programmed number of samples have been deposited or after a programmed period of time elapses. Multiple bottle compositing is useful when you want a series of identical sets of samples or a larger volume composite sample than can be collected in a single 350 or 1000 ml bottle. Multiple bottle compositing can be used with time-paced or flow-paced routines.

Stops and Resumes

The extended programming mode allows you to create an intermittent sampling schedule. You can program the sampler to stop the routine at a specific time. The routine can then be resumed at a later time. Up to 12 stop times and 12 resume times can be entered. Stops and Resumes can be used with time-paced and flow-paced routines and with routines programmed for nonuniform time intervals.

Figure 17 Multiple Bottle Compositing



STORM Programming

The 3700FR Sampler's STORM programming allows you meet storm water monitoring requirements easily. The sampler's STORM pacing program divides the bottles of the 4, 12, and 24 bottle configurations into two separate groups. The first group receives a first flush (time-paced) grab sample. The second bottle group receives either a flow-paced or time-paced "composite" sample.

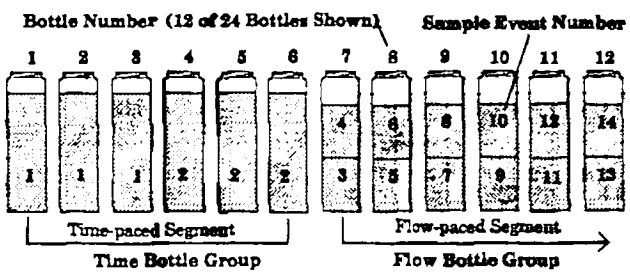
STORM Event Sample Distribution Schemes

A bottle group can consist of one or more bottles. Thus, the first flush sample can be a large sample delivered to a single bottle or distributed to several bottles with a multiplexing scheme. The remaining samples can be distributed to the second bottle group sequentially or according to any of the three available multiplexing distribution schemes — bottles-per-sample, samples-per-bottle, or multiple bottle compositing. By dividing the samples into multiple bottles, you can analyze the pollutant concentration from each phase of the storm event. To obtain an analysis of a composite sample, simply combine the contents of the bottles into a composite for the grab sample and a composite for the flow-weighted samples.

Figure 18 shows a STORM distribution scheme that combines time-paced bottles-per-sample multiplexing with flow-paced samples-per-bottle multiplexing. The program has allocated bottles 1, 2, and 3 for the timed grab samples, and bottles 4 through 24 for flow-weighted samples. At each time-paced sample event, the sampler places a single sample in the first bottle group: bottles 1, 2, and 3. Each bottle of the second group receives two samples per bottle.

If you need to obtain a greater number of samples or a larger volume of samples than a single sampler will permit, use the master/slave option. The master/slave option allows you to use the first sampler to acquire a set of samples based on STORM programming and the second (slave) sampler to continue the sampling.

Figure 18 Storm Distribution Scheme



Programming Introduction

The sampler's programming process is self-prompting. Prompts displayed on the LCD step you through the programming sequence in a logical order, indicating the needed value or option. For example, the sampler will prompt you to enter settings for the interval between samples (time-paced or flow-paced); sample volume in ml; determine whether you want sequential, composite, or multiplexed samples; and other operating controls. These settings can be changed at any time. If the unit is turned off or power is disconnected, the settings are retained in the sampler's memory by the lithium battery. The sampler will accept only appropriate values for the program settings and will reject any unacceptable values.

Operating States

Although there is a certain amount of overlap between the types of operations the sampler performs, there are essentially three operating states: the standby state where the sampler is waiting for your instructions, the run state where the sampler is running a sampling routine, and the interactive state used to program the sampler. Each state serves a different purpose and is discussed separately.

Standby State

In the standby state, the sampler is waiting for your instructions. From standby, you can start a sampling routine, placing the sampler in the run state. You can also access the interactive state to program it. The standby state is discussed in *Standby State,* on page 88.

Run State

In the run state, the sampler's sampling routine is being executed and the sampler is operating under program control. While the sampling routine is executed, the LCD displays a number of messages to communicate the progress of the sampler through the routine. The current bottle or bottle set, current time or flow pulse count, and remaining time or pulse count to the next sample are reported. These status messages vary according to the sampling routine; a representative set of messages are included with the programming examples placed in *Basic Programming Procedure,* on page 28 and *Start Times,* on page 58.

As the routine progresses, the sampler creates a log of sampling results that records pertinent information about each sample event. The results include the time and date of each sample, the number of pump counts occurring until liquid is detected for each sample event, and any problems encountered.

This information can be retrieved with the Display Status procedure, discussed in *Display Status,* on page 91. You can retrieve the results in the middle of a routine or when the routine is done. The results remain in the sampler's memory until you start the sampler again. More information on the run state is placed in *Run State.*

INTERACTIVE STATE

The interactive state allows you to program the sampler. The interactive state contains two branches: the program sequence and the configure sequence. **Figure 19,** on page 22 diagrams the structure of the interactive state. The program sequence is used to define the sampling routine; it allows you to enter the interval between samples, the number of samples in each bottle, the sample size, and the start time. The configure sequence provides a number of setup options. Some configure options provide equipment specifications. For example, the 3700FR Sampler can be used with two sizes of sequential bottles: 350 ml and 1000 ml. You must tell the sampler which bottle size you are using so that it can calculate the number of samples of a certain size each bottle can contain. This information is used to prevent overfilling. Other options allow you to set the sampler's real time clock, calibrate the sampler, or enable the password program protection.

Programming Modes

The configure sequence also allows you to select either of the programming modes: basic or extended. The basic programming mode is used for conventional sampling routines. Using the basic programming mode, you can take sequential or composite samples at uniform time intervals or flow pulse intervals. You can multiplex samples, if desired; both bottles-per-sample and samples-per-bottle multiplexing are available.

Extended Programming

The extended programming mode increases the number of available features. These features make more complex sampling routines possible. While all basic programming features are available in the extending programming mode, the less frequently used extended features have been separated to simplify the programming process for conventional routines. For example, you can use STORM programming, multiple bottle compositing, or create an intermittent sampling schedule with the Stops and Resumes feature.

Although the basic and extended program sequences vary in detail, both can be divided into four sections: Sample Pacing (interval between samples), Sample Distribution (number of samples in each bottle), Sample Volume (sample size in ml), and Key Times (start times or, in the extended mode, stop and resume times). These sections are noted in the Program Sequence section of the diagram shown in **Figure 19,** on page 22.

Configure Sequence

The program sequence and the configure sequence are interdependent. The selections you make in the configure sequence determine what settings will be available to you in the program sequence. For example, the basic or extended programming modes are selected in the configure sequence as a setup option. When you select the extended programming mode, the program sequence is modified to accommodate the extended features by adding one or more input displays. For example, because Nonuniform Times are an extended programming feature, the nonuniform times input displays are available in the Sample Pacing program section in the extended programming mode, but not in the basic programming mode.

The extended programming mode not only extends the number of features available in the program sequence, it extends the number of configure options. Refer to **Figure 19,** on page 22. The configure options marked with asterisks are available only when you select the extended programming mode. As in the programming sequence, less frequently used options have been separated to simplify the configuration process.

Most configure options are available to both programming modes. The configure sequence contains 18 options which are summarized in **Table 3,** on page 22; each option is marked as available in both modes or available only in the extended mode. A detailed discussion of each configuration option is found in *Set Clock,* on page 44 and through *Exit Configuration,* on page 54.

It is usually not necessary to change the configure option settings unless the sampling application changes significantly. The sampler is always programmed and configured: program and configure settings are maintained by the sampler's internal battery. The sampler is shipped with factory program and configure settings. It is configured for the basic program mode and for the bottles and suction line ordered with the sampler. **Table 7,** on page 55 lists the factory settings for the program sequence; **Table 6,** on page 54 lists the factory settings for the configure options.

Figure 19 Interactive State Structure

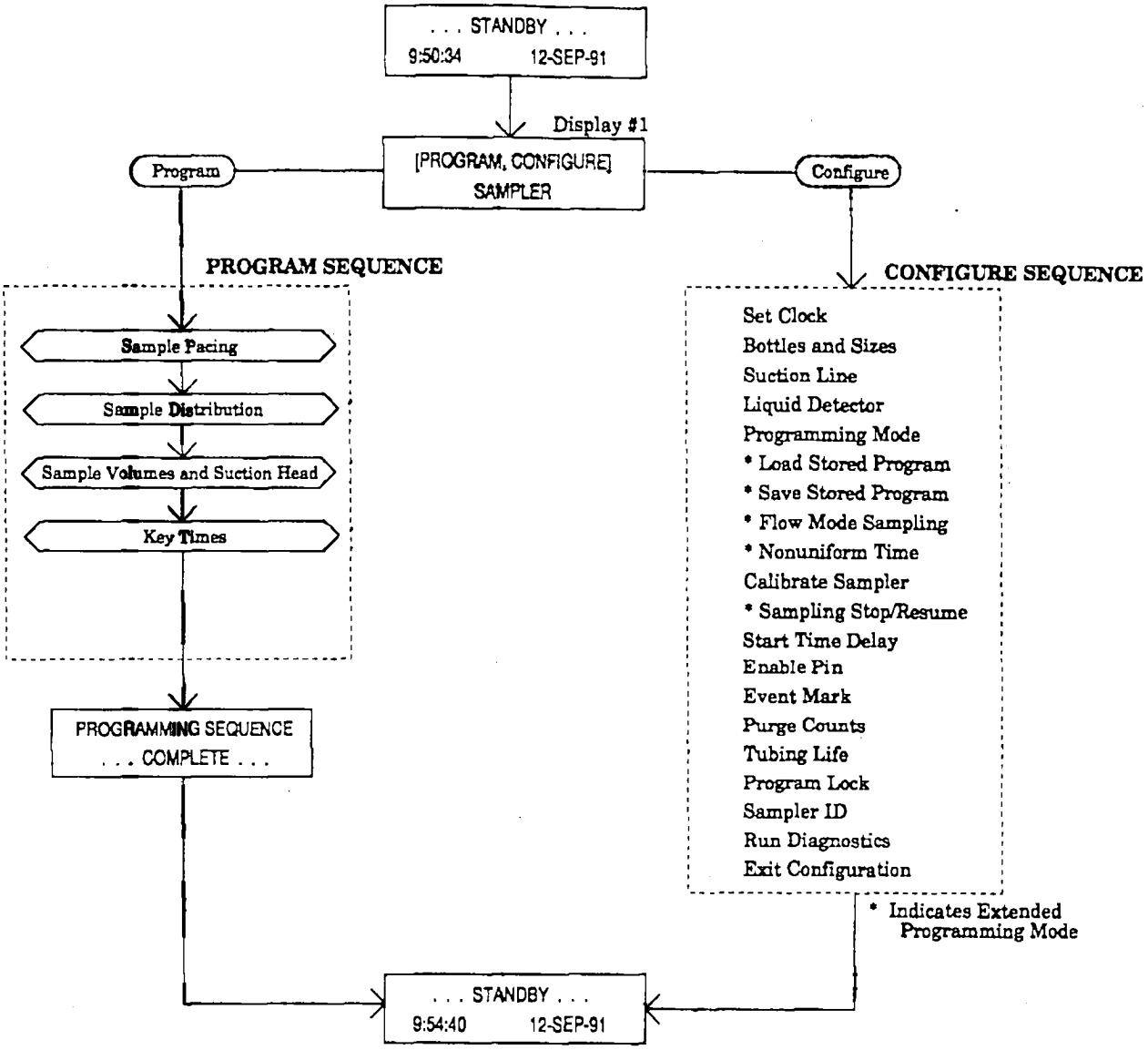


Table 3 Configure Option Functions

Configure Option	Programming Mode	Function
Set Clock	Basic & Extended	Sets the sampler's real time clock.
Bottles and Sizes	Basic & Extended	Sets the number and size of bottles used in the tub.
Suction Line	Basic & Extended	Sets the type of line (vinyl or Teflon), line diameter (¼ or⅜ inch), and line length (3 to 99 ft).
Liquid Detector	Basic & Extended	Enables/disables liquid detector, sets the number of rinse cycles (0 to 3), enables/disables the suction head entry, and sets the number of sampling retries (0 to 3).
Programming Mode	Basic & Extended	Sets the programming mode: basic or extended.
Load Stored Program	Extended	Loads one of up to three previously saved sampling programs.
Save Current Program	Extended	Saves current sampling program.
Flow Mode Sampling	Extended	Directs sampler to take a sample at the beginning of a flow-paced program. Directs sampler to take a sample at time-switches.

Configure Option	Programming Mode	Function
Nonuniform Time	Extended	Directs sampler to accept nonuniform intervals as specific clock times or in minutes.
Calibrate Sampler	Basic & Extended	Enables/disables the calibration sequence.
Sampling Stop/Resume	Extended	Enables/disables Sampling Stops and Resumes feature.
Start Time Delay	Basic & Extended	Sets the start time delay (from 0 to 9999 minutes). If no start time is entered in the program sequence, the program will delay the routine according to the amount of time entered in the Start Time Delay option. The delay begins after the start sampling key is pressed.
Enable Pin	Basic & Extended	Enables/disables the master/slave sampling mode. Directs the sampler to take a sample when disabled and/or enabled by a Liquid Level Actuator or like device. Allows you to restart the sampling interval when the sampler is enabled.
Event Mark	Basic & Extended	Allows you to select one of four types of event marks.
Purge Counts	Basic & Extended	Adjusts the number of pre-sample and post-sample purge counts.
Tubing Life	Basic & Extended	Displays the pump tubing life information. Resets the tubing life count.
Program Lock	Basic & Extended	Enables/disables the password protection for input displays.
Sampler ID	Basic & Extended	Allows you to enter a 10 character ID number for the sampler.
Run Diagnostics	Basic & Extended	Tests the RAM, ROM, pump, and distributor. Allows for re-initialization of certain program and configure settings.

INTRODUCTION TO THE PROGRAMMING PROCEDURE

The procedure used to program the sampler, in the basic programming mode, essentially follows the steps listed below.

Note: because the configuration settings determine portions of the program sequence and affect the accuracy of the sample, check the configuration settings before programming. Steps 2 and 3, configuring and programming the sampler, are covered in greater detail in *Basic Programming Mode Introduction*, on page 27 and in programming **Example 1,** on page 31 through **Example 7,** on page 43.

1. Determine the equipment you will be using with the sampler. You will need to know the size of the bottles you will be using and the inside diameter, type, and length of the suction line. You will need this information when you verify and revise the configuration settings in step 2.

   If you will be using the sampler for composite sampling, you may need to convert the sampler. **Example 6,** on page 40 demonstrates the configuration changes you must make.
2. Configure the sampler. From standby, access the interactive state. Select the configure sequence. Check the configuration settings, revising any settings as needed; select basic or extended programming mode. Return to the standby state.

   Example 1, on page 31 shows you how to check and revise the configuration settings in the configure sequence. We recommend you review *Keypad Description*, on page 24 and *Displays*, on page 26 before you work through the programming examples. These sections discuss the functions of the individual keys and how to use the keys when programming the sampler.
3. Program the sampler. Again, from standby, access the interactive state. Select the program sequence. Enter the program settings for your routine. The sampler will prompt you through the programming process. When the process is completed, the sampler will automatically return to standby. (A more detailed discussion of this procedure is placed in *Basic Programming Mode Introduction*, on page 27). **Example 2,** on page 34 through **Example 7,** on page 43 demonstrate several types of sampling programs in the basic mode. **Example 10,** on page 74 through **Example 17,** on page 86 demonstrate several sampling programs in the extended mode.
4. Install the sampler, if you have not already done so. (The sampler can be programmed on site or in the office before installation.) If desired, connect the sampler to a flow meter or other interfacing equipment. Chapter 2 discusses the installation of the sampler and interfacing equipment. Start the sampler to place the sampler into the run state and execute the routine.

5. As the routine runs, the displays will report the sampler's progress. The programming examples in this manual conclude with the run state displays you should see for each sampling routine. When the routine is done, the sampler will return to standby.
6. Retrieve the filled sample bottles. If desired, use the display status procedure, discussed in *Display Status*, on page 91, to examine the sampler's log of sampling results.
7. If you need to reprogram the sampler, follow this procedure from the beginning. If the sampler's current program is correct, start the sampling routine again.

Using the Keypad to Respond to Displays

Configuring and programming the sampler is as simple as responding to displays with the keypad. The sampler will prompt you through many of the entries by presenting a question or a choice on the display. You must respond with the keypad. The LCD and the keypad are located on the 3700FR Sampler control panel, shown in **Figure 20**, on page 25.

A summary of each key's function is placed in *Keypad Description*, on page 24. For a discussion of the displays presented on the LCD and the way you can use the keypad to interact with the sampler, refer to *Displays*, on page 26.

Keypad Description

Keys are grouped together to assist you in identifying related functions. Control keys manually control the sampler, numeric keys enter program values, programming keys monitor the sampler's status and direct programming activities. In this manual, individual keys are indicated in small capital letters.

The individual key switches that make up the keypad provide both tactile and audio feedback to assure you that the key switch has been successfully actuated. You can feel the deflection of the spring member in the switch; an audio indicator inside the sampler will beep once. The sampler has a 10-keystroke buffer which, in some cases, allows you to "type ahead" of the display.

Control Keys

Control keys allow you to turn the sampler on or off, start or resume the currently entered program, and control the sampler manually. The functions of the control keys are listed below.

ON/OFF - Pressing the ON/OFF key when the sampler is off will turn the sampler on, reactivate the display and place the sampler in the standby state. Pressing the ON/OFF key (when the sampler is on) will halt all sampling activity and clear the display.

PUMP FORWARD - While in the standby state, pressing the PUMP FORWARD key will cause the pump to run continuously in the forward direction. The pump will run until the STOP key is pressed.

PUMP REVERSE - While in the standby state, pressing the PUMP REVERSE key will run the pump continuously in reverse. The pump will continue to operate until the STOP key is pressed.

STOP - The STOP key will stop the pump any time it is running. When the STOP key is pressed in the run state, the sampling routine will be halted, the sampler will be transferred to the standby state, and the "PROGRAM HALTED" message will be displayed. Pressing the STOP key while in the interactive state will access the display's reference number.

START SAMPLING - When in the standby state, pressing the START SAMPLING key will begin the sampling program. When entering a sampler ID, the key will type a space.

RESUME SAMPLING - When "PROGRAM HALTED" is displayed, pressing the RESUME SAMPLING key will cause the sampler to continue with the current sample program at the point at which it was halted. When entering a sampler ID, the key will type a period

MANUAL SAMPLE - Pressing the MANUAL SAMPLE key will allow you to take a manual sample. The MANUAL SAMPLE key is valid in the standby state, the run state, and when calibrating the sampler. When entering a sampler ID, the key will type a dash (-).

NEXT BOTTLE - Pressing the NEXT BOTTLE key will cause the distributor to move to the next bottle. If the distributor is positioned over the last bottle, it will move to bottle position 1.

Program Keys

The four program keys are used to enter program settings. Each key's function is listed below.

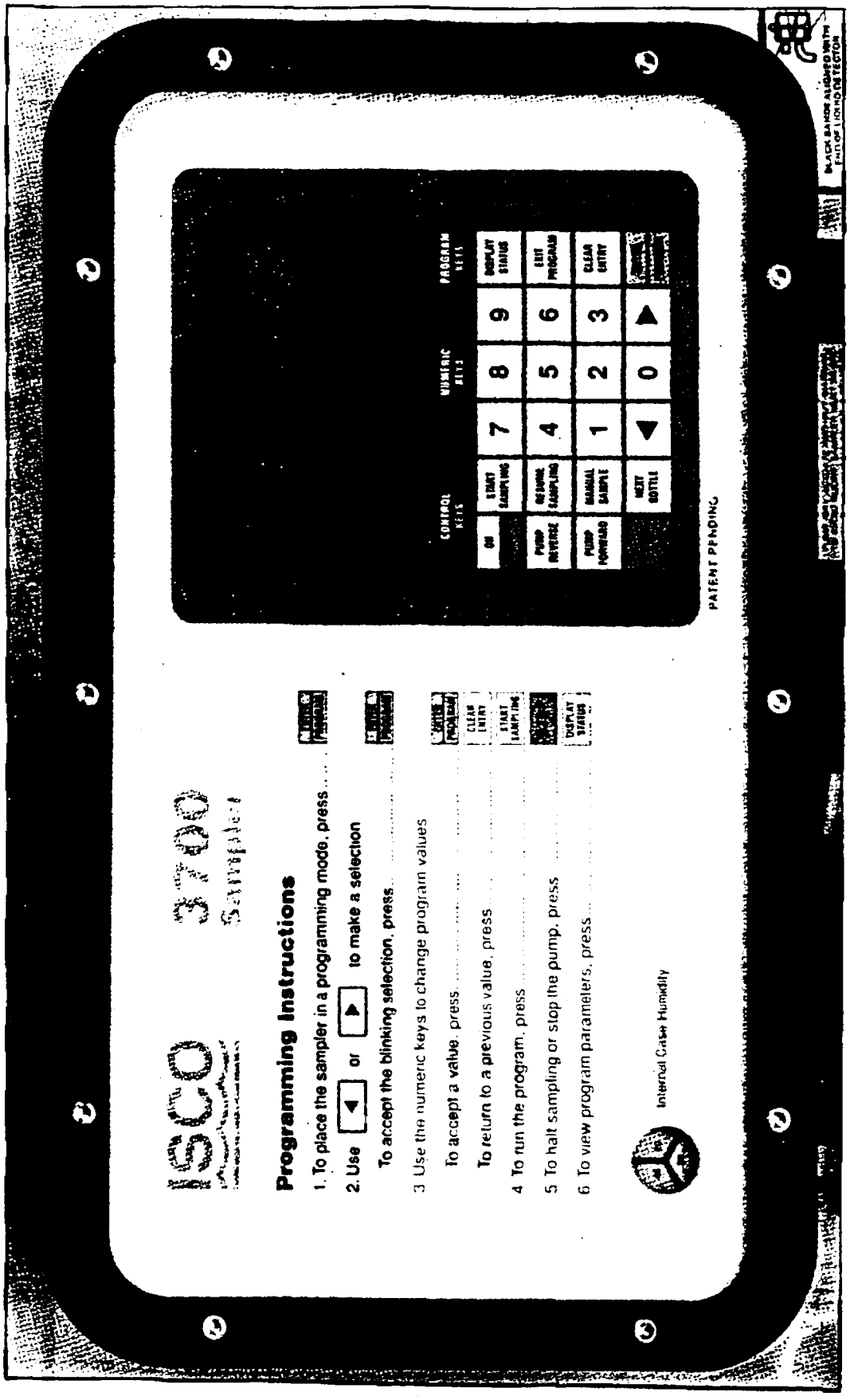
DISPLAY STATUS - While the sampler is in the standby or run state, pressing the DISPLAY STATUS key will allow you to view the program settings or the sampling results.

EXIT PROGRAM - Pressing the EXIT PROGRAM key while in the program sequence will return the sampler to standby. Pressing the EXIT PROGRAM key while in the run state will halt the program; the message "PROGRAM HALTED" will be displayed.

CLEAR ENTRY - When entering a number, the CLEAR ENTRY key can be used to return to the original entry.

ENTER/PROGRAM - Pressing the ENTER/PROGRAM key, while in the standby state, will cause the sampler to enter the interactive state. While at an input display, pressing the ENTER/PROGRAM key will accept an entered value or a blinking option, and direct the sampler to proceed to the next step. Input displays are discussed in *Displays*, on page 26

Figure 20 3700FR Sampler Control Panel



Numeric Keys

The numeric keys consist of 10 digit keys, a LEFT ARROW key, and a RIGHT ARROW key. The digit keys are used to enter quantities. The ARROW keys are used to move through lists or program options.

LEFT ARROW - The LEFT ARROW key is used to select one of two or more program options displayed when the sampler is in the interactive state. When more than one numeric entry is displayed – for example, the hours and minutes of a time setting – the LEFT ARROW can be used to step back to a previously entered value. When entering a number, the LEFT ARROW can be used to erase the most recently entered digit.

RIGHT ARROW - The RIGHT ARROW key is used to select one of two or more program options displayed in an input display. It is also steps through status information.

DISPLAYS

There are two types of displays: displays which communicate information about the sampler's status and displays which request input. In many cases, you must respond with the keypad.

Informational Displays

Informational displays communicate information about the sampler's status. For example, when the sampler completes a sampling program, a display similar to the illustration below appears. It communicates the sampler's status, "DONE," the number of samples taken (which will vary according to the program), and the current time and date.

```
DONE. . . 24 SAMPLES
10:32:34  14-JUN-91
```

Input Displays

Input displays can be identified easily because they contain a blinking word or number. The blinking word or number serves as a prompt for input and is said to be "selected." When the input displays shown below first appear, the word "PROGRAM" (display a) and the sample volume entry "250" (display b) will be blinking. Blinking words or numbers are represented in illustrations with OUTLINED characters.

```
[PROGRAM, CONFIGURE]
SAMPLER
```
a

```
SAMPLES VOLUMES OF
250 ml (10-1000)
```
b

Display Numbers

Nearly all input displays have a number assigned to them. The number is used to cross reference the input displays with a explanatory listing found in Appendix A - Display Index or in the 3700R/3700FR Sampler Pocket Guide. If you have a question about a given input display, you can easily locate the description of the display with the display number.

The display number can be accessed by pressing the STOP key when viewing the input display in the interactive and standby states. (In the run state, the STOP key is used to halt the sampling program.) To see the display number, press the stop key, read the number from the display, then look up the corresponding number in *Appendix B Display Index*, on page 145 for information on that display. The display number for display is "1."

Displays With Choices

There are two types of input displays: displays which prompt you to make a choice (between time-paced and flow-paced sampling, for example) and displays which prompt for numeric input (sample volume, for example). In displays which prompt you to make a choice, you must select one of up to four alternatives placed in brackets.

For example, display a above prompts you to select the program or the configure sequence. The choices, "PROGRAM" and "CONFIGURE," are placed in brackets.

When an input display prompting for a choice first appears, the blinking word indicates the currently selected choice. If the blinking word is acceptable, press the ENTER/PROGRAM key. If the blinking word is not acceptable, select the preferred choice by pressing the LEFT ARROW or RIGHT ARROW key until the preferred choice is blinking; then press the ENTER/PROGRAM key. The sampler will store the selected choice and advance to the next step.

When the display illustrated in a appears, the word "PROGRAM" will be blinking. If "PROGRAM" is acceptable, press the ENTER/PROGRAM key. If "PROGRAM" is not acceptable, press the LEFT ARROW or RIGHT ARROW key until "CONFIGURE" is blinking. Then, press the ENTER/PROGRAM key. The ENTER/PROGRAM key directs the sampler to advance to the next step.

Numeric Input Displays

A numeric input display will prompt for input by blinking the currently stored number. In the display illustrated in b, the number "250" will blink to prompt you to enter a value.

If the blinking number is acceptable, it is not necessary to type the number again: pressing the ENTER/PROGRAM key will store the number and advance the program to the next step. To enter a new number, press the appropriate numeric keys, then press the ENTER/PROGRAM key.

The sampler will not accept a number that exceeds the allowable range of values placed in parentheses on the display. In illustration b, no less than 10 ml and no more than 990 ml can be entered as a sample volume. If an entered number exceeds the range, the sampler will emit a series of beeps and the original number will reappear. An acceptable value must be entered to advance to the next step.

Editing Numbers

The LEFT ARROW key and CLEAR ENTRY key can be used to edit numeric entries if they are used after you press a numeric key and before you press the enter/program key. The CLEAR ENTRY key will clear any typed number and the original number will reappear. The LEFT ARROW will erase the most recently typed number.

Some numeric input displays prompt for more than one value. In the illustration below, the prompt asks for five number entries: hours, minutes, month, day, and year. The LEFT ARROW key and RIGHT ARROW key can be used to move back and forth between each of the five entries. Individual entries can be changed, as discussed above. Pressing the RIGHT ARROW or ENTER/PROGRAM key on the last entry will store the values and advance to the next display.

HH:MM	DD-MM-YY
12:33	21/06/91

Military Times

Times must be entered in military format. For example, to set the sampler's clock to 3:30 PM, enter a time of 15:30. When the display above first appears, the first two digits, "12," will blink. To enter a new time, type in the new hour, "15." Store the hour entry and advance to minutes by pressing the ENTER/PROGRAM key. Although months are displayed with a three-letter abbreviation, you must enter the month as a number. If the month or year entry does not need to be changed, accept the entry by pressing the RIGHT ARROW or ENTER/PROGRAM key. The LEFT ARROW key can be used to return to a previous position. Pressing the RIGHT ARROW or ENTER/PROGRAM key on the last entry, "91," will store the value and advance to the next display.

European Date Format

The sampler uses the European date format where the day precedes the month's three-letter abbreviation. To enter a date, enter the day before the month's number, and the year. The sampler will convert the numeric entry to the three-letter abbreviation for you.

Exit Program Key

The user can exit an input display by pressing the EXIT PROGRAM key. If you use the EXIT PROGRAM key, the currently stored setting will not change.

Basic Programming Mode Introduction

The following examples demonstrate the steps used to check the configure option settings and program the sampler for several different sampling routines. They are designed to provide you with step-by-step procedures and are provided as models for you to use later when programming the sampler for your "real" applications. Each programming example concludes with the run state displays that appear while that routine is being executed. These displays can be used to monitor the sampler's progress through a routine.

Two Sets Of Examples

There are two sets of examples. Examples for the basic programming sequence are provided in **Example 2,** on page 34 through **Example 7,** on page 43. Because many of the features of the extended programming mode are affected by selections made in the configure sequence, examples for the extended programming sequence follow *Basic Programming Mode Introduction,* on page 27, which discusses each configure option separately. We recommend you become familiar with the basic programming mode procedure and basic programming examples before using the extended programming mode. Most of the procedures used in the extended programming mode duplicate those of the basic programming mode and are not repeated in the section on extended programming procedures.

Examples for both programming modes are accompanied by flow charts. These charts diagram the program sequence structure for each mode. Figure 21, on page 29 charts the Basic Programming Mode structure.

Figure 23A, on page 59 charts the structure of the Extended Programming Mode. The charts are provided to act as a "map" to the programming process. Both charts are divided into sections - Sample Pacing, Sample Distribution, Sample Volume, and Key Times - which correspond to the steps listed in *Basic Programming Procedure,* on page 28.

Each chart contains the input displays used in the sequence. The input displays, in turn, are labeled with their display number so they can be cross-referenced with the listing found in *Appendix B Display Index,* on page 145. When programming the sampler, the display number can be accessed by pressing the STOP key.

As noted earlier, the sampler is shipped with a test program and factory configuration settings. The examples in this manual assume that all factory settings are being used, that the sampler will use the 24 bottle base, and that a 10 foot length of ⅜ inch vinyl suction line is being used.

Most program and configure settings can be re-initialized to factory settings, if desired. **Table 6,** on page 54 and **Table 7,** on page 55 list factory settings. A discussion of the re-initialize option, located in the Run Diagnostics configure option is found in *Run Diagnostics,* on page 54. Instructions for re-initializing the sampler are also included as part of **Example 1,** on page 31 and **Example 2,** on page 34 provide detailed instructions to help you work through the procedures detailed in *Basic Programming Procedure,* on page 28.

BASIC PROGRAMMING PROCEDURE

The steps needed to program the sampler in the basic mode follow the procedure outlined below.

1. Turn the sampler on with the ON/OFF key. The sampler always "wakes up" in the standby state. The "STANDBY" message will appear; or, if the sampler were turned off while running a routine, the "PROGRAM HALTED" message will be displayed. Both messages indicate the sampler is in standby.
2. Press the ENTER/PROGRAM key to access the interactive state. Select the program sequence. Refer to **Figure 21,** on page 29 for displays noted in steps 3 - 6. During the programming procedure, if you want to return to a previous display; press the EXIT PROGRAM key. The sampler will return to standby and you can repeat steps 1 and 2. Then press the ENTER/PROGRAM key to scroll through the settings until you locate the display in question.
3. Enter the Sample Pacing settings. The sampler will prompt you to select either time- or flow-pacing. Depending on your selection, you will then be prompted to enter the time interval between samplers, or the flow pulse interval.

   Note: If you will be using very short sample intervals, be sure the interval is longer than the duration of the sampling cycle. The duration of the cycle can be determined by programming the sampler with the desired settings, pressing the MANUAL SAMPLE key, and simply timing the cycle. For truly representative sampling, the interval – in either time- or flow-paced sampling – should be longer than the duration of the sampling cycle. If the intervals are too short, no sample events will be missed, although some events will occur at improper times.

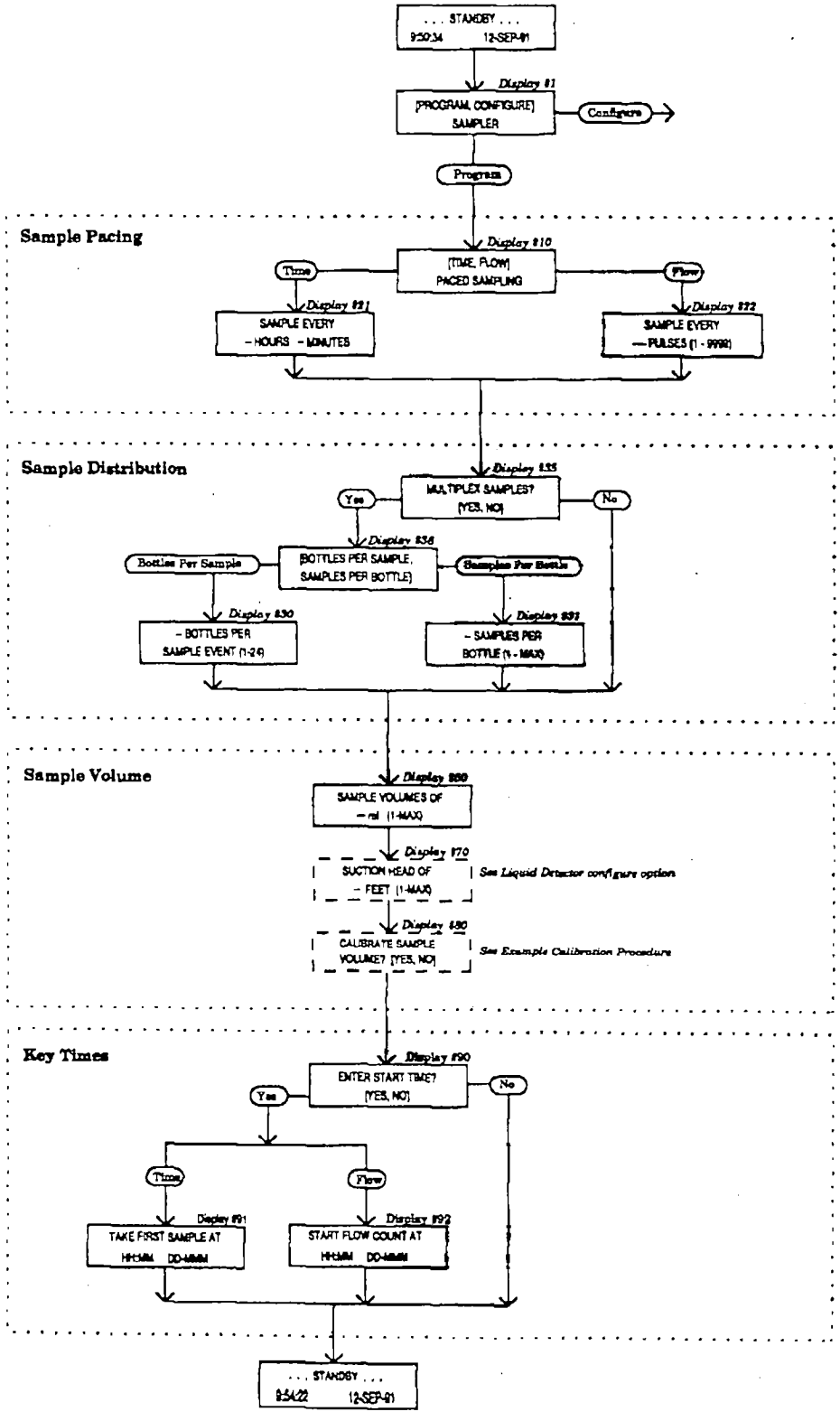
   When programming the sampler for flow pacing, you must enter the number of pulses that make up the flow interval. If the flow meter has been set to send a pulse once every 1000 gallons, you can program the sampler to collect a sample once every 1000 gallons by entering a flow pulse interval of "1." To collect a sample once every 50,000 gallons, you would enter a sample interval of 50 pulses. *Appendix C Calculating Flow Increment Between Samples,* on page 154 provides a discussion of some of the calculations needed when determining flow pulse intervals.
4. Enter the Sample Distribution settings. The settings in the Sample Distribution section allow you to perform sequential or multiplexed sampling. The first display of the Sample Distribution program section asks you if you want to multiplex samples or not. If you want simple sequential sampling – one sample per bottle – select "NO." The sampler will then prompt you for the Sample Volume settings.

   If you want to use bottles-per-sample or samples-per-bottle multiplexing, select "YES." The next display will prompt you to select, "BOTTLES PER SAMPLE" or "SAMPLES PER BOTTLE."

   Bottles-per-sample multiplexing is useful where a sample volume greater than the capacity of a single bottle is required, or where various types of preservatives must be added to the samples. Samples-per-bottle multiplexing is useful when it is desirable to collect a series of small composite samples. For example, four samples at 15 minute intervals can be collected in each bottle, resulting in a series of hourly composite samples. *Types of Samples,* on page 17 discusses the various types of multiplexing.
5. Enter the Sample Volume settings. The Sample Volume program section will always contain prompts for the sample volume. Depending on the selections made in the configure sequence, it may contain prompts for the suction head and for calibrating the sampler.

When entering the sample volume, the ± 10 ml sample volume repeatability should be kept in mind (refer to **Table 1,** on page 7). Because the sample volume programmed is a "nominal" value, it is prudent to enter a total sample volume which is somewhat less than the volumetric capacity of the bottle, as a safety factor. This will minimize the effects of cumulative error. Refer to *Bottles and Sizes,* on page 44 for notes on cumulative error and bottle size.

Figure 21 Basic Programming Mode: Program Sequence Structure



If bottles-per-sample multiplexing is being used to add preservatives to a number of consecutive samples, be sure to take the volume of the preservative into account.

The sampler can be configured, through the Liquid Detector configure option, to add the suction head setting to the program sequence. The suction head display will appear after you enter the sample volume. However, when the head is unknown or variable, the suction head setting should be omitted by disabling the suction head setting in the Liquid Detector configure option. By disabling the setting, you allow the liquid detector to determine the operating suction head each time a sample is taken. If the Liquid Detector is disabled, the suction head is automatically added to the program sequence and you are required to enter the suction head.

If you want to calibrate the sample volume, the calibration option must be enabled. To enable this option, select "ENABLE" in the Calibrate Sampler configure option. (Refer to *Calibrate Sampler*, on page 50). Enabling the option will add the calibration displays to the Sample Volume program section. These displays are included in Example 7, on page 43 which demonstrates the calibration procedure.

6. Enter the Key Times settings. In the basic programming mode, you will be asked if you want to enter a start time for the routine. If you select "YES," you will be prompted to enter a specific start time and date. If you select "NO," the sampler will use the start time delay. The start time delay can be set from 0 to 9999 minutes in the Start Time Delay configure option (see section 3.2.4.12). When you select "NO," the routine will start according to the delay setting in the Start Time Delay configure option. *Start Times*, on page 58 contains an extensive explanation of the sampler's start times.

   When the sampler is operating under factory configuration settings, the first sample will be taken at the start time for time-paced sampling. This is true whether you enter a specific start time and date, or if you use the start time delay. For flow-paced sampling, however, the flow pulse countdown will begin at the start time and the first sample will be taken when the countdown reached zero. Refer to the discussion on the Enable Pin option in *Enable Pin*, on page 51 for additional information.
7. The sampler will automatically return to standby.
8. From standby, start the routine by pressing the START SAMPLING key. This places the sampler into the run state. You will be prompted to enter the starting bottle number. If you want to begin with bottle 1, press the ENTER/PROGRAM key. If you make no response within 60 seconds, sampler will automatically begin with bottle 1. If you happen to start the routine after the programmed start time, the sampler will allow you to reprogram the start time. For more information, see *Standby State*, on page 88.
9. Use the run state displays to monitor the sampler's progress.

Example 1 Checking the Configure Option Settings

Before programming the sampler – especially if you are unfamiliar with the settings used in the previous routine, or if you think the settings have been changed – you should verify the configure option settings. You must change the settings if they do not match the number or size of the bottles, or the suction line used with the unit. The entries suggested in this example configure the sampler for 24 1000-ml bottles, a 10-foot length of ⅜-inch vinyl suction line, enable the liquid detector, and select the basic programming mode among other settings. Procedures for reinitializing the program settings and configure options to factory settings are placed in steps 22 through 26.

Not all configure options are discussed in this example; however, the options noted in this example include all the configure options which are not reinitialized to factory settings when the reinitialization process is run.

Step No.	Display	Procedure
1	...STANDBY... 10:34:50 19-JUN-91	If the sampler is not already on, press the ON/OFF key to turn it on. The standby display shown here will appear. Press the ENTER/PROGRAM key to access the interactive state. The next display you'll see is shown in step 2.
2	[PROGRAM, CONFIGURE] SAMPLER	Access the configure sequence by selecting "CONFIGURE." Select "CONFIGURE" by pressing the RIGHT ARROW key once. When "CONFIGURE" blinks, accept the selection by pressing the ENTER/PROGRAM key.
3	SELECT OPTION: (← →) SET CLOCK	Press the LEFT ARROW or RIGHT ARROW key to scroll through the configure options. The first option displayed is the Set Clock configure option. If the time displayed on the LCD in the standby message is not correct, reset the time with the Set Clock configure option. Access the Set Clock input display by pressing the ENTER/PROGRAM key.
4	HH:MM MM/DD/YY 10:35:20 19-JUN-91	Use this display to reset the time. This display requires five entries. The LEFT ARROW and RIGHT ARROW key can be used to move back and forth between each of the five entries. Use the ARROW keys until the entry you want to change blinks. Type in the new entry. Press the ENTER/PROGRAM key to accept the new entry. Pressing the RIGHT ARROW or ENTER/PROGRAM key on the last entry will store the values and advance to the next display.
5	SELECT OPTION: (← →) BOTTLES AND SIZES	To verify the Bottles and Sizes settings, press the ENTER/PROGRAM key. The display shown in step 6 will appear.
6	[PORTABLE, REFRIG.] SAMPLER	The 3700 Series portable and refrigerated samplers use the same controller. Because the 3700FR Sampler is a refrigerated sampler, select "REFRIG." Accept the selection by pressing the ENTER/PROGRAM key.
7	[1, 2, 4, 8, 12, 24] BOTTLES	For the purposes of this example, select "24" when you are using the 24 bottle base. Use the ARROW keys until "24" blinks, then press the ENTER/PROGRAM key. Select "1" when you are using a single bottle for composite sampling. NOTE: The 12 bottle configuration is available for Isco's fiberglass refrigerated samplers only.

Step No.	Display	Procedure
8	BOTTLE VOLUME IS 1000 ml	Enter the bottle size here. Enter "350" for the 350 ml glass bottles, "1000" for plastic bottles. Press the ENTER/PROGRAM key. If you enter a number that exceeds the standard bottle size, the message, "WARNING: STANDARD BTL VOLUME EXCEEDED!", will be displayed for a short time. The sampler will then prompt you to confirm the volume entered. This prompt is displayed in step 9.
9	1001 ml! . . . ARE YOU SURE? [YES, NO]	Select "YES" if you want to use the non-standard bottle volume. Select "NO" if you want to revise the entry. The display shown in step 8 will reappear; use it to enter the revised bottle volume. Press the ENTER/PROGRAM key to accept the entry and advance to step 10.
10	SELECT OPTION: (← →) SUCTION LINE	Press the ENTER/PROGRAM key at this display to access the Suction Line input displays shown in steps 11 - 13.
11	SUCTION LINE ID IS [1/4, 3/8] INCH	Select "¼" if you are using ¼ inch suction line, "⅜" if you are using ⅜ inch suction line. Press the ENTER/PROGRAM key to accept the entry and advance to the next step. If you select "¼," you will not see the display shown in step 12; instead you will be prompted for the suction line length, as shown in step 13. (¼ inch suction line is only available in vinyl, so you do not need to specify the line type.)
12	SUCTION LINE IS [VINYL, TEFLON]	This display appears when you have selected "⅜" in step 11. Select "VINYL" if you are using vinyl suction line, "TEFLON" if you are using Teflon suction line. Press the ENTER/PROGRAM key to accept the selection.
13	SUCTION LINE LENGTH IS 10 FEET (3 - 99)	Enter the length of the suction line. The length should not include the tube coupling or the strainer. Press the ENTER/PROGRAM key to accept the entry and move to the step 14. If you change the suction line settings, the ". . . CALCULATING . . . PUMP TABLE VALUES" message will appear for a short time.
14	SELECT OPTION: (← →) LIQUID DETECTOR	Press the ENTER/PROGRAM key at this display to access the Liquid Detector input displays shown in steps 15 - 18.
15	[ENABLE, DISABLE] LIQUID DETECTOR	Select "ENABLE" to turn the Liquid Detector on, "DISABLE" to turn the Liquid Detector off. For the purposes of the following examples, select "ENABLE." Press the ENTER/PROGRAM key to accept the selection. The detector should normally be left enabled unless you suspect it is malfunctioning. If you disable the detector, you will be required to enter the suction head in the program sequence.
16	0 RINSE CYCLES (0 - 3)	This display appears when you have selected "ENABLE" in step 15. Enter the number of rinse cycles. For the purposes of this example, enter "0." Press the ENTER/PROGRAM key to accept the entry. Rinse cycles condition the suction line to reduce cross contamination.
17	ENTER HEAD MANUALLY [YES, NO]	This display appears when you have selected "ENABLE" in step 15. Select "YES" to add the suction head setting to the program sequence. For the purposes of the following examples, select "NO" to omit the setting. Press the ENTER/PROGRAM key to accept the selection.

Step No.	Display	Procedure
18	RETRY UP TO 0 TIMES WHEN SAMPLING (0 - 3)	This display appears when you have selected "ENABLE" in step 15. Enter the number of retries. For the purposes of this example, set the number of retries to "0." Press the ENTER/PROGRAM key to accept the entry. This setting determines the number of times the sampler will try to detect the presence of liquid for each sample event.
19	SELECT OPTION: (← →) PROGRAMMING MODE	To verify the programming mode setting, press the ENTER/PROGRAM key.
20	[BASIC, EXTENDED] PROGRAMMING MODE	Select "BASIC." Press the ENTER/PROGRAM key to accept the selection.
21	↓ ↓	Scroll through the remaining options with the arrow keys. Use the techniques demonstrated above to change or verify the settings. If you want to re-initialize the configure and program settings to factory settings, follow the procedures given in steps 22-27.
22	SELECT OPTION: (← →) RUN DIAGNOSTICS	To access the displays used in this option, press the ENTER/PROGRAM key.
23	SOFTWARE REVISION #4.6	The sampler will display the software revision number for a short period of time.
24	RAM' PASSED TEST TESTING 'ROM'	The software revision display is replaced by the RAM and ROM test messages. A successful test is indicated by the messages "RAM PASSED TEST" or "ROM PASSED TEST." If either the RAM or ROM fail the test, the sampler will display one of the following messages: "RAM FAILED TEST" or "ROM FAILED TEST" and beep every three seconds until you turn the sampler off. If either the RAM or ROM fail their test, the sampler should be serviced. Contact Isco Customer Service for instructions on returning the sampler.
25	ABCDEFGHIJKLMNOPQRST UVWXYZ[\]^_`abcdefgh	After successful RAM and ROM tests, the sampler will then test the LCD by first filling the display with solid rectangles and then printing the alphabet and other characters. Each character position in the display should contain a character.
26	PUMP COUNT TEST OFF/ON = 105	The next step tests the pump. During the test, the pump will run briefly and the display will indicate an "OFF/ON" number. The number should fall within the range of 50 to 200. If the count falls below 50 or exceeds 200, the pump should be serviced. A count near 100 is typical.
27	TEST DISTRIBUTOR? [YES, NO]	For the purposes of this example, select "NO" to skip the test. Press ENTER/PROGRAM to accept the selection.
28	RE-INITIALIZE? [YES, NO]	If you want to re-initialize the settings, select "YES." The entire RAM, with the exception of the current pump count total, bottle size settings, and suction line settings, will be re-initialized to factory settings. When you select "YES," the sampler will automatically turn itself off as part of the re-initialization process. Select "NO" leave the controller unchanged. Press the ENTER/PROGRAM key to accept the selection.

Example 2 Time-Paced Sequential Sampling

The steps in this example program the sampler to take samples every 30 minutes. Each bottle is to receive one 250 ml sample volume. The sampling routine is to begin according to the start time delay - one minute after the start sampling key is pressed.

Step No.	Display	Procedure
1	...STANDBY... 5:34:50 19-JUN-91	If the sampler is not already on, press the ON/OFF key to turn it on. The standby display shown here will appear. Press ENTER/PROGRAM to access the interactive state.
2	[PROGRAM, CONFIGURE] SAMPLER	Access the program sequence by selecting "PROGRAM." Because the choice "PROGRAM" will already be selected (blinking), press the ENTER/PROGRAM key to accept it and move to the next step.
3	[TIME, FLOW] PACED SAMPLING	To enter the interval between samples in time increments, select "TIME." If "TIME" is already blinking, press the ENTER/PROGRAM key to accept the selection. If "FLOW" is blinking, press the LEFT ARROW key once so that "TIME" blinks. Then, press the ENTER/PROGRAM key to accept "TIME."
4	SAMPLE EVERY 0 HOURS, 1 MINUTES	This display requires two entries: one for the hours, one for the minutes. Enter "0" to set the hours at zero. Press ENTER/PROGRAM to accept the number "0" and move to the minutes entry shown in step 5.
5	SAMPLE EVERY 0 HOURS, 30 MINUTES	Enter "30" to set the minutes entry to 30. Press ENTER/PROGRAM to accept the entry.
6	MULTIPLEX SAMPLES? [YES, NO]	For the purposes of this example, select "NO." Press the ENTER/PROGRAM key to accept the entry. If you select "YES" in response to this question, you would be able to select bottles-per-sample or samples-per-bottle multiplexing for your routine.
7	SAMPLE VOLUMES OF 250 ml (10 - 1000)	Enter "250" to set the sample volume at 250 ml. Press the ENTER/PROGRAM key to accept the entry.
8	ENTER START TIME? [YES, NO]	Because this sampling routine does not require a specific start time, use the arrow keys to select "NO." Press the ENTER/PROGRAM key to accept the entry. If you select "YES," you would be able to enter a specific start time and date for the routine.
9	PROGRAMMING SEQUENCE COMPLETE...	After this message is displayed briefly, the sampler will automatically return to the standby state.
10	...STANDBY... 5:42:23 19-JUN-91	After the sampler is properly installed, press the START SAMPLING key to run the program.
11	START SAMPLING BOTTLE 1 (1-24)	To start the sampling routine with the first bottle, accept the blinking "1" by pressing the ENTER/PROGRAM key. If you want to start the routine with another bottle, enter the starting bottle number here.
12	BOTTLE 1 AT 5:44 5:42:33	This display appears as the sampler counts down the time remaining to the start time. The first line reports the bottle which will receive the next sample volume. The second line reports the start time at the left and the current time on the right.

Step No.	Display	Procedure
13	BOTTLE 1	When the start time arrives, the sampler will take the first sample. The sample event cycle begins with a pre-sample purge. During the purge, the display indicates the bottle number which will receive the sample volume.
	BOTTLE 1 PUMPING 250 ml	As soon as the pump runs forward to deliver the sample volume, the message on the second line appears. This message remains through the post-sample purge.
14	BOTTLE 2 AT 6:14 5:45:11	This display appears when the post-sample purge from the previous sample event is completed. It indicates the bottle number which is to receive the sample at the upcoming sample event. The second line displays the scheduled time for the next event on the left. The current time is displayed on the right.
15	↓ ↓	The cycle of displays, illustrated in steps 12 through 13, is repeated for each bottle until the sampling routine is done.
16	DONE . . . 24 SAMPLES 6:10:35 21-JUN-91	When the routine is completed, this message appears. It reports the status of the routine ("DONE"), the total number of sample events, and the current time and date.

Example 3 Flow-paced Sequential Sampling

This example programs the sampler to take flow-paced samples at intervals of 5 pulses. One 500 ml sample is to be placed in each bottle. The sampling program will default to the start time delay entered in the Start Time Delay configure option.

Step No.	Display	Procedure
1	. . . STANDBY . . . 10:34:50 19-JUN-91	Press ENTER/PROGRAM to access the interactive state.
2	[PROGRAM, CONFIGURE] SAMPLER	Access the program sequence by selecting "PROGRAM."
3	[TIME, FLOW] PACED SAMPLING	Select "FLOW."
4	SAMPLE EVERY 5 PULSES (1-9999)	Enter "5" as the flow pulse interval. The sampler will take a sample every fifth flow pulse received.
5	MULTIPLEX SAMPLES? [YES, NO]	
6	SAMPLE VOLUMES OF 500 ml (10 - 1000)	Enter "500" to set the sample volume at 500 ml.
7	ENTER START TIME? [YES, NO]	ENTER START TIME? [YES, NO] Select "NO."

Step No.	Display	Procedure
8	PROGRAMMING SEQUENCE COMPLETE . .	After this message is displayed briefly, the sampler will automatically return to the standby state.
9	. . . STANDBY . . . 10:37:23 19-JUN-91	After the sampler is properly installed, press the START SAMPLING key to run the program.
10	START SAMPLING AT BOTTLE 1 (1-24)	To start the sampling routine with the first bottle, press the ENTER/PROGRAM key. To start the routine with another bottle, enter the starting bottle number here.
11	START AT 10:38 19-JUN 10:37:26 19-JUN	The first line of this display indicates the start time. The second line reports the current time and date.
12	BOTTLE 1 AFTER 5 PULSES	This display indicates the bottle which will receive a sample at the next sample event. The second line indicates the number of pulses remaining to the sample.
13	BOTTLE 1 AFTER 4 PULSES	This display shows that one flow pulse has been received. The pulse countdown will continue until the sample event.
14	↓ ↓	
15	BOTTLE 1	The second line of the display will disappear as the sampler begins the pre-sample purge.
	BOTTLE 1 PUMPING 500 ml	This display appears when the pump begins to run in the forward direction to deliver the sample volume. It remains through the end of the post-sample purge.
16	BOTTLE 2 AFTER 5 PULSES	When the first sample volume has been delivered, the display will indicate the next sample bottle and the number of pulses remaining until the next sample event. This series of displays will repeat until the last sample is taken at bottle 24 and the sampling routine is done.
17	↓ ↓	
18	DONE . . . 24 SAMPLES 22:48:32 20-JUN-91	This display informs you that the sampling routine is completed. The number of sample events is displayed in the upper right corner. The second line indicates the current time and date.

Example 4 Time-paced Multiplexed (Samples-Per-Bottle) Sampling

This programming example demonstrates samples-per-bottle multiplexed sampling. Samples are to be taken every 15 minutes. Each bottle is to receive four sample volumes of 200 ml each, so that bottles are switched every hour. The sampling routine is to start at 6:00 AM on the following day.

Step No.	Display	Procedure
1	. . . STANDBY . . . 10:34:50 19-JUN-91	Press ENTER/PROGRAM to access the interactive state.

Step No.	Display	Procedure
2	[PROGRAM, CONFIGURE] SAMPLER	Access the program sequence by selecting "PROGRAM."
3	[TIME, FLOW] PACED SAMPLING	Select "TIME."
4	SAMPLE EVERY 0 HOURS,1 MINUTES	Enter "0" to set the hours at zero. Press ENTER/PROGRAM to store the number "0" and move to the minutes entry.
5	SAMPLE EVERY 0 HOURS,15 MINUTES	Enter "15" to set the minutes entry to 15.
6	MULTIPLEX SAMPLES? [YES, NO]	Select "YES" to set up the samples-per-bottle multiplexing.
7	[BOTTLES PER SAMPLE, SAMPLES PER BOTTLE]	Select "SAMPLES PER BOTTLE."
8	4 SAMPLES PER BOTTLE (1 - 50)	Enter "4" to set the number of samples per bottle to 4.
9	SAMPLE VOLUMES OF 200 ml (10 - 250)	Enter the sample volume of "200" ml.
10	ENTER START TIME? [YES, NO]	Select "YES" so you can enter the specific start time.
11	TAKE FIRST SAMPLE AT 6:00 20-JUN-91	When this display first appears, it will show you the sampler's "guess" at the start time. Type in the desired start time. For this example, the start time is 6:00 on June 20.
12	PROGRAMMING SEQUENCE COMPLETE . . .	After this message is displayed briefly, the sampler will automatically return to the standby state.
13	. . STANDBY . . . 10:37:23 19-JUN-91	To run the program, press the START SAMPLING key after the sampler is installed.
14	START SAMPLING AT BOTTLE 1 (1-24)	To start the sampling routine with the first bottle, accept the blinking "1" by pressing the ENTER/PROGRAM key. If you want to start the routine with another bottle, enter the starting bottle number here.
15	1 OF 4, BOTTLE 1 AT 6:00 5:55:33	This display is used with samples-per-bottle multiplexing. The first line shows the number of the next sample, the number of samples each bottle is to receive, and the current bottle number. Here, the next sample is the first of four samples for bottle 1. The second line shows the time of the next sample and displays the current time.
16	1 OF 4, BOTTLE 1	When the scheduled sample event time arrives, the second line will disappear while the sampler completes the pre-sample purge.
	1 OF 4, BOTTLE 1 PUMPING 200 ml	This message appears when the pump begins to deliver the sample. The message remains through the post-sample purge.

Step No.	Display	Procedure
17	2 OF 4, BOTTLE 1 AT 6:15 6:00:26	When the sampling cycle is completed, the display will again indicate the upcoming sample.
18	2 OF 4, BOTTLE 1	The next displays illustrated here, in steps 18 through 20, show the displays as the sample volumes are deposited in bottle 1.
	2 OF 4, BOTTLE 1 PUMPING 200 ml	
19	3 OF 4, BOTTLE 1 AT 6:30 6:15:27	
20	3 OF 4, BOTTLE 1	
	3 OF 4, BOTTLE 1 PUMPING 200 ml	
21	↓ ↓	
22	1 OF 4, BOTTLE 2AT 7:00 6:45:25	When the final sample has been deposited in the first bottle, the display changes to indicate the new sample bottle. This display indicates that the next sample event will place the first of four sample volumes in bottle 2 at 7:00.
23	1 OF 4, BOTTLE 2	This display appears as the pump begins the pre-sample purge for the first sample delivered to bottle 2.
	1 OF 4, BOTTLE 2 PUMPING 200 ml	
24	↓ ↓	The cycle of displays is repeated for each bottle until the sampling routine is done.
25	DONE . . . 96 SAMPLES 6:10:35 21-JUN-91	When the routine is completed, this message appears. It reports the status of the routine ("DONE"), the total number of sample events, and the current time and date.

Example 5 Flow-paced Multiplexed (Bottles-per-Sample) Sampling

This example demonstrates the steps needed to program the sampler for a flow-paced routine that is to place a sample in two bottles at each sample event. Sample volumes of 500 ml are to be placed in the bottle sets at intervals of 10 flow-pulses. The routine is to start at 5:00 AM, the following morning.

Step No.	Display	Procedure
1	. . . STANDBY . . . 10:34:50 19-JUN-91	Press ENTER/PROGRAM to access the interactive state.
2	[PROGRAM, CONFIGURE] SAMPLER	Access the program sequence by selecting "PROGRAM."

Step No.	Display	Procedure
3	[TIME, FLOW] PACED SAMPLING	Select "FLOW."
4	SAMPLE EVERY 10 PULSES (1-9999)	Enter "10" as the flow pulse interval. The sampler will take a sample every tenth flow pulse received.
5	MULTIPLEX SAMPLES? [YES, NO]	Select "YES" to multiplex samples.
6	[BOTTLES PER SAMPLE, SAMPLES PER BOTTLE]	Select "BOTTLES PER SAMPLE."
7	2 BOTTLES PER SAMPLE EVENT (1-24)	Enter the number of bottles per sample event: "2."
8	SAMPLE VOLUMES OF 500 ml (10 - 1000)	Enter "500" to set the sample volume at 500 ml.
9	ENTER START TIME? [YES, NO]	Select "YES."
10	START FLOW COUNT AT 6:00 20-JUN-91	Enter the start time for the sampling routine. Note that the sampler may receive flow pulses before the sampling routine begins. Any pulses received before the start time will be disregarded.
11	PROGRAMMING SEQUENCE COMPLETE . . .	After this message is displayed briefly, the sampler will automatically return to the standby state.
12	. . . STANDBY . . . 10:37:23 19-JUN-91	Press the START SAMPLING key to run the program.
13	START SAMPLING AT BOTTLE 1 (1-23)	START SAMPLING?AT BOTTLE 1 (1-23) To start the sampling routine with the first bottle, accept the blinking "1" by pressing the ENTER/PROGRAM key. If you want to start the routine with another bottle, enter the starting bottle number here.
14	START AT 5:00 4/20 10:37:23 19-JUN	This display appears after you press the start SAMPLING KEY to start the routine. It reports the scheduled start time on the first line. The second line reports the current time and date.
15	BOTTLES 1- 2 AFTER 10 PULSES	When the scheduled start time arrives, the sampler will begin to count flow pulses. This display indicates the bottles which will receive sample volumes at the sample event. (If the bottle set consisted of four bottles, the first line of the display would read, "BOTTLES 1 - 4.") The number of flow pulses remaining to the sample event is displayed on the second line.
16	BOTTLES 1- 2 AFTER 9 PULSES	The second line of the display changes as each flow pulse is received.
17	↓ ↓	

Step No.	Display	Procedure
18	BOTTLES 1-2 AFTER 1 PULSES	This display shows one pulse remaining until the sample event.
19	BOTTLE 1	When the tenth pulse is received, the first line will report the current bottle number.
20	BOTTLE 1 PUMPING 500 ml	When the pump begins to run forward to deliver the sample volume, the second line appears. After the pump completes the sample delivery, it reverses to purge the liquid from the pump tube past the liquid detector. The suction line is not completely purged; instead, the liquid is pumped just past the liquid detector. At the end of the pump tube purge, the distributor moves to the next bottle of the set. The display remains unchanged until the distributor relocates to the next bottle of the set.
21	BOTTLE 2 PUMPING 500 ml	When the distributor is relocated above the next bottle, the bottle number reported in the display changes to indicate the bottle number. The message, "PUMPING 500 ml," will remain on the display. When the distributor reaches the correct position over the second bottle, the pump delivers the sample volume. When the delivery is completed, the pump reverses to complete the post-sample purge.
22	BOTTLE 3-4 AFTER 10 PULSES	At the end of the post-sample purge, the display changes to indicate the bottle numbers of the next bottle set. The display will change as it receives each flow pulse.
23	↓ ↓	The cycle is repeated until the sampling routine is completed.
24	DONE... 12 SAMPLES 6:10:35 21-JUN-91	When the routine is complete, the display will indicate the status of the routine ("DONE"), the number of sample events, and the current time and date.

Example 6 Time-Paced Composite Sampling

This example demonstrates the programming procedures for a composite sampling routine. When using the 3700FR Sampler for composite sampling, the unit must be mechanically converted for single bottle sampling.

After converting the sampler, check the configure settings to verify the sampler is configured for composite sampling. This example begins with a demonstration of the steps needed to check the Bottles and Sizes configure option settings. The Bottles and Sizes configure settings should indicate that only one bottle is being used. Be sure to enter the correct bottle volume. The settings used in this example are for the 4-gallon (15000 ml) composite bottle. Please refer to *Bottles and Sizes,* on page 44. for a discussion of the Bottles and Sizes configure option.

This time-paced routine takes samples at 15-minute intervals for a 12-hour period. Sample volumes are to be 250 ml each. When entering the program settings, you must enter the number of samples required before entering the sample volumes. At four samples per hour, the 12 hour period would yield 48 samples. The total volume at the end of the routine would be 12000 ml (48 samples x 250 ml/sample), well within the capacity of the 4-gallon bottle.

Step No.	Display	Procedure
1	...STANDBY... 10:34:50 19-JUN-91	If the sampler is not already on, press the ON/OFF key to turn it on. Press ENTER/PROGRAM to access the interactive state.

Step No.	Display	Procedure
2	[PROGRAM, CONFIGURE] SAMPLER	Access the configure sequence by selecting "CONFIGURE."
3	SELECT OPTION: (← →) SET CLOCK	Press the LEFT ARROW or RIGHT ARROW key to scroll through the configure options until the Bottles and Sizes configure option appears.
4	SELECT OPTION: (← →) BOTTLES AND SIZES	To access the Bottles and Sizes settings, press the ENTER/PROGRAM key.
5	[PORTABLE, REFRIG.] SAMPLER	Select "REFRIG."
6	[1, 2, 4, 8, 12, 24] BOTTLES	Select "1" for single bottle composite sampling.
7	BOTTLE VOLUME IS 15000 ml	Enter the bottle size here, "15000." (**Table 4,** on page 45 lists the standard Isco bottle sizes.)
8	SELECT OPTION: (← →) SUCTION LINE	Press the ENTER/PROGRAM key at this display to access the Suction Line input displays.
9	SUCTION LINE ID IS [1/4, 3/8] INCH	Select "1/4" if you are using ¼ inch suction line, "3/8" if you are using ⅜ inch suction line.
10	SUCTION LINE IS [VINYL, TEFLON]	This display appears when you have selected "3/8" in step 9. Select "VINYL" if you are using vinyl suction line, "TEFLON" if you are using Teflon suction line.
11	SUCTION LINE LENGTH IS 10 FEET (3 - 99)	Enter the length of the suction line. The length should not include the tube coupling or the strainer.
12	SELECT OPTION: (← →) LIQUID DETECTOR	To verify the Liquid Detector configure options, press the ENTER/PROGRAM key.
13	↓ ↓	Continue to scroll through the configure options with the RIGHT ARROW key. When you have checked the settings for the desired options, press the EXIT PROGRAM key to return to standby.
14	. . . STANDBY . . . 10:38:50 19-JUN-91	Press the ENTER/PROGRAM key to reenter the interactive state.
15	[PROGRAM, CONFIGURE] SAMPLER	Access the program sequence by selecting "PROGRAM."
16	[TIME, FLOW] PACED SAMPLING	Select "TIME."
17	SAMPLE EVERY 0 HOURS, 1 MINUTES	Enter "0" to set the hours at zero. Press ENTER/PROGRAM to store the number "0" and move to the minutes entry.
18	SAMPLE EVERY 0 HOURS, 15 MINUTES	Enter "15" to set the minutes entry to 15.

Step No.	Display	Procedure
19	48 COMPOSITE SAMPLES (0-200)	Enter the number of samples to be collected: "48."
20	SAMPLE VOLUMES OF 250 ml H (10 - 310)	Enter the sample volume: "250." Note that the upper limit of the range of acceptable volumes has been adjusted. When 48 samples are to be collected, the maximum sample volume is 310 ml. If you need to use a larger sample volume, you would need to adjust the sample number downward.
21	ENTER START TIME? [YES, NO]	Select "YES" to enter the start time for the routine.
22	TAKE FIRST SAMPLE AT 6:00 20-JUN	Enter the start time and date: "6:00" on "4-20."
23	PROGRAMMING SEQUENCE COMPLETE . . .	After this message is displayed briefly, the sampler will automatically return to the standby state.
24	. . . STANDBY . . . 10:40:23 19-JUN-91	After the sampler is properly installed, press the START SAMPLING key to run the program.
25	SAMPLE 1 OF 48 AT 6:00 5:50:43	The first line of this display indicates the number of the upcoming sample event and the total number of programmed samples. The second line indicates the scheduled time of the upcoming event followed by the current time.
26	SAMPLE 1 OF 48	When the time to the next sample event has elapsed and the sampler has initiated the sample event, the sampling cycle begins.
	SAMPLE 1 OF 48 PUMPING 250 ml	When the pump reverses for the pre-sample purge, the second line disappears. At the end of the pre-sample purge, the pump runs forward to deliver the sample, and the second line appears on the display. This display remains through the end of the post-sample purge.
27	SAMPLE 2 OF 48 AT 6:15 6:00:33	At the end of the sample event, the display changes to indicate the number and time of the next event. The current time is in the lower right corner.
28	SAMPLE 2 OF 48	The cycle is repeated for the remainder of the sampling routine.
	SAMPLE 2 OF 48 PUMPING 250 ml	
29	↓ ↓	
30	DONE . . . 48 SAMPLES 6:10:35 21-JUN-91	This display appears when the routine is completed. It reports the status of the routine ("DONE"), the total number of sample events, and the current time and date.

Example 7 Calibration Procedure

This example demonstrates the method used to calibrate the sampler for a 200 ml sample volume. The Calibrate Sampler configure option must be enabled in the configure sequence before the calibration displays shown below appear.

Even without calibrating, the 3700FR Sampler will deliver accurate sample volumes. If your sample volumes vary significantly with the entered values, check the suction line first. Be sure the line slopes continuously downhill and is draining completely after each pumping cycle. Then, please check the suction line entries in the configure sequence to see that they are accurate. The calibration procedure is intended for "fine tuning" only. After you enter the sample volume actually delivered, as shown in step 8, the next sample volume delivered will be adjusted to correct for the difference between the expected sample volume and the actual volume entered. All subsequent volumes delivered will be adjusted. The adjustment can be cleared by changing a suction line entry in the Suction Line configure option or by re-initializing the sampler.

We suggest using a spare sample bottle as the collection container. Because the sample volume can be calibrated to ± 10 ml, a graduated cylinder should be used to facilitate measurement. A graduated cylinder and spare bottles are available as accessories from the factory. Refer to the Accessories List at the back of this manual for details.

The calibration pump cycle will include rinse cycles and retries, if the sampler is configured to perform them (*Liquid Detector*, on page 45). This insures that the calibration procedure includes the pump cycle used while running the sampling program.

Step No.	Display	Procedure
1	...STANDBY... 9:34:50 19-JUN-91	Press ENTER/PROGRAM to access the interactive state.
2	[PROGRAM, CONFIGURE] SAMPLER	Access the program sequence by selecting "PROGRAM."
3	[TIME, FLOW] PACED SAMPLING	Step through the program until the "CALIBRATE SAMPLER?" (step 5) input display appears.
4	↓ ↓	Other program sequence displays.
5	CALIBRATE SAMPLER? [YES, NO]	Select "YES."
6	PRESS MANUAL SAMPLE KEY WHEN READY...	Before pressing the MANUAL SAMPLE key, make sure a collection container is underneath the distributor.
7	...MANUAL SAMPLE... PUMPING 200 ml	The sampler will deliver the programmed sample volume.
8	200 ml VOLUME DELIVERED	Measure the actual volume delivered and enter that value here.
9	CALIBRATE SAMPLER? [YES, NO]	Repeat the procedure if desired, then select "NO." Under normal conditions, you should not need to repeat the procedure more than once.
10	↓ ↓	Other program sequence displays.
11	...STANDBY... 9:39:50 19-JUN-91	The sampler will return to standby. Press the START SAMPLING key to run the program.

CONFIGURE SEQUENCE

The configure sequence provides a number of setup options. Some options enable sampling features, some provide reference data, and others affect run state operations.

Example 1, on page 31 shows the procedure used to access the configure sequence. (When you see a "SELECT OPTION: (← →)" display, you are in the configure sequence.) Each option uses at least two displays. The first display lists the option name. The following displays are input displays. To access an input display, press the ENTER/PROGRAM key while the desired option name is displayed. Once you've accessed the input display, use the keypad to enter numbers and make choices as described in *Keypad Description,* on page 24 through *Displays,* on page 26.

Note: pressing the EXIT PROGRAM key in the configure option list will return the sampler to standby. Pressing the EXIT PROGRAM key in a configure option input display will return you to the list of configure options without changing the setting.

By pressing the LEFT ARROW or RIGHT ARROW key at the "SELECT OPTION:" display in the configure sequence, you can scroll through the list of configure options without viewing each input display. If you are interested in only one or two options, you can locate the option of interest quickly.

Each option is discussed below in the order in which it appears when configuring the sampler. Individual input displays and their settings, are discussed separately within the discussion of each option. For these, the name of the setting is placed in the left margin so you can identify each topic. Illustrations of displays are not included in each discussion; however, each discussion includes the display number, should you need to refer to display listing in *Appendix B Display Index,* on page 145.

SET CLOCK

The Set Clock option is used to synchronize the sampler's clock with real time. Times must be entered in military time: 9:30 AM would be entered as 9:30, 9:30 PM would be entered as 21:30. When the year entry is accepted, the seconds will be reset to zero. (Display #210).

BOTTLES AND SIZES

The Bottles and Sizes option is used to enter the number of bottles and the bottle volume. The option uses four input displays:

- The first display specifies a portable or refrigerated sampler.
- The second display sets the number of bottles (1, 4, 12, or 24) for portable configurations. The second display appears only when you specify a portable sampler in the first display.
- The third display sets the number of bottles (1, 2, 4, 8, 12, 24) for refrigerated configurations. The third display appears only when you specify a refrigerated sampler in the first display.
- The fourth display sets the bottle volume.

Portable or Refrigerated Sampler

Because the 3700 Series portable and refrigerated samplers use the same control box, you must specify the type of unit. The 3700FR Sampler will be shipped with this setting as "REFRIGERATED." This setting is not changed when you reinitialize the settings. You should not specify "PORTABLE" unless you move the control box to portable sampler. (Display #220).

CAUTION

The sampler uses the bottle configuration setting to position the distributor. If you enter a bottle configuration that does not correspond to the actual configuration used in the sampler, the sampler may position the distributor over locations without a bottle and fill the refrigerator instead of a sample bottle.

1, 4, 12, 24

If you specify "PORTABLE" in the previous display, you will be able to specify a 1-, 4-, 12, or 24-bottle configuration. The sampler comes configured for the number of bottles ordered with the sampler. Each bottle configuration requires a different base section. The 1-bottle configuration requires the composite base section; the 4-bottle configuration requires the 4 bottle base section, and so on. Change the configuration setting only when you have moved the controller to a portable sampler. If you change the bottle configuration without changing the base section, the sampler will not position the distributor arm over the bottles and will miss the bottle mouth, filling the base section instead of the bottles. (Display #222).

1, 2, 4, 8, 12, 24

If you specify "REFRIGERATED," you will be able to specify a 1-, 2-, 4-, 8-, 12-, or 24-bottle configuration. The 2- and 8-bottle configurations are used only with Isco's 3700 Series Refrigerated Samplers. (Display #221).

Table 4 Bottle Volume Settings for Sequential and Composite Bottle Configurations

Bottle Configuration	Bottle Size	Bottle Volume Setting
24 (polypropylene)	1000 ml	1000
24 (glass)	350 ml	350
12 (polyethylene)	2500 ml	2500
8 (polyethylene)	2000 ml	2000
8 (glass)	1800 ml	1800
4 (glass and polyethylene)	1 gal	3800
2 (glass and polyethylene)	2.5 gal	9400
1 (glass and polyethylene)	2.5 gal	2.5 gal
1 (polyethylene)	4 gal	15000

Continuous Sampling

You can program the 3700FR refrigerated sampler for continuous sampling. A 3700FR programmed for continuous sampling will deposits samples into successive sets of bottles, until it reaches the last set of bottles. It then returns to the first set of bottles and continues sampling indefinitely into successive sets. Continuous sampling is available for all multiple-bottle configurations.

Before programming a sampler for continuous sampling, configure the sampler as follows. Select "refrigerated" and "2," "4," "8," "12," or "24" bottles in the Bottles and Sizes configure option. Next, configure the sampler for extended programming in the Programming Mode configure option. Under these settings, the display illustrated below will appear in the sample distribution section.

SAMPLE CONTINUOUSLY? [YES, NO]	Display #48

Note: The sampler will deposit samples indefinitely, even though the bottles have been filled to capacity. To avoid overfilling the bottles, replace them at regular time intervals or as soon as they are filled.

Cumulative Error

The sample accuracy is the greater of 10% of the sample volume or 20 ml and is repeatable to ± 10 ml. If you wish to fill a 1000-ml bottle with five 200-ml samples, adjust the actual sample volume according to the sample accuracy. Since samples of 200 ml can vary by 10% or ± 20 ml, the cumulative error for five samples would be ± 100 ml. If the sampler consistently places an actual sample volume of 220 ml for each of five samples, the total volume held by the bottle would be 1100 ml. Again, to avoid possible overfilling, enter a bottle volume that is less than the actual bottle capacity.

Suction Line

The Suction Line configure option is used to configure the sampler for the type (vinyl or Teflon), diameter, and length of the suction line used. Because the volumetric delivery varies with line diameter, type, and length; it is important that these settings be entered accurately. An incorrect setting will impair the accuracy of the sample volume. If you change the current suction line settings, the ". . . CALCULATING . . . PUMP TABLE VALUES" message will appear for a short time. Because the volumetric delivery of the sample varies with the diameter, type, and length of the suction line, the sampler must revise the internal pump tables. The tables are used as reference for the electronic pump count for sample delivery.

There are three types of suction lines available for use with the 3700FR sampler: ¼ inch vinyl, ⅜ inch vinyl, and ⅜ inch Teflon. If you specify ¼ inch line, the sampler will prompt you for the line length immediately. If you specify ⅜ inch line, the sampler will prompt you to specify vinyl or Teflon before prompting for the line length. (Display #'s 230 and 231).

The sampler will accept suction line lengths of 3 to 99 feet. When measuring the line, do not include the tube coupling or the strainer in the measurement. The line should be cut to even foot lengths. It is important to enter these settings accurately. These settings affect the accuracy of the sample volume and are used to determine the number of post-sample purge counts. It is important to have sufficient counts to completely clear the line. (Refer to *Purge Counts*, on page 52.) (Display #232).

Liquid Detector

The Liquid Detector configure option is used to turn the liquid detector on or off, set the number of rinse cycles, add a suction head setting to the program sequence, and set the number of sampling retries should the suction line become clogged. The option uses four input displays. Each display is discussed below.

Enable/Disable Detector

The recommended setting for the Enable/Disable Detector option is "ENABLE." The 3700FR Sampler determines the delivered sample volume suction head by counting revolutions of the peristaltic pump rotor.

The volume of liquid delivered by one revolution of the pump rotor is a function of the suction head of the pump; as the suction head increases, the volume delivered by one revolution of the pump rotor decreases and vice versa. By enabling the detector, the sampler can accurately determine the operating suction head. It does not have to rely on a programmed suction head value, but can instead begin its volume delivery count when liquid is detected. This minimizes inaccuracies which can occur in changing head conditions, or when measurement of the suction head is difficult to determine accurately.

The disable option is provided should the detector or its associated circuitry become suspect. If the detector is disabled, the manual suction head setting (Display #70) is automatically added to the sample volume program section in the program sequence. If the detector is disabled, the sampler will use a calculated number of pump counts based on the suction head entry to deliver the correct sample volume. The programmed suction head entry is then used to determine the operating suction head. The sampler will operate at diminished accuracy with the detector disabled. (Display #240).

Rinse Cycles

The Rinse Cycle setting is available only when the detector is enabled. It is used to set the number of suction line rinses, from 0 to 3. Rinses are used to condition the suction line to reduce cross contamination. During a rinse cycle, the pump draws liquid up through the line until it is detected by the liquid detector. At that point, the pump reverses to purge the line. This cycle is repeated according to the number of rinse cycles entered. (See *Sample Events and the Sampling Cycle,* on page 16 for a discussion of the sample event cycle.) (Display #241).

Rinse cycles contribute to the wear on pump tubing; therefore, if you use rinse cycles, it may be necessary to replace the tubing more frequently. The Tubing Life configure option, *Tubing Life,* on page 53, allows you to monitor pump tubing wear.

Enter Head Manually

Entering the head manually is available as an option when the detector is enabled and allows you to add the suction head entry (Display #70) to the program sequence. When the detector is disabled, the Suction Head entry is automatically added to the program sequence. By disabling the suction head setting, you allow the liquid detector to determine the operating suction head each time a sample is taken. Using the Suction Head entry in conjunction with the liquid detector, when the head is stable and known accurately, further increases accuracy of the delivered volume. When the head is variable or unknown, you should select "NO." An incorrect head setting diminishes the delivered volume accuracy. (Display #242).

Sampling Retries

The Sampling Retries option is used to set the number of times, from 0 to 3, the sampler will try to detect liquid in the line before skipping the sample. The option can be used when sampling liquid with a high concentration of solids which tend to clog the suction line or the strainer. The sampler will also retry the rinse cycle when you are using the Sampling Retry option. (Display #243).

PROGRAMMING MODE

The Programming Mode option allows you to specify either the basic or extended programming mode. The basic programming mode is used for conventional routines; the extended programming mode can be used for either conventional or more complex routines. Storm programming is available through the extended programming mode.

Table 5 summarizes the sampling features according to programming mode in the program sequence. Table 3, on page 22, placed in *Interactive State,* on page 21, summarizes the features available in the configure sequence. Extended features are normally used in exceptional applications and are not available in the basic mode to simplify the programming process for conventional routines.

Table 5 Sampling Capabilities Available Through the Program Sequence

Pacing:	Mode	Feature
Time-pacing: Uniform Time Intervals	Basic & Extended	Samples taken at regular time intervals from 1 minute to 99 hours, 59 minutes.
Time-pacing: Nonuniform Intervals in Minutes	Extended	Samples taken at irregular time intervals by specifying the amount of time in minutes between each sample. Intervals can be entered from 1 to 999 minutes.

Pacing:	Mode	Feature
Flow-pacing	Basic & Extended	Samples taken at regular flow intervals. The sampler will totalize flow intervals of 1 to 9999 pulses.

Distribution:	Mode	Feature
Sequential	Basic & Extended	One sample volume placed in each bottle.
Samples per Bottle Multiplexing	Basic & Extended	More than one sample volume placed in each bottle. Bottles can be switched after a specified number of samples have been deposited or after a specified period of time.
Bottles per Sample Multiplexing	Basic & Extended	Sample volumes placed in more than one bottle at each sample event.
Multiple Bottle Compositing	Extended	More than one sample volume placed in a set of bottles. Bottle sets can be switched after a specified number of samples have been deposited or after a specified period of time

Volumes and Accuracy:	Mode	Feature
Sample Volume	Basic & Extended	Volumes from 10 to 9990 ml can be entered.
Suction Head	Basic & Extended	Suction heads from 1 to 20 feet can be entered.
Calibration	Basic & Extended	Sample volumes can be calibrated, if desired.

Key Times:	Mode	Feature
Start Times	Basic & Extended	Specific start times can be entered for both time-paced and flow-paced routines. If no start time is entered, the Start Time Delay will be used.
First Switch Time	Extended	Bottles can be switched after specified time intervals. After the routine is started, the first switch time allows the first bottle or bottle set to receive samples for a partial interval. After the first switch, the remaining sets will receive samples for full time intervals. This allows you to place the sampler "on schedule."
Stop/Resume Times	Extended	Intermittent sampling can be performed by defining sampling stop and resume times. Up to 12 stop times and 12 resume times can be entered.

STORM Programming (Available in the Extended Mode Only.)

STORM Pacing:	Mode	Feature
Time-pacing	Extended	Samples taken at regular time intervals from 1 minute to 99 hours, 59 minutes.
Flow-pacing	Extended	Samples taken at regular flow intervals. The sampler will totalize flow intervals of 1 to 9999 pulses.

STORM Distribution:	Mode	Feature
Sequential	Extended	One sample volume placed in each bottle.
Samples per Bottle Multiplexing	Extended	More than one sample volume placed in each bottle. Bottles can be switched after a specified number of samples have been deposited.
Bottles per Sample Multiplexing	Extended	Sample volumes placed in more than one bottle at each sample event.
Multiple Bottle Compositing	Extended	More than one sample volume placed in a set of bottles. Bottle sets can be switched after a specified number of samples have been deposited.

STORM Volumes and Accuracy:	Mode	Feature
Sample Volume	Extended	Volumes from 10 to 990 ml can be entered for the time-paced and flow-paced segments separately.
Suction Head	Extended	Suction heads from 1 to 20 feet can be entered.
Calibration	Extended	Sample volumes can be calibrated, if desired. Sets calibration using the timed sample volume, only.

STORM Key Times:	Mode	Feature
Delay to First Timed Sample	Extended	A delay of up to 99 minutes can be entered to delay the first timed sample event after the programmed start time, and, in applications where a flow meter is programmed to enable the sampler, after the sampler is enabled.
Start Times	Extended	A specific start time can be entered for the routine. Bottle groups can be filled concurrently. If no start time is entered, the Start Time Delay will be used.
Maximum Flow Interval	Extended	Maximum period of time can be entered between flow-paced sample events. If this period of time is exceeded, the sampler will terminate the routine.

LOAD STORED PROGRAM

The Load Stored Program option allows you to load one of up to three sampling programs which have been previously saved with the Save Current Program configure option, discussed in section 3.2.4.7. The loaded program will replace the current program. After loading a program, the sampler will adjust the loaded program's time settings to current times and dates. Check the settings before starting the program to be sure they are appropriate for your application.

When the sampler loads a program, it compares the current Bottle Configuration setting (Display #220) to the Bottle Configuration setting required by the loaded program. If the settings do not match, an error message will be displayed: "LOAD ERROR - BOTTLE COUNT MISMATCH." The load process will be aborted. (Display #250).

The sampler is shipped from the factory with four programs: the current program and three stored programs, numbered from 1 to 3. All four programs contain the factory default program settings. Unless you have previously saved a program under one of the program numbers, loading a program will replace the current program with the factory default settings. When you reinitialize the sampler, all four programs return to the default program settings.

Example 8 Loading a Stored Program.

Step No.	Display	Procedure
1	...STANDBY... 10:34:50 19-JUN-91	Press ENTER/PROGRAM to access the interactive state.
2	[PROGRAM, CONFIGURE] SAMPLER	Access the configure sequence by selecting "CONFIGURE."
3	SELECT OPTION: (← →) SET CLOCK	Press the LEFT ARROW or RIGHT ARROW key to scroll through the configure options. The first option displayed is the Set Clock configure option.
4	↓ ↓	
5	SELECT OPTION: (← →) PROGRAMMING MODE	You can load a stored programmed only when the sampler is configured for the extended programming mode. To verify the programming mode setting, press the ENTER/PROGRAM key.

Step No.	Display	Procedure
6	[BASIC, EXTENDED] PROGRAMMING MODE	Select "EXTENDED." Press the ENTER/PROGRAM key to accept the selection.
7	SELECT OPTION: (← →) LOAD STORED PROGRAM	Press ENTER to access the Load Stored Program configure option.
8	LOAD PROGRAM [#1, #2, #3, NONE]	Select the number of the program you want to load. Select "NONE" when you do not want to load a program.
9	SELECT OPTION: (← →) SAVE CURRENT PROGRAM	When the sampler has loaded the program, it will display the next configure option. When you are done configuring the sampler, press EXIT PROGRAM to return to Standby.
10	. . . STANDBY . . . 10:37:23 19-JUN-91	After the sampler is properly installed, press the START SAMPLING key to run the program.

SAVE CURRENT PROGRAM

The Save Current Program option allows you to assign up to three sampling routines a number and store them. This option eliminates the need to reprogram the sampler for recurrent routines. Only the program settings are saved; if different routines require different configurations, the sampler must be reconfigured for each routine. For example, if the sampler is used at two sites, each requiring a specific sampling routine and different suction line lengths, the sampling routines can be stored for each site, but the suction line length settings must be reentered each time the line changes. (Display #260).

The sampler is shipped from the factory with four programs: the current program and three stored programs, numbered from 1 to 3. All four programs contain the factory default program settings. Saving a program will replace the default program with the current settings. Reinitializing the sampler will restore the default program settings. The default program settings are listed in Table 7, on page 55.

Note: saving a program will overwrite a program saved earlier under the same number. Settings for the current program can be viewed with the Display Status procedure. Refer to *Display Status*, on page 91.

Example 9 Saving a Current Program

Step No.	Display	Procedure
1	. . . STANDBY . . . 10:34:50 19-JUN-91	Press ENTER/PROGRAM to access the interactive state.
2	[PROGRAM, CONFIGURE] SAMPLER	Access the configure sequence by selecting "CONFIGURE."
3	SELECT OPTION: (← →) SET CLOCK	Press the LEFT ARROW or RIGHT ARROW key to scroll through the configure options. The first option displayed is the Set Clock configure option.
4	↓ ↓	
5	SELECT OPTION: (← →) PROGRAMMING MODE	You can save the current program only when the sampler is configured for the extended programming mode. To verify the programming mode setting, press the ENTER/PROGRAM key.

Step No.	Display	Procedure
6	[BASIC, EXTENDED] PROGRAMMING MODE	Select "EXTENDED." Press the ENTER/PROGRAM key to accept the selection.
7	SELECT OPTION: (← →) LOAD STORED PROGRAM	Press the RIGHT ARROW key to skip the Load Stored Program configure option.
8	SELECT OPTION: (← →) SAVE CURRENT PROGRAM	Press the ENTER/PROGRAM key to access the Save Current Program configure option.
9	SAVE PROGRAM AS [#1, #2, #3, NONE]	Select the number you want to use as the program "name." Select "NONE" when you do not want to save a program. When the sampler has saved the program, it will display the next configure option. When you are done configuring , press EXIT to return to Standby.
10	. . . STANDBY . . . 10:37:23 19-JUN-91	When the sampler is properly installed, press the START SAMPLING key to run the program.

Flow Mode Sampling

The Flow Mode Sampling option is used to direct the sampler to take a sample at key times in a flow-paced sampling program. The Flow Mode Sampling option has two settings. The first setting directs the sampler to take a sample at the start time. The second directs the sampler to take a sample at the switch times (when the bottle set changes are based on time). Both settings of the option are disregarded in STORM sampling routines. (Display #40).

Sample at Start Time

If you select "YES," the first sample will be taken at the start time. If you select "NO," the first sample is delayed until the number of flow pulses, set in the program sequence, have been counted. (Display #270).

Sample at Time Switch

If you select "YES," the sampler will switch to a new bottle or set, take a sample, and reset the flow pulse count. The next sample will occur after a full pulse countdown. If you select "NO," the sampler will take no samples at the switch time and will not reset the pulse countdown. The switch will occur in the middle of a pulse countdown and the first sample will be deposited in the new bottle or set when the countdown is completed. (Display #271).

Nonuniform Time

The Nonuniform Time option specifies the method in which nonuniform intervals are to be entered in the program sequence (Display #'s 26 or 27). If you select "clock-time," you will be able to enter a specific time and date for each sample event. If you select "MINUTES," you will be able to enter nonuniform intervals in minutes. Nonuniform times are not available in a STORM sampling routine. (Display #280).

Calibrate Sampler

The Calibrate Sampler option is used to add the calibration sequence to the program sequence. If you select "ENABLE," the calibration sequence will be added to the program sequence and you will be able to precisely calibrate the sample volumes. (Display #290)

Sampling Stop/Resume

The Sampling Stop/Resume configure option allows you to add stop and resume settings (Display #'s 100, 101, and 102) to the Key Time section of the program sequence. You can enter up to 24 times: 12 stop times and 12 resume times. For example, the Stop/Resume option allows you to define a sampling routine which will take samples at intervals of 15 minutes between 6:00 AM to 8:00 AM and between 4:00 PM to 6:00 PM. Sampling Stops and Resumes are not available in a STORM routine.

When you are using a time-switched sampling routine which includes stops and resumes, the sampler will reset the time-switch interval at each resume time. For example, if a routine with time-switches every hour is programmed for stop and resume times, the first time-switch would occur one hour after the resume time; switches would repeat every hour until a stop time occurred or the routine was completed. See **Example 10, on page 74.**

There are two other settings which direct the sampler to take samples at stop or resume times.

Enable/Disable

Select "ENABLE" to add the stops and resume settings to the program sequence. (Display #300).

Sample at Stop

The Sample at Stop setting directs the sampler to take a sample at stop times. (Display #301).

Sample at Resume

The Sample at Resume setting directs the sampler to take a sample at resume times. (Display #302).

START TIME DELAY

The Start Time Delay option is used to set the amount of time in minutes, between the time you press the start sampling key and the time the sampling routine is initiated. The sampler's response varies according to specific entries: "0," "1," and entries greater than 1.

---MINUTE DELAY TO START (0 - 9999)	Display #310

An entry of "0" eliminates the delay to start time; the start time occurs the moment you press START SAMPLING. For example, if you press START SAMPLING at 10:32:15, the sampler will initiate a time-paced sample event at 10:32:15.

However, the sampler will start clocking time intervals at the beginning of the minute (HH:MM:00) of the first sample event. If a sampling routine requires 10 minute intervals and you pressed start sampling at 10:32:15, the sampler would begin the time interval at 10:32:00. It would initiate the second sample event at 10:42:00. The sampler would begin the flow interval at 10:32:15 for flow-paced routines.

If you enter a start time delay of "1," the sampler will begin the routine at the beginning of the next minute. Thus, if you pressed start sampling at 10:32:15, the sampler would initiate the sample event at 10:33:00. The sampler would begin time and flow intervals at 10:33:00. If you enter a start time delay of "2," the sampler would begin time or flow intervals at 10:34:00. (Display #310).

Note: If you enter a start time, the sampler will disregard the start time delay. The sampler will use the start time delay setting when you do not enter the start time in the program sequence. Care must be taken when using a start time delay of greater than zero when the sampler is being inhibited by another sampler or by a Liquid Level Actuator. Refer to *Enable Pin,* on page 51.

ENABLE PIN

The Enable Pin option allows you to program the sampler's response to a device controlling pin F of the sampler's flow meter connector: for example, the Model 1640 Liquid Level Actuator. Samplers configured for refrigerated sampling have four Enable Pin setup options: Sample Upon Disable, Sample Upon Enable, Reset Sample Interval, and Inhibit Countdown. The sampler disregards the Enable Pin configure option setting when running a STORM routine. Each of these options is discussed below.

Sample Upon Disable

When you are using a flow meter, a Liquid Level Actuator, or like device, "SAMPLE UPON DISABLE?" allows you to direct the sampler to take a sample as soon as the sampler is disabled through pin F. A response of "YES" will cause the sampler to take a sample when the pin is disabled; a response of "NO" will prevent the sampler from taking a sample at that time. (Display #321).

Sample Upon Enable

When you are using a Liquid Level Actuator or like device, "SAMPLE UPON ENABLE?" allows you to direct the sampler to take a sample as soon as the sampler is enabled through pin F. A response of "YES" will cause the sampler to take a sample when the pin is enabled; a response of "NO" will prevent the sampler from taking a sample at that time. (Display #322).

Reset Sample Interval

"Reset Sample Interval" is used to control the time or flow pulse countdown. If you select "YES," a full sample interval will begin when pin F is enabled. If you select "NO," the interval will not be reset when the sampler is enabled; the interval is then governed by settings entered in the "INHIBIT COUNTDOWN?" option. If you are sampling on a time-paced basis and wish to synchronize all sampling with real time, do not reset the sample interval. (Display #323).

Inhibit Countdown

"INHIBIT COUNTDOWN?" is only applicable when you respond "NO" to "RESET SAMPLE INTERVAL?" The Inhibit Countdown option is used to control the countdown while the sampler is inhibited. Select "YES" to freeze the countdown to the next sample. The count will resume when the sampler is enabled. Select "NO" to allow the countdown to continue while the sampler is disabled. (Display #324).

The sampler determines an enable or disable condition by monitoring the voltage on pin F. High voltage is interpreted as an enable signal. Low voltage or ground is interpreted as a disable signal.

A sampler which has been inhibited while running a routine will move to the next bottle set when enabled if at least one sample volume has been deposited in the current bottle set. This is true for both time-switched and count-switched routines, and for bottles sets composed of one or more bottles.

A sampler which has been inhibited while running a time-switched routine will advance to the next bottle or bottle set, regardless of the number of time-switches that elapse while the sampler is inhibited. In other words, if the bottle sets were to be switched every two hours and the sampler has been inhibited for six hours, the recommenced routine will begin with the next bottle set. The routine may not continue with the bottle set that would have been used had the sampler not been inhibited.

Event Mark

The Event Mark option configures the sampler to send an event mark to an interfaced flow meter or other equipment. The sampler will supply a variable duration pulse of up to 700 mA at 12 V on pin E of the flow meter connector. Four types of signals can be sent: a pulse at the beginning of the pre-sample purge, a pulse at the beginning of forward pumping only, continuous during the entire pump cycle, and continuous during forward pumping only.

The event mark includes a signal sent on pin D which is interpreted and recorded by an Isco flow meter as the bottle number(s) for the sample event. The bottle number signal consists of a number of 100 millisecond, 12 V pulses which equal the bottle number; i.e., four pulses represent bottle 4, twenty pulses for bottle 20.

The type of signal selected from the Event Mark configure option affects both the event mark signal on pin E and the bottle number signal on pin D.Figure 22, on page 53 diagrams the signals during a sample event cycle according to the selection made in the option. The figure shows three sample volumes being delivered (to bottles 1, 2, and 3) at the sample event. In Figure 22 (A), a pulse signal is sent at the beginning of the pre-sample purge and only the first bottle number of the bottle set is sent to the flow meter. In Figure 22 (B), a pulse signal is sent during the sample volume delivery portion of the sample event. Since three sample volumes are delivered, three pulses are sent to the flow meter and three bottle number signals are sent. In Figure 22 (C), a continuous signal is sent during the entire pump cycle; the bottle numbers are sent as shown. In Figure 22 (D), three continuous pulses are sent for the duration of each sample volume delivery and three bottle number signals are sent.

Continuous/Pulse Signal

The Continuous/Pulse setting is used to select either continuous or pulse signals. Pulse signals are three seconds in duration; continuous signals are three seconds or longer and depend on the setting and the pump cycle. (Display #330).

Pump/Cycle Forward Pumping

The Pump Cycle/Fwd Pumping settings will appear when you have selected "CONTINUOUS." Select "PUMP CYCLE" when you want a continuous signal transmitted during the entire pump cycle, from the beginning of the pre-sample purge to the end of the post-sample purge. Select "FWD PUMPING" when you want a continuous signal transmitted while the pump is delivering a sample volume. A signal is transmitted for each bottle when the sampler is programmed for more than one bottle per sample. (Display #331).

Pulse Signal Timing

The Pulse Signal setting will appear when you have selected "PULSE." Two options are available. The first option, "PURGE," is used to send a pulse at the beginning of the pre-sample purge. The second option, "FWD PUMPING," is used to send a pulse at the beginning of the sample delivery when the pump is running forward. (Display #332).

Purge Counts

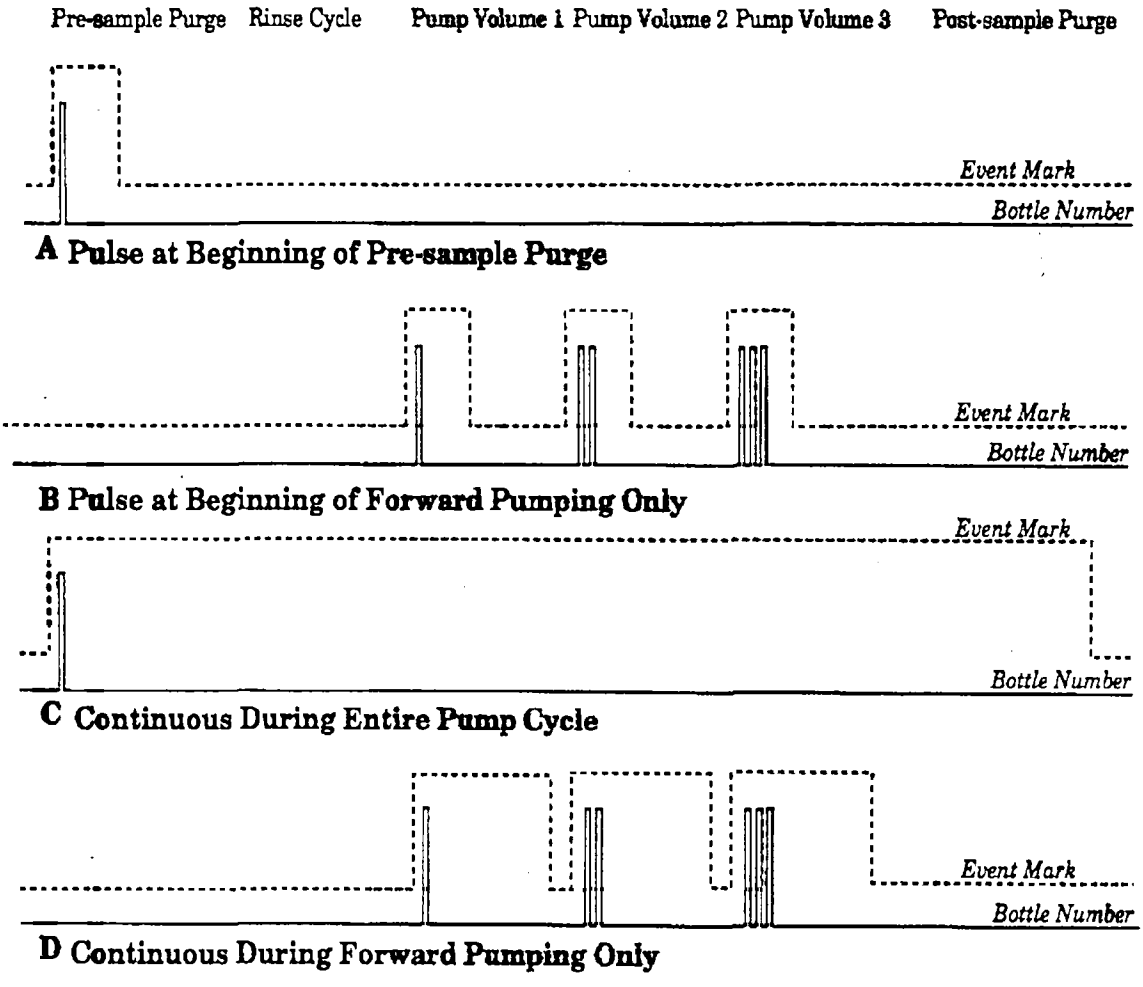
The Purge Counts option is used to override the number of pump counts needed to clear the suction line in both pre-sample purge and post-sample purge cycles. The pre-sample purge count is normally set to 150 counts and will be reset to this value if the sampler is re-initialized. The post-sample purge count is derived from the suction line diameter and length settings.

If your observations indicate that a greater or lesser number of pump counts in either purge is needed, you can change the count settings. Acceptable entries are between 0 and 9999 for both purges. A purge count can be obtained using the PUMP FORWARD or PUMP REVERSE keys; refer to section 3.3. (Display #'s 340 and 341).

TUBING LIFE

The Tubing Life option is used to set the number of pump counts needed to trigger the "Replace Pump Tubing" warning. You must reset the pump counter after replacing the pump tubing. The warning will be activated when the pump count reaches the entered value. If you consistently experience a tubing failure at a pump count that differs significantly from the current setting, enter that value here. The factory set value of 500,000 pump counts will deliver approximately 500 samples of 200 ml each, using a ⅜ inch x 10 ft vinyl suction line and a 5 ft suction head. (Display #350, 351, and 352).

Figure 22 Event Mark and Bottle Number Signal Output



PROGRAM LOCK

The Program Lock option allows you to protect program and configure settings with a pass-number. Select "ENABLE" to turn the protection on. When the Program Lock is enabled, each protected display can be viewed, but no values can be changed without first entering the pass-number: 3700. Once the pass-number has been entered, you can change any value or setting in either the program or configure sequence. (Display #360).

SAMPLER ID

The Sampler ID option allows you to enter a 10 character ID for the sampler. The ID number is used to identify sampling reports produced by the Isco Field Printer and in files created by SAMPLINK. The sampler is shipped from the factory with 10 dashes (-) entered for the ID. (Display #365).

Acceptable Characters

The ID field will accept digits, dashes, spaces, and periods. You can enter spaces, dashes, and periods with three of the control keys. Enter a space with the START SAMPLING key, a dash (-) with the manual SAMPLE KEY, and a period with the RESUME SAMPLING key.

RUN DIAGNOSTICS

Run Diagnostics is used to perform a number of diagnostic functions. This option contains the software revision number; tests the sampler's RAM, ROM, display, distributor, and pump; and allows for re-initializing RAM. The display information is discussed below in the order of appearance.

Software Revision Number

The sampler will display the software revision number for a short period of time.

Test RAM and ROM

The software revision display is replaced by the RAM and ROM test messages. A successful test is indicated by the messages "RAM PASSED TEST" or "ROM PASSED TEST." If either the RAM or ROM fail the test, the sampler will display one of the following messages: "RAM FAILED TEST" or "ROM FAILED TEST" and beep every three seconds until you turn the sampler off. If either the RAM or ROM fail their test, the sampler should be serviced. Contact Isco Customer Service for instructions on returning the sampler. Contact Isco Customer Service for assistance: (800) 228-4373.

LCD Test

After successful RAM and ROM tests, the sampler will then test the LCD by first filling the display with solid rectangles and then printing the alphabet and other characters. Each character position in the display should contain a character.

Pump Test

The next step tests the pump. During the test, the pump will run briefly and the display will indicate an "OFF/ON" number. The number should fall within the range of 50 to 200. If the count falls below 50 or exceeds 200, the pump should be serviced. A count near 100 is typical.

Distributor Test

Following the pump test, you can test the distributor. If you elect to test the distributor, the sampler will move the distributor to position 24, then return it to position 1. The positions are indicated on the display. If the message, "DISTRIBUTOR JAMMED" is displayed; check the routing of the pump tubing and the bottles in the tub. If the tubing and bottles are correctly positioned, the distributor drive mechanism may need servicing. (Display #370).

Re-initialize Controller

The final step allows you to re-initialize the sampler. If you select "NO," the sampler will return to the configure option list. If you select "YES," the sampler will reset a number of configuration and program settings, then turn the sampler off. (Display #371).

Table 6, on page 54 and Table 7, on page 55 list the re-initialized settings. Note: not all settings are reset. Set Clock, Bottles and Sizes, and Suction Line configure option settings remain unchanged to minimize the settings you would need to change if the sampler were accidentally re-initialized. The Pump Count total is not reset to maintain an accurate count for the Tubing Life Warning.

EXIT CONFIGURATION

This option allows you to leave the configure sequence and return to the standby state. There are no input displays. Press the ENTER/PROGRAM key to exit the configure sequence. The configuration sequence can also be exited at any time using the EXIT PROGRAM key.

Table 6 Factory Configure Option Settings

CONFIGURE OPTION	DISPLAY NO.	FACTORY SETTING
SET CLOCK	210	Not Reset
BOTTLES AND SIZES	220,221,222,223	Not Reset
SUCTION LINE	230, 231, 232	Not Reset
LIQUID DETECTOR		
LIQUID DETECTOR	240	ENABLE
RINSES	241	0
ENTER HEAD MANUALLY	242	NO
# OF RETRIES	243	0
PROGRAMMING MODE	250	BASIC
LOAD STORED PROGRAM	255	
SAVE CURRENT PROGRAM	260	
FLOW MODE SAMPLING		
SAMPLE AT START TIME	270	NO

CONFIGURE OPTION	DISPLAY NO.	FACTORY SETTING
SAMPLE AT SWITCH TIMES	271	NO
NONUNIFORM TIME	280	Minutes
CALIBRATE SAMPLER	290	DISABLE
SAMPLING STOP/RESUME	300	DISABLE
SAMPLE AT STOP TIMES	301	NO
SAMPLE AT RESUME TIMES	302	NO
START TIME DELAY	310	2
ENABLE PIN		
SAMPLE UPON DISABLE	321	NO
SAMPLE UPON ENABLE	322	NO
RESET SAMPLE INTERVAL	323	NO
INHIBIT COUNTDOWN	324	NO
EVENT MARK		
CONTINUOUS/PULSE	330	CONTINOUS SIGNAL
PUMP CYCLE/FORWARD ONLY	331	FWD PUMPING ONLY
PURGE COUNTS		
PRE-SAMPLE COUNTS	340	150
POST-SAMPLE COUNTS	341	BASED ON LINE LENGTH
TUBING LIFE		
RESET PUMP COUNTER	351	NO
# PUMP COUNTS	352	Not Reset
PROGRAM LOCK	360	DISABLE
SAMPLER ID	365	Not Reset
RUN DIAGNOSTICS		

Table 7 Factory Program Sequence Settings

PROGRAM SETTING	DISPLAY NO.	FACTORY SETTING
[TIME, FLOW, PACED] SAMPLING	10	TIME
UNIFORM/NONUNIFORM TIME INTERVALS	11	UNIFORM
[TIME, FLOW, STORM] PACED SAMPLING	12	TIME
-- MINUTE DELAY TO FIRST TIMED SAMPLE	15	0 MINUTES
[DURING, AFTER] TIME MODE	16	DURING
SAMPLE EVERY -- HOURS, -- MINUTES	21	1 HOUR 0 MINUTES
SAMPLE EVERY ---- PULSES (1 - 9999)	22	10
TAKE -- TIMED SAMPLE EVENTS (1-MAX)	23	1

PROGRAM SETTING	DISPLAY NO.	FACTORY SETTING
SAMPLE INTERVALS OF –MINUTES (1-99)	24	60
TAKE — SAMPLES (1 - MAX)	25	10
QUANTITY AT INTERVAL 1. – AT — MINUTES	27	1 AT 60 MINUTES
– BOTTLES PER SAMPLE EVENT (1 - 24)	30	1
– SAMPLES PER BOTTLE (1-MAX)	31	1
MULTIPLEX SAMPLES? [YES, NO]	35	NO
[BOTTLES PER SAMPLE, SAMPLES PER BOTTLE]	36	SAMPLES PER BOTTLE
CHANGE BOTTLES BASED ON [TIME, SAMPLE]	40	COUNT
CHANGE SETS BASED ON [TIME, SAMPLE]	41	COUNT
CHANGE BOTTLES EVERY – HOURS, – MINUTES	42	2 HOURS 0 MINUTES
CHANGE SETS AFTER – HOURS, – MINUTES	43	2 HOURS 0 MINUTES
CHANGE BOTTLES AFTER – SAMPLES	44	1
CHANGE SETS AFTER SAMPLES	45	1
SAMPLE CONTINUOUSLY? [YES, NO]	48	NO
SAMPLE VOLUMES OF — ml EACH (10 - MAX)	50	200
— COMPOSITE SAMPLES (0 - MAX)	60	10
SUCTION HEAD OF – FEET (1 - MAX)	70	10
ENTER START TIME? [YES, NO]	90	NO
STORM ENABLED AFTER HH:MM MM/DD	93	
ENTER FIRST SWITCH TIME? [YES, NO]	95	NO
– STOP or RESUME TIMES (0 - 24)	100	0
MAX FLOW INTERVAL OF – HOURS, –MINUTES	110	2 HOURS 0 MINUTES

Extended Programming Mode

All sampling capabilities available in the basic programming mode are available in the extended programming mode; a listing of the capabilities is placed in **Table 5,** on page 46. The extended programming mode provides several additional capabilities: Nonuniform Time pacing, an additional multiplexing scheme (multiple bottle compositing), Sampling Stops and Resumes, program storage, etc.

The procedure used to program the sampler in the extended mode is the same as the procedure used to program the sampler in the basic programming mode. This procedure is outlined in *Basic Programming Mode Introduction,* on page 27. (To avoid duplication, the programming procedure is not repeated here.) There are some exceptions, however. The extended mode modifies the sections of the program sequence to allow you to take advantage of the additional features. The Sample Pacing section is extended to include settings for nonuniform times. The Sample Distribution section is modified to allow you to program the sampler for multiple bottle compositing. The procedure and displays used to program the sampler for bottles-per-sample and samples-per-bottle multiplexing, and sequential sampling are somewhat different. The section is also extended to allow you to switch multiplexed bottles or bottle sets after programmed periods of time. (With the extended mode, you can still switch bottles after a programmed number of samples have been deposited.) The Key Times section is extended to allow you to enter the time of the first bottle or bottle set change. If you have enabled the Sampling Stops and Resumes configure option, it will also include displays for sampling stops and resumes.

Each of these extended features is discussed briefly below. You may find it helpful to refer to **Figure 23A,** on page 59 which charts the program sequence in the extended mode.

Extended Mode Sample Pacing

In the extended programming mode, the Sample Pacing section allows you to select one of two types of time-pacing: uniform or nonuniform time intervals. Uniform time intervals are identical to the time intervals entered in the basic programming mode. Nonuniform times allow you to pace the sampler at irregular intervals. You can enter nonuniform intervals in two ways. The first method allows you to define the interval between each sample event in minutes. For example, you can program the sampler to take sample #2 after an interval of 10 minutes, sample #3 after an interval of 30 minutes, sample #4 after an interval of 60 minutes, and so on. Sample #1 would be taken at the start time. The second method allows you to enter a specific time and date for each sample event. For example, with nonuniform time pacing, samples can be collected at specific times and dates at irregular intervals: 6:00 AM on April 15, noon on April 15, 7:00 AM on April 16, and 1:00 PM (or 13:00 in military time) on April 16. If you have several sequences of nonuniform times, you can use the program storage feature to save the programs using each sequence.

Extended Mode Sample Distribution

The extended Sample Distribution section expands the multiplexing capabilities of the sampler. Both the bottles-per-sample and samples-per-bottle multiplexing are available; however, the procedure used to program them differs slightly from the procedure used in the basic programming mode. **Example 12,** on page 78 illustrates the bottles-per-sample multiplexing procedure; **Example 11, on page 76** demonstrates the procedure used for samples-per-bottle multiplexing. The extended mode also offers multiple bottle compositing; refer to **Example 13,** on page 80.

In the extended programming mode, you can switch bottles or bottle sets after a programmed time period elapses or after a programmed number of samples have been deposited.

The displays used to specify the type of switches are shown in the Sample Distribution section of **Figure 23A,** on page 59. Display #40 allows you to select either "TIME" or "SAMPLES." If you select "TIME," the bottles can be changed after a programmed period of time.

If you select "SAMPLES," the bottles can be switched after a programmed number of samples. In Display #41, which allows you to switch bottle sets, you can select either "TIME" or "SAMPLES/BTL." If you select "TIME," the bottle sets can be changed after a programmed period of time. If you select "SAMPLES/BTL," the bottle sets can be changed after a programmed number of samples. You can use select either "TIME," "SAMPLES," or "SAMPLE/BTL" settings with both time- and flow-paced sampling.

Extended Mode Sample Volumes

The extended mode Sample Volumes section is identical to the Basic Mode Sample Volume section.

Extended Mode Key Times

The extended mode Key Times section has two additional sets of displays which allow you to specify the time of the first bottle or bottle set change and to set up the sampling stop and resume times.

First Switch Time

The first switch time displays will appear only when you have specified bottle or bottle set changes based on time in the Sample Distribution section. If you select "TIME" rather than "SAMPLES/BTL" in the "CHANGE SETS BASED ON [TIME, SAMPLES/BTL]" display, you first will be asked if you want to enter a setting for the first switch time. If you respond "YES," you will be asked for the time of the first bottle or set change.

The first switch time setting allows you to control the times of each bottle switch without delaying the routine and thereby missing samples. For example, if you have programmed the sampler for time switches every hour and you want the switches to occur on the hour, you can set the time of the first switch at the next even hour, start the sampling routine early, and deposit samples in the first bottle set until the first switch time. At the first switch time, the distributor moves to the next bottle set. The first bottle set may not be completely filled; however, by starting the routine early, you can sample until the bottle switches are placed "on schedule" to avoid missing any samples. The first time switch displays are indicated by display #'s 95, 46, and 47 in **Figure 18,** on page 20.

If you do not enter a first switch time, the sampler will begin timing the switch interval from the start time for the routine and the first bottle or bottle set will receive samples for the full time period. Switch times are not available in STORM routines.

Stops and Resumes

The Stops and Resumes settings are available only when you have enabled the Sampling Stop/Resume configure option (see *Sampling Stop/Resume,* on page 50). You must first enter the number of stops and resumes, from 0 to 24. (Enter "0" if you want to omit the stop and resume settings without returning to the configure sequence and disabling the Stops and Resumes option.) Then enter the stop and resume clock times beginning with the first stop time. Refer to the Key Times section of **Figure 23A,** on page 59, display #'s 100, 101, and 102.

Start Times

This section discusses the sampler's start times. It begins by outlining the sequence of events preceding the start time for most sampling routines.

Sequence of Events Preceding Sampling Routine

After you program a sampler, you must start the sampling routine by pressing the start sampling key. However, depending on the program and configure option settings, the sampling routine may not start at soon as you press the key. The "Delay to Start Time" is the period between the time you press start sampling and the start time for the routine. **Figure 24,** on page 62 diagrams the sequence of events preceding the start time.

The start time for a routine is either the programmed start time or the time at which the delay to start time expires. The programmed start time is determined by entries made in Displays #90, #91, #92 and #93. The delay to start time is determined by the entry in Display #310 of the Start Time Delay configure option. These input displays are illustrated below. They are also illustrated in the program structure charts in **Figure 16,** on page 18 and **Figure 18,** on page 20.

Note: Unless the sampling routine contains a programmed start time (Displays #91, #92, or #93), the sampler will delay the start time according to the amount of time specified in the Start Time Delay configure option. A programmed start time entry always overrides any settings made in the Start Time Delay configure option.

Programmed Start Time displays (Program Sequence)

ENTER START TIME? [YES, NO]	Display #90.
TAKE FIRST SAMPLE AT HH:MM DD-MMM	Display #91 (time-paced sampling).
START FLOW COUNT AT HH:MM DD-MMM	Display #92 (flow-paced sampling).
STORM ENABLED AFTER HH:MM DD-MMM	Display #93 (storm-paced sampling).

Start Time Delay display (Configure Sequence)

— MINUTE DELAY? TO START (0 - 9999)	Display #310 (Start Time Delay configure option).

Figure 23A Extended Programming Mode: Sample Pacing and Sample Distribution

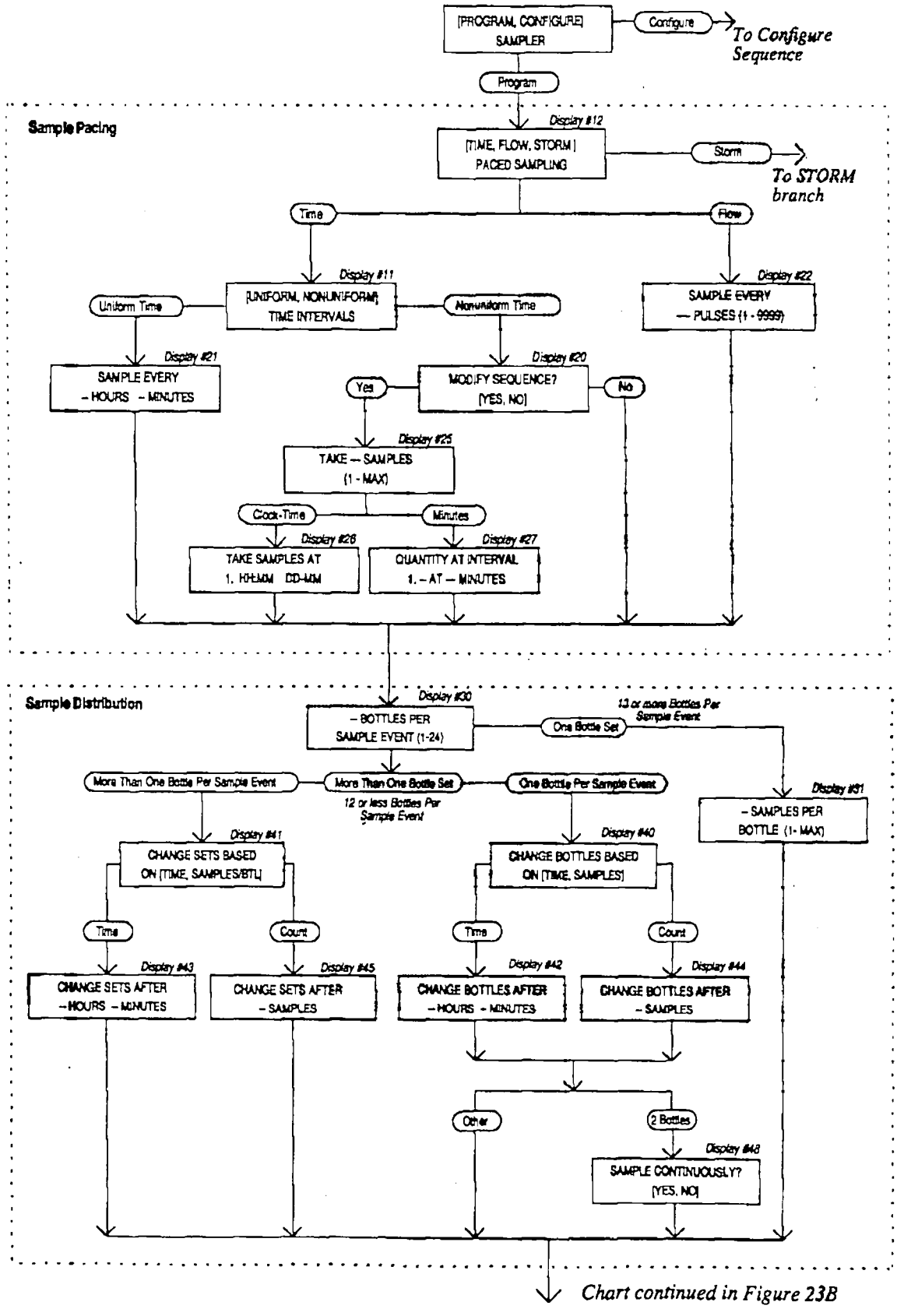


Figure 23B Extended Programming Mode: STORM Programming

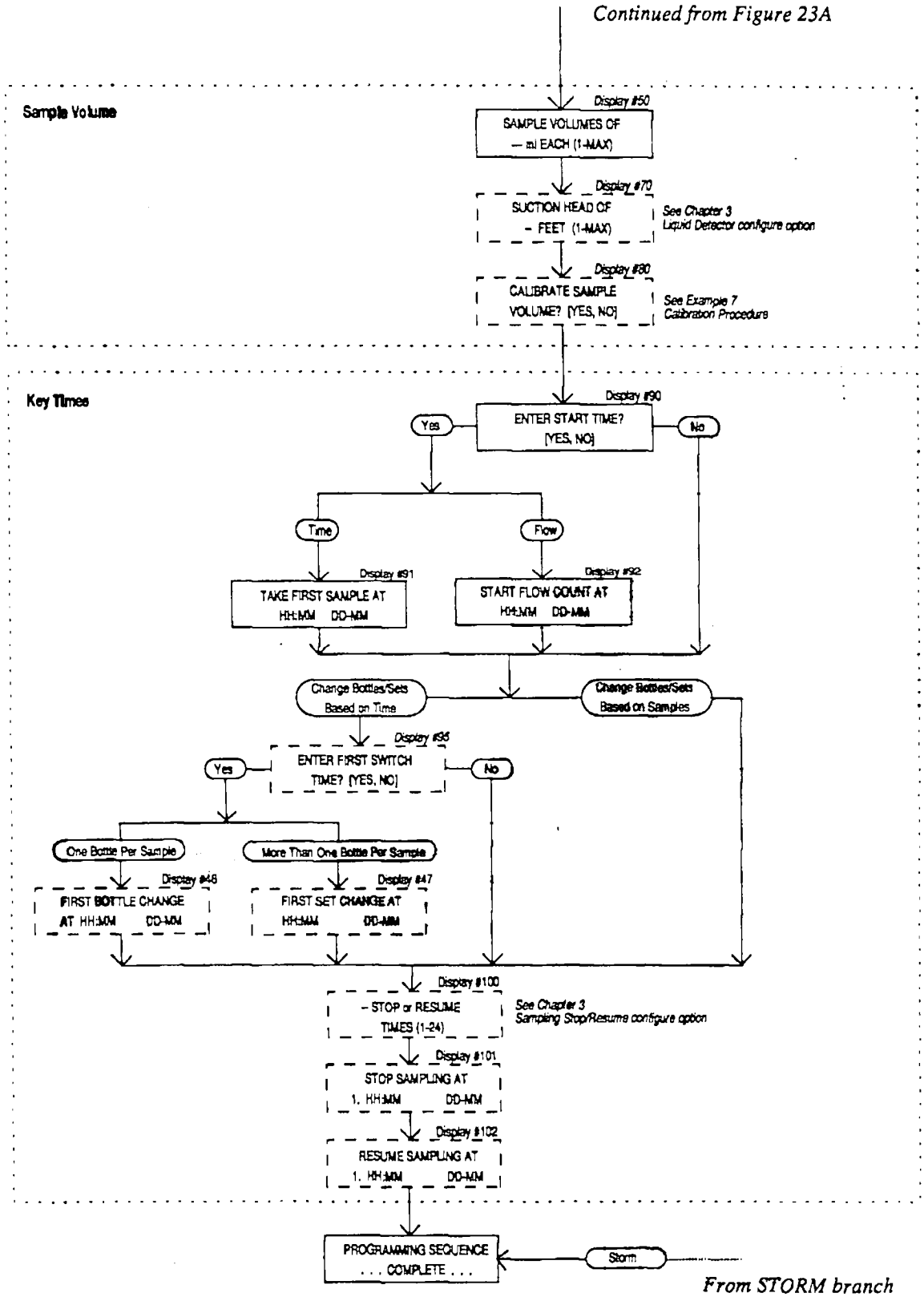


Figure 23C Extended Programming Mode: STORM Programming

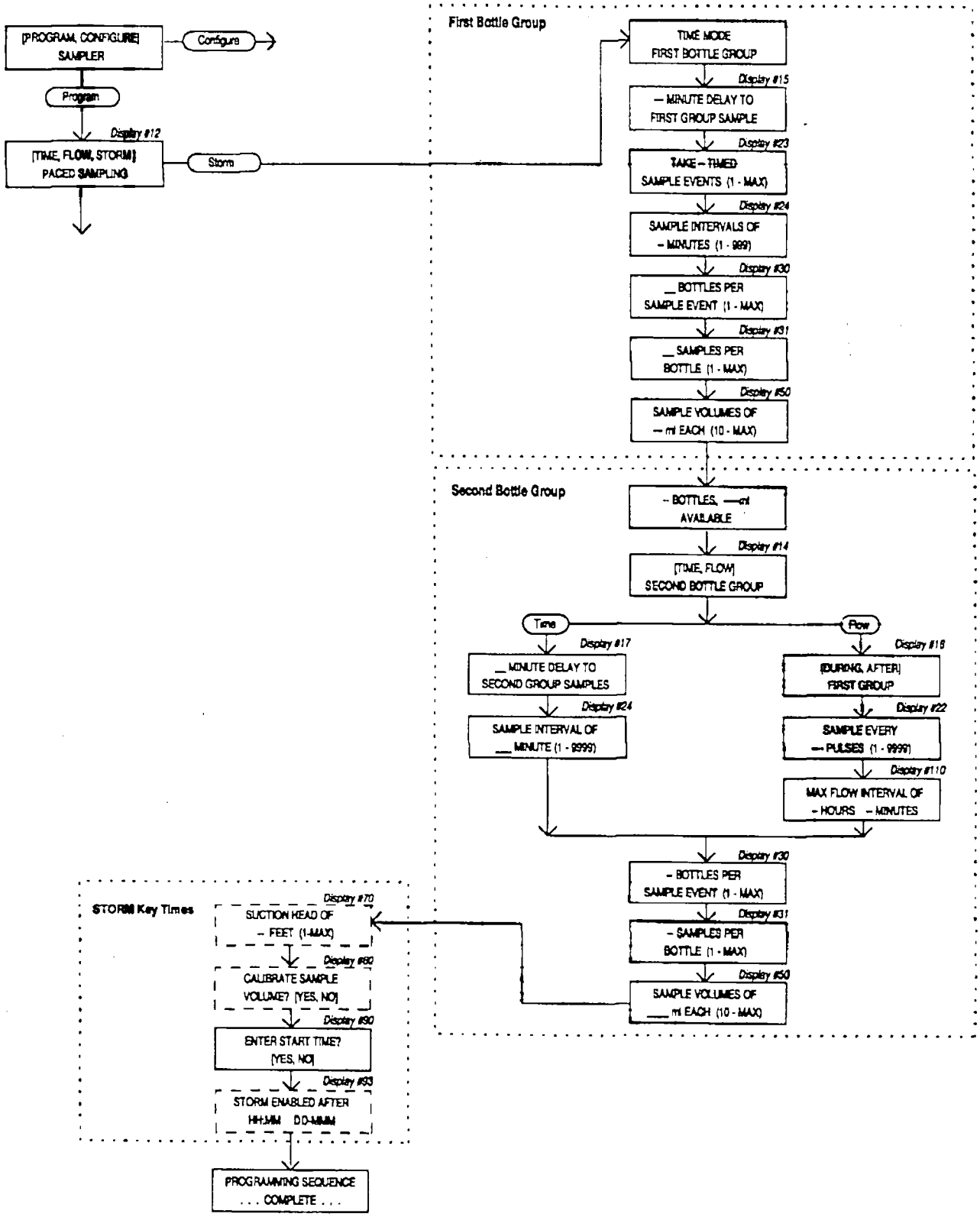
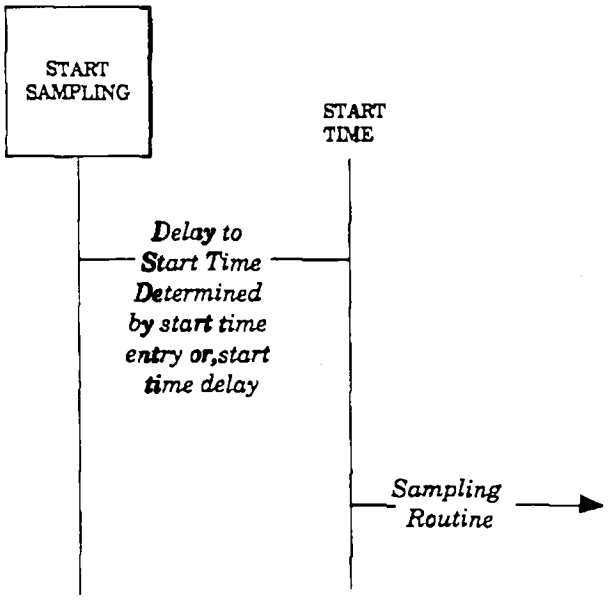


Figure 24 Simplified Start Time Diagram



Isco 3200 and 4200 Series Flow Meters and 4100 Series Flow Loggers provide two essential functions for certain sampling applications. They send flow-pacing signals — flow pulses — to the sampler for flow-paced sampling. The second function provides disable (inhibit) or enable signals to the sampler. A sampler receiving a disable signal will suspend the sampling routine until it receives an enable signal.

The sampler will disregard a disable signal received from a flow meter during the delay to start time. If the sampler is disabled when the start time occurs, it will suspend the routine until it is enabled. Once enabled, the sampler will begin the time or flow intervals. The sampler will initiate a sample event when enabled for all time-paced routines. For flow-paced routines, it will initiate a sample event when the sampler is configured to take a sample upon enable in the Enable Pin configure option (see *Enable Pin*, on page 51).

If the sampler is enabled when the start time occurs, it will begin the routine. The sampler will initiate a sample event at the start time for all time-paced routines. It will initiate a sample event at the start time for flow-paced routines when configured for sample at start time in the Flow Mode configure option (see *Flow Mode Sampling*, on page 50). Refer to **Figure 25, on page 63**. The diagram shows the sampler's response when enabled or disabled at the start time for most basic and extended mode routines.

Nonuniform Clock Times and Disable Signals

Figure 26, on page 64 diagrams the sequence of events preceding a routine programmed for nonuniform clock times. Nonuniform clock time programming allows you to enter a specific time and date for each sample event. Samplers programmed with nonuniform clock times may skip a number of samples if disabled for long periods. If the sampler is disabled and subsequently enabled, it will initiate only one event to compensate for the skipped sample events even if several sample event times have been passed.

Note: Nonuniform clock time programming is designed to replace flow-pacing when a flow meter is not available at the site. Before using a sampler programmed for nonuniform clock times with a flow meter, be sure flow-pacing is not a more appropriate application.

Manual Sample Key and Programmed Start Times

The sampler will disregard the manual sample key during the delay to start time and during the disable period. The periods where the sampler disregards disable signals (Delay to Start) and the manual sample key (when disabled) appear in **Figure 25,** on page 63 and **Figure 26,** on page 64.

Start Time Delay

Entries made in the Start Time Delay configure option affect the start times. The sampler's response varies according to specific entries: "0," "1," and entries greater than 1. *Start Time Delay,* on page 51 discusses the Start Time Delay configure option.

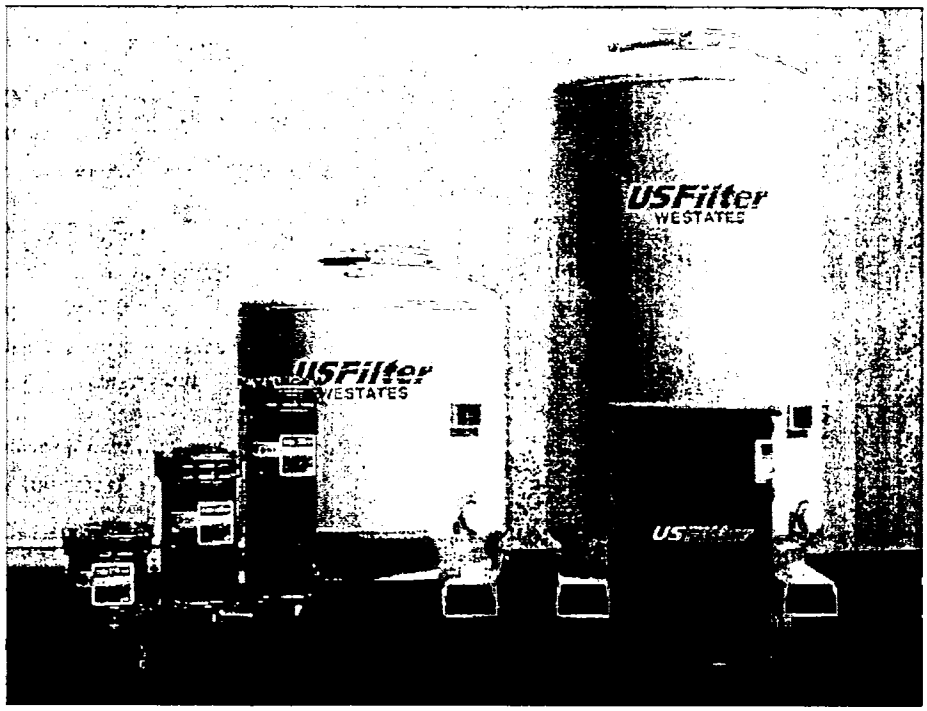
USFILTER WESTATES CARBON ASC-SERIES LOW PRESSURE LIQUID PHASE ADSORBERS

Benefits and Design Features

- *Rugged carbon steel construction; internally/externally welded seams*
- *SSPC-SP5 surface preparation, fusion bonded epoxy internal lining; rust preventative/urethane exterior coat. (ASC-1000/2000)*
- *Approved for the transport of hazardous spent carbon*
- *ASC-1000/2000 can be easily moved with a forklift*
- *Adapters are available to reduce the inlet/outlet to 1" FNPT (ASC-2000) and 2" FNPT (ASC-1000/2000)*
- *Cartridge and bag prefilters available*
- *ASC-1000/2000's available for rental or purchase*

Piping Manifold (Optional)

- *2"/3" sch 80 PVC piping and valves (optional carbon steel and stainless steel piping)*
- *Series or parallel operation.*
- *Clean utility water connection for manual backflush.*
- *Sampling ports and pressure gauges*
- *Flexible hoses with Kamlock fittings allow easy installation and removal during service exchange operations.*



ASC-Series Adsorbers are designed to provide uniform water flow for consistent treatment and to ensure efficient carbon usage. The ASC-Series Adsorbers can be cost effectively used in applications including:

- Groundwater remediation
- Wastewater filtration
- Pilot testing
- Leachate treatment
- Dechlorination
- Spill cleanup

Installation, Start Up and Operation

The ASC-Series Adsorbers are shipped filled with dry activated carbon that must be properly wetted and deaerated prior to use.

Your USFilter sales representative can assist with details on installation, preferred operating conditions and carbon usage calculations using our extensive isotherm database.

At the time of purchase or rental of the ASC-Series Adsorbers, arrangements should be made for the reactivation of the spent carbon. USFilter Westates will provide instructions and assistance to obtain acceptance of RCRA or non-RCRA spent carbon for reactivation.

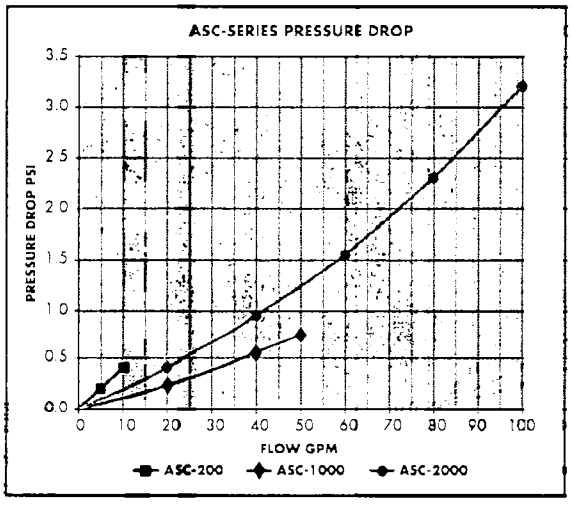
ASC-Series Adsorbers must be drained and the inlet/outlet plugged prior to shipment. Spent carbon cannot be received until the acceptance process has been completed.

USFilter

ASC-SERIES LOW PRESSURE LIQUID PHASE ADSORBERS

SPECIFICATIONS			
	ASC-200	**ASC-1000**	**ASC-2000**
Dimensions, diameter x overall height	22" x 34"	48" x 56"	48" x 96"
Vessel Construction	Carbon Steel	Carbon Steel	Carbon Steel
Inlet/Outlet Connection	2" FNPT/2"MNPT	4" FNPT	4" FNPT
Manway	Top	18"	16"
Internal Piping	PVC	PVC	PVC
Interior Coating	Epoxy	Fusion Bonded Epoxy	Fusion Bonded Epoxy
Exterior Coating	Enamel	Epoxy/Urethane	Epoxy/Urethane
Carbon Bed Volume (cu.ft.)	6.8	34	68
Cross Section (sq.ft.)	2.6	12.3	12.3
Vessel Weight (lbs.):			
Shipping (carbon)	250	1890	3190
Operating (approx)	500	4280	7250
Flow, gpm (max)	10	50	100
Pressure, psig (max)	3	25	25
Temperature °F. (max)	140°	140°	140°
Pounds of Carbon	200	1000	2000
Contact time @ max flow/min:	5.1	5.1	5.2
Backflush rates (GPM)	15	75	75

For detailed specifications or dimensional information or drawings, contact your local USFilter Westates sales representative.



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APPENDIX B

PROCESS AND INSTRUMENTATION DIAGRAM

SHALLOW GROUNDWATER COLLECTION TRENCH

COLLECTION SUMP (TYP OF 4, LOOPS 111-114) S-1 W/PUMP P-1

COLLECTION SUMP S-2 W/PUMP P-2

COLLECTION SUMP S-3 W/PUMP P-3

COLLECTION SUMP W/PUMP P-4 S-4

RECOVERY WELL (TYP OF 11, LOOPS 100-110) RW-1

RECOVERY WELL RW-2

RECOVERY WELL RW-3

RECOVERY WELL RW-4

RECOVERY WELL RW-5

RECOVERY WELL RW-6

RECOVERY WELL RW-7

RECOVERY WELL RW-8

RECOVERY WELL RW-9

RECOVERY WELL RW-10

RECOVERY WELL RW-11

SEE RECOVERY WELL SCHEDULE ON DWG C-11 FOR FLOAT ELEVATIONS

HDPE PIPE

2" GI (HDPE)

2" GI

3" GI

4" GI (HDPE)

4" GI RW-1-7 (HDPE)

2" GI S-1, S-2 & S-3

2" GI (HDPE) & S-4

2" GI RW-8,9 & S-4 (HDPE)

2" GI RW-10,11 (HDPE)

2" (HDPE)

HOA

1/2" AF (PVC)

1/2" AF RETURN

2" GI RW-8,9 (PVC)

ACID DRUM TRANSFER PUMP

CALIBRATION CHAMBER

STRAINER

55 GAL. ACID DRUM

ACID STORAGE TANK ST-1

ACID STORAGE CONTAINMENT ST-1

ACID FEED PUMP CP-1

ACID FEED PUMP CP-2

2" GI RW-10,11 (PVC)

4" GI RW-1-7 (PVC)

FROM FT-127

TO SAMPLER

1/2" FLEXIBLE HOSE

1/2" CR RETURN

1/2" CR SUCTION

55 GAL. CAUSTIC DRUM

CAUSTIC STORAGE CONTAINMENT ST-4

CAUSTIC FEED PUMP CP-3

1/2" CR (PVC)

1/2" CF (PVC)

TO FY-128

3" VENT THRU WALL

2" GI RW-8,9 (HDPE)

2" GI S-1, S-2 & S-3

2" GI RW-10,11 (PVC)

4" GI RW-1-7 (PVC)

MIXER MX-1

MIXER MX-2

1" ST

3" AP (CPVC)

FROM BUILDING SUMP

ACIDIFICATION TANK T-1

3" OVERFLOW TO BUILDING SUMP

2" TD

HDPE / PVC

2" LNAPL EFFLUENT PORT

LNAPL RESERVOIR

OIL/WATER SEPARATOR OWS-1

BUILT-IN DECANTING CHAMBER

WATER DECANT VALVE

730 GAL LNAPL STORAGE TANK ST-3

1/2" SAMPLE TAP

2" LD

3" OWP (PVC)

SIGHT GLASS

MH-1 TO RW-8, 9 & S-1 THRU 4

DRAIN TO STORAGE CONTAINER

EQUALIZATION TANK T-2

BLIND FLANGE

WEIR

TO SANITARY SEWER

6" OVERFLOW TO SANITARY SEWER

3" TD

DRAIN TO BUILDING SUMP

2" GI BYPASS (PVC)

4" GI BYPASS (PVC)

6" GI BYPASS

FLOW PROPORTIONAL COMPOSITE SAMPLER

(NOTE 1)

(NOTE 2)

(NOTE 3)

LEL

MALF

pH

1" ST (CPVC)

TO TANK T-1

DRY CONNECT QUICK CONNECT

BUILDING SUMP P-5

1 1/2"ø VENT

ROTOMETER

5 MICRON PRETILTER

CARBON CANISTER CC-1

CARBON CANISTER CC-2

5 MICRON POST FILTER

DRAIN

PUMP STATION PST-1

GROUNDWATER TREATMENT BUILDING OUTLINE

NOTES:

1. BUILDING SUMP HIGH LEVEL, HIGH OR LOW EQUALIZATION TANK pH, AND LOW BUILDING TEMPERATURE SHUTS DOWN ALL WELL AND COLLECTION SUMP PUMPS. THIS IS IDENTIFIED AS "SHUNT A".
2. LEL ALARM SHUTS OFF ELECTRICITY TO WELL PUMPS, COLLECTION SUMP PUMPS, AND ALL TREATMENT EQUIPMENT. THIS IS IDENTIFIED AS "SHUNT A" (WELLS AND SUMPS), AND "SHUNT B" (PROCESS EQUIPMENT).

No.	Description	Date	By
0	FINAL ISSUE FOR CONSTRUCTION	07/29/97	EMM
1	ISSUE FOR CONSTRUCTION	07/15/96	SMP
2	ADDED DRIER ADSORBER SYSTEM	08/30/96	EMM
3	RECORD DRAWING		EMM

Job No. 726821
Designed JDZ
Drawn CAS
Checked EMM
Reviewed DJC
Approved SM
Proj. No. 64488
Date 07/29/97

Table Certification

PARSONS ENGINEERING SCIENCE, INC.
BUFFALO, NEW YORK (716) 633-7074

CHERRY FARM/RIVER ROAD PRP GROUP

CHERRY FARM/RIVER ROAD REMEDIAL DESIGN

GROUNDWATER COLLECTION AND TREATMENT SYSTEM P&ID

DRAWING NO. I-2

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Chapter 165
SEWERS

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Sewer Use

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[HISTORY: Adopted by the Town Board of the Town of Tonawanda as indicated in article histories. Amendments noted where applicable.]

GENERAL REFERENCES

Building, plumbing and electrical standards — See Ch. 54.
Excavations — See Ch. 77.
Housing standards — See Ch. 111.
Licensing of plumbers — See Ch. 150.
Solid waste management — See Ch. 181.
Water — See Ch. 212.
Zoning — See Ch. 215.

Part 1
Sewer Use
[Adopted 8-21-2000 by L.L. No. 2-2000[1]]

ARTICLE I
Definitions; Applicability

§ 165-1. Definitions, word usage.

A. Unless the context specifically indicates otherwise, the meanings of terms used in this Part 1 shall be as follows:

ABNORMAL POLLUTANT — Industrial waste, substance or wastewater characteristic in excess of that found in normal sewage, but which is otherwise acceptable into a public sewer under the terms of this Part 1.

ABNORMAL POLLUTANT SURCHARGE — The charge levied against any person for services rendered during treatment of abnormal pollutants or waste. This charge is intended to partially defray the added cost of transporting and treating abnormal pollutants or waste. This charge shall be in addition to the usual monthly charge for sanitary sewerage service.

ABNORMAL SEWAGE — Any industrial waste having a suspended solid or BOD content in excess of that found in normal sewage but which is otherwise acceptable into a public sewer under the terms of this Part 1.

ABNORMAL SEWAGE PERMIT — A permit approved by and received from the Pretreatment Administrator permitting the discharge or deposit of abnormal sewage into a sanitary sewer upon payment of a surcharge.

ABNORMAL SEWAGE SURCHARGE — The charge levied against any person for services rendered during treatment of abnormal sanitary sewage or waste. This charge is intended to partially defray the added cost of transporting and treating abnormal sewage or waste. This charge shall be in addition to the usual monthly charge for sanitary sewerage service.

ACT — The Federal Clean Water Act, as amended.

ADMINISTRATOR — The person or person's authorized deputy, agent or representative in responsible charge of operating and maintaining the pretreatment program.

APPLICANT — That person who makes application for any permit. The applicant may be any owner, new or old, or his agent.

ASTM — American Society for Testing and Materials.

BASELINE MONITORING REPORT — Within 180 days after the effective date of a categorical pretreatment standard, or 180 days after the final administrative decision made upon a category determination submission under 40 CFR 403.6(a)(4), whichever is later,

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[1] Editor's Note: This local law also repealed former Part 1, Sewer Use, adopted 2-13-1984 by L.L. No. 3-1984, as amended.

existing industrial users subject to such categorical pretreatment standards and currently discharging to or scheduled to discharge to a publicly owned treatment works shall be required to submit to the Pretreatment Administrator a report which contains identifying information, a list of permits held by the facility, a description of operations, flow measurement data and measurement of pollutants as required under 40 CFR 403.12(b).

BOD (denoting "biochemical oxygen demand") — The quantity of oxygen utilized in the biochemical oxidation of organic matter under standard laboratory procedure in five days at 20° C., expressed in milligrams per liter.

BOD STRENGTH INDEX — The measure of the biochemical oxygen demand content of sewage in parts per million (milligrams per liter).

BUILDING DRAIN — That part of the lowest horizontal piping of a drainage system which receives the discharge from soil, waste and other drainage pipes inside the wall of the building and conveys it to the building sewer, beginning five feet (1.5 meters) outside the inner face of the building wall.

BUILDING SEWER — The extension from the building drain to the public sewer or other place of disposal.

CFR — Code of Federal Regulations.

COMBINED SEWER — A sewer receiving both surface runoff and sewage.

CONTROL AUTHORITY — The Town of Tonawanda Town Board.

COOLING WATER — The water discharge from any system of condensation, such as air conditioning, cooling or refrigeration. It should contain no polluting substances which would produce COD or suspended solids in excess of five milligrams per liter, or toxic substances as limited elsewhere in this Part 1.

DEC — The New York State Department of Environmental Conservation (or NYSDEC).

DILUTION OF DISCHARGE — The intentional or unintentional mixing of unpolluted water or wastes with polluted process wastewaters such that it creates a lowering of pollutant concentrations in the polluted wastewaters.

ENGINEER:

(1) CITY ENGINEER — The City Engineer of the City of Tonawanda or his authorized deputy, agent or representative.

(2) VILLAGE ENGINEER — The Village Engineer of the Village of Kenmore or his authorized deputy, agent or representative.

(3) CONSULTING ENGINEER — An individual engineer or firm of professional engineer(s), licensed to practice in New York State, and who has specifically been designated by the town to perform certain enumerated tasks.

EPA — The United States Environmental Protection Agency (or USEPA).

FEDERAL ACT — The 1972 Federal Water Pollution Control Act Amendment (P.L. 92-500) and the 1977 Clean Water Act (P.L. 95-217) and any amendment thereto; as well

as any guidelines, limitations and standards promulgated by the Environmental Protection Agency pursuant to the Act.

FEDERAL CATEGORICAL PRETREATMENT STANDARD — Any federal regulation which specifies quantities or concentrations which may be discharged to the POTW by existing and new industrial users in specific industrial subcategories, as found in 40 CFR Chapter I, Subchapter N.

GARBAGE — Solid wastes from the domestic and commercial preparations, cooking and dispensing of food, and from the handling, storage and sale of produce.

INDIRECT DISCHARGE — The introduction of pollutants into a POTW from any nondomestic source regulated under Section 307(b) or (d) of the Clean Water Act.

INDUSTRIAL WASTE PERMIT — A permit to deposit or discharge industrial waste into any sanitary sewer in the town.

INDUSTRIAL WASTES — The liquid or liquid-carried solid or gaseous wastes from industrial manufacturing processes, trade or businesses, institutions, utilities, governmental entities or other SIC Index establishments whether classified as polluted water/waste or nonpolluted water/wastes. This classification includes all wastewater except those generated by sanitary facilities such as domestic sinks, water closets, urinals, showers, tubs, etc.

INDUSTRIAL USER — Any person or user generating or producing as a by-product liquid wastes from manufacturing processes, trade, business, institution or other SIC Index operations as distinct from sanitary sewage and which indirectly discharges to the Town of Tonawanda POTW.

INTERCEPTOR SEWER — Any public sewer or appurtenances owned and operated by the Town of Tonawanda.

INTERFERENCE — The inhibition or disruption of the POTW treatment processes or operations or which contributes to a violation of any requirement of Town of Tonawanda SPDES permit. The term includes prevention of sewage sludge reuse, reclamation or disposal by the POTW in accordance with § 405 of the Act (33 U.S.C. § 1345) or any criteria, guidelines or regulations developed pursuant to the Solid Waste Disposal Act (SWDA), the Clean Air Act, the Toxic Substances Control Act or more stringent state criteria applicable to the method of disposal or use employed by the POTW.

LABORATORY DETERMINATION — The measurements, tests and analyses of the characteristics of waters and wastes in accordance with the methods contained in the latest edition at the time of any such measurement, test or analysis, of "Standard Methods for Examination of Water and Sewage," a joint publication of the American Public Health Association, the American Waterworks Association and the Water Pollution Control Federation or in accordance with any other method prescribed by the USEPA or by any other method specifically approved by the Pretreatment Administrator.

NATIONAL PRETREATMENT STANDARDS — Standards prohibiting certain industrial discharges as referenced in 40 CFR Part 403.5 as well as Federal Categorical pretreatment standards.

NATURAL OUTLET — Any outlet into a watercourse, pond, ditch, lake or other body of surface or ground water.

NEW OWNER — That individual or entity who purchased property within the service area of the Town of Tonawanda after the effective date of this Part 1.

NEW SOURCE — Any building, structure, facility or installation from which there is or may be a discharge of pollutants, the construction of which commenced after the publication of pretreatment standards under Section 307(c) of the Clean Water Act which will be applicable to such source, provided that the building, structure, facility or installation is constructed at a site at which no other source is located; or the building, structure, facility or installation totally replaces the process or production equipment that causes the discharge of pollutants at an existing source; or the production or wastewater-generating processes of the building, structure, facility or installation are substantially independent of an existing source at the same site.

NEW USER — A discharger to the POTW who commences discharge after the effective date of Part 1.

NORMAL SEWAGE — Sewage which, when analyzed, shows by weight a daily average of not more than 2,500 pounds per million gallons (250 parts per million) of suspended solids and not more than 2,500 pounds per million gallons (250 parts per million) of BOD, and which is otherwise acceptable into a public sewer under the terms of this Part 1.

OBJECTIONABLE WASTE — Any wastes that can harm either the sewers, sewer treatment process or equipment, have an adverse effect on the receiving stream, or can otherwise endanger life, limb, public property or constitute a nuisance.

OWNER or OWNERS — The owner or owners of record of the freehold of the premises or lesser estate therein, a mortgagee or vendee in possession, assignee of rents, receiver, executor, trustee, lessee or other person, firm or corporation in control of a building.

P (denoting "phosphate") — The total phosphate determined under standard laboratory procedures, expressed in milligrams per liter.

PASS-THROUGH — A discharge which exits the POTW into waters of the United States in quantities or concentrations which, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any requirement of this POTW's SPDES permit (including an increase in the magnitude or duration of a violation).

PERSON — Any individual, firm, company, association, society, corporation, including municipal corporation, or group.

pH — The reciprocal of the logarithm of the weight of hydrogen ions in grams per liter of solution.

PLUMBING INSPECTOR — The person authorized by the town to inspect and approve plumbing connections within the town's jurisdiction.

POLLUTANTS — Defined now or hereafter by appropriate local, state or federal authorities or by the Pretreatment Administrator, substances which may be present in wastewater, whether gaseous, liquid or solid, the amount which may contain soluble or insoluble solids of organic or inorganic nature which may deplete the dissolved oxygen

content of natural waters, contribute solids, contain oil, grease or floating solids which may cause unsightly appearance on the surface of such waters or contain materials detrimental to aquatic life. "Pollutants" shall also mean any substance or wastewater characteristic present in polluted water or waste.

POLLUTED WATER OR WASTE — Any water or liquid waste containing any of the following: phenols or other substances to an extent imparting taste and odor in receiving waters; toxic or poisonous substances in suspension, colloidal state or solution; noxious odorous gases; more than 10,000 parts per million by weight of dissolved solids, of which more than 2,500 parts per million are chloride; more than 10 parts per million each of suspended solids and/or BOD; color exceeding 50 parts per million; a pH value of less than 5.0 or more than 9.5; and/or water or waste not approved for discharge into a stream or waterway by the appropriate state or federal authority.

POTW — Publicly owned treatment works.

PRESSURE SEWERS — Any pipe or conduit for carrying sewage under pressure and without intermediate openings to the atmosphere.

PRETREATMENT — The reduction of the amount of pollutants, the elimination of pollutants, or the alteration of the nature of the pollutant properties in wastewater to a less harmful state prior to or in lieu of discharging or otherwise introducing such pollutants into a publicly owned treatment works. The reduction or alteration can be obtained by physical, chemical or biological processes, process changes or by other means, except as prohibited by 40 CFR 403.6, General Pretreatment Regulations for Existing and New Sources of Pollution.

PRETREATMENT ADMINISTRATOR — The Pretreatment Administrator of the Town of Tonawanda or his authorized deputy, agent or representative.

PRETREATMENT REQUIREMENTS — Any substantive or procedural requirement related to pretreatment, other than a national pretreatment standard, imposed on an industrial user.

PROPERLY SHREDDED GARBAGE — The wastes from the preparation, cooking and dispensing of foods that have been shredded to such a degree that all particles will be carried freely under the flow conditions normally prevailing in public sewers, with no particle greater than ½ inch (1.27 centimeters) in any dimension.

PUBLICLY OWNED TREATMENT WORKS (POTW) — A treatment works as defined by Section 212 of the Act (33 U.S.C. § 1292); includes any sewers that convey wastewater to the POTW but does not include pipes, sewers or other conveyances not connected to a facility providing treatment.

PUBLIC SEWER — A sewer in which all owners of abutting properties have equal rights and is controlled by public authority.

RULES AND REGULATIONS — Any additional rules and regulations adopted by the Town of Tonawanda Town Board.

SANITARY SEWER — A sewer which carries sewage and to which storm-, surface and ground waters are not intentionally admitted.

SANITARY WASTES — Those wastes generated by normal sanitation facilities, including sinks, urinals, water closets, showers, bathtubs, dishwashers, clothes washers and similar fixtures and appliances.

SEWAGE — A combination of the water-carried wastes from residences, business buildings, institutions and industrial establishments, together with such ground- , surface and storm waters as may be present.

SEWAGE TREATMENT PLANT — Any arrangement of devices and structures used for treating sewage.

SEWAGE WORKS — All facilities for collecting, pumping, treating and disposing of sewage.

SEWER — A pipe or conduit for carrying sewage.

SEWER DISTRICT — The Town of Tonawanda Consolidated Sanitary Sewer District.

SEWER INSPECTOR — Any person, agent or representative of the United States Environmental Protection Agency, New York State Department of Environmental Conservation or Town of Tonawanda Pretreatment Administrator who has the proper authority to approve, inspect, observe, sample or test building sewers or appurtenances in the sewer system.

SIGNIFICANT INDUSTRIAL USER (SIC):

(1) All industrial users subject to categorical pretreatment standards under 40 CFR 403.6 and 40 CFR Chapter I, Subchapter N; and

(2) Any other industrial user that discharges an average of 25,000 gallons per day or more of process wastewater to the POTW (excluding sanitary, noncontact cooling and boiler blowdown wastewater); contributes a process wastestream which makes up 5% or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant; or is designated as such by the Pretreatment Administrator as defined in 40 CFR § 403.12(a) on the basis that the industrial user has a reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement [in accordance with 40 CFR § 403.8(f)(6)].

SIGNIFICANT NONCOMPLIANCE — An industrial user is in significant noncompliance if its violation meets one or more of the following criteria:

(1) Chronic violations of "wastewater discharge limits," defined here as those in which 66% or more of all of the measurements taken during a six-month period exceed (by any magnitude) the daily maximum limit or the average limit for the same pollutant parameter.

(2) "Technical review criteria" (TRC) violations, defined here as those in which 33% or more of all of the measurements for each pollutant parameter taken during a six-month period equal or exceed the product of the daily maximum limit or the average limit multiplied by the applicable TRC (TRC=1.4 for BOD, TSS, fats, oil and grease, and 1.2 for all other pollutants except pH).

(3) Any other violation of a pretreatment effluent limit (daily maximum or longer-term average) that the Pretreatment Administrator determines has caused, alone or in combination with other discharges, interference or pass-through (including endangering the health of POTW personnel or the general public).

(4) Any discharge of a pollutant that has caused imminent endangerment to human health, welfare or to the environment or has resulted in the POTW's exercise of its emergency authority under paragraph (f)(1)(vi)(B) of 40 CFR 403.8 to halt or prevent such a discharge.

(5) Failure to meet, within 90 days after the schedule date, a compliance schedule milestone contained in a local control mechanism or enforcement order for starting construction, completing construction or attaining final compliance.

(6) Failure to provide, within 30 days after the due date, required reports such as baseline monitoring reports, ninety-day compliance reports, periodic self-monitoring reports and reports on compliance with compliance schedules.

(7) Failure to accurately report noncompliance.

(8) Any other violation or group of violations which the Pretreatment Administrator determines will adversely affect the operation or implementation of the local pretreatment program.

SLUG — Any discharge of water, sewage or industrial waste which in concentration of any given constituent or in quantity of flow exceeds for any period of duration longer than 15 minutes more than five times the average twenty-four-hour concentration or flows during normal operation.

SPDES PERMIT — State Pollutant Discharge Elimination System Permit issued by the New York State Department of Environmental Conservation (NYSDEC) pursuant to Titles 7 and 8 of Article 17 of the Environmental Conservation Law, Part 1.

SS STRENGTH INDEX — The measure of the suspended solids content of sewage in parts per million (milligrams per liter).

STANDARD METHODS — Standard Methods of the Examination of Water and Wastewater prepared and published jointly by the American Public Health Association, American Waterworks Association and the Water Environment Federation, latest edition.

STORM DRAIN (sometimes termed "STORM SEWER") — A sewer which carries storm- and surface waters and drainage, but excludes sewage and industrial wastes, other than unpolluted cooling water.

STRENGTH INDEX — Both the biochemical oxygen demand index and the suspended solids strength index.

SUSPENDED SOLIDS (SS) — Solids that either float on the surface of or are in suspension in water, sewage or other liquids, and which are removable by laboratory filtering.

SYSTEM — The trunk sewers, interceptors, pumping stations, pressure lines, grinder pump stations, treatment plant, outfall conduits and so forth, designed to collect, transmit,

treat and dispose of estimated flows and loadings of participants and other users of the system.

TOTAL EXTRACTABLE HYDROCARBONS — The measure of the amount of total oil and grease which is of hydrocarbon petroleum origin.

TOTAL OIL AND GREASE — The total amount of oil and grease material present in a waste sample, including materials of both vegetable and mineral origin.

TOXIC SUBSTANCES — Any substance, whether gaseous, liquid or solid, which, when discharged to the sewer system in sufficient amount, may tend to interfere with any sewage treatment process, constitute a hazard to recreation in the receiving waters of the effluent from the sewage treatment plant, pose a hazard to sewer maintenance personnel or constitute a hazard to fish or animal life or inhibit aquatic life.

TREATMENT WORKS — Any devices or systems used in the storage, treatment, recycling and reclamation of municipal sewage or industrial wastes of liquid nature. This includes intercepting sewers, outfall sewers, sewage collection systems, pumping, power and other equipment and their appurtenances; extensions, improvement, remodeling, additions and alterations thereof; elements essential to provide a reliable recycled supply, such as standby treatment units and clear well facilities; and any works, including site acquisition of the land that will be an integral part of the treatment process or is one for ultimate disposal or residues resulting from such treatment; or any other method or system for preventing, abating, reducing, storing, treating, separating or disposing of municipal wastes, including stormwater runoff, or industrial waste, including waste in combined stormwater and sanitary sewer systems.

UNPOLLUTED WATER OR WASTE — Any water or liquid waste containing none of the following: phenols or other substances to an extent imparting taste and odor in receiving waters; toxic or poisonous substances in suspension, colloidal state or solution; noxious or odorous gases; not more than 10,000 parts per million, by weight, of dissolved solids, of which not more than 2,500 parts per million are chloride; not more than 10 parts per million each of suspended solids and BOD; color not exceeding 50 parts per million; a pH value of less than 5.0 nor higher than 9.5; and/or any water or waste approved for discharge into a stream or waterway by the appropriate state or federal authority.

WATERCOURSE — A channel in which a flow of water occurs, either continuously or intermittently.

B. "Shall" is mandatory; "may" is permissive.

§ 165-2. Applicability.

This Part 1 shall affect only that area of the Town of Tonawanda, exclusive of the Village of Kenmore, where sanitary sewer and/or drainage (storm sewer) districts have been created.

ARTICLE II
Use of Public Sewers Required

§ 165-3. Deposit of objectionable waste on public or private property.

It shall be unlawful for any person to place, deposit or cause to be deposited in any unsanitary manner on public or private property within the Town of Tonawanda, wherein a sanitary sewer district or drainage district has been created, any human excrement, garbage or other objectionable waste.

§ 165-4. Discharge of sewage or polluted waters to natural outlets.

It shall be unlawful to discharge to any natural outlet within the Town of Tonawanda, located within an area included in a sanitary sewer district or drainage district, any sewage or other polluted waters, except where suitable treatment has been provided in accordance with subsequent provisions of this Part 1 and except where a federal national pollutant discharge elimination system (NPDES) permit has been duly issued and is currently valid for such discharge. A valid copy of such a permit and any modification thereof must be filed with the Pretreatment Administrator for an exception under this section of this Part 1.

§ 165-5. Construction or maintenance of certain sewage disposal facilities.

Except as hereinafter provided, it shall hereafter be unlawful to construct or maintain any privy, privy unit, septic tank, cesspool or other facility intended or used for the disposal of sewage. If application is made to the Pretreatment Administrator of the Town of Tonawanda for a temporary-type toilet facility, and if said applicant has theretofore obtained the approval of the Erie County Health Department, the Pretreatment Administrator of the Town of Tonawanda may consent to the usage of the same for a temporary period not to exceed 180 days.

§ 165-6. Connection with public sewer required.

The owners of all houses, buildings or properties used for human occupancy, employment, recreation or other purposes, situated within the Town of Tonawanda and abutting on any street, alley or right-of-way, in which there is now located or may in the future be located a public sanitary or combined sewer of the Town of Tonawanda, is hereby required at his expense to install suitable toilet facilities therein and to connect such facilities directly with the proper public sewer in accordance with the provisions of this Part 1 within 90 days after date of official notice to do so, provided that said public sewer is within 100 feet (30.5 meters) of the property line in residential and commercial areas and within 500 feet (152.4 meters) of the property line in industrial areas.

ARTICLE III
Building Sewers and Connections

§ 165-7. Permit required prior to connection.

A. No unauthorized person shall uncover, make any connections with or opening into, use, alter or disturb any public sewer or appurtenances thereof without first obtaining a written permit from the Plumbing Inspector.

B. Where any undertaking involves the discharge of any industrial wastes, including cooling waters or other lightly contaminated waters into the sewer system, an industrial waste permit is also required to be issued by the Pretreatment Administrator. No discharge of any quantity or type of industrial wastes into the sewer system is authorized without the issuance of such permit or formal written communication from the Pretreatment Administrator advising that such a permit will not be required.

§ 165-8. Classes of building sewer permits; applications.

A. There shall be two classes of building sewer permits:

(1) For residential and commercial service; and

(2) For service to establishments producing industrial wastes.

B. For connections from residential buildings, the sewer connection permit will be issued by the Plumbing Inspector.

C. For permits involving wastewater discharges from commercial establishments, the sewer connection permit will be issued by the Plumbing Inspector after consultation with the Pretreatment Administrator.

D. For discharges of wastewater from industrial facilities, a sewer connection permit will be issued by the Plumbing Inspector and any discharge of industrial wastes will be governed by an industrial waste permit, if deemed necessary by the Pretreatment Administrator.

E. Each permit application shall be supplemented by any plans, specifications or other information considered pertinent in the judgment of the permit issuer.

§ 165-9. Responsibility for costs and expenses; indemnification of town; responsibility for maintenance and repairs.

A. All costs and expenses incident to the installation and connection of the building sewer shall be borne by the owner. The owner shall indemnify the Town of Tonawanda from any loss or damage that may, directly or indirectly, be occasioned by the installation of the building sewer.

B. The owner shall be responsible for the maintenance and repairs of the sanitary sewer lateral and apparatus within the confines of any building, dwelling or structure.

C. When sanitary sewer laterals become inoperative due to plugging, breaks, settling, etc., it shall be the owner's responsibility to repair the same up to and including the wye connection at the Town of Tonawanda sanitary sewer main.

§ 165-10. Separate building sewers required; exceptions.

A separate and independent building sewer shall be provided for every building in residential and commercial areas; except that where one building stands at the rear of another on an interior lot and no private sewer is available or can be constructed to the rear building through an adjoining alley, court, yard or driveway, the building sewer from the front building may be extended to the rear building and the whole considered as one building sewer.

§ 165-11. Use of old building sewers.

Old building sewers may be used in connection with new buildings only when they are found, on examination and tested by the Plumbing Inspector, to meet all requirements of this Part 1, including the exclusion of surface stormwater.

§ 165-12. Construction standards.

The size, slope, alignment, materials of construction of a building sewer and the methods to be used in excavating, placing of pipe, jointing, testing and backfilling the trench shall all conform to the requirements of the Building and Plumbing Code[2] or other applicable rules and regulations of the Town of Tonawanda. In the absence of code provisions or in amplification thereof, the materials and procedures set forth in appropriate specifications of the American Society for Testing and Materials and Water Pollution Control Federation Manual of Practice No. 9 shall apply.

§ 165-13. Elevation of building sewer.

Whenever possible, the building sewer shall be brought to the building at an elevation below the basement floor. In all buildings in which any building drain is too low to permit gravity flow to the public sewer, sanitary sewage carried by such building drain shall be lifted by an approved means and discharged to the building sewer or the building drain may be hung on the cellar wall and shall not be less than four inches in size.

§ 165-14. Connections for surface runoff.

No person shall make connection of roof downspouts, exterior foundation drains, areaway drains or other sources of surface runoff or groundwater to a building sewer or building drain, which in turn is connected directly or indirectly to a public sanitary sewer.

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[2] Editor's Note: See Ch. 54, Building, Plumbing and Electrical Standards.

§ 165-15. Connection standards.

The connection of the building sewer into the public sewer shall conform to the requirements of the Building and Plumbing Code[3] or other applicable rules and regulations of the Town of Tonawanda or the procedures set forth in appropriate specifications of the American Society for Testing and Materials and Water Pollution Control Federation Manual of Practice No. 9. All such connections shall be made gastight and watertight. Any deviation from the prescribed procedures and materials must be approved by the Plumbing Inspector before installation.

§ 165-16. Connection and inspection.

The applicant for the building sewer permit shall notify the Plumbing Inspector when the building sewer is ready for inspection and connection to the public sewer. The connection shall be made under the supervision of the Plumbing Inspector.

§ 165-17. Guarding of excavations; restoration of public property.

All excavations for building sewer installation shall be adequately guarded with barricades and lights so as to protect the public from hazard. Streets, sidewalks, parkways and other public property disturbed in the course of the work shall be restored in a manner satisfactory to the Town of Tonawanda.

§ 165-17.1. Costs for equipment, material and installation.

Costs for saddles, taps and other equipment or appliances, including labor, related to town sewer service shall be established by resolution of the Town Board. Said established costs may be from time to time amended, supplemented, changed, modified or repealed by the Town Board by resolution after a public hearing in relation thereto in which parties in interest and citizens shall have an opportunity to be heard; at least 10 days' and not more than 20 days' notice of the time and place of such hearing shall be published in a paper of general circulation in the Town of Tonawanda. A copy of such resolution shall be filed in the office of the Town Clerk of the Town of Tonawanda and shall be incorporated into the Town of Tonawanda Sewer Use Local Law.

ARTICLE IV
Use of Public Sewers

§ 165-18. Discharge of unpolluted waters into sewer restricted.

No person shall discharge or cause to be discharged any stormwater, groundwater, roof runoff, subsurface drainage or drainage from downspouts, yard drains, sump pumps, yard foundations and ponds or lawn sprays into any sanitary sewer, except as provided by the Town of Tonawanda Code. Water from swimming pools and unpolluted industrial water, such as water drains, blowoff pipes or cooling water from various equipment, shall not be discharged into

[3] Editor's Note: See Ch. 54, Building, Plumbing and Electrical Standards.

B. Discharges of any unpolluted industrial wastewaters, including cooling waters, etc., to a storm sewer or natural watercourse shall be approved by the Pretreatment Administrator only after the applicant obtains a SPDES permit from the NYSDEC authorizing such discharge.

§ 165-20. Prohibited discharge.

No person shall discharge or cause to be discharged any of the following described waters or wastes to any public sewer:

A. Any pollutants such as gasoline, benzene, naphtha, fuel oil or other flammable or explosive liquid, solid or gas or any pollutant which creates a fire or explosion hazard in the POTW, including, but not limited to, waste streams with a closed-cup flashpoint of less than 140° F. or 60° C. using the test methods specified in 40 CFR 261.21.

B. Any waters or wastes containing solids, liquids or gases which, by reason of their nature or quantity, are or may, singly or by interaction with other wastes, cause injury or interfere with any sewage treatment process, constitute a hazard to humans or animals, create a public nuisance or create any hazard in the receiving waters of the sewage treatment plant; any wastewater containing toxic pollutants in sufficient quantity, either singly or by interaction with other pollutants, to injure or interfere with any wastewater treatment process, constitute a hazard to humans, animals, create a toxic effect in the receiving waters of the treatment works or to exceed the limitations set forth in a categorical pretreatment standard. A "toxic pollutant" shall include, but not be limited to, any pollutant identified pursuant to Section 307 (a) of the Federal Act.

C. Any waters or wastes having a pH lower than 5.0 or in excess of 9.5 or having any other corrosive property capable of causing damage or hazard to structures, equipment and personnel of the sewage works.

D. Solid or viscous substances in quantities or of such size capable of causing obstruction to the flow in sewers or other interference with the proper operation of the sewage works, such as but not limited to ashes, cinders, sand, mud, straw, shavings, metal, glass, rags, feather, tar, plastics, wood, unground garbage, whole blood, paunch manure, hair and fleshings, entrails and paper dishes, cups, milk containers, etc., either whole or ground by garbage grinders.

E. Any noxious or malodorous substances which can form a gas which, either singly or by interaction with other wastes, is capable of causing objectionable odors or hazards to life or form solids in concentration exceeding limits established in this Part 1 or creates any other condition deleterious to structures or treatment processes or requires unusual provisions, attentions or expenses to handle such material.

F. Any water or wastes containing iron, chromium, copper, zinc, other heavy metals and similar objectionable or toxic substances or wastes exerting an excessive chlorine requirement at point source discharge in excess of the concentrations prescribed herein or other substances that exceed the limits established by the Pretreatment Administrator for such materials. The following maximum daily allowable limits shall be based on a composite sample taken over a period of active production. Total metals run on a sample

shall be acidified to a pH of two without prior filtration. These limits require approval by USEPA, and any subsequent revision requires similar approval.

Parameter	Limit (milligrams per liter)
Arsenic	0.5
Cadmium	0.2
Chromium (total)	5.2
Chromium (hexavalent)	1.5
Copper	2.6
Lead	0.5
Mercury	0.001
Nickel	5.0
Silver	1.3
Zinc	4.4
Cyanide	1.1

G. Any waters or wastes containing strong-acid iron-pickling wastes or concentrated plating solutions, whether neutralized or not.

H. Any substance which may cause the treatment works' effluent or any other product of the treatment works, such as residues, sludges or scums, to be unsuitable for reclamation and reuse to interfere with the reclamation process where the treatment works is pursuing a reuse and reclamation program. In no case shall a substance discharged to the treatment works cause the treatment works to be in noncompliance with sludge use or disposal criteria, guidelines or regulations developed under Section 405 of the Federal Act and criteria, guidelines or regulations affecting sludge use or disposal developed pursuant to the Solid Waste Disposal Act, the Clean Air Act, the Toxic Substances Control Act or Department of Environmental Conservation criteria applicable to the sludge management method being used.

I. Any pollutants, including chlorine-demanding or oxygen-demanding pollutants (BOD, chlorine demand etc.), released at a flow rate and/or pollutant concentration which a user knows or has reason to know will cause interference or pass-through at the Town of Tonawanda POTW. In no case shall a slug load have a flow rate or contain concentration or qualities of pollutants that exceed for any time period longer than 15 minutes more than five times the average twenty-four-hour concentration, quantities or flow during normal operation.

J. Any wastewaters containing radioactive wastes or isotopes of such half-life or concentration as may exceed limits established by the Pretreatment Administrator in compliance with applicable state or federal regulations.

K. Any wastewater having a temperature which will inhibit biological activity in the treatment works, resulting in interference, but in no case wastewater with a temperature at the introduction into the sewer system which exceeds 150° F. (65.5° C.) unless the treatment works is designed to accommodate such temperature or in such quantities that the temperature at the treatment works influent exceeds 104° F. (40° C.).

L. Any discharges of petroleum, oil, nonbiodegradable cutting oil or products of mineral oil origin that will cause interference or pass-through.

M. Waters or wastes containing substances which are not amenable to treatment or reduction by the sewage treatment processes employed or are amenable to treatment only to such degree that the sewage treatment plant effluent cannot meet the requirements of other agencies having jurisdiction over discharge to receiving waters.

N. Any trucked or hauled pollutants, except at discharge points designated by the POTW.

§ 165-21. Restricted discharges.

No person shall discharge or cause to be discharged the following described substances, materials, waters or wastes if it appears likely, in the opinion of the Pretreatment Administrator, that such wastes, in addition to similar wastes from other dischargers, can harm either the sewers, sewer treatment process or equipment, have an adverse effect on the receiving stream or can otherwise endanger life, limb or public property or constitute a nuisance. In forming his opinion as to the acceptability of these wastes, the Pretreatment Administrator will give consideration to such factors as the quantities of subject wastes, including similar wastes from other users, in relation to flows and velocities in the sewers, construction materials of the sewers, nature of the sewage treatment process, capacity of the sewage treatment plant, degree of treatability of wastes in the sewage treatment plant and other pertinent factors. The restricted substances are:

A. Any commercial, institutional or industrial wastes containing total oils and greases, whether floatable or emulsified, in a concentration exceeding 300 milligrams per liter (mg/l) or total extractable hydrocarbons, whether floatable or emulsified, in excess of 100 mg/l at any time as measured by the analysis of a single grab sample.

B. Any garbage that has not been properly shredded. The installation and operation of any garbage grinder equipped with a motor of ¾ horsepower (0.76 horsepower metric) or greater shall be subject to the review and approval of the Pretreatment Administrator.

C. Any waters or wastes containing phenols or other taste- or odor-producing substances in such concentrations exceeding limits, which may be established by the Pretreatment Administrator as necessary, after treatment of the composite sewage, to meet the requirements of the state, federal or other public agencies of jurisdiction for such discharge to the receiving waters.

D. Materials which exert or cause:

(1) Unusual concentrations of inert suspended solids, such as but not limited to fuller's earth, lime slurries and lime residues, or of dissolved solids, such as but not limited to sodium chloride and sodium sulfate.

(2) Excessive discoloration, such as but not limited to dye wastes and vegetable tanning solutions, where, in the opinion of the Pretreatment Administrator, such discoloration would not be removed in the treatment process.

(3) Unusual BOD, chemical oxygen demand or chlorine requirements in such quantities as to constitute a significant load on the sewage treatment works.

(4) Unusual volume of flow or concentration of wastes constituting slugs as defined herein.

E. Any water or waste that contains more than 10 parts per million of the following gases: hydrogen sulfide, sulphur dioxide or nitrous oxide.

F. Drains receiving acid waste shall be constructed of any acid-resisting material. Such drains located outside of a building shall be constructed of vitrified clay or earthenware pipe or other approved acid-resisting material. Joints shall be constructed by caulking with asbestos-rope wicking and by pouring a heated sulphur and carbon compound or a heated bituminous compound in such manner as to secure tight joints. In no case shall corrosive waste be discharged into a drain, sanitary sewer, storm sewer or soil or waste pipe without being first neutralized in such manner as to render such wastes noncorrosive. These wastes shall be treated by passing through a properly trapped neutralizing catch basin which shall function automatically.

G. Any water or waste containing hair, fine filament growth, pile, nap or similar substances that will form a thick, dense mass or mat.

H. Cooling water shall not be discharged into any public sewer, except in accordance with the provisions of § 165-18 and 165-19 hereof.

§ 165-22. Alternatives for handling of restricted discharges.

A. If any waters or wastes are discharged or are proposed to be discharged to the public sewers, which waters contain the substances or possess the characteristics enumerated in § 165-21 hereof, and which, in the judgment of the Pretreatment Administrator, may have a deleterious effect upon the sewage works, processes, equipment or receiving waters or which otherwise create a hazard to life or constitute a public nuisance, the Pretreatment Administrator may:

(1) Reject the wastes;

(2) Require pretreatment to an acceptable condition for discharge to the public sewers;

(3) Require control over the quantities and rates of discharge; and/or

(4) Require payment to cover the added costs of handling and treating the wastes not covered by existing taxes or sewer charges under the provisions of §§ 165-27 and 165-28 hereof.

B. The admission into the public sewers of any waters or wastes of abnormal strength or containing any quantity of substances having the characteristics described in § 165-21, or having an average daily flow greater than 2% of the average daily sewage flow of the Town of Tonawanda, shall be subject to review and approval of the Town of Tonawanda and the Pretreatment Administrator. When necessary in the opinion of the Town of Tonawanda, the owner shall provide, at the owner's expense, such preliminary treatment as may be necessary to reduce the five-day BOD, suspended solids, phosphate or other objectionable characteristics or constituents to within the maximum limits provided for in § 165-21, or control the quantities and rates of discharge for such waters or wastes. Plans, specifications and other pertinent information relating to proposed preliminary treatment

facilities shall be prepared and submitted by a qualified professional engineer for the approval of the Pretreatment Administrator, and no construction of such facilities shall be commenced until said approvals are obtained in writing. Pretreatment facilities are subject to the requirements of all applicable codes, ordinances and laws.

§ 165-23. Grease, oil and sand interceptors.

Grease, oil and sand interceptors shall be provided when, in the opinion of the Plumbing Inspector and/or Pretreatment Administrator, they are necessary for the proper handling of liquid wastes containing grease in excessive amounts or any flammable wastes, sand or other harmful ingredients, except that such interceptors shall not be required for private living quarters or dwelling units. All interceptors shall be of a type and capacity approved by the Plumbing Inspector or the Pretreatment Administrator and shall be located as to be readily and easily accessible for cleaning and inspection.

§ 165-24. Maintenance of pretreatment or flow-equalizing facilities.

Where preliminary treatment or flow-equalizing facilities are provided for any waters or wastes, they shall be maintained continuously in satisfactory and effective operation by the owner at his expense.

§ 165-25. Special procedures relating to industrial waste.

A. Permits. From and after 90 days after the effective date hereof, it shall be unlawful for any person to deposit or discharge industrial waste into any public sewer in the Town of Tonawanda without having first obtained an industrial waste permit from the Town of Tonawanda and having complied with all of the applicable provisions hereof. Within 90 days after the effective date hereof, any person desiring to deposit or discharge or who is now depositing or discharging industrial waste into any public sewer in the Town of Tonawanda shall make application to the Town Pretreatment Administrator for a permit. All significant industrial users proposing to connect to or contribute to the POTW shall obtain an industrial waste permit before connecting to or contributing to the POTW. All existing significant industrial users connected to or contributing to the POTW shall obtain an industrial waste permit within 180 days after the effective date of this Part 1. It shall be unlawful for any person, any municipality or sewerage collection system located outside the boundaries of the Town of Tonawanda to deposit or discharge industrial waste into any public sewer in the Town of Tonawanda without having first obtained an industrial waste permit from the Town of Tonawanda and having complied with all of the applicable provisions hereof.

(1) Filing of industrial waste permit applications. Industrial users required to obtain an industrial waste permit shall complete and file with the Town Pretreatment Administrator an application in the form presented by the Town Pretreatment Administrator. The applicant may be required to submit the following information:

(a) His name, address and location (if different from the address).

(b) Name and phone number of the person to contact concerning industrial waste.

(c) The average daily and maximum daily wastewater flow rates, including daily, monthly and seasonal variations, if any.

(d) Wastewater constituents and characteristics of the sewage, industrial waste or other waste discharged to the sewer system, including but not limited to those mentioned in §§ 165-20 and 165-21 of this Part 1 as determined by reliable analytical laboratory, sampling and analysis to be performed in accordance with procedures established by the EPA pursuant to Section 304(h) of the Clean Water Act and contained in 40 CFR Part 136, as amended.

(e) The time and duration of discharge.

(f) Site plans, floor plans, mechanical and plumbing plans and details to show all sewers, sewer connections and appurtenances by size, location and elevation.

(g) Description of activities, facilities and plant processes on the premises, including all material processes and the type of materials which are or could be discharged.

(h) Each product produced by type, amount, process or processes and rate of production.

(i) The type and amount of raw materials processed (average and maximum per day).

(j) The number and type of employees and hours of operation of the plant and proposed or actual hours of operation of the pretreatment system.

(k) Daily water consumption and uses.

(l) SIC number according to the Standard Industrial Classification Manual, Bureau of the Budget, 1972, as amended, or its most recent edition.

(m) Where known, the nature and concentration of any pollutants in the discharge which are limited by state or federal pretreatment standards or requirements, and a statement regarding whether or not the pretreatment standards or requirements are being met on a consistent basis and, if not, whether additional Operation and Maintenance (O&M) and/or additional pretreatment is required for the industrial user to meet applicable pretreatment standards or requirements.

(n) If additional pretreatment and/or O&M will be required to meet the pretreatment standards or requirements, the shortest schedule by which the industrial user will provide such additional pretreatment. The completion date in this schedule shall not be later than the compliance date established for the applicable pretreatment standard or requirement.

(o) Any other information as may be deemed by the Pretreatment Administrator to be necessary to evaluate the permit application.

(p) Any known plans by the applicant for the introduction of new wastewater constituents or any substantial change in the volume or character of the wastewater constituents being introduced into the wastewater treatment system.

(2) The Pretreatment Administrator shall review all applications for approval or disapproval. The Pretreatment Administrator, upon approval of such applications, will grant an industrial waste permit only when the evidence submitted by the applicant demonstrates that the waste or wastewater to be deposited by the applicant in the public sewer will comply with all the regulations of this Part 1.

(3) Permit conditions. Industrial waste permits shall be expressly subject to all provisions of the rules and regulations and all other ordinances, regulations, charges and fees established by the Town Board. The conditions of the industrial waste permit shall be uniformly enforced by the Town Pretreatment Administrator in accordance with the rules and regulations and applicable state and federal regulations. The permits may contain the following:

(a) Effluent limitations or other appropriate limitations, when toxic substances are present in the industrial user's wastewater discharge.

(b) Specifications for monitoring programs which may include sampling, locations, frequency and method of sampling, number types and standards for analytical tests and reporting schedule when deemed necessary in the opinion of the Pretreatment Administrator.

(c) Requirements for submission of reports for conditions of noncompliance.

(d) Requirements for submission of technical reports or discharge reports.

(e) Pretreatment requirements when deemed necessary in the opinion of the Pretreatment Administrator.

(f) Requirements for the submission of information concerning the disposal of waste material separated from the authorized discharge.

(g) Requirements for the installation of inspection and sampling manhole when deemed necessary in the opinion of the Pretreatment Administrator.

(h) Schedule of compliance allowing reasonable time to conform to the effluent limitations of these rules and regulations.

(i) Limits on the average and maximum daily wastewater constituents flow rates and time of discharge.

(j) Requirements for maintaining plant records relating to wastewater discharge as specified by the Pretreatment Administrator, and affording the Pretreatment Administrator access thereto, including affording the Pretreatment Administrator the opportunity to inspect and copy industrial effluent data and records.

(k) The computation and requirement for payment of the industrial waste surcharge.

(l) Other conditions as deemed appropriate by the Pretreatment Administrator to ensure compliance with these rules and regulations.

(m) Requirements for the reporting of slug discharges as required by 40 CFR 403.12(f).

(4) Duration of permits. Industrial waste permits shall be issued for a specified period of time, not to exceed three years. A permit may be issued for a period of less than one year or may be stated to expire on a specified date. If the permittee is not notified by the Pretreatment Administrator 30 days prior to the expiration of the permit, the permit shall be extended one additional year. The terms and conditions of the permit may be subject to modification and change by the Pretreatment Administrator during the life of the permit as limitations or requirements as identified in §§ 165-20 through 165-30 are modified or changed. The permittee shall be informed of any proposed changes in his permit at least 30 days prior to the effective date of change. Any changes or new conditions in the permit shall include a reasonable time schedule for compliance.

(5) Transfer of a permit. If there are any changes in the processes, pollutants discharged or mode or location of operations of a permitted facility, the permit shall not be reassigned, transferred or sold to a new owner or a new user. A new permit must be secured.

(6) An industrial discharger shall apply for a permit modification if production or process is changed or the wastewater characteristics or flow is altered.

(7) No statement contained in this section shall be construed as preventing any special agreement or arrangement between the Pretreatment Administrator and any industrial user whereby an industrial waste of unusual strength or character may be accepted by the Pretreatment Administrator subject to payment therefor by the industrial user, except in the case where such agreement would allow a discharge to violate federal categorical standards as promulgated by the USEPA or the national pretreatment standards as defined in 40 CFR 403.5 (a) and (b).

B. Structures required. Within 180 days after the effective date hereof, any person discharging industrial waste into a public sewer in the Town of Tonawanda shall construct a suitable control manhole downstream from any treatment or storage tanks or other approved works utilized by such person for pretreatment, such control manhole to be for the purpose of facilitating observations, measurements and sampling of all waste created and discharged by such person. The control manhole shall be constructed at a location and in a manner approved by the Pretreatment Administrator. The control manhole shall be constructed and installed at the expense of the person discharging the waste, and it shall be maintained at the expense of such person at all times in a safe, acceptable and proper operation condition.

C. Disconnection. If any person depositing or discharging industrial waste into the public sewer fails to secure an industrial waste permit within the time prescribed herein or if any person allows or causes waste of unacceptable quality under the requirements of this section to be discharged into any public sewer in the Town of Tonawanda, the Pretreatment Administrator is authorized, if such person is using Town of Tonawanda water, to disconnect such person's service line from the Town of Tonawanda water system and/or the public sewer system, and the same shall only be reconnected at the owner's expense. If such person does not use Town of Tonawanda water, the Pretreatment Administrator is authorized to disconnect such person's service line from the sewer system, and the same shall only be reconnected at the owner's expense. The Pretreatment Administrator shall notify the occupant or user of the premises where the waste is generated 48 hours before

disconnecting the service line. No sewer connection or water connection disconnected hereunder shall be reconnected until the condition causing the disconnection has been corrected.

D. Dilution. Except where expressly authorized to do so by an applicable pretreatment standard or requirement, no industrial user shall ever increase the use of process water or in any other way attempt to dilute a discharge as a partial or complete substitute for adequate treatment to achieve compliance with a pretreatment standard or requirement. The Pretreatment Administrator (as defined in § 403.12(a)) may impose mass limitations on industrial users which are using dilution to meet applicable pretreatment standards or requirements, or in other cases where the imposition of mass limitations is appropriate.

E. Permit map. Each industrial waste permit shall be accompanied by a permit map drawn to sufficient scale to show the locations of all sewers, pipes and drains which collect and convey sewage, industrial wastes and/or cooling waters from their points of origin to the public sewers. Each pipe or sewer shall be labeled and noted as to the substance it is conveying. Each inlet or entrance point into the sewer system shall be shown on the map, and each point shall be labeled with all substances of wastes which can enter the system at that point.

F. Reports. Each person shall submit reports on the volume of flow measurements, characteristics and concentrations for each waste entering public sewers and/or watercourses as often as deemed necessary by the Pretreatment Administrator. The frequency of reporting shall be as determined by the Pretreatment Administrator. All tests and reports shall be performed and prepared at the expense of the person discharging the waste. Each report, test, measurement and analysis shall be identified by town industrial waste permit number, control manhole location and point of discharge into the public sewer or watercourse.

§ 165-26. Measurement, test and analysis standards.

All measurements, tests and analyses of the characteristics of waters and wastes to which reference is made in this Part 1 shall be determined in accordance with the laboratory methods set forth in Environmental Protection Agency regulation 40 CFR 136, Approved Analytical Methods.

A. Measurement of flow.

(1) The volume of flow used in computing abnormal sewage surcharges shall be based upon metered water consumption as shown in the records of meter readings maintained by the Town Water Department. In the event that a person discharging waste into the public sewer system produces evidence to the Pretreatment Administrator demonstrating that a substantial portion of the total amount of water used for all purposes does not reach the sewer system, an estimated percentage of total water consumption to be used in computing charges may be established by Pretreatment Administrator.

(2) Any person discharging industrial waste into the public sewers of the Town of Tonawanda who procures any part or all of his water supply from sources other than

the Town Water Department, all or part of which is discharged into the public sewer, shall install and maintain at his expense water meters of the type approved by the Pretreatment Administrator for the purpose of determining the proper volume of flow to be used in computing sewer service charge. Such meters shall be read monthly and tested for accuracy when deemed necessary by the Pretreatment Administrator. Where it can be shown to the satisfaction of the Pretreatment Administrator that a substantial portion of the water, as measured by the aforesaid meter or meters, does not enter the public sewer system of the Town of Tonawanda, then the Pretreatment Administrator may require or permit the installation of additional meters at the owner's expense in such manner as to measure the quantity of water actually entering said public sewerage system from the lot, parcel of land, building or premises of such owner or occupant, and the quantity of water used to determine the sewer service charge and abnormal sewage surcharge may be the quantity of water actually entering the sewerage system as so determined, if the Pretreatment Administrator so elects.

B. Determining the character and concentration of waste. The industrial waste discharged or deposited into the public sewers shall be subject to periodic inspection and sampling as often as may be deemed necessary by the Pretreatment Administrator. Samples shall be collected in such manner as to be representative of the character and concentration of the waste under operation conditions. The laboratory methods used in the examination of said waste shall be those set forth in Environmental Protection Agency regulation 40 CFR 136, Approved Analytical Methods. The determination of the character and concentration of industrial waste shall be made by the Pretreatment Administrator at such times and on such schedules as may be established by the Pretreatment Administrator. Should an owner or occupant discharging industrial waste to the public sewers desire a determination of the quality of such industrial waste to be made at some time other than that scheduled by the Pretreatment Administrator, such special determination may be made by the Pretreatment Administrator at the expense of the owner or occupant discharging the waste.

§ 165-27. Pretreatment and surcharge.

A. Handling of prohibited or restricted wastes. Owners, occupants or any other person generating waste prohibited from discharge into public sewers by the foregoing shall pretreat or otherwise dispose of such prohibited waste so as to make the waste discharged to the public sewer acceptable under the standards established in this Part 1.

B. Requirements for industrial users.

(1) Industrial users shall make wastewater acceptable under the limitations established by these rules and regulations and by Section 307 of the Clean Water Act and shall achieve compliance with all Federal Categorical Pretreatment Standards, before discharging into the town's sewer system. Any facilities required to pretreat wastewater to a level acceptable to the Pretreatment Administrator shall be provided and maintained at the industrial user's expense. Detailed plans, prepared by a New York State licensed professional engineer, showing pretreatment facilities and operating procedures shall be submitted to the Pretreatment Administrator for review and shall be approved by the Pretreatment Administrator before construction of the facility. The review and approval of such plans and operation procedures will in no

way relieve the industrial user from the responsibility of modifying the facility as necessary to produce an effluent complying with the provisions of these rules and regulations. Any subsequent changes in the pretreatment facilities or method of operation shall be reported to and be approved by the Pretreatment Administrator prior to the industrial user's initiation of the changes. When pretreatment regulations are adopted by the United States Environmental Protection Agency or New York State Department of Environmental Conservation for any industry, then that industry shall immediately conform to the United States Environmental Protection Agency or New York State Department of Environmental Conservation timetable for adherence to federal or state pretreatment requirements and any other applicable requirements promulgated by the United States Environmental Protection Agency or New York State Department of Environmental Conservation in accordance with Section 307 of the Clean Water Act. Additionally, such industrial users shall comply with any more stringent standards necessitated by local conditions as determined by the Pretreatment Administrator.

(2) The Town of Tonawanda shall annually publish in a newspaper having general circulation in the County of Erie a list of the industrial users who were in significant noncompliance with any pretreatment requirements or standards during the 12 previous months. The notification shall also summarize any enforcement actions taken against industrial users during the same 12 months.

(3) All records relating to compliance with pretreatment standards shall be made available to officials of the USEPA or NYSDEC upon request.

C. Compliance schedules. If additional pretreatment and/or operation and maintenance will be required to meet pretreatment regulations, the industrial user will immediately advise the Town of Tonawanda of the shortest schedule by which the industrial user will provide such additional pretreatment. The completion date in this schedule shall not be later than the compliance date established for the applicable pretreatment regulations. The following conditions shall apply to this schedule:

(1) The schedule shall contain increments of progress in the form of dates for the commencement and completion of major events leading to the construction and operation of additional pretreatment required for the industrial user to meet the applicable pretreatment standards (e.g., hiring an engineer, completing preliminary plans, completing final plans, executing contract for major components, commencing construction, completing construction, etc.).

(2) No increment referred to in Subsection C(1) hereof shall exceed nine months.

(3) Not later than 14 days following each date in the schedule and the final date for compliance, the industrial user shall submit a progress report to the Pretreatment Administrator, including, as a minimum, whether or not it complied with the increment of progress to be met on such date and, if not, the date on which it expects to comply with this increment of progress, the reason for delay and the steps being taken by the industrial user to return the construction to the schedule established. In no event shall more than nine months elapse between such progress reports to the Pretreatment Administrator.

D. Submission of self-monitoring reports. The Town of Tonawanda may require the submission of all notices and self-monitoring reports from industrial users as are necessary to assess and assure compliance by industrial users with pretreatment standards and requirements, including but not limited to the reports required in 40 CFR 403.12 and 403.8(f)(1)(iv)(B).

(1) The Pretreatment Administrator shall, at least once per year, sample each significant industrial discharge and measure the volume of flow. The data collected shall be used in the calculation of sewer use charges and to determine compliance with these regulations.

(2) The Pretreatment Administrator shall require all categorical industrial users to determine, at a minimum twice per year during the months of June and December at each discharge point to the Town of Tonawanda sewers, both the volume and characteristics of the wastewater discharged from their facility. The specific requirements of the self-monitoring to be performed shall be identified in the industrial user's wastewater discharge permit. The results of this self-monitoring are to be evaluated by the industrial user with respect to the limits contained in the industrial user's wastewater discharge permit. If sampling performed by the industrial user indicates a violation, the industrial user shall notify the Pretreatment Administrator with 24 hours of becoming aware of the violation. The industrial user shall also repeat the sampling and analysis and submit the results of the repeat analysis to the Pretreatment Administrator within 30 days after becoming aware of the violation.

(3) The Pretreatment Administrator shall require noncategorical significant industrial users to submit, at a minimum of at least three times every six months (on dates specified), a description of the nature, concentration and flow of the pollutants required to be reported by the Pretreatment Administrator. These reports shall be based on sampling and analysis performed in the period covered by the report, and performed in accordance with the techniques described in 40 CFR Part 136 and amendments thereto.

(4) Samples shall be taken and flow measurements made, whenever economically and technically feasible, at a common manhole into which all industrial wastes from such premises are combined. Such manhole shall be constructed by the owner of such premises, at the owner's expense, prior to the issuance of any wastewater discharge permit under this Part 1. Such manhole shall be maintained by the owner so as to be safe and accessible at all times. Whenever the installation of such common manhole is deemed by the owner to be economically and/or technically infeasible, the owner shall accept the burden of preparing and presenting to the Pretreatment Administrator an alternative plan whereby the Town of Tonawanda may obtain that information (flow and analytical data) which the town deems necessary to the successful operation of their industrial wastewater monitoring program.

(5) All measurements, tests and analyses of the characteristics of water and wastes to which reference is made in this Part 1 shall be determined in accordance with the methods specified in 40 CFR Part 136 or equivalent methods approved by USEPA, and shall be determined at the control manhole or upon suitable samples taken at said

control manhole, or in accordance with the alternative plan submitted to the Town of Tonawanda as described in Subsection D(4) above. Sampling shall be carried out by customarily accepted methods to reflect the effect of constituents upon the sewage works and to determine the existence of any hazards.

(6) All reports required to be submitted by industrial users under this Part 1 are required to be certified by a responsible corporate officer of the firm. The industrial user is required to identify to the Pretreatment Administrator at the time of application, or of renewal of its wastewater discharge permit, all responsible officers who would be authorized to certify any reports required to be submitted to the Pretreatment Administrator by this Part 1.

E. Random monitoring. The Town of Tonawanda will randomly sample and analyze the effluent from industrial users and conduct surveillance activities in order to identify, independent of information supplied by industrial users, occasional and continuing noncompliance with pretreatment standards at least once per year. The Town of Tonawanda will evaluate, at least once every two years, whether each such significant industrial user needs a plan to control slug discharges. For purposes of this subsection, a "slug discharge" is any discharge of a nonroutine, episodic nature, including but not limited to an accidental spill or a noncustomary batch discharge. The results of such activities shall be made available to the Pretreatment Administrator upon request. If the POTW decides that a slug control plan is needed, the plan shall contain, at a minimum, the elements identified in 40 CFR 403.8(f)(2)(iii)(A), (B), (C) and (D).

F. Hazardous waste discharge. The industrial user shall notify the wastewater treatment facility, the EPA Regional Waste Management Division Director and the State Hazardous Waste Authority, in writing, of any discharge into the POTW of a substance which, if otherwise disposed of, would be a hazardous waste under 40 CFR Part 261.

G. Accidental slug discharges. In the case of an accidental discharge, it is the responsibility of the industrial user to immediately telephone and notify the Town of Tonawanda wastewater treatment facility of the incident. The notification shall include location of discharge, type of waste, concentration and volume, and corrective actions.

H. Written notice. Within five days following an accidental discharge, the industrial user shall submit to the Pretreatment Administrator a detailed written report describing the cause of the discharge and the measures to be taken by the industrial user to prevent similar future occurrences. Such notification shall not relieve the industrial user of any expense, loss, damage or other liability which may be incurred as a result of damage to the Town of Tonawanda POTW, fish kills or any other damage to person or property; nor shall such notification relieve the industrial user of any fines, civil penalties or other liability which may be imposed by this Part 1 or other applicable law.

I. Notice to employees. A notice shall be permanently posted on the industrial user's bulletin board or other prominent place advising employees whom to call in the event of a dangerous discharge. Employers shall ensure that all employees who may cause or suffer such a dangerous discharge to occur are advised of the emergency notification procedure.

J. Credit for intake pollutants. Any industrial user wishing to obtain credit for intake pollutants must make application to the Pretreatment Administrator. Upon request of the

industrial user, the applicable standard will be calculated on a "net" basis (i.e., adjusted to reflect credit for pollutants in the intake water) if the requirements identified below are met:

(1) The industrial user must demonstrate that the control system it proposes or uses to meet applicable Federal Categorical Pretreatment Standards would, if properly installed and operated, meet the standards in the absence of pollutants in the intake waters.

(2) Credit for generic pollutants such as biochemical oxygen demand (BOD), total suspended solids (TSS) and oil and grease should not be granted unless the industrial user demonstrates that the constituents of the generic measure in the industrial user's effluent are substantially similar to the constituents of the generic measure in the intake water or unless appropriate additional limits are placed on process water pollutants either at the outfall or elsewhere.

(3) Credit shall be granted only if the industrial user demonstrates that the intake water is drawn from the same body of water as that into which the POTW discharges. The Pretreatment Administrator may waive this requirement if it finds that no environmental degradation will result.

(4) The applicable categorical pretreatment standards contained in 40 CFR Subchapter N specifically provide that they shall be applied on a net basis.

K. Deadline for compliance with pretreatment standards. A new source shall install and have in operating condition and shall start-up all pollution control equipment required to meet applicable pretreatment standards before beginning to discharge. Within the shortest feasible time (not to exceed 90 days), the new source must meet all applicable pretreatment standards.

L. Alternative measurement methods. If the Pretreatment Administrator finds that it is not practicable to measure the quantity or quality of waste by the aforesaid meters or monitoring devices, he shall determine the quantity or quality of waste in any manner or method he may find practicable in order to arrive at the percentage of waste entering the sanitary sewerage system of the Town of Tonawanda and/or the quality of sewage to be used to determine the sewer service charge and surcharge.

M. Industrial user charge system. The industrial user charge system shall consist of the following components: area, assessed valuation, flow (sewage discharged), frontage, water billing (water purchased) and excess pollutant discharges. Industrial users who have been issued industrial waste permits will incur fees based on permit administration which shall consist of permit review, permit renewal (every three years), necessary analytical sampling, facilities inspection, permit parameters exceeded and consultant cost. The Town Board shall set the appropriate charges, rates and fees and formally approve any changes to such charges. Said industrial user charge system shall take precedence over any inconsistent agreements.

N. Notification of charges. Each person discharging wastes to the system under this Part 1 shall be notified within 30 days after approval by the Town Board of any revision in basic industrial user rates of such new rates and portion of the waste subject to such revised industrial user rates.

§ 165-28. Abnormal sewage surcharge.

No statement contained in Part 1 hereof shall be construed as preventing any special agreement or arrangement between the Town of Tonawanda and any industrial, business or commercial center whereby an industrial waste of unusual strength or character may be accepted by the Town of Tonawanda for treatment, subject to payment therefor by the industrial user, for an abnormal sewage surcharge, based upon the following formula. The abnormal surcharge in dollars shall be added to any other charge computed or levied by the town.

A. Abnormal BOD and SS sewage surcharge. Persons generating abnormal sewage may discharge such sewage into the sanitary sewer, provided that:

(1) The waste will not cause damage to the collection system.

(2) The waste will not impair the treatment processes.

(3) The person discharging such wastes pays a monthly surcharge to the Town of Tonawanda in addition to the usual monthly sewer service charges.

(a) Computations of such surcharges shall be based on the following formula:

$$S = V \times 8.34 [A (BOD-250) + B (SS-250)]$$

Where:

S	=	Surcharge in dollars
V	=	Millions of gallons of water consumed during billing period
8.34	=	Pounds per gallon of water
A	=	Unit charge per pound for BOD in dollars
BOD	=	BOD strength index in parts per million by weight
250	=	Normal BOD_5 strength in parts per million by weight
B	=	Unit charge per pound for suspended solids in dollars
SS	=	Suspended solids strength index in parts per million by weight
250	=	Normal suspended solids strength in parts per million by weight

(b) Values for A and B will be determined annually by the Pretreatment Administrator based upon the total cost of removing said pollutant.

B. Other abnormal waste surcharge. Persons generating other undefined industrial wastes may discharge such waste into the sanitary sewer, provided that:

(1) The waste will not cause damage to the collection system.

(2) The waste will not impair the treatment processes.

(3) The person discharging said waste does not violate any state or federal rule or regulation governing said industrial waste.

(4) The person discharging such waste pays a monthly surcharge to the Town of Tonawanda in addition to the usual monthly sewer service charges. Computations of such surcharges shall be based upon the following formula:

S (additional) = V x 8.34 [C x Y]

Where:

C = Unit charge per pound to accept said pollutant as determined quarterly by the Pretreatment Administrator in dollars

Y = Pollutant or waste in parts per million by weight

C. Abnormal sewage surcharge: phosphate (P) and chlorine demand (Cl). Persons generating abnormal sewage may discharge such waste into the sanitary sewer, provided that:

(1) The waste will not cause damage to the collection system.

(2) The waste will not impair the treatment processes.

(3) The person discharging such waste pays a monthly surcharge to the Town of Tonawanda in addition to the usual monthly sewer service charges.

(a) Computations of such surcharges shall be based on the following formula:

S = (additional) = V x 8.34 [D(P-6) + E(Cl-8)]

Where:

D = Unit charge per pound of P in dollars
P = Phosphate as P in parts per million by weight
6 = Normal P strength in parts per million by weight
E = Unit charge per pound for chlorine demand in dollars
Cl = Chlorine demand in parts per million by weight
8 = Normal Cl strength in parts per million by weight

(b) The values for D and E hereof will be determined annually by the Pretreatment Administrator based upon the total cost of removing said pollutant.

D. Less than normal strength index. If the strength index for either BOD, SS, phosphates, chlorine demand or other pollutants is less than the normal strength index for that category, then there shall be no surcharge for that category, nor shall there be credit given to the total surcharge.

E. Increased costs. Any person who discharges any pollutant into the system who, in the opinion of the Pretreatment Administrator, causes an increase in the cost of managing the waste, treating the waste or disposing of the effluent or sludge leaving the treatment works shall pay for these increased costs in addition to those provided above.

§ 165-29. Waste stream formulas.

A. Waste averaging for noncategorical industries. Industrial users not subject to Federal Categorical Pretreatment Standards with two or more discharge points into the same

sanitary sewer may consider themselves a point source and mathematically composite the waste by volume and concentration as if there were one discharge point for the purpose of determining abnormal sewage discharges and concentrations of obnoxious pollutants, provided that no one discharge point would be injurious to the sewers, pumps or other appurtenances as restricted in §§ 165-20 and/or 165-21 hereof. To qualify under this section, a complete analysis of each waste so composited must be submitted before mathematically compositing along with the calculations showing the methods employed and the final computed single analysis to be used under this Part 1.

B. Combined waste stream formula. Where process effluent is mixed prior to treatment with wastewaters other than those generated by the regulated process, fixed alternative discharge limits may be derived by the POTW. These alternative limits shall be applied to the mixed effluent and will be derived in accordance with the combined waste stream formula as presented in 40 CFR Part 403.6(3).

§ 165-30. Effluent limitations.

Effluent limitations promulgated by the Federal Act shall apply in any instance where they are more stringent than limitations in these rules and regulations. Under Section 307 of the Federal Act, pretreatment standards are designed to achieve three purposes: to protect the operation of the publicly owned treatment works; to prevent the discharge of pollutants which pass through such works inadequately treated; and to prevent treatment plant sludges from becoming contaminated with toxic materials which would limit a publicly owned treatment works' sludge disposal alternatives. Users in industrial categories subject to effluent guidelines issued under Section 304 of the Federal Act and discharging pollutants to publicly owned treatment works are required to achieve the level of treatment established by federal regulations. Nothing in these rules and regulations shall be construed to relieve any industrial user from its obligation to comply with the pretreatment standards established pursuant to Section 307 of the Federal Act. Limitations on wastewater strength in § 165-21 hereof may be supplemented with more stringent limitations when, in the opinion of the Pretreatment Administrator:

A. Protection of treatment works. The limitations on § 165-21 hereof may not be sufficient to protect the operation of the Department's treatment works; or

B. Maintenance of effluent limitations. The limitations in § 165-21 hereof may not be sufficient to enable the Department's treatment works to comply with the water quality standards or effluent limitations specified in the state pollutant discharge elimination system (SPDES) permit.

ARTICLE V
Inspections; Confidential Information

§ 165-31. Authority to enter properties for inspection.

A. The Pretreatment Administrator and/or other duly authorized employees of the Town of Tonawanda, United States Environmental Protection Agency or New York State Department of Environmental Conservation, bearing proper credentials and identification, shall be permitted to enter all properties for the purpose of inspection, observation,

measurement, sampling and testing in accordance with the provisions of this Part 1. The Pretreatment Administrator and such other duly authorized employees shall have the authority to inquire into all areas of the facility's operations, including raw products used, any processes, including metallurgical, chemical, oil, refining, ceramic, paper or other processes, as well as any other area of facility construction or operation that may reasonably be expected to impact the quantity or quality of wastes generated or discharged by that industrial user. The inspectors, employees, agents or representatives of the Town of Tonawanda, New York State Department of Environmental Conservation and United States Environmental Protection Agency charged with the enforcement of this Part 1 shall be deemed to be performing a governmental function for the benefit of the general public, and neither the Town of Tonawanda, the Pretreatment Administrator nor the individual inspector, employee, agent or representative shall be held liable for any loss or damage, whether real or asserted, caused or alleged to have been caused as a result of the performance of such governmental function. The owners or occupants of premises where industrial waste is created or discharged into the sewer shall allow the Pretreatment Administrator, Department of Environmental Conservation, Environmental Protection Agency, their inspectors, employees, agents or representatives free access at all reasonable times to all parts of such premises for the purpose of inspection or sampling or any of their duties hereunder, and the failure or refusal of such owners or occupants to comply with this provision shall be grounds for the disconnection of water and/or sewer service.

B. While performing the necessary work on private properties referred to in Subsection A above and § 165-32 hereof, the Pretreatment Administrator and/or duly authorized employees of the Town of Tonawanda shall observe all safety rules applicable to the premises established by the company, and the company shall be held harmless for injury or death to the Town of Tonawanda employees, and the Town of Tonawanda shall indemnify the company against liability claims and demands for personal injury or property damage asserted against the company and growing out of the gauging and sampling operation, except as such may be caused by negligence or failing of the company to maintain safe conditions as required by this Part 1.

C. The Pretreatment Administrator or duly authorized employees of the Town of Tonawanda bearing proper credentials and identification shall be permitted to enter all private, nonindustrial properties after first notifying the owner of said property at least 48 hours in advance of the visit and the proposed entry and the purpose of the inspection, observation, measurement and/or sampling of any portion of the sewage facilities or factors contained in § 165-25 hereof.

D. The Pretreatment Administrator may immediately sever any sewer connection when such action is necessary, in the opinion of the Pretreatment Administrator, in order to halt or prevent a discharge which reasonably appears to present an imminent threat to the health or welfare of persons.

(1) The Pretreatment Administrator may issue orders requiring suspension of a discharge when such suspension is necessary to halt or prevent a discharge, which presents or may represent an endangerment to the environment or threatens to interfere with the operation of any part of the treatment system.

(2) Any person receiving such an order shall immediately stop or eliminate the contribution. In the event that such person fails to comply voluntarily with the suspension order, the Pretreatment Administrator shall take such steps as deemed necessary, including immediate severance of the sewer connection, to prevent or minimize damage to the environment or to the treatment system. The Pretreatment Administrator shall reinstate wastewater treatment service upon proof of the elimination of the noncomplying discharge.

(3) The Town of Tonawanda shall not be liable for damage or losses occurring as a result of actions taken in accordance with these provisions.

§ 165-32. Authority to enter easements.

The Pretreatment Administrator and/or other duly authorized employees of the Town of Tonawanda, United States Environmental Protection Agency or New York State Department of Environmental Conservation bearing proper credentials and identification shall be permitted to enter all private properties through which the town holds a duly negotiated easement for the purpose of but not limited to inspection, observation, measurement, sampling, repair and maintenance of any portion of the sewage works lying within said easement. All entry and subsequent work, if any, on said easement shall be done in full accordance with the terms of the duly negotiated easement pertaining to the private property involved.

§ 165-33. Confidential information.

A. Information and data on an industrial user obtained from reports, questionnaires, permit applications, permits and monitoring programs and from inspections shall be available to the public or other governmental agency without restriction unless the industrial user specifically requests and is able to demonstrate to the satisfaction of the Town of Tonawanda that the release of such information would divulge information, processes or methods of production entitled to protection as trade secrets of the industrial user.

B. When requested by the person furnishing a report, the portions of a report which might disclose trade secrets or secret processes shall not be made available for inspection by the public but shall be made available upon written request to governmental agencies for uses related to this Part 1, the national pollutant discharge elimination system (NPDES) permit, state disposal system permit and/or the pretreatment programs; provided, however, that such portions of a report shall be available for use by the state or any state agency in judicial review or enforcement proceedings involving the person furnishing the report. Wastewater constituents and characteristics will not be recognized as confidential information.

C. Information accepted by the Town of Tonawanda as confidential shall not be transmitted to any governmental agency or to the general public by the Town of Tonawanda until and unless a ten-day notification is given to the industrial user.

ARTICLE VI
Enforcement and Penalties

§ 165-33.1. Penalties for offenses; civil penalties; enforcement.

A. Violations.

(1) Any violations of §§ 165-3 through 165-19 of this Part 1 is hereby declared a violation except as otherwise provided by law.

(2) Any person who violates the provisions of §§ 165-3 through 165-19 of this Part 1, upon conviction thereof in a court of competent jurisdiction, may be punished by a fine of not more than $250, and each day on which there is a failure to comply shall be and is hereby declared to be a distinct and separate offense and punishable as such.

(3) The Town of Tonawanda may also maintain an action or proceeding in the name of the Town of Tonawanda in a court of competent jurisdiction to collect a civil penalty of not over $200 for each violation of §§ 165-3 through 165-19 of this Part 1.

(4) The Town of Tonawanda may also maintain an action or proceeding in the name of the Town of Tonawanda in a court of competent jurisdiction for injunctive relief for any violation of Article III, IV or V of this Part 1.

B. Misdemeanors.

(1) Any violation of §§ 165-20 through 165-30 of this Part 1 is hereby declared a misdemeanor except as otherwise provided by law.

(2) Any person who violates the provisions of §§ 165-20 through 165-30 of this Part 1, upon conviction thereof in a court of competent jurisdiction, may be punished by a fine of not more than $500, and each day on which there is a failure to comply shall be and is hereby deemed to be a distinct and separate offense and punishable as such.

(3) The Town of Tonawanda may maintain an action or proceeding in the name of the Town of Tonawanda in a court of competent jurisdiction to collect a civil penalty of not over $1,000 for violation of §§ 165-20 through 165-30 of this Part 1.

(4) The Town of Tonawanda may also maintain an action or proceeding in the name of the Town of Tonawanda in a court of competent jurisdiction for injunctive relief for any violation of Article VI in this Part 1.

C. Criteria for enforcement response. The Town of Tonawanda will consider the following criteria when determining a proper enforcement response among the available enforcement options:

(1) Magnitude of the violation;

(2) Duration of the violation;

(3) Effect of the violation on the receiving water;

(4) Effect of the violation on the POTW;

(5) Compliance history of the industrial user; and

(6) Good faith of the industrial user.

D. Enforcement alternatives. The following enforcement alternatives may be utilized by the Town of Tonawanda in response to violations of this Part 1:

(1) Notice of violation (NOV). The NOV is a letter providing the industrial user with notice of the violation(s) and the opportunity to correct violations prior to the town's use of other enforcement remedies.

(2) Administrative fines.

(a) An administrative fine is a monetary penalty assessed by the Pretreatment Administrator for violations of pretreatment standards and requirements. Notwithstanding any other section of this Part 1, any industrial user who is found to have violated any provision of this Part 1, permits or orders issued hereunder, shall be fined in an amount not to exceed $5,000 per violation per day for each day on which noncompliance shall occur or continue.

(b) The industrial user may, within 15 days of notification of such fine, petition the Pretreatment Administrator to modify or suspend the fine. Such petition shall be in written form and shall be transmitted to the Pretreatment Administrator by registered mail. The Pretreatment Administrator may:

[1[] Reject any frivolous petitions;

[2] Modify or suspend the fine;

[3] Request additional information from the industrial user; or

[4] Order the petitioner to show cause as described herein.

(c) Administrative fines are punitive in nature and are not related to a specific cost borne by the Town of Tonawanda. Instead, fines are designed to recapture the full or partial economic benefit of noncompliance and to deter future violations.

(3) Administrative orders. Administrative orders (AOs) are enforcement documents which direct industrial users to either undertake or to cease specified activities. AOs are typically utilized as the first formal response to significant noncompliance (unless judicial proceedings are more appropriate), and may incorporate compliance schedules, administrative penalties or termination of service orders. The four types of AOs which the Town of Tonawanda may employ are:

(a) Cease and desist orders. A cease and desist order directs a noncompliant industrial user to cease illegal or unauthorized discharges immediately or to terminate its discharger(s) altogether. The Pretreatment Administrator may issue a cease and desist order in situations where the discharge could cause interference or pass-through or otherwise create an emergency situation.

(b) Consent orders. The consent order is an agreement between the Town of Tonawanda and the industrial user which will normally contain three elements:

[1] Compliance schedules;

[2] Stipulated fines or remedial actions; and

[3] Signatures of Town of Tonawanda and industrial user representatives.

(c) Show cause hearing.

[1] In addition to the provisions listed above and in no way limiting their application, the Pretreatment Administrator may order any offender of a provision of this Part 1 to appear before him or his designated representative to show cause why such offense should not be discontinued. A written notice shall be served upon the offending party, specifying the time and place of said hearing and directing the offending party to show cause why an order should not be issued directing the discontinuance of the offense. The notice shall be served personally or by certified mail at least five days prior to the date of hearing; service may be made on any agent or officer of a corporation.

[2] The Pretreatment Administrator shall request the Town of Tonawanda Town Attorney or his designated representative to be present at such show cause hearings.

(d) Compliance orders.

[1] A compliance order directs the industrial user to achieve or restore compliance by a date specified in the order. The compliance order is usually issued when noncompliance cannot be resolved without construction, repair or process changes, or to require industrial users to develop management practices, spill prevention programs and related pretreatment program requirements.

[2] The compliance order will document the noncompliance and state-required actions to be accomplished by specific dates, including interim and final reporting requirements.

(4) Civil litigation. Civil litigation is the formal process of filing lawsuits against industrial users to secure court-ordered action to correct violations and to secure penalties for violations, including the recovery of costs to the POTW of the noncompliance. The Town of Tonawanda's Town Attorney is authorized to commence civil litigation in a court of competent jurisdiction to obtain injunctive relief, penalties and damages under any applicable rule, regulation, ordinance or statute. Such civil penalties shall be in the amount of at least $1,000 per violation per day.

(5) Consent decree. Consent decrees are agreements between the Town of Tonawanda and the industrial user reached after a lawsuit has been filed. To be binding, the decree must also be signed by the judge assigned to the case.

(6) Injunctive relief. Whenever an industrial user has violated or continues to violate the provisions of this Part 1 or permit or order issued hereunder, the Pretreatment Administrator, through counsel, may petition the court for the issuance of a preliminary or permanent injunction, or both (as may be appropriate), which restrains or compels the activities on the part of the industrial user.

(7) Civil penalties and cost recovery. Civil litigation may be necessary to recover costs associated with noncompliance and to impose civil penalties. A civil suit commenced by the Town of Tonawanda's Town Attorney in a court of competent jurisdiction will seek to require the industrial user to pay for all expenses which the Town of Tonawanda incurred in responding to the noncompliance, including restoration of the town's POTW, payment for medical treatment of injured employees and indemnification of the Town of Tonawanda for all fines assessed against it for SPDES permit violations.

(8) Termination of sewer service. Termination of service is the revocation of an industrial user's privilege to discharge industrial wastewater into the Town of Tonawanda's sewer system. Termination may be accomplished by physical severance of the industrial user's connection to the collection system, plugging or by issuance of an AO which compels the industrial user to terminate its discharge, or by a court ruling.

(9) Suspension and/or revocation of permit.

(a) Harmful contributions. The Town of Tonawanda may suspend the wastewater treatment service and/or industrial waste permit when such suspension is necessary, in the opinion of the Town of Tonawanda, in order to stop an actual or threatened discharge which presents or may present an imminent or substantial endangerment to the health or welfare of persons or to the environment, causes interference to the POTW or causes the Town of Tonawanda to violate any condition of its SPDES permit. Any person notified of a suspension of the wastewater treatment service and/or the industrial waste permit shall immediately stop or eliminate the contribution. In the event of a failure of the person to comply voluntarily with the suspension order, the Town of Tonawanda shall take such steps as deemed necessary, including immediate severance of the sewer connection, to prevent or minimize damage to the POTW system or endangerment to any individuals. The Town of Tonawanda shall reinstate the industrial waste permit and/or the wastewater treatment services upon proof of the elimination of the noncomplying discharge. A detailed written statement submitted by the industrial user describing the causes of the harmful contribution and the measures taken to prevent any future occurrence shall be submitted to the Town of Tonawanda within 15 days of the date of occurrence.

(b) Revocation of permit.

[1] Any industrial user who violates the following conditions of this Part 1 or applicable state and federal regulations is subject to having his permit revoked in accordance with the procedures of this subsection:

[a] Failure of a industrial user to factually report the wastewater constituents and characteristics of his discharge;

[b] Failure of the industrial user to report significant changes in operations of wastewater constituents and characteristics;

[c] Refusal of reasonable access to the industrial user's premises for the purpose of inspection or monitoring; or

[d] Violation of conditions of the permit.

[2] The Pretreatment Administrator may revoke a permit upon finding that the industrial user has violated the conditions of the industrial waste permit, any provisions of the rules and regulations and applicable state and federal regulations, or has failed to report significant changes in operations or wastewater characteristics or has refused authorized personnel reasonable access to the industrial user's premises for the purposes of inspection and monitoring.

[3] Any industrial user whose industrial waste permit has been revoked shall immediately stop all discharge of any liquid-carried waste covered by the permit to any town sewer. The Pretreatment Administrator may disconnect or permanently block from such town sewer the industrial connection of any industrial user whose permit has been revoked, if such action is necessary to ensure compliance with the order of revocation, without any liability for prosecution or damages. Before any further discharge of industrial wastewater may be made by the industrial user, he must apply for a new permit and pay all delinquent fees, charges and such other sums that the industrial user may owe the Pretreatment Administrator. Costs incurred by the Pretreatment Administrator in revoking the permit and disconnecting the industrial sewer shall be paid for by the industrial user before issuance of a new permit.

§ 165-33.2. Supplemental enforcement responses.

This section outlines the supplemental enforcement responses available to the Town of Tonawanda to complement the more traditional responses described in the preceding sections. Normally, these responses will be used in conjunction with more traditional approaches.

A. Public notices. According to USEPA regulations, the Town of Tonawanda must comply with the public participation requirements of 40 CFR 403.8((2)(vii). Among these requirements is annual publication of a list of industrial users which were in significant noncompliance. "Significant noncompliance" is defined as violating applicable pretreatment standards or requirements. The criteria for determining significant noncompliance are set forth in 40 CFR 403.8(f)(2)(vii) and include one of more of the following:

(1) Chronic violations (exceedances 66% of the time or more during a six-month period) of the same parameter limits;

(2) Technical review criteria (TRC) violations, 33% or more of measurements for each pollutant parameter taken during a six-month period equal or exceed the TRC (1.4 times the limit for conventionals or 1.2 times the limit for toxics except pH);

(3) Causing pass-through or interference;

(4) A discharge of imminent endangerment to human health, welfare or the environment, or which required the POTW to use its emergency authorities;

(5) Violations of a compliance schedule milestone by 90 days or more;

(6) Violations of report submittal deadlines by 30 days;

(7) Failure to report noncompliance; or

(8) Any other violation deemed significant by the Pretreatment Administrator.

B. Performance bonds/liability insurance. The Town of Tonawanda may require, through an AO or as part of a consent agreement, that a noncompliant industrial user post a performance bond covering expenses which the POTW might incur in the event of future violations. This action may require the industrial user to obtain sufficient liability insurance to cover the cost of restoring the treatment works in the event that a second upset occurs.

C. Increased monitoring and reporting. Industrial users demonstrating a history of noncompliance will be subject to increased surveillance (i.e., sampling and inspections) by the Town of Tonawanda. Since recurring violations indicate that at least one chronic problem exists at the facility, the Town of Tonawanda will monitor the industrial user closely and require additional user self-monitoring until the problem is corrected and consistent compliance is demonstrated. For example, where a pretreatment system is found to be inadequate to meet applicable limits, an AO requiring the installation of additional technology may also include increased self-monitoring frequency.

D. Short-term permit. The length of a permit's effective period is a discretionary matter. The Town of Tonawanda can use a permit's duration to force an early look at a noncompliant industrial user by issuing it a short-term permit. In addition to scheduling a comprehensive review of the industrial user's circumstances, a short-term permit may be used to increase self-monitoring and reporting requirements as well as to impose a compliance schedule which concludes shortly before permit expiration.

§ 165-33.3. Liability for loss by town.

Any person violating any of the provisions of this Part 1 shall become liable to the Town of Tonawanda for such expense, loss or damage occasioned the Town of Tonawanda by reason of such violation.

§ 165-33.4. Protection from damage.

No unauthorized person shall enter or maliciously, willfully or negligently break, damage, destroy, uncover, deface or tamper with any structure, appurtenance or equipment which is part of the Town of Tonawanda's sewage facilities, equipment, lines or systems.

§ 165-33.5. Rates.

The rate of sewage service in the Town of Tonawanda will be based on charges as set by Town Board resolution.[4]

[4] Editor's Note: See Part 2, Sewer Rents, of this chapter.

§ 165-33.6. Rules and regulations.

The Town of Tonawanda shall have the authority to promulgate such additional rules and regulations as it deems advisable, desirable and necessary to implement the terms and conditions of this Part 1. Such rules and regulations shall be established by Town Board resolution.

§ 165-33.7. Correlation and intent of law, rules and regulations.

The terms, conditions, rules, regulations, definitions, requirements, restrictions, use, charges, rates, permits, power and authority of inspectors and engineers and penalties contained in this Part 1 and any and all rules and regulations promulgated by the Town of Tonawanda are complementary, and what is called for by any one shall be as binding as if called for by both.

§ 165-33.8. Validity.

A. The provisions of this Part 1 are severable, and if any of the provisions, words, phrases, clauses or terms, or the application thereof to any person, firm or corporation or to any circumstances, shall be held invalid, illegal or unconstitutional by any court of competent jurisdiction, such decision or findings shall not in any way affect the validity, legality or constitutionality of any other provision, word, phrase, clause or term, and they shall continue in full force and effect.

B. All laws and parts of laws, codes and regulations which are inconsistent with or in conflict with or repugnant to any provisions of this Part 1 shall be deemed not to apply; provided that nothing herein contained shall be construed to prevent the adoption and enforcement of a law, code, or regulation which is more restrictive or establishes a higher standard than those provided in this Part 1.

C. This Part 1 shall supersede all prior laws and ordinances in conflict therewith.

§ 165-33.9. Repealer.

Chapter 165, Part 1, Sewer Use, of the Code of the Town of Tonawanda, New York, is hereby repealed.[5] This repeal shall not affect or impair any act done or offense committed, or liability, penalty, forfeiture or punishment incurred prior to the time such repeal takes effect, but the same may be enforced or prosecuted as fully and to the same extent as if such repeal had not been effected. Furthermore, all actions and proceedings commenced under or by virtue of the local law repealed hereby and pending immediately prior to the taking effect of the repeal of said local law may be prosecuted and defended to final effect in the same manner as they might if such provisions were not so repealed.

§ 165-33.10. When effective.

This Part 1 shall take effect immediately upon filing with the Secretary of State.

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[5] Editor's Note: Former Ch. 165, Part 1, was comprised of L.L. No. 3-1984, adopted 2-13-1984, as amended.

ARTICLE VII
(Reserved)

Part 2
Sewer Rents
[Adopted 9-13-1976 by L.L. No. 1-1976]

ARTICLE VIII
Imposition of Rents; Basis for Charges

§ 165-34. Establishment and imposition of charges.

A scale of annual charges is hereby established and imposed in the Town of Tonawanda for the use of its sanitary sewer system or any part or parts thereof

§ 165-35. Basis for charges. [Amended 12-1-1980 by L.L. No. 8-1980]

Such charges shall be computed quarterly and shall be based either upon the charge for consumption of water on the premises connected with and served by the sewer system or such part or parts thereof or based upon the outflow of sewage from the premises connected with and served by the sewer system or such part or parts thereof.

§ 165-36. Quarterly payments; rents to accompany water bill.

Said sewer rents shall be due and payable quarterly and shall accompany the water bill to the premises connected with and served by the sewer system or such part or parts thereof.

§ 165-37. Penalties for late payment. [Amended 10-18-1976 by L.L. No. 2-1976]

Penalties for late payment of sewer rents shall be as follows: 10% for bills paid later than 30 days following the due date of each quarter.

§ 165-38. Unpaid rents and penalties to constitute lien; action by town.

A. Such unpaid rents, together with the penalties described by Part 2 of this chapter, shall be a lien upon the real property connected with and served by the sewer system or such part or parts thereof, and such a lien is prior and superior to every other lien or claim except the lien of an existing tax, assessment or other lawful charge imposed by or for the state or a political subdivision or district thereof.

B. The Town Board may bring and maintain an action in the name of the town for the foreclosure of such liens for such sewer rents, or such Board may certify to the Town Clerk the amount of any such lien which has not been paid at the time and in the manner prescribed by Part 2 of this chapter, with a description of the real property affected thereby.

and the Town Board may include such amount in the annual tax levy and shall levy the same upon the real property in default.

§ 165-39. Establishment of charges. [Amended 12-1-1980 by L.L. No. 8-1980; 12-3-1984 by L.L. No. 12-1984; 9-24-1990 by L.L. No. 4-1990]

Sewer rent charges shall be established by resolution of the Town Board.

Volume II: SOPs for Groundwater Remediation System

MANUAL OF STANDARD OPERATING PROCEDURES FOR GROUNDWATER REMEDIATION SYSTEM: CHERRY FARM SITE (NYSDEC SITE NO. 9-15-063) RIVER ROAD SITE (NYSDEC SITE NO. 9-15-031)

Tonawanda, New York

SUBMITTED TO:

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION DIVISION OF HAZARDOUS WASTE REMEDIATION

SUBMITTED BY:

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Potentially Responsible Parties

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LIST OF ABBREVIATIONS

CC	Carbon Contactor
GAC	Granular Activated Carbon
GPM	Gallons per Minute
MCC	Motor Control Center
OWS	Oil/Water Separator
POTW	Publicly Owned Treatment Works
psi	Pounds per Square Inch
RPM	Revolutions per Minute
RW-xx	Recovery Well, xx= Well Number
S-xx	Shallow Sump, xx= Sump Number
SOP	Standard Operating Procedure
VSD	Variable Speed Drive

INTRODUCTION

This manual contains the standard operating procedures (SOP) for the operation of the groundwater treatment system at the Cherry Farm/River Road Site. This manual should be updated as necessary, with all updates recorded in Table 1 of this section. Appendices are provided which contain a copy of the facility's pretreatment discharge permit, a copy of the Town of Tonawanda Sewer Use Ordinance, a copy of the treatment facility's as-built process and instrumentation diagram (PID), and material safety data sheets for bulk chemicals used in the treatment facility.

This manual contains the following thirteen SOPs:

1. SOP-1 SYSTEM START-UP FROM A SHUT-DOWN MODE
2. SOP-2 FLOW METER OPERATION, FLOW BALANCING, AND FLOW ADJUSTMENT
3. SOP-3 ACIDIFICATION PRETREATMENT SYSTEM OPERATION
4. SOP-4 GRANULAR ACTIVATED CARBON SYSTEM OPERATION
5. SOP-5 EQUALIZATION TANK OPERATION
6. SOP-6 ACID AND CAUSTIC SYSTEM CALIBRATION AND CONTROL
7. SOP-7 COMPLIANCE SAMPLING FROM THE TREATMENT FACILITY EFFLUENT
8. SOP-8 SYSTEM SHUT-DOWN
9. SOP-9 ACCIDENTAL SPILL PREVENTION PLAN
10. SOP-10 ROUTINE OPERATION, MAINTENANCE, AND RECORDKEEPING
11. SOP-11 LOCKOUT / TAGOUT PROCEDURE
12. SOP-12 CONFINED SPACE ENTRY PROCEDURE
13. SOP-13 CONVEYANCE PIPELINE FLUSHING PROCEDURE

A history of revisions to the manual is provided in Table 1.

TABLE 1
UPDATES TO CHERRY FARM/RIVER ROAD
MANUAL OF STANDARD OPERATING PROCEDURES FOR GROUNDWATER
REMEDIATION SYSTEM

Date	Affected Sections	Reason For Change
11/10/97	SOP-2	Incorporated ISCO flow meter into SOP-2.
1/21/98	SOP-7	Incorporated permanent discharge permit conditions and deleted temporary permit conditions.
4/1/98	SOP-11	Added SOP-11 based on H&S audit findings.
3/30/98	SOP-12	Added SOP-12 based on H&S audit findings.
3/30/98	SOP-3	Revised SOP to reflect use of Teflon hose from drum pump to acid tank.
4/1/98	SOP-10	Revised SOP to reflect changed permit conditions, and to reflect required maintenance intervals based on experience.
4/24/98	SOP-1	Revised controls description of power coming into recovery well vaults that have sumps associated with them.
July 1998	All Sections	Updated manual to reflect first year's O&M experience.
January 2000	All Sections	Updated manual to reflect continuing O&M experience
April 2004	SOP-10, SOP-3	Revised to reflect additional PPE requirements for handling chemicals
June 2006	All Sections	Revised to reflect the decommissioning of Recovery Wells RW-1 thru RW-3, and RW-6 thru RW-11.
June 2006	SOP-13	Additional SOP created for Annual Line Flushing

SOP-1
SYSTEM START-UP FROM A SHUT-DOWN MODE

1.1 PURPOSE

The purpose of this SOP how to start up the groundwater treatment system from a complete shut-down mode.is to describe

1.2 RELATED SECTIONS

1. SOP-2 FLOW METER OPERATION, FLOW BALANCING, AND FLOW ADJUSTMENT
2. SOP-3 ACIDIFICATION PRETREATMENT SYSTEM OPERATION
3. SOP-4 GRANULAR ACTIVATED CARBON SYSTEM OPERATION
4. SOP-5 EQUALIZATION TANK OPERATION
5. SOP-6 ACID AND CAUSTIC SYSTEM CALIBRATION AND CONTROL
6. SOP-8 SYSTEM SHUT-DOWN
7. SOP-10 ROUTINE OPERATION, MAINTENANCE, AND RECORDKEEPING

1.3 STANDARD OPERATING PROCEDURE

To start up the process equipment, perform the following:

1. Check that acid supply is sufficient. Open the acid supply valves (Valves 33, 34, 35, 40, 41) at the base of the acid storage tank.
2. Check that caustic supply is sufficient. Open the caustic supply valves (Valves 42, 45).
3. Check all process valves for proper position.
   - The following valves are normally open: 1, 3, 4, 9, 10, 12, 16, 18, 19, 20, 21, 23, 26, 28, 46.
   - The following valves are normally closed: 2, 5, 6, 7, 8, 11, 13, 14, 15, 17, 22, 24, 25, 27, 29, 30, 31, 32, 36, 37, 38, 39, 43, 44, 47.
4. The following breakers on the MCC panel should be in the "on" position.
   - S-1
   - S-2
   - S-3
   - S-4
   - Clearwell Pump Panel (1 of 2)
   - Clearwell Pump Panel (2 of 2)
   - EQ Tank Mixer MX-2
5. Go to each sump (S-1, S-2, S-3, and S-4) and verify that the two butterfly valves on the two inlet pipes are in the full open position, and the on/off switch is in the "on" position.

- Do not proceed to the following steps until the acidification tank (T-1) and the equalization tank (T-2) are full of water.

6. The following circuit breakers in the lighting panel should be switched to the "on" position.
    - LP-8 Instrument Panel
    - LP-10 FE-126
    - LP-11 Acid Drum Pump
    - LP-12 FE-127
    - LP-13 Shunt Trip A
    - LP-14 FE-125
    - LP-15 Shunt Trip B
    - LP-16 Chemical feed pump CP-3
    - LP-17 Chemical feed pump CP-1
    - LP-18 Mixer MX-1
    - LP-19 Chemical feed pump CP-2
    - LP-20 Control Power for PST-1
    - LP-22 Building Sump Pump
    - LP-24 Building Sump Pump
    - LP-26 Composite Sampler
7. Calibrate the two pH controllers (AIC-121, AIC-131) using pH 4 and 7 buffers. See SOP-3 and SOP-5 for additional information.
8. Turn MX-1 and MX-2 on at the variable speed drive units located on the rear of the control panel by pressing the "forward" key, and then increasing the speed to the desired setting by using the up or down arrow keys. Set MX-1 at 1750 RPM. The VSD for MX-2 has been bypassed; therefore, it operates at the rated motor speed.
9. Verify flow meter rates at the control panel for sumps S-1, S-2, S-3, and S-4 by switching each sump off (at the MCC) one at a time, and verifying its contribution to the total flow. Alternatively, flow contribution can be observed by opening the top cover on Tank T-1 and inspecting the incoming flow. If any sump is not putting out correct flow, go to the sump, investigate, and take corrective action. (See SOP-2 for desired flow rates and flow adjustment procedures.)
10. Once the pH in the acidification tank (T-1) has stabilized at its operational set point (1.9 to 2.0), measure the pH in tank T-1 using a calibrated hand-held meter. Verify that the pH as recorded by the pH controller is within 0.1 pH units of the hand held pH meter reading. If not recalibrate AIC-121 in accordance with SOP-3.
11. Once the pH in the equalization tank (T-2) has stabilized at its operational set point (5.75 to 9.0), measure the pH in tank T-2 using a calibrated hand held meter. Verify that the pH as recorded by the pH controller is within 0.2 pH units of the hand held pH meter reading. If not recalibrate AIC-131 in accordance with SOP-5.

12. Check the operation of the oil skimmer to verify that water is not entering the skimmer pipe. Rotate the skimmer pipe to the vertically upward position so that no oil or water enters the skimmer. (Oil quantities at the site are small therefore skimming has been done manually at every site visit.)
13. Check the flowrate from the GAC pump station, PST-1. Throttle back valves 19 and 20 to get approximately 15 gpm from each pump.
14. Check the four pressure gauges on the pre- and post-filter, and on the GAC filters. Change the bag filter when the inlet pressure to any bag filter reaches 15 psig. Under no condition should the GAC operating pressure exceed 25 psig.

SOP-2
FLOW METER OPERATION, FLOW BALANCING, AND FLOW ADJUSTMENT

2.1 PURPOSE

The purpose of this section is to describe how to operate the flow meters, and how to perform flow balancing/flow adjustment of the sumps. There are three magnetic flow meters at the facility that monitor the influent flows. The 4 to 20 mA signals from each of the three magnetic flow meters are electrically combined and are indicated at a fourth flow meter indicator (FY-128) and totalizer. The flow monitoring instruments at the treatment plant are summarized below:

MAG 125	RW-10, RW-11 0 to 40 GPM at 4 to 20 mA output respectively Totalizes in gallons, multiplier = 1
MAG 126	RW-1, RW-2, RW-3, RW-4, RW-5, RW-6, RW-7 0 to 150 GPM at 4 to 20 mA output respectively Totalizes in gallons, multiplier = 10
MAG 127	RW-8, RW-9, S-1, S-2, S-3, S-4 0 to 60 GPM at 4 to 20 mA output respectively Totalizes in gallons, multiplier = 1
FY-128	Combines 4 to 20 mA signals from MAG-125, 126, 127 0 to 250 GPM at 4 to 20 mA output respectively Totalizes in gallons, multiplier = 10

In July 2005, most of the recovery wells were decommissioned. RW-4 and RW-5 remain in place, but all plumbing leading to the treatment plant has been disconnected. Because there is no flow coming into the plant from any of the recovery wells, MAG 125 and MAG 126 read as 0 gpm on the control panel, and MAG 127 only indicates incoming flow from S-1 thru S-4.In addition to these flow monitors, the combined plant flow is monitored before discharging to the sewer by a fourth flow meter. This meter utilizes a 90 degree V-Notch weir as the primary flow device, and an ultrasonic level sensor/calculator/integrator (ISCO 4210). The unit displays flow in gallons per minute and totalizes in gallons. This is the only flow monitoring device equipped with a chart recorder. The ISCO flow monitor is used to totalize total plant flow for purposes of reporting to the Town of Tonawanda.

2.2 RELATED SECTIONS

1. SOP-1 SYSTEM START-UP FROM A SHUT-DOWN MODE
2. SOP-3 ACIDIFICATION PRETREATMENT SYSTEM OPERATION

3. SOP-5 EQUALIZATION TANK OPERATION
4. SOP-7 COMPLIANCE SAMPLING FROM THE TREATMENT FACILITY EFFLUENT
5. SOP-10 ROUTINE OPERATION, MAINTENANCE, AND RECORDKEEPING

2.3 STANDARD OPERATING PROCEDURE

The sumps are equipped with a constant speed pump, and a plug valve that can be regulated to control the flow.

The sumps pump into two common pipe headers as follows:

- S-4
- S-1, S-2, and S-3

All flows are discharged to the Town of Tonawanda POTW.

The sumps are connected to a french drain that will drain water that accumulates under the landfill cap. Each sump has two french drains entering it; one from the north and one from the south. Each french drain has a hand-operated butterfly valve to control the flow into the sump. The design flow for each sump is approximately 3 to 5 gpm (maximum) under wet weather conditions. During dry weather the sumps have minimal flow (1 gpm or less). Each sump is equipped with two float switches that, when in auto mode, turn the pump on at the high level, and turns the pump off at the low level. Each sump pump is a vertical submersible pump that is mounted on a slide rail, and seats into a pitless adapter.

There is no local flow meter for the sumps. To check the flow output of any particular sump, observe the MAG 127 flow meter display on the control panel at the treatment building, while turning each sump off, then on (using the MCC breaker), one at a time. In between turning the sump off, then on, allow the flow rate to equilibrate, and note the flow meter reading. Once the sump is turned back on, verify that the flow rate returns to the prior level. This process can be repeated for each sump, and the relative contribution of each sump can be determined. Alternatively, the amount of water being discharged into Tank T-1 can be observed by opening the top of Tank T-1. Be careful that other sumps are not cycling during this time, by observing the control panel on and off lights for S-1, S-2, S-3, and S-4, or by manually turning these sources off.

2.3.2.1 Adjusting Sump Flows

To adjust the pump output at a sump, perform the following:

1. Pump the sump dry by closing the two inlet butterfly valves and allowing the sump to be pumped down to the low level float; before attempting to adjust the flow. This allows the operator to see all the equipment in the sump, avoid tangling of the cables, and allows observation of the seal at the pitless adapter. However, it may take an hour or more for the sump to be pumped to the low level.

2. Turn the sump pump off by either turning off the on/off switch located inside the corresponding above-ground control panel, and/or by turning the hand/off/auto switch on the sump control panel to off.

3. Pull the pump out of the vault using the attached cable. The cable forms a continuous loop with one end connected to the pitless adapter handle, and the other end connected to the sump pump. The cable is run through the hinge on the sump access cover so that the cable does not fall into the sump. Position the cable so that the pump and the pitless adapter can be controlled separately, and pull evenly on both cables. During raising and lowering the pump, the operator must carefully watch the cables, and the power cord, to ensure that they do not become entangled around any of the equipment in the sump, such as: the pump, pressure gauge, pump rails, sample tap, globe valve, etc.

4. With the pump out of the vault, rest the pump on the ground, and adjust the position of the globe valve. The valve is graduated from 0 (full closed) to 10 (full open). Full open flow is approximately 15 gallons per minute, and 2 to 5 gallons per minute is achieved at settings from 2.5 to 4. Below the number 2 setting, the flow is erratic.

5. Reinstall the pump down the slide rails by carefully lowering the pump while controlling the two cables. Once the pump is at the bottom of the slide rail, gently lift up on the pump cable until you feel the pump firmly seat into the pitless adapter. While the pump is being set on the guide-rails and lowered into place, be careful not to bump the handle of the globe valve on anything, or the flow setting will be changed and the process will have to be repeated.

2.3.2.2 Troubleshooting Sump Flows

If the sump pump does not operate, perform the following:

1. It is possible that the sump is not running because the water level has not come up to the level of the high float. If this is the case, when the level rises, then the pump will turn on.
2. In the control room, check that the MCC breaker for the sump is in the "on" position.

If the sump output is too low, check that the globe valve on the discharge from the sump pump is not in the closed position, or open less than the No. 2 position. Typically the globe valve is kept at least half open.

SOP-3
ACIDIFICATION PRE-TREATMENT SYSTEM OPERATION

3.1 PURPOSE

The purpose of this section is to describe how to operate the acidification and oil removal portion of the pre-treatment system. The flow from S-1, S-2, S-3, and S-4 is treated for removal of emulsified oil by lowering the pH to 2.0 in the acidification tank (T-1) with sulfuric acid (93 percent), allowing the oil to separate, and passing the water through a coalescing pack oil/water separator (OWS-1). Water that is treated for oil removal is then processed through granular activated carbon as described in SOP-4.

Oil is skimmed from the separator and placed into a holding tank that is integral to the oil water separator. This holding tank can be used to decant water to the building floor sump. Oil overflows from the integral holding tank into the LNAPL Storage Tank (ST-2). Water can also be decanted from ST-2. When ST-2 is full the contents are taken off-site for disposal.

Please note: Due to the use of sulfuric acid, hydrogen sulfide has been noted within the treatment plant. Hydrogen sulfide concentrations collected by the NYSDOH on July 7, 1998, ranged from 0.023 to 0.12 ppm. While these concentrations are below NIOSH and OSHA worker exposure levels, care should be used when working near the acidification tank.

3.2 RELATED SECTIONS

1. SOP-1 SYSTEM START-UP FROM A SHUT-DOWN MODE
2. SOP-2 FLOW METER OPERATION, FLOW BALANCING, AND FLOW ADJUSTMENT
3. SOP-4 GRANULAR ACTIVATED CARBON SYSTEM OPERATION
4. SOP-5 EQUALIZATION TANK OPERATION
5. SOP-6 ACID AND CAUSTIC SYSTEM CALIBRATION AND CONTROL
6. SOP-7 COMPLIANCE SAMPLING FROM THE TREATMENT FACILITY EFFLUENT
7. SOP-8 SYSTEM SHUT-DOWN
8. SOP-10 ROUTINE OPERATION, MAINTENANCE, AND RECORDKEEPING

3.3 STANDARD OPERATING PROCEDURE

Influent flows to the acidification process are from S-1, S-2, S-3, and S-4. These flows all pass through MAG-127 and enter into the acidification tank (T-1). pH controller AIC 121 is used to control the pH between 1.9 and 2.0 by adding 93 percent sulfuric acid. The tank is kept mixed by mixer MX-1. Water flows by gravity to OWS-1 where oil is separated from the flow. Once the acidification process is started up in accordance with SOP-1, it is operated on a continuing basis in accordance with this SOP.

1. On a regular basis, check the volume of acid remaining in acid tank ST-1, and record the acid volume on the daily log. **Ensure that drum pump is not running, prior to**

checking liquid level in the acid tank. If it appears that an entire drum of acid (55 gallons) is not needed, do not pump acid from the drum to the tank at this time. This will eliminate the need to look into the acid tank during transfer of acid from the drum to the tank.

2. As necessary, add acid to ST-1 using the dedicated acid drum pump and full protective gear (face shield, safety glasses or splash goggles, apron with sleeves, acid resistant gloves, and safety boots). Before transferring acid, check the drum label to verify that the contents are 93 percent sulfuric acid. Pump the drum as empty as possible by tipping the drum. When finished transferring the drum contents, leave the drum pump in the drum to drain for 5 minutes before moving the drum pump to the next drum. When finished, allow the drum pump to drain for 5 minutes in the drum, and then put the drum pump in the specially labeled 5-gallon pail to collect any additional dripping for at least one-hour. At the end of the one-hour period, return the drum pump to the wall-mounted drum pump holder. Regularly check the drum pump holder and 5-gallon pail for accumulations of acid. Carefully pour any accumulated acid into tank T-1. Clean up all residues of acid remaining on the gloves, apron, or work surfaces (floor, stair platform or railing, etc.) by flushing with water for 5 minutes. Record the volume of acid added to ST-1 in the daily log, along with the new ST-1 tank reading.
3. Observe the following cautions while handling or transferring acid:
   - **DO NOT ALLOW THE DRUM PUMP TO RUN UNATTENDED.**
   - **ALWAYS WEAR FULL PROTECTIVE GEAR WHEN WORKING WITH SULFURIC ACID.**
   - **DO NOT TOUCH THE DRUM PUMP RISER TUBE, AS IT WILL CONTINUE TO HOLD ACID.**
   - **DO NOT FLUSH OR RINSE THE DRUM PUMP WITH WATER.**
   - **DO NOT PLACE THE DRUM PUMP IN WATER.**
   - **DO NOT USE THE DRUM PUMP TO PUMP ANY OTHER FLUID OTHER THAN 93 PERCENT SULFURIC ACID.**
4. Keep all full acid drums, drip pail, and drum pump within the acid secondary containment area. Keep the containment sump dry, and check the sump on a monthly basis for evidence of leaks or spills, by measuring the pH of any water in the sump. During the warmer months, perspiration from pipes and other components drip to the floor and accumulate in the acid containment sump. As a preventative measure, a portable berm should be placed along the outside of the containment grate so that any runoff is directed towards the floor drain near the loading door. As needed, remove any water in the sump by using a Shop Vac or hand pump. Dispose of the water into the floor sump, which is pumped to T-1.
   - DO NOT USE THE SHOP VAC TO CLEAN-UP CONCENTRATED SULFURIC ACID

- THOROUGHLY RINSE THE SHOP VAC WITH WATER WHEN DONE.

5. The hose from the drum pump to the acid storage tank is constructed of Teflon that is resistant to concentrated sulfuric acid. Before using the drum pump, inspect the hose for signs of deterioration (swelling, discoloration, cracking), kinking, or leaks.

6. Empty acid drums should be resealed, and taken over to the floor sump where their exterior surfaces can be hosed off to remove any acid splatters or drips. The clean, sealed drums can be placed outdoors while awaiting pick-up by the chemical supply company.

   - DO NOT HOSE OR RINSE THE INTERIOR OF THE DRUM
   - DO NOT PUT DRUMS OUTDOORS THAT ARE NOT SEALED, AND HAVE NOT HAD THEIR EXTERIOR THOROUGHLY RINSED

7. Mixer MX-1 is operated in a forward direction at 1,750-RPM (maximum speed) using the variable speed drive located on the rear of the control cabinet. Speed is adjusted by using the up/down arrow keys on the VSD while the mixer is running. On a regular, basis the mixer operation should be checked by observing that it is running, and by opening up the tank cover to confirm that Tank T-1 is well mixed.

8. On a weekly basis, the flow contribution from S-1, S-2, S-3, and S-4 should be checked and confirmed. Check S-1, S-2, S-3, and S-4 to see that they are contributing approximately 3 to 5 gpm each. This can be done by manually turning each sump off one at a time at the MCC while observing the flow meter output, or by observing the flow entering Tank T-1. If a sump is not putting out the correct flow, and the sump is not dry, then adjust the sump flow in accordance with SOP-2.

9. On a weekly basis, the hand-held pH meter should be used to check the calibration of the pH controller, AIC 121. This is performed by calibrating the hand-held pH meter in accordance with its operating instructions. The pH in tank T-1 should be measured with the hand-held meter and compared to the pH controller reading. If the pH in tank T-1 as recorded by the pH controller is within 0.1 pH units of the hand held pH meter reading, then the controller calibration is acceptable. If the difference is 0.1 pH units or greater, then the pH controller should be recalibrated in accordance with SOP-6. Alternatively, AIC-121 can be placed in the pH 2 buffer and the same analysis performed.

10. As needed, decant water from the internal oil holding tank of the oil water separator. The water is decanted to the floor sump by opening Valve 11, and allowing it decant until water is no longer visibly clear. Do not allow oil to drain into the floor sump. When the decant is completed, run tap water into the floor sump for a sufficiently long time so that the sump pump turns on and empties the sump. This water is all directed to tank T-1. If there is excessive water in the oil holding tank, adjust the slotted skimmer in OWS-1 slightly upwards.

11. On a bi-weekly basis, skim oil from the OWS by rotating the slotted skimmer pipe down to the water surface, and manually skimming the oil from the surface into the skimmer. Be careful not to splash contents of the OWS. Use a "paddle-like" device to accomplish this. When done, return the skimmer slot to a vertical position.

12. As needed, order acid supplies, pH buffers, and arrange for oil disposal. As needed, decant water from the LNAPL storage tank ST-3 by using Valve 14 and a flexible hose to decant water to the floor sump. When the decant is completed, run tap water into the floor sump for a sufficiently long time so that the sump pump turns on and empties the sump.

SOP-4
GRANULAR ACTIVATED CARBON SYSTEM OPERATION

4.1 PURPOSE

The purpose of this section is to describe the granular activated carbon (GAC) treatment system that is used to treat the water from sumps S-1, S-2, S-3, and S-4, following acidification and oil removal. This section includes a discussion of PST-1 which pumps the discharge from OWS-1 to the GAC filters, the activated carbon contactors (CC-1 and CC-2), and the pre- and post-filters that are used to remove particulates prior to, and after GAC treatment, respectively.

4.2 RELATED SECTIONS

1. SOP-1 SYSTEM START-UP FROM A SHUT-DOWN MODE
2. SOP-3 ACIDIFICATION PRETREATMENT SYSTEM OPERATION
3. SOP-5 EQUALIZATION TANK OPERATION
4. SOP-7 COMPLIANCE SAMPLING FROM THE TREATMENT FACILITY EFFLUENT
5. SOP-8 SYSTEM SHUT-DOWN
6. SOP-10 ROUTINE OPERATION, MAINTENANCE, AND RECORDKEEPING

4.3 STANDARD OPERATING PROCEDURE

4.3.1 PST-1

PST-1 has two pumps, each of which is throttled back so that each pumps approximately 15 gpm. The pumps alternate operation so that pump life is equally balanced between the two pumps. PST-1 has four ultrasonic level switches installed to control the operation of the pumps. The lowest switch turns off all pumps, the first high switch turns on the lead pump (the lead pump alternates between each cycle), the second high switch turns on the lag pump (the lag pump also alternates between each cycle), and the high-high switch is the high alarm. The high-high switch triggers a horn alarm at the PST-1 control panel which is located in the control room, and turns off S-1, S-2, S-3, and S-4. When the high-high condition no longer exists, these same sumps are turned back on. Each of the two pumps are significantly throttled back so that each pump's output is approximately 15 gpm. The pumps are throttled with valves 19 and 20. Once the system is operational, the following procedures should be followed on an ongoing basis.

1. If necessary, adjust the throttling valve located adjacent to each pump (Valve 19 and 20) to maintain the flow at 15 gpm. Note that as head loss builds up in the pre-filter, the throttling valves will have to be opened up to overcome the increased head loss, to maintain the flow at 15 gpm. Do this for both pumps. Record the flow rates on the daily operation log.
2. On a daily basis, verify that the lead pump is alternating between each cycle.
3. On a weekly basis, verify the operation of the entire PST-1 pump station including:

- Verify operation of lead and lag pump by turning off the lead pump using the local switch mounted on the equalization tank, and observing that the lag pump comes on when the level reaches the second high switch. Do this for two pump cycles so that the lag function of both pumps are checked and confirmed to be operational.
- Verify the operation of the high level alarm and cutoff by turning off both pumps at the local hand switch, and observing that when the water reaches the high-high switch, that the alarm on the panel sounds, and that S-1, S-2, S-3, and S-4 are all shut off. (To confirm that these sumpsare turned off, observe that the "on" lights on the main control panel all switch to "off" when the alarm is tripped.)
- Verify that the high level alarm is tripped just **before** the water level reaches the high level overflow to the floor sump. This will ensure that whenever water is flowing through the high level overflow, that the alarm is tripped.

4.3.2 Pre-Filter and Post-Filter

Flow from PST-1 passes through a bag filter (pre-filter) to remove any particulate from the water prior to passing through CC-1. The pre-filter can utilize a number of different pore size filters. Currently, a 10-micron bag filter is being used. After the pre-filter, the flow passes through CC-1, and CC-2, and then through a second bag filter (post-filter) that will collect any carbon particles or carbon fines that are washed out of CC-2. The post-filter also uses a 10-micron bag filter.

The maximum recommended pressure differential across the pre- and post-filter is 15 psig. The pre-filter has a pressure gauge before (labeled pre-filter) and after (labeled CC-1). The difference between the inlet and outlet pressure is used to monitor the headloss buildup in the pre-filter. When the difference is 15 psig or greater, the pre-filter should be changed. The post-filter only has a pressure gauge before it (Labeled Post-filter). The outlet pressure on the post-filter can be assumed to be zero. Therefore the pressure gauge reading on the inlet can be assumed to represent the differential across the post-filter. The post filter should be changed when the pressure gauge preceding it exceeds 15 psig. Once this system is operational, the following routine procedures should be practiced:

1. On a daily basis, monitor and record the pressure gauge readings on the daily operating log. The gauges are labeled pre-filter and post-filter, based on the equipment that the gauge precedes.
2. If the difference between the pre-filter and CC-1 exceeds 15 psig then this filter needs to be changed. To change the pre-filter perform the following:
   - Turn off, S-1, S-2, S-3, and S-4 by turning off the corresponding breakers on the MCC.
   - Allow the oil/water separator to stop flowing into PST-1. If PST-1 turns on, allow it to pump itself down to the low level and then shut off automatically.

- Turn off the two PST-1 pumps by manually operating the two on/off switches located adjacent to PST-1.
- Put acid resistant gloves and safety glasses with side shields on. All water in PST-1, the pre-filter, CC-1 CC-2, and the post-filter, is at pH 2.0.
- Close the inlet and outlet valve from the pre-filter (Valves 21 and 23).
- Bleed the pressure off the pre-filter by opening the cock on the top of the pre-filter.
- Drain the pre-filter by opening the drain valve (Valve 31).
- Open up the pre-filter by unscrewing the top of the filter in a counterclockwise direction.
- Remove the bag retainer, and lift the bag out by the handle.
- Drain the dirty bag for a minimum of 24 hours by hanging it over the floor sump, and then put the bag filter into the process waste drum. Seal the process waste drum when done.
- Install a new bag filter into the pre-filter.
- Fill the pre-filter housing with tap water from the sink as full as possible.
- Place the bag retainer back into the pre-filter and put the top back on the pre-filter. The top is turned clockwise to seal. Be careful to not crossthread the top, and be careful that O-rings are not dislodged.
- Open the pre-filter outlet valve (Valve 23) and open the cock to dispel any air from the filter.
- Open the pre-filter inlet valve (Valve 21).
- Turn on the two PST-1 pumps by manually operating the two on/off switches located adjacent to PST-1.
- Turn on S-1, S-2, S-3, and S-4 by turning on the corresponding breakers on the MCC.
- Bleed air from the pre-filter by opening the cock on the top of the pre-filter until water comes out.
- Verify proper operation of the entire acidification system
- Take new readings on the 4 pressure gauges and record the new results on the daily operational log. There will be two sets of pressure gauge readings. Make a note that the pre-filter was changed in the comments column of the daily operational log.

3. If the post-filter pressure gauge reads greater than 15 psig, then this filter needs to be changed. To change the post-filter, perform the following:

   - Turn off S-1, S-2, S-3, and S-4 by turning off the corresponding breakers on the MCC.
   - Allow the oil/water separator to stop flowing into PST-1. If PST-1 turns on, allow it to pump itself down to the low level and then shut off automatically.
   - Turn off the two PST-1 pumps by manually operating the two on/off switches located adjacent to PST-1.

- Put acid resistant gloves and safety glasses with side shields on. All water in PST-1, the pre-filter, CC-1 CC-2, and the post-filter, is at pH 2.0.
- Close the inlet and outlet valve from the post-filter (Valves 26 and 28).
- Bleed the pressure off the post-filter by opening the cock on the top of the post-filter.
- Drain the post-filter by opening the drain valve (Valve 32).
- Open up the post-filter by unscrewing the top of the filter in a counterclockwise direction.
- Remove the bag retainer, and lift the bag out by the handle.
- Drain the dirty bag for a minimum of 24 hours by hanging it over the floor sump, and then put the bag filter into the process waste drum. Seal the process waste drum when done.
- Install a new 10-micron bag filter into the post-filter.
- Fill the post-filter housing with tap water from the hose as full as possible.
- Place the bag retainer back into the post-filter and put the top back on the post-filter. The top is turned clockwise to seal. Be careful to not crossthread the top, and be careful that O-rings are not dislodged.
- Open the post filter outlet valve (Valve 28) and open the cock to dispel any air from the post-filter.
- Open the post-filter inlet valve (Valve 26).
- Turn on the two PST-1 pumps by manually operating the two on/off switches located adjacent to PST-1.
- Turn on S-1, S-2, S-3, and S-4 by turning on the corresponding breakers on the MCC.
- Bleed air from the pre-filter by opening the cock on the top of the pre-filter until water comes out.
- Verify proper operation of the entire acidification system
- Take new readings on the 4 pressure gauges and record the new results on the daily operational log. There will be two sets of pressure gauge readings. Make a note that the post-filter was changed in the comments column of the daily operational log.

4. As needed order new bag filters to maintain stock at a one month minimum supply.

4.3.3 GAC Contactors (CC-1 and CC-2)

The carbon contactors are plumbed in series, and each carbon contactor contains approximately 2,000 pounds of activated carbon. CC-1 is equipped with a pressure gauge before (Labeled CC-1) and after (Labeled CC-2) the filter. CC-2 is also equipped with a pressure gauge before (Labeled CC-2) and after the filter (Labeled Post-filter). The difference between the inlet and outlet pressure is used to monitor the head loss buildup in the GAC filters. The maximum recommended operating pressure for the GAC filters is 25 psig. Therefore if either inlet pressure reaches 25 psig, the GAC filter will need to be changed regardless of the condition of the GAC. Do not attempt to operate the GAC filters without the pre- and post-filters in place and

operational. Operation without the pre-filter will lead to shortened GAC life. Operation of the GAC filters without the post-filter may result in loss of GAC that contains contaminants. This section describes operation of the system once it is started up.

1. On a daily basis, monitor and record the pressure gauge readings on the daily operating log. The gauges are labeled: CC-1 and CC-2; based on the equipment that the gauge precedes.
2. On a weekly basis, vent any accumulated air in the carbon filters by opening the air vent valves located at the top of each column. Any water that is released is discharged into tank T-1.
3. On a monthly basis, sample the effluent from CC-1 (the lead column) for PCB concentration by taking a sample from the sample port labeled Valve 24. Allow the water to flush the sample tap for approximately 30 seconds before collecting a sample.
4. Change-out of the GAC in the lead column is required when either 1) detectable levels of PCBs are measured in the effluent from the lead column, or 2) operating pressure in the column exceeds 25 psig. Note that only one GAC column (lead column) at a time will require change-out. The GAC in the lead column will be replaced, and this column will become the lag column, while the existing lag column will become the lead column. The piping for the GAC system was not designed to allow switching of the lead/lag role of the GAC columns. There are three options for reversing the lead/lag role of the carbon canisters. The first one is to physically switch the position of the two canisters. The second option is to re-pipe the carbon canisters, and pre- and post-filters; and the third option is to switch the carbon from CC-2 to CC-1 after the carbon in CC-1 is removed. For this procedure, it is assumed that item 1, to switch the physical position of the columns, will be implemented. To perform a GAC change-out, the following procedures should be followed.
    - Order and have available 2,000 pounds of activated carbon suitable for adsorption of PCBs and continuous operation at pH 2.0.
    - Turn off the entire treatment process following a routine shut-down as discussed in SOP-8. This entire procedure will likely require five days to implement, and restart the system.
    - Drain both carbon canisters by opening the bottom drain valve. Draining will require an overnight period.
    - Disassemble the piping that connects to each column, and remove enough piping, pipe supports, and possibly the pre- and post-filter (as necessary) so that the carbon canisters can be switched using a fork truck.
    - Have the carbon removed from the lead carbon canister by a contracted company using a vacuum. The carbon should be placed into 55 gallon drums for disposal.

- Rent or otherwise procure the services of a fork-truck and operator that are capable of lifting and switching the canisters. Each canister and platform weighs 2,300 pounds (dry) and likely weighs 5,000 pounds when wet (drained). Note that there is limited maneuvering room in the treatment building.
- Switch the two carbon canisters. Note that the entire skid should be moved, not just the FRP carbon column.
- Refill the lag carbon canister with the new granular activated carbon. Wear respiratory protection to prevent breathing of carbon dust. To refill the GAC canister will require the use of a fork truck to elevate the bags of GAC as they are dumped into the carbon canister.
- Reconnect the piping, pipe supports, pre- and post-filters, and GAC canisters.
- Follow the carbon supplier's instructions to place the carbon filters back into service. Allow at least two days for the carbon to degas prior to attempting to restart the GAC filters.

SOP-5
EQUALIZATION TANK OPERATION

5.1 PURPOSE

The purpose of this section is to describe the operation of the equalization tank (T-2). In the equalization tank, flow from the oil removal/GAC system (S-1, S-2, S-3. S-4) is treated with caustic to bring the pH from 2 to within. the sewer use ordinance limits of 5.5 to 9.5. The pH of the combined flow is monitored and controlled in the equalization tank by AIC 131. AIC-131 controls acid and caustic addition systems to maintain the pH to within preset limits of 5.75 to 9.0. Sulfuric acid (93 percent) is used to lower the pH and sodium hydroxide (50 percent) is used to raise the pH. Normally, only sodium hydroxide is required due to the low pH of the acidified water coming out of the GAC system.

5.2 RELATED SECTIONS

1. SOP-1 SYSTEM START-UP FROM A SHUT-DOWN MODE
2. SOP-2 FLOW METER OPERATION, FLOW BALANCING, AND FLOW ADJUSTMENT
3. SOP-3 ACIDIFICATION PRETREATMENT SYSTEM OPERATION
4. SOP-4 GRANULAR ACTIVATED CARBON SYSTEM OPERATION
5. SOP-6 ACID AND CAUSTIC SYSTEM CALIBRATION AND CONTROL
6. SOP-7 COMPLIANCE SAMPLING FROM THE TREATMENT FACILITY EFFLUENT
7. SOP-8 SYSTEM SHUT-DOWN
8. SOP-10 ROUTINE OPERATION, MAINTENANCE, AND RECORDKEEPING

5.3 STANDARD OPERATING PROCEDURE

Once the equalization tank is running, the operational procedures listed below should be followed.

1. The acid tank ST-1 feeds the acid pump CP-2. As per SOP-3, check the volume of acid remaining in acid tank ST-1, and add acid as necessary.
2. On a daily basis, check the volume of caustic remaining in caustic tank ST-4, and record the volume on the daily log. A200-gallon storage tank, ST-4, is used to store 50 percent sodium hydroxide. Note that 50 percent sodium hydroxide will solidify at 54°F; therefore, during cold months, the building temperature should be maintained at 65°F.
3. As necessary, add caustic to ST-4 using the dedicated caustic drum pump and full protective gear (face shield, apron with sleeves, caustic resistant gloves, and safety boots). Before transferring caustic, check the drum label to verify that the contents are 50 percent sodium hydroxide. The caustic drum pump has a specially equipped plug to fit into the explosion proof receptacle located on the platform. Pump the drum as empty as possible by tipping the drum to get at the drum heel. When finished transferring the drum contents, leave the drum pump in the drum to drain for 5 minutes before moving

the drum pump to the next drum. When finished, allow the drum pump to drain for 5 minutes in the drum, and then put the drum pump in the specially labeled 5 gallon pail that is used to store the drum pump. Regularly check the 5-gallon pail for accumulations of caustic. Carefully pour any accumulated caustic into tank T-2. Clean up all residues of caustic remaining on the gloves, apron, or work surfaces (floor, stair platform or railing, etc.) by flushing with water for 5 minutes. Record the volume of caustic added to ST-4 in the daily log, along with the new ST-4 tank reading.

4. Observe the following cautions while handling or transferring caustic:

   - **DO NOT ALLOW THE DRUM PUMP TO RUN UNATTENDED.**
   - **ALWAYS WEAR FULL PROTECTIVE GEAR WHEN WORKING WITH SODIUM HYDROXIDE.**
   - **DO NOT TOUCH THE DRUM PUMP RISER TUBE AS IT WILL CONTINUE TO HOLD CAUSTIC.**
   - **DO NOT FLUSH OR RINSE THE DRUM PUMP WITH WATER.**
   - **DO NOT EVER PLACE THE DRUM PUMP IN WATER.**
   - **DO NOT USE THE DRUM PUMP TO PUMP ANY OTHER FLUID OTHER THAN 50 PERCENT SODIUM HYDROXIDE.**

5. Keep all full caustic drums, drip pail, and drum pump within the caustic containment area. Keep the containment sump dry, and on a monthly basis, check the sump for evidence of leaks or spills by measuring the pH of any water in the sump. As needed, remove any water in the sump by using a Shop Vac or hand pump. Dispose of the water into the floor sump, which is pumped to Tank T-1.

   - **DO NOT USE THE SHOP VAC TO CLEANUP CONCENTRATED SODIUM HYDROXIDE.**
   - **THOROUGHLY RINSE THE SHOP VAC WITH WATER WHEN DONE.**

6. Empty caustic drums should be resealed, and taken over to the floor sump where their exterior surfaces can be hosed off to remove any caustic splatters or drips. The clean, sealed drums can be placed outdoors while awaiting pick-up by the chemical supply company.

   - **DO NOT HOSE OR RINSE THE INTERIOR OF THE DRUM.**
   - **DO NOT STACK EMPTY DRUMS MORE THAN TWO (2) HIGH.**
   - **DO NOT PUT DRUMS OUTDOORS THAT ARE NOT SEALED, AND HAVE NOT HAD THEIR EXTERIOR THOROUGHLY RINSED.**
   - **ALWAYS TIE DRUMS OFF WHEN STORED OUTDOORS.**

7. Mixer MX-2 is operated at 1,750 RPM, in a forward direction. The variable speed drive, located at the rear of the control cabinet has been by-passed. On a daily basis, the mixer

operation should be checked by observing that it is running, and by observing tank T-2 to confirm that the tank is well mixed.

8. On a weekly basis, the hand-held pH meter should be used to check the calibration of the pH controller, AIC 131. This is performed by calibrating the hand-held pH meter at pH 7 and pH 4 in accordance with its operating instructions. The pH in tank T-2 should be measured with the hand-held meter and compared to the pH controller reading. If the pH in tank T-2, as recorded by the pH controller, is within 0.2 pH units of the hand-held pH meter reading, then the controller calibration is acceptable. If the difference is 0.2 pH units or greater, then the pH controller should be recalibrated in accordance with SOP-6. Alternatively, immerse the probe in a pH-7 buffer solution and read the pH at the main control panel as a means to double-check the hand held meter. When doing this, turn off the shunts in the circuit breaker box (LP-13 and LP-15) so the system is not shut down. Also, turn off the corresponding chemical feed pump using LP-16. Turn the shunts and pump back on when the test is complete.

9. On a weekly basis, remove the pH probe from tank T-2 and clean the surfaces of the probe using a gentle stream of water directed at the probe surfaces, and the probe membrane (on the tip of the probe). Wipe the body of the probe with a paper towel, but only blot the probe membrane. Soak the probe for 5 minutes in a muriatic acid solution prepared in accordance with the probe manufacturer's recommendations. To avoid shutting down the process while the probe is soaking, turn off the shunts (LP-13 and LP-15) and the caustic feed pump (CP-3) at LP-16. Rinse the probe thoroughly with tap water and then distilled water before placing it back into service. Remember to turn on the shunts and CP-3. For additional information on the pH controller and pH probe, refer to SOP-6.

    - **DO NOT WIPE THE PROBE MEMBRANE.**

10. On an as needed basis, hose down the interior of the equalization tank to remove any accumulations at or above the waterline.

11. As needed, order caustic supplies.

SOP-6
ACID AND CAUSTIC SYSTEM CALIBRATION AND CONTROL

6.1 PURPOSE

The purpose of this section is to describe the operation of the caustic metering pumps and controllers. There are two separate controllers.

- AIC 121 controls the acid addition pump (CP-1) that adds 93 percent sulfuric acid to the acidification tank (T-1), and maintains a set pH of 1.9 to 2.0.
- AIC 131 controls the acid and caustic addition pumps (CP-2 and CP-3, respectively) that add 93 percent sulfuric acid and 50 percent sodium hydroxide, respectively, to the equalization tank (T-2) and maintains the pH between the range of 5.75 to 9.

6.2 RELATED SECTIONS

1. SOP-1 SYSTEM START-UP FROM A SHUT-DOWN MODE
2. SOP-3 ACIDIFICATION PRETREATMENT SYSTEM OPERATION
3. SOP-5 EQUALIZATION TANK OPERATION
4. SOP-8 SYSTEM SHUT-DOWN
5. SOP-10 ROUTINE OPERATION, MAINTENANCE, AND RECORDKEEPING

6.3 STANDARD OPERATING PROCEDURE

In this section, routine operating procedures are presented that are to be used on a continuing basis for AIC-121, AIC-131, and chemical feed pumps CP-1, CP-2, and CP-3.

6.3.1 Acidification Tank Controller (AIC-121)

Note that this controller only adds sulfuric acid. Therefore any references to base addition are not used. The setpoints that are programmed into AIC-121 are listed below.

Parameter	Value
Access Code	314
Lower Set Point	1.5
Upper Set Point	2.0
High Alarm	3.0
Low Alarm	1.0
Max Delta pH	0.2
Max Pump On	6000
Max Acid strokes per minute (SPM)	100
Max Base SPM	100
Delta pH Max SPM	0.1
4 mA output	4.0

20 mA output	10.0

1. To calibrate AIC-121, perform a one-point calibration at pH 2 using a standard pH buffer solution. It is necessary to remove the pH probe from the tank by unbolting the flange at the top of the tank. The probe should then be dried, rinsed with distilled water, and the length of the probe dried so that process water does not contaminate the pH buffer. The probe needs to be supported from the platform railing while it is immersed in the pH buffer solution. Check the temperature of the buffer solution and enter it at the appropriate prompt. Immerse the probe in the pH 2 buffer, then enter the calibration mode on AIC-121. Note that AIC -121 is panel mounted on the main control panel. Follow the prompts on the pH controller. Double-check the pH in the pH 2 buffer. If the difference between the known pH 2 buffer and the control panel reading is greater than 0.07 pH units, the probe needs to be cleaned using a 5 percent HCl solution to remove inorganic buildup and/or isopropyl alcohol (rubbing alcohol) or detergent to remove organic film buildup. If the pH probe cannot be restored to within 0.07 pH units, the probe will need to be replaced.

6.3.2 Chemical Feed Pump CP-1

This pump delivers 93 percent sulfuric acid to tank T-1. The control knobs on the pump are set at 60 percent of stroke length and speed is set to external control meaning that CP-1's speed is under the control of AIC-121. With the set points listed in Section 6.3.1, the stroke rate for CP-1 will be as follows:

pH	CP-1 Stroke Speed Strokes per Minute
<= 2.00	0
>= 2.01	100

6.3.3 Equalization Tank Controller (AIC-131)

The following are the setpoints for important parameters that are programmed into AIC-131:

Parameter	Value
Access Code	314
Lower Set Point	7.00
Upper Set Point	9.0
High Alarm	9.5
Low Alarm	5.5
Max Delta pH	0.1
Max Pump On	1800
Max Acid strokes per minute (SPM)	100
Max Base SPM	100
Delta pH Max SPM	0.2
4 mA output	4.0
20 mA output	10.0

1. To calibrate AIC-131, perform a two point calibration at pH 4 and 7 using standard pH buffer solutions. It is necessary to raise the pH probe from the tank by loosening the two U-bolt connectors holding the probe in the tank. The probe should then be dried, rinsed with distilled water, and the length of the probe dried so that process water does not contaminate the pH buffer. Immerse the probe in a pH 7 buffer, then enter the calibration mode on AIC-131. Note that AIC-131 is mounted on the main control panel. Follow the prompts from the pH controller then rinse and dry the pH probe again before inserting it into the pH 4 buffer. Again, follow the prompts from the pH controller. When the calibration is complete, the controller will provide the percent error of the slope adjustment from theoretical. If the error is greater than 30 percent, the probe needs to be cleaned using a 5 percent HCl solution to remove inorganic buildup and/or isopropyl alcohol (rubbing alcohol) or detergent to remove organic film buildup. If the pH probe cannot be restored to within a 30 percent slope adjustment, the probe will need to be replaced. Note that due to iron and sulfides in the groundwater, the pH probe's response becomes slow. This will necessitate changing the probe approximately every two months.

2. Upon completion of the calibration, replace the probe in the tank and fasten the two U-bolts. Re-check the pH using a calibrated hand-held pH meter to insure that the pH display on the controller is within 0.2 pH units of the hand-held pH meter reading.

3. Note that the low and high alarm set points on the controller activate relays that trigger the main alarm panel. Either a high or low alarm shuts down all recovery wells and sumps by tripping Shunts A and B. To reset this alarm condition, operator attention is required. The alarm must be acknowledged at the alarm control panel. Diagnose and correct the problem that caused the alarm. Likely causes for low pH are: tank ST-4 is empty or a malfunctioning caustic feed pump CP-3 AIC-131 is then re-started by entering the access code (314) into AIC-131 and pressing run.

6.3.4 Chemical Feed Pump CP-2

This pump delivers 93 percent sulfuric acid to tank T-2. The control knobs on the pump are set at 100 percent of stroke length and speed is set to **external** control meaning that CP-2's speed is under the control of AIC-131. With the set points described in the previous section, the stroke rate for CP-1 will be as follows:

pH	CP-2 Stroke Speed Strokes per Minute
<= 9.00	0
>= 9.01	100

6.3.5 Chemical Feed Pump CP-3

This pump delivers 50 percent sodium hydroxide to tank T-2. The control knobs on the pump are set at 100 percent of stroke length and speed is set to **external** control meaning that CP-3's speed is under the control of AIC-131. With the set points described in the previous section, the stroke rate for CP-1 will be as follows:

pH	CP-3 Stroke Speed Strokes per Minute
> = 5.75	0
<= 5.74	100

SOP-7
COMPLIANCE SAMPLING FROM THE TREATMENT FACILITY EFFLUENT

7.1 PURPOSE

The purpose of this section is to describe procedures for the collection of samples in accordance with the facility's "Industrial Sewer Connection Permit" (Appendix A). This SOP has been updated to reflect the discharge permit that was issued by the Town of Tonawanda effective January 1, 2006.

7.2 RELATED SECTIONS

1. SOP-2 FLOW METER OPERATION, FLOW BALANCING, AND FLOW ADJUSTMENT
2. SOP-4 FOR MONITIORING PCB'S BETWEEN CARBON COLUMNS
3. SOP-5 EQUALIZATION TANK OPERATION
4. SOP-8 SYSTEM SHUT-DOWN
5. SOP-10 ROUTINE OPERATION, MAINTENANCE, AND RECORDKEEPING

7.3 STANDARD OPERATING PROCEDURE

The discharge permit defines two monitoring locations: ML-1 and ML-2 as follows:

ML-1 is the outlet from the two carbon columns following oil/water separation but prior to entering the equalization tank. Samples from ML-1 are collected from Valve 25 by opening the valve and filling the sample bottles. Prior to collecting the sample, the sample tap is flushed for approximately 30 seconds by opening the valve and allowing the sample to flush the tap.

ML-2 is the discharge point of to the Town sewer. Samples from ML-2 are collected using the ISCO sampler. The sample strainer for the ISCO sampler is installed in the equalization tank just prior to overflowing the weir. Prior to collecting samples from ML-2 the ISCO pump is operated in reverse to purge the sample strainer, then in forward to flush the sample tube, and then in reverse to purge the sample tube. Then the pump is operated manually in forward while holding the sample bottle beneath the sampler discharge tube. Alternatively, grab samples are taken by dipping the sample container in the flow just before the weir.

In addition, the discharge permit includes provisions for monitoring of recovered oil. The purpose of this monitoring requirement is to determine the PCB content of the recovered oil, and to determine when oil is no longer being recovered. Because the volume of recovered oil is small, and does not require monthly disposal, a "fresh sample" of recovered oil is best collected from the "oil side" of the oil/water separator in the vicinity of the oil/water separator skimmer pipe. Normally there is a sheen to 1/8 inch thick layer of oil on the "oil side" of the oil/water separator. The sample of recovered oil will be collected by skimming a sample of oil from the surface of the oil/water separator by dipping a clean beaker into the separator, approximately

1/8th inch, so that as much free oil is collected in the sample bottle as possible. The oily water from the beaker is then transferred into a sample bottle. Record the estimated percentage of oil present in the sample on the chain of custody record. The reported laboratory PCB value will then be adjusted to reflect the concentrations in the oil phase only.

7.3.2 Permit Monitoring Requirements

A summary of required chemical analytical samples and analysis for the treatment plant is provided in Table 2.2 of Volume I. Samples are collected from the treatment plant on the following schedule:

- Monthly: PCB arochlors from sampling points ML-1, ML-2, and between carbon vessels. PCB arochlors from a skimmed oil sample, collected from the oil/water separator. Oil and grease from ML-1 and ML-2.
- Semi-annually (Janaury and July): In addition to PCBs and oil and grease as described above, TSS, BOD, iron, phosporus, and zinc.
- Annually (November): In addition to PCBs and oil and grease as described above, list of 126 priority pollutants.

7.3.2.1 Monthly Sampling

Since a sample between the GAC contactors is not required for compliance, it is not discussed in detail in this section. Refer to SOP-10 for collecting samples between the GAC contactors. Procedures for compliance sampling are as follows:

1. Arrange with the contract laboratory to have pre-preserved sample bottles, chain-of-custody forms, sample coolers, and packaging materials delivered to the Parsons office.
2. Schedule a sample pick-up with the contract laboratory at least 24 hours prior to sampling. This will ensure that the lab has someone available the day the pick-up is needed.
3. Fill in the sample date, time, and sampler's initials on the bottle labels using a fine point indelible ink marker. Cover the label with clear plastic packaging tape that encircles around the bottle and overlaps at least 2 inches.
4. Collect the samples at ML-1, ML-2, and the recovered oil from the oil/water separator.
5. Complete the chain-of-custody form.
6. Pack the samples in the laboratory provided coolers using laboratory provided packaging materials. Ice the samples by using gallon-size Ziplock bags filled with ice cubes (double bagged). The samples should be maintained at 4°C. Samples are to be picked up by laboratory personnel at the Parsons office on the same day the samples are collected.

7. If sample chain of custody does not have carbon copies, make a photo copy of the chain after the sample pick-up personnel relinquish it, but before the cooler leaves the premises.

7.3.2.2 Semi-Annual Sampling

A semi-annual (July and January) flow proportional composite sample is collected from ML-2 for BOD, TSS, total phosphorous, zinc, and iron. This sampling event should be conducted in conjunction with a monthly sampling event to minimize sample shipping. Procedures are as follows:

1. Arrange with the contract laboratory to have pre-preserved sample bottles; chain-of-custody forms, sample coolers and, packaging materials, delivered to the Parsons office.
2. Schedule a sample pick-up with the contract laboratory at least 24 hours prior to sampling. This will ensure that the lab has someone available the day the pick-up is needed.
3. Program the automatic composite sampler to collect a flow proportional composite sample. The sampler should be programmed to collect a sample approximately every 20 minutes. This can be achieved by dividing the typical daily flow by 72 (there are 24 X 3 = 72 20-minute intervals in a 24-hour period) and programming the sampler to sample every time this increment of flow is obtained.
   - For example, if the typical daily flow is 100,000 gallons per day, then the sampler should be programmed to sample every 1400 gallons.
   - The ISCO sampler has two 9,450 milliliter sample bottles in it. The sampler should be programmed to multiplex the samples by putting a sample aliquot into each bottle every time it collects a sample. At the end of 24 hours, both 9,450 milliliters bottles will contain an equivalent composite sample. The sample aliquot volume is 125 milliliters (9,450 divided by 72, rounded down to a convenient number).
4. Once the sampler is started, observe the sampler to ensure that it is collecting the right volume of sample at the appropriate interval, into the appropriate bottle.
5. When 24 hours has passed, the sampler will stop automatically. Complete the sample bottle label by filling in the sample date, time, and sampler's initials on the bottle labels using a fine point indelible ink marker. Cover the label with clear plastic packaging tape that encircles the bottle and overlaps itself at least 2 inches. Pour the collected sample (from either of the two 9,450 milliliters bottles) into the sample bottles for shipment to the laboratory.
6. Complete the chain-of-custody form.
7. Pack the samples in the laboratory provided coolers using laboratory provided packaging materials. Ice the samples by using the laboratory provided ice packs (if kept frozen) or by using gallon size Ziplock bags filled with ice cubes (double bagged). The samples should be maintained at 4°C. Samples are to be picked up by laboratory personnel at the Parsons office on the same day the samples are collected.

8. If sample chain of custody does not have carbon copies, make a photocopy of the chain after sample pick-up relinquishes it but before the cooler leaves the premises.

7.3.2.3 Annual Sampling Event

Once each year (November) one composite sample is collected from ML-2 for 126 priority pollutants. Dioxin and asbestos are specifically excluded (see Appendix XX of Volume I for list). This sampling event should be conducted simultaneously with a monthly event to minimize sample collection effort. Procedures are as follows:

1. Arrange with the contract laboratory to have pre-preserved sample bottles, chain-of-custody forms, sample coolers, and, packaging materials delivered to the Parsons office.
2. Schedule a sample pick-up with the contract laboratory at least 24 hours prior to sampling. This will ensure that the lab has someone available the day the pick-up is needed.
3. Program the automatic composite sampler to collect a flow proportional composite sample. Follow the procedures presented in Section 7.3.2.2 to program the sampler.
4. Once the sampler is started, observe the sampler to insure that it is collecting the right volume of sample at the appropriate interval, into the appropriate bottle.
5. When 24 hours has passed, the sampler will stop automatically. Complete the sample bottle label by filling in the sample date, time, and sampler's initials on the bottle labels using a fine point Sharpie marker. Cover the label with clear plastic packaging tape that encircles the bottle and overlaps itself at least 2 inches. Pour the collected sample (from either of the two 9,450 ml bottles) into the sample bottles for shipment to the laboratory.
6. Complete the chain-of-custody form.
7. Pack the samples in the laboratory provided coolers using laboratory provided packaging materials. Ice the samples by using the laboratory provided ice packs (if kept frozen) or by using gallon size Ziplock bags filled with ice cubes (double bagged). The samples should be maintained at 4°C. Samples are to be picked up by laboratory personnel at the Parsons office on the same day the samples are collected.
8. If sample chain of custody does not have carbon copies, make a photo copy of the chain after sample pick-up relinquishes it, but before the cooler leaves the premises.

7.4 SELF MONITORING REPORT PREPARATION

In accordance with the facility's discharge permit Part III - Reporting Requirements, a monthly self-monitoring report must be prepared and submitted to the Town of Tonawanda. The report must contain analytical results, total monthly flows, and other information for the previous month specifically listed in the discharge permit. The report is due by the 25th of the month, following sample results (i.e. 25th of February for the January results).. Note that the flows should be reported by the 9th of each month by email to:

Bill Mucci (Town of Tonawanda Water Resource Department; Pretreatment Division,

Wastewater Treatment Facility) at bmucci@tonawanda.ny.us.

SOP-8
SYSTEM SHUT-DOWN

8.1 PURPOSE

The purpose of this section is to describe the shut down of the wells, sumps, and groundwater treatment system from an operating condition. Two levels of shut-down are described.

Routine Shut-down applies to periods up to one week, when non-freezing conditions are expected (temperatures > 40°F).

Extended Shut-down applies to longer periods, or when freezing conditions may be encountered (temperatures < 40°F).

8.2 RELATED SECTIONS

1. SOP-1 SYSTEM START-UP FROM A SHUT-DOWN MODE
2. SOP-2 FLOW METER OPERATION, FLOW BALANCING, AND FLOW ADJUSTMENT
3. SOP-3 ACIDIFICATION PRETREATMENT SYSTEM OPERATION
4. SOP-4 GRANULAR ACTIVATED CARBON SYSTEM OPERATION
5. SOP-5 EQUALIZATION TANK OPERATION
6. SOP-6 ACID AND CAUSTIC SYSTEM CALIBRATION AND CONTROL
7. SOP-10 ROUTINE OPERATION, MAINTENANCE, AND RECORDKEEPING

8.3 STANDARD OPERATING PROCEDURE

8.3.1 Routine Shut-down

During a routine shut-down, the following procedures should be enacted:

1. The following breakers on the MCC panel should be turned to the "off" position.
    - S-1
    - S-2
    - S-3
    - S-4
    - Clearwell Pump Panel (1 of 2)
    - Clearwell Pump Panel (2 of 2)
    - EQ. Tank Mixer MX-2
2. The following circuit breakers in the lighting panel should be turned to the "off" position.
    - LP-11 Acid Drum Pump
    - LP-13 Shunt Trip A
    - LP-15 Shunt Trip B
    - LP-16 Chemical feed pump CP-3

- LP-17 Chemical feed pump CP-1
- LP-18 Mixer MX-1
- LP-19 Chemical feed pump CP-2
- LP-20 Control Power for PST-1
- LP-22 Building Sump Pump
- LP-24 Building Sump Pump

3. Close the acid feed supply valves (Valves 33, 34, 35) at the base of the acid tank.
4. Close the caustic supply valve (Valves 42) on CP-3 inlet piping.

8.3.2 Extended Shutdown

During an extended shut-down the following procedures should be enacted:

1. The following breakers on the MCC panel should be turned to the "off" position.
   - S-1
   - S-2
   - S-4
   - S-3
   - Clearwell Pump Panel (1 of 2)
   - Clearwell Pump Panel (2 of 2)
2. The following circuit breakers in the lighting panel should be turned to the "off" position.
   - LP-10 FE-126
   - LP-11 Acid Drum Pump
   - LP-12 FE-127
   - LP-13 Shunt Trip A
   - LP-14 FE-125
   - LP-15 Shunt Trip B
   - LP-17 Chemical feed pump CP-1
   - LP-18 Mixer MX-1
   - LP-20 Control Power for PST-1
   - LP-26 Composite Sampler
3. Drain the acidification tank (T-1) to the floor sump. Note that throughout this procedure water will be drained to the floor sump. The floor sump will be pumped to the equalization tank (T-2) by connecting a hose to Valve 47. Run the hose into the first compartment of the equalization tank, so that the flow can be pH neutralized. It is essential that all flows be pH neutralized to within 5.5 to 9.5 prior to discharging, so that the sewer use ordinance is not violated.
4. Skim any remaining oil in the oil/water separator into the oil/water separator oil holding tank by rotating the slotted oil skimmer pipe. Drain the oil/water separator via the solids flush connection (Valve 29) to the floor sump. Pump the floor sump to the first compartment of the equalization tank (T-2) for pH neutralization.

5. Drain the PST-1 clearwell sump by hand pumping residual water out of the tank. Note a hand pump will have to be inserted into the vent fitting in order to access the tank interior. Water should be drained to the floor sump and then discharged to the first compartment of the equalization tank for pH neutralization.
6. Drain the pre-filter and post-filter (Open Valves 31, 32 and air bleed cocks) to the floor sump, open the filters and remove the bag filters. Allow the bag filters to drain over the floor sump for 24 hours. When dry, place the bag filters into the process waste drum. All water that is drained to the floor sump should be discharged to the first compartment of the equalization tank for pH neutralization.
7. Drain the GAC columns to the floor sump by opening up the bottom drains (Valves 24 and 25) and opening the air vents at the top of the column. Water should be drained to the floor sump and then discharged to the first compartment of the equalization tank for pH neutralization.
8. Transfer the contents of the oil water separator oil holding tank to the LNAPL storage tank ST-3. This is done by draining the oil holding tank in the oil/water separator into a 5 gallon pail via the water decant valve of the oil holding tank (Valve 11). The 5 gallon pail can then be dumped into the top bung of the LNAPL storage tank ST-3.
9. The following breakers on the MCC panel should be turned to the "off" position.
    - EQ. Tank Mixer MX-2
10. The following circuit breakers in the lighting panel should be turned to the "off" position.
    - LP-16 Chemical feed pump CP-3
    - LP-19 Chemical feed pump CP-2
11. Close the acid feed supply valves (Valves 33, 34, 35) at the base of the acid tank.
12. Close the caustic supply valve (Valves 42) on CP-3 inlet piping.
13. Drain the equalization tank to the floor sump by opening the bottom drain valve (Valve 17). Pump the floor sump to the equalization tank (T-2) by connecting a hose to Valve 47. Run the hose from valve 47 into the final compartment of the equalization tank, which discharges directly to the sewer.
14. Remove any accumulated sediment in the acidification tank, oil/water separator, and/or equalization tank.
15. Hose out the acidification tank, oil/water separator, equalization tank, pre-filter, and post-filter and drain all flush water to the floor sump. Pump the floor sump to the final compartment of the equalization tank.
16. The following circuit breakers in the lighting panel should be turned to the "off" position.
    - LP-8 Instrument Panel
    - LP-22 Building Sump Pump
    - LP-24 Building Sump Pump

17. Break unions where necessary to drain all process piping at the low points to the floor sump. Pump the floor sump to the final compartment of the equalization tank.
18. If the treatment system will no longer be used, the chemical feed systems should be drained and decontaminated. Excess chemicals should be returned to the chemical supplier or otherwise disposed of.
19. Empty the acid and caustic containment areas of all liquid, and clean out any accumulated sediment.
20. Empty the floor sump and clean out all sediment.
21. Unplug the ISCO sampler, clean out the inside, leave door propped open ½ inch to prevent moisture buildup.
22. Characterize and dispose of any remaining oil in the LNAPL storage tank ST-3, accumulated sediment, and/or process waste.

SOP-9
ACCIDENTAL SPILL PREVENTION PLAN

9.1 PURPOSE

The purpose of this section is to comply with the Town of Tonawanda's Industrial Sewer Connection Permit issued for this facility which requires an accidental spill prevention plan be developed to eliminate or minimize the accidental or slug discharge of pollutants into the sewer system. With regards to this facility, the accidental spill prevention plan will address the accidental discharge of sulfuric acid, sodium hydroxide, and untreated groundwater.

9.2 RELATED SECTIONS

1. SOP-10 ROUTINE OPERATION, MAINTENANCE, AND RECORDKEEPING
2. SOP-5 EQUALIZATION TANK OPERATION
3. SOP-3 ACIDIFICATION PRETREATMENT SYSTEM OPERATION
4. SOP-6 ACID AND CAUSTIC SYSTEM CALIBRATION AND CONTROL

9.3 STANDARD OPERATING PROCEDURE

9.3.1 Accidental Discharge of Untreated or Partially Treated Groundwater

This section describes the conditions that could result in the accidental discharge of untreated or partially treated groundwater. For each scenario, a discussion of spill prevention measures is presented.

Prior to proceeding it is helpful to discuss the treatment facility's fail-safe measures. The table that follows presents a list of the facility's treatment alarms. The table also indicates the alarm action that is taken. The following are the possible alarm reactions:

Alarm Annunciator: The alarm panel blinks continuously until acknowledged. The horn has been disconnected because the facility is not manned continuously Shunt A: Trips all recovery wells (RW-1 through RW-11) and collection sumps (S-1 through S-4) so that they are turned off. The tripped items need to be manually reset at the MCC.

Shunt B: Trips the clearwell pump station (PST-1) breakers so that it is turned off. The tripped items need to be manually reset at the MCC.

Autodialer: Phones the treatment plant operator on the operator's pager (phone number 716-522-7705) every 5 minutes and provides a phone number message of 9374.

Condition	Alarm Reaction	Alarm Reset
Low pH in Equalization Tank (T-2) (pH < 5.75)	Alarm Annunciator, Shunt A is Tripped, Autodialer	Alarm must be acknowledged and tripped equipment manually reset..
High pH in Equalization Tank T-2 (pH > 9.0)	Alarm Annunciator, Shunt A is Tripped, Autodialer	Alarm must be acknowledged and tripped equipment manually reset.
Low pH in Acidification Tank (T-3) (pH <.1.00)	Alarm Annunciator, Shunt A is Tripped, Autodialer	Alarm must be acknowledged and tripped equipment manually reset..
High pH in Acidification Tank T-3 (pH > 3.0)	Alarm Annunciator, Shunt A is Tripped, Autodialer	Alarm must be acknowledged and tripped equipment manually reset.
LEL Warning (See Note) (LEL > 10 percent)	Alarm Annunciator	Alarm must be acknowledged.
LEL Danger (See Note) (LEL > 15 percent)	Alarm Annunciator, Shunt A and B are Tripped, Autodialer	Alarm must be acknowledged and tripped equipment manually reset.
Low Building Temperature (Temperature < 50 °F)	Alarm Annunciator, Shunt A is Tripped, Autodialer	Alarm must be acknowledged and tripped equipment manually reset.
HVAC Failure	Alarm Annunciator, Shunt A is Tripped, Autodialer	Alarm must be acknowledged and tripped equipment manually reset.
High-High in Building Floor Sump	Alarm Annunciator, Shunt A is Tripped, Autodialer	Alarm must be acknowledged and tripped equipment manually reset.
High-High in GAC Clearwell PST-1	Turns off, S-1, S-2, S-3, S-4 and annunciates (light and horn) at the PST-1 control panel.	When alarm condition no longer exists, the wells and sumps are turned back on and the annunciator is turned off. No acknowledgment is required.

NOTE: During the system start-up, significant baseline drift was encountered with the two LEL meters. As a result, to avoid unnecessary alarms, the LEL warning and danger setpoints have both been set to 100 percent until the problem is resolved.

In addition to these alarms, the treatment facility is equipped with separate secondary containments for storing acid and caustic supplies. The entire building also has secondary containment provided by a 6-inch high curb around the entire building perimeter.

9.3.1.1 Process Overflow or Leak

All floor drains in the treatment facility discharge to the building floor sump, which is automatically pumped back to the head of the acidification treatment process (Tank T-1). This flow is then treated by acidification, oil/water separation, and granular activated carbon. In the event the leak overwhelms the building sump, and/or the sump pump does not operate, a building sump high alarm will trip Shunts A and B which will turns off all recovery wells, sumps, and process equipment; and autodials an alarm condition. At this point all flow into the treatment facility will be turned off, and the process will sit idle until the operator responds to the alarm.

9.3.1.2 Discharge of Partially Treated Groundwater

It is possible that groundwater will pass through the treatment system untreated or partially treated. This could occur in the event the pH adjustment step of the acidification process fails, or the pH adjustment step of the equalization process fails. Any other failure would not cause untreated or partially treated water to be discharged.

9.3.1.2.1 Failure of the Acidification Process

Failure of the acidification process would occur under the following conditions:

1. Calibration error of the pH probe in Tank T-1 may lead to erroneous pH's and result in incomplete treatment. If for example the pH probe is reading 2.0 when the actual pH is 2.5, then incomplete emulsion breaking may be occurring. In this case the water is still receiving treatment from the activated carbon contactors, which should provide for complete PCB removal. This situation, however, will result in oil and grease loading onto the activated carbon, which will shorten the life of the GAC.

- Precautions against this type of error occurring are taken by cleaning and checking the calibration of the probe every time the treatment facility is inspected, which is at least two times per week.

2. Depletion of sulfuric acid supplies may result in failure to maintain the pH at 2.0. In the unlikely event the sulfuric acid tank is pumped empty, there would not be any acid available to add to the process. In this case, the AIC 121 pH controller would experience a pump overrun error and a high pH alarm. These are only local alarm conditions, and influent groundwater would continue to be pumped through the process. In this case the water is still receiving treatment from the activated carbon contactors which should provide for complete PCB removal.

- This type of error occurring is unlikely because the system is checked at least two times per week by the operator, and it is unlikely that the acid tank level would drop this low. Daily consumption is less than 20 gallons per day, and the acid tank is 250 gallons. Therefore, it is unlikely that the tank could ever become depleted.

The other components of the acidification treatment system are not subject to failure that would result in untreated or partially treated water being discharged. For example the oil/water separator is a gravity flow unit with no moving parts, therefore here is no potential for failure.

Likewise the GAC beds are simple devices that are not subject to sudden or mechanical failure. The pump station feeding the GAC system (PST-1) has duplex pumps. In the event the wet well experiences a high-high alarm, all of the influent pumps (S-1, S-2, S-3, S-4) are shut down until the alarm condition clears itself.

9.3.1.2.2 Failure of the pH Adjustment Step of the Equalization Process

Failure of the pH controller to maintain the pH in the equalization tank to within the preset limits would occur under the following conditions:

1. Calibration error of the pH probe in Tank T-2 may lead to erroneous pH's and result in incomplete treatment. If for example the pH probe is reading 6.0 when the actual pH is 5.0, then improper pH discharge may be occurring.

    - Precautions against this type of error occurring are taken by cleaning and checking the calibration of the probe weekly.

2. Depletion of sulfuric acid or sodium hydroxide supplies, may result in failure to maintain the pH within the preset limits. In the unlikely event the sulfuric acid or sodium hydroxide tank were pumped empty, there would not be any acid/caustic available to add to the process. In this case, the AIC 131 pH controller would experience a pump overrun error and a high/low pH alarm. The high/low pH alarm will result in Shunt A being tripped which will shut down all of the recovery wells and sumps.

    - This type of error occurring is unlikely because the system is checked at least two times per week by the operator, and it is unlikely that the acid or caustic tank would ever get so low. Daily acid (caustic) consumption is less than 20 (30) gallons per day, and the acid (caustic) tank is 300 (200) gallons, therefore it is unlikely that either of these tanks would become depleted.

The other components of the equalization portion of the treatment system are not subject to failure that would result in untreated water being discharged. For example, if the mixer in tank T-2 failed, incomplete mixing in the tank would occur, but this would not be catastrophic, as the incoming flows may be sufficient to keep the tank mixed.

9.3.2 Sulfuric Acid Spill

The facility uses (93 percent) sulfuric acid to adjust the pH in tank T-1 to within 1.9 to 2.0. This same acid reservoir is used (if necessary) to adjust the pH downward in the equalization tank (T-2). Tank T-1 is fed by chemical feed pump CP-1 from acid reservoir ST-1. Tank ST-1 is a 300 gallon tank. Tank T-2 is fed by chemical feed pump CP-2 also from acid reservoir ST-1. There are two possibilities for an acid spill within the treatment facility; one is a leak or failure within the acid containment area, and the second is a piping leak or failure outside the containment area, but inside the building. Both possibilities are discussed in the following sections.

9.3.2.1 Discharge Into the Acid Containment Area

The acid storage tank is located within a recessed concrete contained area. This same area is also used for the storage of full 55 gallon drums of sulfuric acid. Chemical feed pumps CP-1 and CP-2 are located within the containment. The capacity of the recessed contained area is approximately 35 gallons. Any minor spill or leak from tank ST-1, a drum, chemical feed pump CP-1 or CP-2, or acid piping in this area will be contained within the containment area. Any leak in excess of the containment's capacity would overflow the containment but would be contained within the building. The building floor has a 4-inch wide by 6-inch high curb around the entire perimeter. The acid containment area, the building floor, and the building curb are constructed of concrete that is coated with an acid and caustic resistant coating.

All floor drains within the building drain to the floor sump, which is pumped to the head of the acidification treatment process (tank T-1). Therefore in the event there was a complete failure of the acid storage tank, chemical feed pump, drum, or piping, that was not contained within the acid containment area, it would overflow the containment until it entered the floor sump. If the floor sump filled up, it would turn on and pump the material to the acidification tank (T-1). The material would be treated, and then would be neutralized by caustic in the equalization tank (Tank T-2). In the event that the caustic metering system in Tank T-2 could not keep up with the acid, a low pH alarm would be signaled by AIC 131, and all influent flow would be shut down by Shunt A. The operator would be called by the auto-dialer signaling the alarm condition. In this case, the acid spilled on the floor and in the containment would remain until the operator arrived at the site.

9.3.2.2 Discharge Onto the Building Floor

Acid piping within the building is constructed of Schedule 80 CPVC. It is located within the building, and therefore has complete secondary containment provided by the curbed floor of the building. In the event there was a leak in the acid pipe supplying tank T-1 or T-2, any acid spilled on the floor of the building would be contained within the building. The same discussion presented in Section 9.3.2.1 would apply if the acid reached the floor sump.

9.3.3 Sodium Hydroxide Spill

The facility uses 50 percent sodium hydroxide to adjust the pH in tank T-2 to within 5.75 to 9.0. Tank T-2 is fed by chemical feed pump CP-3 from caustic reservoir ST-4. Tank ST-4 is a 200 gallon tank. There are two possibilities for a caustic spill within the treatment facility; one is a leak or failure within the caustic secondary containment, and the second is a piping leak or failure outside the caustic secondary containment but inside the building. Both these possibilities are discussed in the following paragraphs.

9.3.3.1 Discharge into the Caustic Containment Area

The caustic storage tank is located within a recessed concrete contained area. This same area is also used for the storage of full 55-gallon drums of sodium hydroxide. The containment is coated with a corrosion resistant coating. Chemical feed pump CP-3 is also located within the contained area. The capacity of the recessed contained area is approximately 35 gallons. Any

minor spill or leak will be contained within the containment area. Any leak in excess of the containment's capacity would be contained within the building.

Therefore in the event there was a catastrophic failure of the caustic storage tank that was not contained within the caustic containment area, it would overflow the containment until it entered the floor sump. If the floor sump filled up, it would turn on and pump the material to the acidification tank (T-1). The material would be treated through the acidification process, and then would pass to the equalization tank for final pH adjustment. As with the discussion presented in Section 9.3.2, discharges to the Town sewer are protected from pH excursions by AIC-131 which has both high and low alarms that trip Shunt A, which will shut down all influent groundwater from the recovery wells and sumps. The operator would be called by the auto-dialer signaling the alarm condition. In this case the caustic spilled on the floor would remain until the operator arrived at the site.

9.3.3.2 Discharge onto the Building Floor

Caustic piping within the building is constructed of Schedule 80 PVC. It is located within the building, and therefore has complete secondary containment provided by the curbed floor of the building. In the event there was a leak in the caustic pipe supplying tank T-2, any caustic spilled on the floor of the building would be contained within the building.

9.3.4 Spill Prevention

To prevent a spill, the following precautions are taken:

1. All treatment plant operators are 40-hour OSHA certified, with up-to-date annual 8-hour Refresher Training/Certification. Some or all of the operators also have training in the following areas: first aid, CPR, hazard communication, and confined space entry.
2. Written standard operating procedures exist for filling the acid and caustic tank and for proper storage of empty and full drums of acid and caustic (SOP-3 and SOP-5).
3. Full containment is provided for acid and caustic storage tanks, pumps, piping, and drums.
4. Only empty, sealed, rinsed drums are stored outdoors, during the warmer months where temperatures are typically above 55°F, while awaiting pick-up by the chemical delivery company.

9.3.5 Spill Control and Clean-Up

To control and clean-up a spill, the following procedure and equipment should apply:

1. The treatment operator is capable of responding to and cleaning up spills that are less than approximately 5 to 10 gallons. In this case, containment and cleanup will be used. Spill cleanup residues such as pads and adsorbent will be properly disposed of. Spill areas will be thoroughly flushed with water, and that water discharged to the acidification tank (T-1) for subsequent treatment in the process.

2. For responding to small spills (5 to 10 gallons maximum), an acid/caustic spill kit is kept at the facility. Spill clean-up supplies consist of: 3 - 3" by 4" adsorbent socks, 12 - 18 inch square adsorbent pads, 4 - large disposal bags, and a 10 gallon wet/dry shop vacuum. Personal protective equipment consists of: safety glasses, full face shield, apron with arms, acid resistant gloves, and knee-high boots. The facility is equipped with an eyewash and safety shower. A pH meter is also kept at the facility to check for cleanup efficiency, although litmus paper may be more efficient for this purpose.
3. Spills larger than 5 to 10 gallons or that are beyond the capabilities of the treatment plant operator, should be dealt with by a privately contracted clean-up contractor.
4. In the event the spill escapes the building, then external spill notification must be performed. The project manager is responsible for performing external spill notification. If any spill escapes the building via the connection to the Town sewer system without being properly treated or neutralized, then the notification procedure spelled out in the facility's discharge permit (Part III - Reporting Requirements Items 2 and 4) shall be performed.
    - Any discharge that leaves the building through other means (overflow of building containment curbing) should be reported to the NYSDEC if the amount exceeds 100 pounds (6.4 gallons of 93 percent sulfuric acid or 8.1 gallons of 50 percent sodium hydroxide). In this case, the NYSDEC notification number is 1-800-457-7362 or 518-457-7362.
5. Following a spill, complete the attached form (Table 9.1) and file the completed form with this SOP.
6. Re-order spill supplies to replace those consumed.

SOP-10
ROUTINE OPERATION, MAINTENANCE, AND RECORDKEEPING

10.1 PURPOSE

The purpose of this section is to describe the routine scheduled tasks that are to be performed at the Cherry Farm treatment plant. Record keeping procedures are also described. A daily operation log, a recovery well log, and a preventative maintenance log will be used to document treatment plant operations. In addition, an Operator's Notebook is maintained at the site to record all other events, actions, and occurrences.

10.2 RELATED SECTIONS

1. SOP-1 SYSTEM START-UP FROM A SHUT-DOWN MODE
2. SOP-2 FLOW METER OPERATION, FLOW BALANCING, AND FLOW ADJUSTMENT
3. SOP-3 ACIDIFICATION PRETREATMENT SYSTEM OPERATION
4. SOP-4 GRANULAR ACTIVATED CARBON SYSTEM OPERATION
5. SOP-5 EQUALIZATION TANK OPERATION
6. SOP-6 ACID AND CAUSTIC SYSTEM CALIBRATION AND CONTROL
7. SOP-7 COMPLIANCE SAMPLING FROM THE TREATMENT FACILITY EFFLUENT
8. SOP-8 SYSTEM SHUT-DOWN
9. SOP-9 ACCIDENTAL SPILL PREVENTION PLAN

10.3 STANDARD OPERATING PROCEDURE

10.3.1 Sign In/Out and Daily Log

A copy of the sign in/out log is attached to this SOP as Table 10.1. It should be completed by ALL personnel each day onsite (Parsons and non-Parsons). A copy of the daily log is attached to this SOP as Table 10.2. It should also be completed each day that Parsons is on site. In the event that an action is taken that will manually change an entry, then a second set of readings should be taken following the action. Several examples where two sets of readings should be taken are:

1. Before and after transferring acid to ST-1.
2. Before and after transferring caustic to ST-4, or switching a caustic drum.
3. Before and after changing a bag filter.
4. Before and after calibrating a pH controller.
5. Before and after transferring LNAPL out of ST-3.

A copy of the daily log will be sent to the Town with the monthly SMR. Flow meter readings recorded on the daily log will be the basis for sewer use surcharges levied by the Town of Tonawanda. Upon completion of a month, the original daily log should be placed in the

project file and retained for an indefinite period. The sign in/out log will be used for monthly health and safety reporting, and will be placed in the project file once reporting for the month is complete.

10.3.2 Operator's Notebook

In addition to the daily log, the operator is responsible for maintaining a permanent record of all activities that occur at the treatment facility. Each day should be dated, and a time entered for each entry. The following occurrences should be described along with a description of any corrective action that was taken, or a discussion of the outcome from the occurrence:

1. Alarms noted (LEL, floor sump, high or low pH in T-2, building low temperature, HVAC failure); and actions taken
2. Scheduled maintenance items (See Section 10.3.3)
3. Spills or leaks
4. Process upsets
5. Treatment plant shutdowns
6. Recovery well problems (level switches, VSD, pumps, in-line flowmeter,)
7. Groundwater sump problems (overload, floats, pump, etc.)
8. AIC -121 pump overruns or alarms
9. Mixer problems with MX-1, MX-2
10. Chemical feed problems with CP-1, CP-2, CP-3
11. Control panel problems (LEL, flowmeters, bulb replacement, etc.)
12. Filling or emptying of any of the chemical or LNAPL storage tanks
13. Supplies ordered
14. Cleanout of any containments
15. Other maintenance or repairs performed
16. Unusual weather problems
17. Heat trace activation/deactivation

10.3.3 Maintenance Schedule

The following items should be performed at the indicated frequencies. All items should be recorded in the Operator's Notebook. For non-routine maintenance problems, complete the troubleshooting log (Table 10.3).

10.3.3.1 Daily

1. Read and record all information on the daily log. For parameters that are adjusted provide two sets of readings and describe the adjustment in the comments column.
2. Record all maintenance that needs to be performed and all maintenance completed in the maintenance log.
3. Check acid supply and transfer acid as necessary into ST-1. Record acid volume transferred and new tank level on the daily log.
4. Check caustic supply and transfer caustic as necessary into ST-4. Record caustic volume transferred and new tank level on the daily log.
5. Check acid storage tank, pumps, and piping for visible evidence of leaks

6. Check caustic storage tank, pump, and piping for visible evidence of leaks
7. Check process for proper operation (Tank T-1, OWS-1, Tank T-2, PST-1, CC-1, CC-2, pre-and post-filter), and verify no leaks of process water
8. Bleed air from CC-1 and CC-2 by opening air release valves for approximately 30 seconds.
9. Hose down T-2, and PST-1 to remove any staining or dirt buildup at or above the waterline.
10. Clean pH probes in tank T-2.
11. Check control panel and pH controllers AIC-121 and AIC-131 for alarms or pump overrun errors.
12. Check PST-1 for proper operation as evidenced by flowrate of each pump, and cycling of lead and lag pumps.
13. Observe recovery well cycling on control panel.
14. Record all incidents and occurrences in treatment plant operator's note book.
15. Keep floor broom clean.
16. Keep eyewash and safety shower free of any obstructions.
17. Inspect building exterior and building perimeter fence for security breeches and evidence of vandalism.
18. During the cooler months (when ambient temperatures are below 55 °F), be sure to place the drum heater around the base of a caustic drum (keeping the caustic warm enough to allow it to be easily pumped into ST-4 when next needed). Loosen one of the bungs on the top of the drum to relieve any possible pressure build-up from heating.
19. Turn off all hoses at the hose bibs before leaving for the day.
20. Turn off all interior lights before leaving for the day.
21. Be sure all access gates to the plant and the landfill are securely locked before leaving.

10.3.3.2 Weekly

1. Check the calibration of both pH meters (AIC-121, AIC 131) and recalibrate as necessary.
2. Check operation of PST-1: one pump; two pumps; high alarm; and S-1, S-2, S-3, and S-4 cutoff.
3. Clean the walls of T-2 below the waterline using a long handled brush.
4. Test all control panel lights and replace any burned out bulbs (including alarm panel).
5. Flush water through eye wash and emergency shower for 1 minute each.
6. Exercise and confirm the operation of the floor sump pump by filling the sump with potable water until pump kicks on.
7. Verify HVAC system is operating properly by checking building temperature and observing system components (boiler, boiler pump, exhaust fans, louvered inlets, air exchanger)
8. Dispose of any accumulated trash off-site.

10.3.3.3 Bi-Weekly

1. Hose down floor and squeegee water to the drain. This is also done on an "as needed" basis depending on activities at the plant.
2. Skim oil from OWS-1 into the LNAPL reservoir of OWS-1.
3. Inspect sumps S-1, S-2, S-3, and S-4 and verify sump pumps are operational.

10.3.3.4 Monthly

1. Collect monthly compliance samples (see Section 7.3.2.1 for procedures).
2. Collect monthly between GAC column samples. See sections 10.3.4 for procedures.
3. Loosen sump butterfly valves on inlet drains in S-1, S-2, S-3, S-4.
4. Test process alarms (Tank T-2 high pH, Tank T-2 low pH, floor sump high-high alarm) and verify proper operation of alarm panel, Shunt A, and auto dialer. Acknowledge the alarm and reset the tripped items between testing each alarm and when done.
    - To test Tank T-2 high pH alarm, after calibrating the pH, immerse the probe in pH 10 buffer. The alarm should illuminate the alarm panel, trip shunt A, and autodial the pager.
    - To test Tank T-2 low pH alarm, after calibrating the pH, immerse the probe in pH 4 buffer. The alarm should illuminate the alarm panel, trip shunt A, and autodial the pager.
    - To test the floor sump high-high alarm, turn off the floor sump by switching the on/off switch located adjacent to the pump to "off" while running water into the floor sump. The alarm should illuminate the alarm panel, trip shunt A, and autodial the pager.
5. Test environmental alarms (LEL, building low temperature, HVAC failure) and verify proper operation of Shunts A and B. Acknowledge the alarm and reset the tripped items between testing each alarm and when done.
    - To test the LEL alarm, follow the instructions for the LEL meter (page 3-5 and 3-6 of manufacturer's O&M manual) to change the warning and alarm set points to levels that will generate an alarm. The warning should illuminate the panel. The alarm should trip shunts A and B, illuminate the alarm panel, and autodial the pager. To reset the LEL meter, there is a separate reset on the control panel.
    - To test the building low temperature alarm, turn the alarm setpoint controller (mounted on top of the control cabinet) upward until the building temperature is reached. The alarm should illuminate the alarm panel, trip shunt A, and autodial the pager.
6. Check calibration of ISCO flow meter whenever all flow (S-1 through S-4) and flow over the 90 degree V-notch weir in the equalization tank ceases. Check that the flow meter reads a level of 0.00 inches. If the flow meter does not read 0.00 inches, then adjust the flow meter level to read 0.00 inches (approximately once per month, or whenever plant is shut down for any reason).
7. Grease HVAC main blower shaft (both ends).
8. Change HVAC filters (4 each G-6 Filters measuring 16" X 25" X 2").
9. Complete self-monitoring report for submittal to Town of Tonawanda (Project Manager).

10. Order 1 monthly sample kit from the laboratory, and 1 monthly between-column sample kit.

10.3.3.5 Semi-Annually

1. Turn on heat tracing in S-1, S-2, S-3, S-4, and water meter hot-box on November 1 of each year
2. Turn off heat tracing in S-1, S-2, S-3, S-4, and water meter hot-box on April 30 of each year.
3. Collect the semi-annual compliance samples per discharge permit issued by the Town of Tonawanda (see SOP-7).

10.3.3.6 Annually

1. Recalibrate the LEL meter.
2. Have factory authorized ISCO representative document calibration of ISCO flow meter.
3. Recalibrate the digital display for the three flow meters and the totalizer.
4. Drain and clean accumulated sediment from tank T-1, OWS-1, and tank T-2.
5. Contract for snow removal.
6. Collect the annual compliance samples per discharge permit issued by the Town of Tonawanda.
7. Have the back flow prevention valve tested by March 31st of each year.

10.3.3.7 As-Needed

1. Change the GAC pre- and post-filters when the pressure differential is 15 psig or greater.
2. Adjust flows in sumps.
3. Check and clean the acid and caustic containment sumps. Neutralize all water by discharging it to tank T-1.
4. Order chemical supplies (acid, caustic, pH buffers, distilled water)
5. Order HVAC filters, 10-micron filter bags, acid transfer pump hose, pH probes, garbage bags, spill supplies, paper towels, hand soap, disposable gloves, acid-resistant gloves, and control panel light bulbs (2 varieties).
6. Decant water from OWS-1 oil holding tank and LNAPL storage tank ST-3.
7. Have LNAPL characterized and hauled off-site.
8. Have process waste characterized and hauled off-site.
9. Switch HVAC to winter mode when ambient temperature drops below 65°F.

10.3.4 Operational Sampling

A monthly grab sample is collected from between the GAC columns for PCB's in order to determine when the carbon columns need to be changed. This procedure should be coordinated with monthly, and/or annual and semi-annual compliance sampling (see SOP-7). The procedures are as follows:

1. Arrange with the contract laboratory to have pre-preserved sample bottles; chain-of-custody forms, sample coolers, and, packaging materials delivered to the Parsons office.

2. Schedule a sample pick-up with the contract laboratory at least 24 hours prior to sampling. This will ensure that the lab has someone available the day the pick-up is needed.
3. Fill in the sample date, time, and sampler's initials on the bottle labels using a fine point indelible ink marker. Cover the label with clear plastic packaging tape that encircles the bottle and overlaps itself at least 2 inches.
4. Collect the sample at valve #24 located after the outlet of the first carbon column, and before the inlet of the second carbon column. Note that the GAC between is performed in the same manner as the ML-1, as described in 7.3.2.1.
5. Complete the chain-of-custody form.
6. Pack the samples in the laboratory provided coolers using laboratory provided packaging materials. Ice the samples by using gallon-size Ziplock bags filled with ice cubes (double bagged). The samples should be maintained at 4°C. Samples are to be picked up by laboratory personnel at the Parsons office on the same day the samples are collected.
7. If sample chain of custody does not have carbon copies, make a photo copy of the chain after sample pick-up relinquishes it but before the cooler leaves the premises.

SOP-11
LOCKOUT / TAGOUT PROCEDURE

11.1 PURPOSE

The purpose of this section is to describe the procedures for the proper lockout and tagout of equipment prior to performing work on the equipment. This procedure was developed in accordance with 29 CFR 1910.147.

This procedure establishes the minimum requirements for the lockout of energy isolating devices whenever maintenance or servicing is done on equipment. It shall be used to ensure that the equipment is stopped, isolated from all potentially hazardous energy sources and locked out before employees perform any servicing or maintenance where the unexpected energization or start-up of the equipment or release of stored energy could cause injury.

When the energy isolating devices are not lockable, tagout may be used, provided the employer complies with the provisions of the standard which require additional training and more rigorous periodic inspections. When tagout is used and the energy isolating devices are lockable, the employer must provide full employee protection and additional training and more rigorous periodic inspections are required.

11.1.1 Compliance With This Program

All personnel responsible for operation and maintenance of the treatment plant are required to comply with the restrictions and limitations imposed upon them during the use of lockout. The authorized employees are required to perform the lockout in accordance with this procedure. All employees, upon observing a piece of equipment which is locked out to perform servicing or maintenance shall not attempt to start, energize or use that equipment.

11.2 RELATED SECTIONS

1. SOP-1 SYSTEM START-UP FROM A SHUT-DOWN MODE
2. SOP-2 FLOW METER OPERATION, FLOW BALANCING, AND FLOW ADJUSTMENT
3. SOP-3 ACIDIFICATION PRETREATMENT SYSTEM OPERATION
4. SOP-4 GRANULAR ACTIVATED CARBON SYSTEM OPERATION
5. SOP-5 EQUALIZATION TANK OPERATION
6. SOP-6 ACID AND CAUSTIC SYSTEM CALIBRATION AND CONTROL
7. SOP-8 SYSTEM SHUT-DOWN
8. SOP-12 CONFINED SPACE ENTRY PROCEDURE

11.3 STANDARD OPERATING PROCEDURE

Eight (8) lockout/tagout procedures are attached to this SOP. They are:

1. SOP-11-02 Sumps S-1 through S-4
2. SOP-11-03 Acidification Tank T-1
3. SOP-11-04 Oil Water Separator OWS-1

4. SOP-11-05 Clearwell Pump Station PST-1
5. SOP-11-06 Equalization Tank T-2
6. SOP-11-07 Chemical Feed Pumps CP-1, CP-2, CP-3
7. SOP-11-08 Drum Pumps
8. SOP-11-09 Floor Sump Pumps

11.3.1 Standard Lockout Procedure

The general procedure to be followed is described below. Each of the attached procedures contain this information.

1. Notify all affected employees that servicing or maintenance is required on a piece of equipment and that the equipment must be shut down and locked out to perform the servicing or maintenance.

2. The authorized employee shall refer to the attached procedure to identify the type and magnitude of the energy that the equipment utilizes, shall understand the hazards of the energy, and shall know the methods to control the energy.

3. If the equipment is operating, shut it down by the normal stopping procedure (depress stop button, open switch, close valve, etc.). These shut downs are indicated in the specific procedures.

4. De-activate the energy isolating device(s) so that the equipment is isolated from the energy source(s).

5. Lock out the energy isolating device(s) with assigned individual lock(s).

6. Stored or residual energy (such as that in capacitors, springs, elevated equipment members, rotating flywheels, hydraulic systems, and air, gas, steam, or water pressure, etc). must be dissipated or restrained by methods such as grounding, repositioning, blocking, bleeding down, etc.

7. Ensure that the equipment is disconnected from the energy source(s) by first checking that no personnel are exposed, then verify the isolation of the equipment by operating the push button or other normal operating control(s) or by testing to make certain the equipment will not operate. In the event that the equipment is able to be operated, immediately notify the project manager, do not proceed with the remainder of the lockout/tagout, and stop all work on this process.

8. Caution: Return operating control(s) to neutral or "off" position after verifying the isolation of the equipment.

9. The equipment is now locked out.

11.3.2 Restoring Equipment to Service

When the servicing or maintenance is completed and the equipment is ready to return to normal operating condition, the following steps shall be taken.

1. Check the equipment and the immediate area around the equipment to ensure that nonessential items have been removed and that the equipment components are operationally intact.

2. Check the work area to ensure that all employees have been safely positioned or removed from the area.

3. Verify that the controls are in neutral.

4. Remove the lockout devices and reenergize the equipment.

   - NOTE: The removal of some forms of blocking may require reenergization of the equipment before safe removal.

5. Notify affected employees that the servicing or maintenance is completed and the equipment is ready for use.

6. Refer to specific procedures contained in SOP-1 and other SOPs for detailed startup instructions.

SOP-11-01
LOCKOUT / TAGOUT FOR:
SUMPS S-1 THROUGH S-4

FOR: SUMPS S-1 THROUGH S-4

Date Issued/Revised: October 13, 1999, revised May 2006

AREA: Landfill

IDENTIFICATION

A. **General Description**: EPG Companies, Inc. SurePump TSP2-2 (Sump S-4) and TSP2-4 (Sumps S-1. S-2, S-3) , 480V, 3 phase, and controls (110 V).

B. **Manufacturer:** EPG Companies, Inc.

OPERATOR CONTROLS

A. On/Off/Auto switch in corresponding above ground control box near sump.

B. On/Off Switch on sump control panel in control room.

ENERGY SOURCE/LOCATION/MAGNITUDE

A. Local electrical disconnect is located approximately 200 feet away in the corresponding recovery well and consists of an on/off switch. This switch kills the outgoing 480V power to the sump pump. It does not kill the 120V control power.

B. On the sump control panel, which is located approximately 200 feet away in the corresponding recovery well is an on/off/auto switch. This kills power (480V) to the sump pump.

C. The control power to the sump pump (120V) is killed by turning off the appropriate breaker in the mini power center located in the corresponding above- ground control box. Note that this control power can also be turned off by killing the main power at the MCC for the sump.

D. The sump MCC disconnect is located (100 to 2000 feet away) in the electrical room adjacent to the treatment building. Each sump is labeled. This disconnect de-energizes the 480V power to the submersible sump pump.

SHUTDOWN PROCEDURES

A. Notify all affected employees before shutdown procedure begins.

ENERGY ISOLATION PROCEDURES (LOCK AND TAG)

A. In the electrical room, throw the MCC electrical disconnect switch for the appropriate sump to the off (down) position. Install a locking device and tag on the MCC switch.

B. In the corresponding control panel, turn off the main disconnect. This switch should also be locked and tagged. Note that this step is redundant with Step A, because it de-energizes the same circuit.

C. In the corresponding recovery well vault turn off the control power by turning off the breaker in the mini power center. The breaker should be locked with a locking device and padlock, and should be marked with a tag.

D. Isolate the sump discharge pipe from the header pipe by closing the ball valve located in the vault. Bleed residual pressure in the pipeline by opening the sample tap located in the sump, until water stops flowing out.

ATTEMPT TO RESTART THE EQUIPMENT (TRY)

A. Attempt to restart the sump at the sump control panel by switching the hand/off/auto switch to hand. The operator must walk to the sump to verify that the submersible pump is not operating.

START UP PROCEDURES:

A. Notify all affected employees before startup.

B. Check valve position on sump piping for proper position.

C. Remove personnel and tools from work area.

D. In the sump, remove tag and lock, if installed, and turn on the main disconnect.

E. In the electrical room, remove tags and locks from the electrical disconnect switches.

F. Throw the electric disconnect switches to the on (up) position. and restart the sumps in accordance with procedures specified in SOP-1 and SOP-2.

G. Return to the sump and verify proper operation of the sump.

AFFECTED AND AUTHORIZED EMPLOYEES

A. Affected Employees: Treatment Plant Operator and Project Manager.

B. Authorized Employees: Treatment Plant Operators and Project Manager.

NOTIFY ALL AFFECTED EMPLOYEES BEFORE SHUTDOWN OR STARTUP OF THIS EQUIPMENT.

COMPLY WITH CONFINED SPACE ENTRY PROCEDURES

Approvals / Title	Date
_____ Project Manager	_____
_____ Health & Safety Rep.	_____
_____ Operator	_____

SOP-11-02
LOCKOUT / TAGOUT FOR:
ACIDIFICATION TANK T-1

FOR: ACIDIFICATION TANK T-1

Date Issued/Revised: October 13, 1999, Revised May 2006

AREA: Groundwater Treatment Building

EQUIPMENT IDENTIFICATION

A. **General Description**: Tank T-1, with Appurtenances: Mixer MX-1 (Model DD - Alsop Engineering 120V), and Chemical Feed Pump CP-1 (LMI E-731- Liquid Metronics 120V). Incoming flow is from Sumps S-1, S-2, S-3, and S-4. In addition plant flows from all other sources (i.e. the floor sump pumps) may be bypassed to the acidification tank by manually operating appropriate valves.

OPERATOR CONTROLS

None at the Tank. The following controls are located where indicated:

A. **Mixer MX-1** VSD on the back of the control panel in the electrical room. The VSD has a start/stop switch and a speed adjustment switch on it.

B. **Chemical Feed Pump CP-1** Controlled by pH controller AIC-121 mounted on the front of the control panel in the electrical room.

C. **Incoming Flow Sources** No operator controls, other than MCC.

ENERGY SOURCE/LOCATION/MAGNITUDE

A. **Mixer MX-1** Main electrical disconnect is located 50 feet away in the electrical room in the lighting panel, and consists of circuit breaker LP-18 (120V).

B. **Chemical Feed Pump CP-1** Main electrical disconnect is located 50 feet away in the electrical room in the lighting panel and consists of circuit breaker LP-17 (120V).

C. **Incoming Flow Sources** Main electrical disconnects are located 50 feet away in the electrical room in both the MCC and the lighting panel. The following circuit breakers for the wells and sumps are located in the MCC (480V) and are labeled accordingly:

- S-1
- S-2
- S-3
- S-4

The following circuit breakers for other flow sources are located in the lighting panel (120V):

- LP-22 Building Sump Pump
- LP-24 Building Sump Pump

SHUTDOWN PROCEDURES

A. Notify all affected employees before shutdown procedure begins.

ENERGY ISOLATION PROCEDURES (LOCK AND TAG)

A. **Mixer MX-1** Throw the main electrical disconnect in the electrical room in the lighting panel (circuit breaker LP-18) to off. Lock the lighting panel circuit breaker off, and tag the locking device.

B. **Chemical Feed Pump CP-1** Throw the main electrical disconnect in the electrical room in the lighting panel (circuit breaker LP-17) to off. Lock the lighting panel circuit breaker off, and tag the locking device.

C. **Incoming Flow Sources** All incoming flow sources to tank T-1 should either be de-energized or valves positioned so that flow will not enter Tank T-1. Normally the only flows that will enter Tank T-1 are Sumps S-1, S-2, S-3, S-4, and the floor sumps. Main electrical disconnects for sumps S-1 through S-4 should be turned to off at the MCC panel. Each circuit breaker should be locked and tagged. These include:

- S-1
- S-2
- S-3
- S-4

The floor sump will also normally discharge to Tank T-1. This is de-energized by turning circuit breakers LP-22 and LP-24 in the lighting panel to off. Lock the lighting panel circuit breakers off, and tag the locking devices.

ATTEMPT TO RESTART THE EQUIPMENT (TRY)

A. Manually turn on CP-1 at the pH controller.

B. Turn on MX-1 at the VSD.

START UP PROCEDURES

A. Notify all affected employees before startup.

B. Adjust valve positions as needed.

C. Remove personnel and tools from work area around equipment.

D. In the electrical room, remove tags and locks from the electrical disconnect switches.

E. Throw the electric disconnect switches to the on (up) position and restart the process in accordance with procedures specified in SOP-1 and SOP-3.

NOTIFY ALL AFFECTED EMPLOYEES BEFORE SHUTDOWN OR STARTUP OF THIS EQUIPMENT.

COMPLY WITH CONFINED SPACE ENTRY PROCEDURES

Approvals / Title	Date
_____ Project Manager	_____
_____ Health & Safety Rep.	_____
_____ Operator	_____

SOP-11-03
LOCKOUT / TAGOUT FOR:
OIL/WATER SEPARATOR OWS-1

FOR: OIL/WATER SEPARATOR OWS-1

Date Issued/Revised: October 13, 1999, revised May 2006

AREA: Groundwater Treatment Building

EQUIPMENT IDENTIFICATION

A. **General Description**: Oil/Water Separator Tank OWS-1 has incoming flow from Sumps S-1, S-2, S-3, S-4, and the floor sump. All flow sources to Tank T-1 must be de-energized to insure no flow to OWS-1.

OPERATOR CONTROLS

None at OWS-1. The following controls are located where indicated:

A. **Incoming Flow Sources** No operator controls, other than MCC.

ENERGY SOURCE/LOCATION/MAGNITUDE

A. **Incoming Flow Sources** Main electrical disconnects are located 50 feet away in the electrical room in both the MCC and the lighting panel. The following circuit breakers for the sumps are located in the MCC and are labeled accordingly (480V):

- S-1
- S-2
- S-3
- S-4

The following circuit breakers for other flow sources are located in the lighting panel (120V):

- LP-22 Building Sump Pump
- LP-24 Building Sump Pump

SHUTDOWN PROCEDURES

A. Notify all affected employees before shutdown procedure begins.

ENERGY ISOLATION PROCEDURES (LOCK AND TAG)

A. **Incoming Flow Sources** All incoming flow sources to OWS-1 should either be de-energized or valves positioned so that flow will not enter OWS-1. Normally the only flows that will enter OWS-1 is from Tank T-1 and includes sources: Sumps S-1, S-2, S-3, S-4 and the floor sump. Main electrical disconnects for sumps S-1 through S-4 should be turned to off at the MCC panel, and locked and tagged These include:

- S-1
- S-2
- S-3
- S-4

The floor sump will also normally discharge to Tank T-1. This is de-energized by turning circuit breakers LP-22 and LP-24 in the lighting panel to off. Lock the lighting panel circuit breakers off, and tag the locking devices.

ATTEMPT TO RESTART THE EQUIPMENT AS FOLLOWS (TRY):

A. Not applicable.

START UP PROCEDURES:

A. Notify all affected employees before startup.

B. Adjust valve positions as needed.

C. Remove personnel and tools from work area around equipment.

D. In the electrical room, remove tags and locks from the electrical disconnect switches.

E. Throw the electric disconnect switches to the on (up) position and restart the process equipment in accordance with SOP-1 and SOP-3.

AFFECTED AND AUTHORIZED EMPLOYEES

A. Affected Employees: Treatment Plant Operators and Project Manager

B. Authorized Employees: Treatment Plant Operators and Project Manager

NOTIFY ALL AFFECTED EMPLOYEES BEFORE SHUTDOWN OR STARTUP OF THIS EQUIPMENT.

COMPLY WITH CONFINED SPACE ENTRY PROCEDURES

Approvals / Title	Date
_____ Project Manager	_____
_____ Health & Safety Rep.	_____
_____ Operator	_____

SOP-11-04
LOCKOUT / TAGOUT FOR:
CLEARWELL PUMP STATION PST-1

FOR: CLEARWELL PUMP STATION PST-1

Date Issued/Revised: October 13, 1999, revised in May 2006

AREA: Groundwater Treatment Building

EQUIPMENT IDENTIFICATION

A. **General Description**: The clearwell pump station consists of two pumps (Pump 1 and Pump 2). Incoming flow is from OWS-1 and consists of the following flow sources: Sumps S-1, S-2, S-3, and S-4, and the floor sump pump.. All flow sources to Tank T-1 must be de-energized to insure no flow to the clearwell pump station.

B. **Manufacturer:** The clearwell pump station is custom engineered and built by Ayer Sales Systems Division. The pumps are Webster Pumps P16P8-1396V with 5HP explosion proof motors (480V, 3 phase).

OPERATOR CONTROLS

A. On/Off switch at each pump (Pump 1 and Pump 2).

B. Clearwell control panel in electrical room with on/off/auto selector switch for each pump.

C. **Incoming Flow Sources** No operator controls, other than MCC.

ENERGY SOURCE/LOCATION/MAGNITUDE

A. Main electrical disconnects for PST-1 are located in the electrical room MCC panel (480V). There are two disconnects labeled "Clearwell Pump Panel".

B. **Incoming Flow Sources** Main electrical disconnects are located 50 feet away in the electrical room in both the MCC and the lighting panel. The following circuit breakers for the sumps are located in the MCC and are appropriately labeled (480V):

- S-1
- S-2
- S-3
- S-4

The following circuit breakers for other flow sources are located in the lighting panel (120V):

- LP-22 Building Sump Pump
- LP-24 Building Sump Pump

SHUTDOWN PROCEDURES

A. Notify all affected employees before shutdown procedure begins.

ENERGY ISOLATION PROCEDURES (LOCK AND TAG)

A. **Incoming Flow Sources** Before deenergizing the pump station, the incoming flow sources should be stopped and the preceding process equipment (Tank T-1 and OWS-1) should be allowed to finish gravity draining into the clearwell.

All incoming flow sources to PST-1 should either be de-energized or valves positioned so that flow will not enter PST-1. Normally the only flows that will enter PST-1 are from Tank T-1 and OWS-1 and include Sumps S-1, S-2, S-3, S-4, and the floor sump. Main electrical disconnects for sumps S-1 through S-4 should be turned to off at the MCC panel. Lock and tag the following circuit breakers:

- S-1
- S-2
- S-3
- S-4

The floor sump will also normally discharge to Tank T-1. This is de-energized by turning circuit breakers LP-22 and LP-24 in the lighting panel to off. Lock the lighting panel circuit breakers off, and tag the locking devices.

Finally, as a final fail-safe measure, the flow exiting the oil/water separator can be stopped by closing and locking Valve 16. However, this valve should not be closed until all flow sources are de-energized and the oil/water separator finishes gravity draining. Once gravity draining of OWS-1 is complete, de-energize the clearwell as described in the following steps.

B. Throw the main electrical disconnects for the clearwell, which are located in the MCC panel (2 SWITCHES) to off. Lock the circuit breakers out and install a tag on each circuit breaker.

C. Turn the local on/off switches to off for pumps 1 and 2, and lock and tag the switches. Note that this step is redundant with Step B because it de-energizes the same circuit.

ATTEMPT TO RESTART THE EQUIPMENT AS FOLLOWS (TRY):

A. Try to turn on Pumps 1 and 2 at the local switches and at the control panel by turning the on/off/auto switch to on.

START UP PROCEDURES:

A. Notify all affected employees before startup.

B. Adjust valve positions as needed (reopen valve 16 if it was closed earlier).

C. Remove personnel and tools from work area around equipment.

D. In the electrical room, remove tags and locks from the electrical disconnect switches.

E. Throw the electric disconnect switches to the on (up) position and restart the equipment in accordance with SOP-1 and SOP-4.

AFFECTED AND AUTHORIZED EMPLOYEES

A. Affected Employees: Treatment Plant Operators and Project Manager

B. Authorized Employees: Treatment Plant Operators and Project Manager

NOTIFY ALL AFFECTED EMPLOYEES BEFORE SHUTDOWN OR STARTUP OF THIS EQUIPMENT.

Approvals / Title	Date
_____ Project Manager	_____
_____ Health & Safety Rep.	_____
_____ Operator	_____

SOP-11-05
LOCKOUT / TAGOUT FOR:
EQUALIZATION TANK T-2

FOR: EQUALIZATION TANK T-2

Date Issued/Revised: October 13, 1999, revised May 2006

AREA: Groundwater Treatment Building

EQUIPMENT IDENTIFICATION

A. **General Description**: Tank T-2, with Appurtenances: Mixer MX-2 (Alsop Engineering - Model GD-C), and Chemical Feed Pumps CP-2 and CP-3 (Liquid Metronics - Model LMI E731). Incoming flow is from the acidified OWS/GAC treated flows from Sumps S-1, S-2, S-3, S-4, and the floor sump pump.

OPERATOR CONTROLS

None at the Tank. The following controls are located where indicated:

A. **Mixer MX-2** VSD on the back of the control panel has been bypassed since the start/stop switch and the speed adjustment switch are not working. Main disconnect is at MCC only.

B. **Chemical Feed Pumps CP-2 (acid), CP-3 (caustic)** Controlled by pH controller AIC-131 which is front-mounted on the control panel in the electrical room.

C. **Incoming Flow Sources** No operator controls, other than MCC.

ENERGY SOURCE/LOCATION/MAGNITUDE

A. **Mixer MX-2** Main electrical disconnect is located 50 feet away in the electrical room in the MCC panel and is labeled EQ. Tank Mixer MX-2 (480V).

B. **Chemical Feed Pump CP-2 (acid)** Main electrical disconnect is located 50 feet away in the electrical room in the lighting panel and consists of circuit breaker LP-19 (120V).

C. **Chemical Feed Pump CP-3 (caustic)** Main electrical disconnect is located 50 feet away in the electrical room in the lighting panel and consists of circuit breaker LP-16 (120V).

D. **Incoming Flow Sources** Main electrical disconnects are located 50 feet away in the electrical room in both the MCC and the lighting panel. Lock and tag the following circuit breakers for wells and sumps in the MCC (480V):

- S-1
- S-2
- S-3
- S-4

The following circuit breakers for other flow sources are located in the lighting panel:

- LP-22 Building Sump Pump
- LP-24 Building Sump Pump

SHUTDOWN PROCEDURES

A. Notify all affected employees before shutdown procedure begins.

ENERGY ISOLATION PROCEDURES (LOCK AND TAG)

A. **Mixer MX-2** Throw the main electrical disconnect in the electrical room in the MCC panel to off. Lock and tag the circuit breaker when done.

B. **Chemical Feed Pump CP-2 (acid)** Throw the main electrical disconnect in the electrical room in the lighting panel (circuit breaker LP-19) to off. Lock the lighting panel circuit breaker off, and tag the locking device.

C. **Chemical Feed Pump CP-3 (caustic)** Throw the main electrical disconnect in the electrical room in the lighting panel (circuit breaker LP-16) to off. Lock the lighting panel circuit breaker off, and tag the locking device.

D. **Incoming Flow Sources** All incoming flow sources to the treatment building should be de-energized. Main electrical disconnects for sumps S-1 through S-4 should be turned off at the MCC panel, and tagged and locked. These include:

- S-1
- S-2
- S-3
- S-4

The floor sump will also normally discharge to Tank T-1. This is de-energized by turning circuit breakers LP-22 and LP-24 in the lighting panel to off. Lock the lighting panel circuit breakers off, and tag the locking devices.

ATTEMPT TO RESTART THE EQUIPMENT AS FOLLOWS (TRY):

A. Manually turning on CP-2, CP-3 at the pH controller AIC-131.

B. Turning on MX-2 at the VSD.

START-UP PROCEDURES:

A. Notify all affected employees before startup.

B. Adjust valve positions as needed.

C. Remove tools from work area around equipment, and have personnel leave the area.

D. In the electrical room, remove tags and locks from the electrical disconnect switches.

E. Throw the electrical disconnect switches to the on (up) position, and restart the equipment in accordance with SOP-1 and SOP-5.

NOTIFY ALL AFFECTED EMPLOYEES BEFORE SHUTDOWN OR STARTUP OF THIS EQUIPMENT

COMPLY WITH CONFINED SPACE ENTRY PROCEDURES

Approvals / Title	Date
Project Manager	
Health & Safety Rep.	
Operator	

SOP-11-06
LOCKOUT / TAGOUT FOR:
CHEMICAL FEED PUMPS CP-1, CP-2, CP-3

FOR: CHEMICAL FEED PUMPS CP-1, CP-2, CP-3

Date Issued/Revised: October 13, 1999, revised May 2006

AREA: Groundwater Treatment Building

EQUIPMENT IDENTIFICATION

A. **General Description**: LMI - E-731

B. **Manufacturer**: Liquid Metronics Milton Roy

OPERATOR CONTROLS

A. pH Controllers AIC-121 (CP-1) and AIC-131 (CP-2 and CP-3), which are front-mounted on the control panel in the electrical room.

ENERGY SOURCE/LOCATION/MAGNITUDE

A. Main electrical disconnect is located 50 feet away, in the electrical room lighting panel. Circuit breakers are as follows (120V):

- CP-1 Controlled by LP-17
- CP-2 Controlled by LP-19
- CP-3 Controlled by LP-16

SHUT-DOWN PROCEDURES

A. Notify all affected employees before shutdown procedure begins.

B. Close quarter turn valve in supply line as follows:

- CP-1 Supply Valve 34
- CP-2 Supply Valve 35
- CP-3 Supply Valve 42

ENERGY ISOLATION PROCEDURES (LOCK AND TAG)

A. Throw the main electrical disconnect switch in the lighting panel to the off position. Lock the lighting panel circuit breaker off, and tag the locking device.

ATTEMPT TO RE-START THE EQUIPMENT (TRY)

A. Attempt to re-start the pump by turning it on manually at the pH controller.

START-UP PROCEDURES:

A. Notify all affected employees before startup.

B. Open valves as necessary.

C. Remove tools from work area around equipment, and have personnel leave the area.

D. In the electrical room, remove tags and locks from the electrical disconnect switches.

E. Throw the electrical disconnect switches to the on position, and re-start the equipment in accordance with SOP-1, and SOP-2 (CP-1) or SOP-5 (CP-2, CP-3).

AFFECTED AND AUTHORIZED EMPLOYEES

A. Affected Employees: Treatment Plant Operators and Project Manager

B. Authorized Employees: Treatment Plant Operators and Project Manager

NOTIFY ALL AFFECTED EMPLOYEES BEFORE SHUTDOWN OR STARTUP OF THIS EQUIPMENT.

Approvals / Title	Date
_____ Project Manager	_____
_____ Health & Safety Rep.	_____
_____ Operator	_____

SOP-11-07
LOCKOUT / TAGOUT FOR:
ACID AND CAUSTIC DRUM PUMPS

FOR: ACID AND CAUSTIC DRUM PUMPS

Date Issued/Revised: October 13, 1999 revised May 2006

AREA: Groundwater Treatment Building

EQUIPMENT IDENTIFICATION

A. **General Description**: Finish Thompson Model M3X 115V 50/60Hz 1.7A

B. **Manufacturer**: Finish Thompson

(Acid and caustic drum pumps are identical, therefore, procedure is combined, differences are noted).

OPERATOR CONTROLS

A. On/off switch on the drum pump handle.

ENERGY SOURCE/LOCATION/MAGNITUDE

A. **Acid Pump** Main electrical disconnect is located 50 feet away, in the electrical room lighting panel, circuit LP-11 (120V).

B. **Caustic Pump** Pump is equipped with a plug; to de-energize, simply unplug (120V).

SHUTDOWN PROCEDURES

A. Notify all affected employees before shut-down procedure begins.

B. Remove drum pump from drum.

ENERGY ISOLATION PROCEDURES (LOCK AND TAG)

A. **Acid Pump** Throw the main electrical disconnect switch in the lighting panel to the off position. Lock the lighting panel circuit breaker off, and tag the locking device.

B. **Caustic Pump** Unplug the pump and tag the plug.

ATTEMPT TO RESTART THE EQUIPMENT (TRY)

A. Attempt to re-start the pump by turning it on using the on/off switch on the drum pump.

START UP PROCEDURES:

A. Notify all affected employees before start-up.

B. Remove tools from work area around equipment, and have personnel leave the area.

C. **Acid Pump** In the electrical room, remove tags and locks from the electrical disconnect switch. Throw the electric disconnect switch to the on position. Follow procedures in SOP-2 for proper pump operation.

D. **Caustic Pump** Plug the pump in, and follow procedures in SOP-5 for proper pump operation.

AFFECTED AND AUTHORIZED EMPLOYEES

A. Affected Employees: Treatment Plant Operators and Project Manager

B. Authorized Employees: Treatment Plant Operators and Project Manager

NOTIFY ALL AFFECTED EMPLOYEES BEFORE SHUTDOWN OR STARTUP OF THIS EQUIPMENT.

Approvals / Title	Date
Project Manager	
Health & Safety Rep.	
Operator	

SOP-11-08
LOCKOUT / TAGOUT FOR:
FLOOR SUMP PUMP

FOR: FLOOR SUMP PUMP

Date Issued/Revised: October 13, 1999, revised May 2006

AREA: Groundwater Treatment Building

EQUIPMENT IDENTIFICATION

A. **General Description**: Serfilco EKL ¾-3SC-C.75 220-240V, 50/60Hz, single phase

B. **Manufacturer**: Serfilco

OPERATOR CONTROLS

A. On/off/ switch at the sump pump.

ENERGY SOURCE/LOCATION/MAGNITUDE

A. Main electrical disconnect is located 50 feet away, in the electrical room lighting panel, circuit LP-22 and LP-24 (120V X 2 = 240V).

SHUTDOWN PROCEDURES

A. Notify all affected employees before shut-down procedure begins.

ENERGY ISOLATION PROCEDURES (LOCK AND TAG)

A. Throw the main electrical disconnect switches in the lighting panel to the off position. Lock the lighting panel circuit breakers off, and tag the locking devices.

B. Throw the on/off switch at the pump to off. Lock and tag the switch. Note that this step is redundant with Step A because it deenergizes the same circuit.

ATTEMPT TO RE-START THE EQUIPMENT (TRY)

A. Attempt to start the pump by raising the high level (turn-on) switch in the sump. The control panel should indicate pump running, but the pump should not be on.

START-UP PROCEDURES:

A. Notify all affected employees before startup.

B. Remove tools from work area around equipment, and have personnel leave the area.

C. In the electrical room, remove tags and locks from the electrical disconnect switches.

Throw the electrical disconnect switches to the on position.

D. At the equipment, remove tags and locks from the electrical disconnect switches. Throw the electrical disconnect switches to the on position.

AFFECTED AND AUTHORIZED EMPLOYEES

A. Affected Employees: Treatment Plant Operators and Project Manager

B. Authorized Employees: Treatment Plant Operators and Project Manager

NOTIFY ALL AFFECTED EMPLOYEES BEFORE SHUTDOWN OR STARTUP OF THIS EQUIPMENT.

Approvals / Title	Date
Project Manager	
Health & Safety Rep.	
Operator	

SOP-12
CONFINED SPACE ENTRY PROCEDURE

12.1 PURPOSE

. The purpose of this SOP is to provide the treatment plant operator with the knowledge, training and procedures necessary to safely perform confined space entries.

Parsons employees must enter permit-required confined spaces in accordance with this SOP, which addresses the following items:

- Measures necessary to prevent unauthorized entry into confined spaces;
- Methods for identifying and evaluating the hazards of the confined space prior to entry;
- Procedures and practices necessary for safe entry;
- Safety equipment necessary to conduct operations;
- Methods to evaluate space conditions during entry operations;
- Designated persons who have active roles in confined space operations (e.g., entrants, attendants, and entry supervisor) and their duties; and
- Methods to apprise contractors of precautions or procedures to implement when hired to conduct operations in a permit space.

12.2 RELATED SECTIONS

1. SOP-11 Lockout / Tagout Procedure

12.3 STANDARD OPERATING PROCEDURE

12.3.1 Definition of Confined Space

A confined space is defined as any enclosed or semi-enclosed space that has restricted means for entry or exit and is not intended for continuous occupancy. Typical confined spaces are manholes, metering stations, valve or siphon chambers, digesters, silos, empty tanks, pits, or any other area in the system that has direct contact with wastewater, sludge, sludge gas, or conduits carrying these substances.

12.3.2 Classification of Confined Spaces

Confined spaces are classified based upon existing or potential hazards. The two classifications of confined spaces are non-permit confined space and permit-required confined space.

A non-permit confined space does not contain atmospheric hazards or have the potential to contain any hazard capable of causing death or serious physical harm. Examples of non-permit confined spaces include vented vaults or motor control cabinets. These spaces have either natural or permanent mechanical ventilation to prevent the accumulation of a hazardous atmosphere, and they do not present engulfment or other serious hazards. Since non-permit spaces are free of atmospheric or safety hazards, they do not require special entry protocols.

However, entry into these areas must comply with applicable OSHA requirements (i.e., illumination, ladders, etc.).

A permit-required confined space has one or more of the following characteristics:

- Contains or has the potential to contain a hazardous atmosphere
- Contains a material that has the potential for engulfing a person
- Has an internal configuration such that a person could be trapped by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section
- Contains any other recognized serious safety or health hazard

The Project Health and Safety Representative shall evaluate the work place to determine if any spaces are permit-required confined spaces. A table of confined spaces at the Cherry farm/River Road Site is presented below. Procedures described in Sections 12.3.3 through 12.3.10 apply only to permit-required confined spaces.

If there are changes in the use or configuration of a non-permit confined space that could increase the hazards to the entrants, the Health and Safety Representative shall re-evaluate the space and reclassify it as a permit-required confined space if necessary.

Area or Space	Type of Confined Space
Recovery Well Vaults RW-4 and RW-5	Non-permit required confined space. Allow vault to naturally ventilate for 1 minute with both access doors open prior to entry.
Sumps S-1 through S-4	Permit required confined space. Comply with Sections 12.3.3 through 12.3.9.
Tank T-1	Permit required confined space. Comply with Sections 12.3.3 through 12.3.9.
Tank OWS-1	Permit required confined space. Comply with Sections 12.3.3 through 12.3.9.
Tank T-2	Permit required confined space. Comply with Sections 12.3.3 through 12.3.9.
Acid Storage Tank ST-1	Permit required confined space. Comply with Sections 12.3.3 through 12.3.9.
Caustic Storage Tank ST-4	Permit required confined space. Comply with Sections 12.3.3 through 12.3.9.

12.3.3 Warning Signs

A plant that contains permit-required confined spaces must post warning signs at the entrance of these spaces. Signs, must as a minimum, contain the following language:

12.3.4 Entry Permit

Entry into any area designated as a permit-required confined space will require a permit. The permit is an authorization and approval that specifies the location and type of work to be performed and certifies that all existing hazards have been evaluated and that all necessary steps have been taken to ensure worker safety. ONLY PERSONNEL **TRAINED AND CERTIFIED** FOR CONFINED SPACE ENTRY ARE ALLOWED TO PERFORM ANY NECESSARY WORK WITHIN THE CONFINED SPACE. The entry permit must address the following items:

- Permit space to be entered;
- Purpose of the entry;
- Date and the authorized duration of the entry permit;
- Names of the persons who will enter the confined space (entrants);
- Names of the persons who will be attendants;
- Name of the entry supervisor;
- Hazards of the confined space to be entered;
- Measures used to isolate the permit space and to eliminate or control the hazards before entry into the confined space;
- Acceptable entry conditions;
- Results of initial and periodic tests accompanied by the names or initial of the tester;
- Rescue and emergency services and the means used for summoning the services;
- Communication procedures used by entrants and attendants to maintain contact during the entry;

- Equipment, such as personal protective equipment, testing equipment, communications equipment, alarm systems, and rescue equipment; and
- Other information necessary to ensure employee safety, given the circumstances of the particular confined space.

Once the entry has been completed, the entry supervisor will cancel the permit. Canceled permits must be maintained for at least 1 year. An example of a confined space entry permit is included at the end of this section.

12.3.5 Equipment For Permit-Required Entry

The following is a list of equipment used to conduct permit-required confined space operations:

- Ventilation equipment needed to obtain acceptable airborne concentrations;
- Atmospheric testing equipment to identify oxygen deficiency, combustible gases, and suspected toxic gases (e.g., hydrogen sulfide);
- Communication equipment for entrants and attendant;
- Personal protective equipment (e.g., respirators and hard hats) when feasible engineering controls or work practices do not adequately protect employees;
- Lighting equipment to enable employees to work safely and exit quickly in the event of an emergency;
- Pedestrian or vehicle barriers (e.g., traffic cones, barricades, warning signs, and traffic flags) to protect entrants from external hazards;
- Ladder, tripod, and body harness for safe entry and egress; and
- Any other equipment necessary for the entry into and rescue from the confined space.

The above equipment will be provided by Parsons or the client, and will be maintained in proper working condition.

12.3.6 Atmospheric Testing of Permit-Required Confined Spaces

All permit-required confined spaces must be considered dangerous before entry, until proven safe. Air monitoring shall be performed before removing the cover, if practicable. Some covers have openings through which a probe may be inserted. If not, the lid must be removed using appropriate tools, and the atmosphere tested before entry.

Atmospheric testing will be performed by the entry supervisor or attendant for oxygen deficiency and explosive and toxic gases. Multi-gas meters are available that test for oxygen deficiency, explosive gases, and certain toxic gases (hydrogen sulfide and carbon monoxide).

It is important to understand that some gases or vapors are heavier than air and will settle to the bottom of the space whereas, some gases are lighter than air and will be found around the top of the confined space, as shown in Figure 12.1. All areas of a space must be tested (top, middle, bottom). Entry will be allowed only when the following atmospheric conditions are met:

- Oxygen concentration in the confined space is greater than 19.5 percent and less than 23.5 percent by volume.

- Presence of flammable gases or vapors is less than 10 percent of the lower flammable limit.
- Potential toxic gases or vapors are present at concentrations below OSHA permissible exposure and/or ACGIH TLVs (e.g., <10 ppm for hydrogen sulfide, <25 ppm Carbon Monoxide).

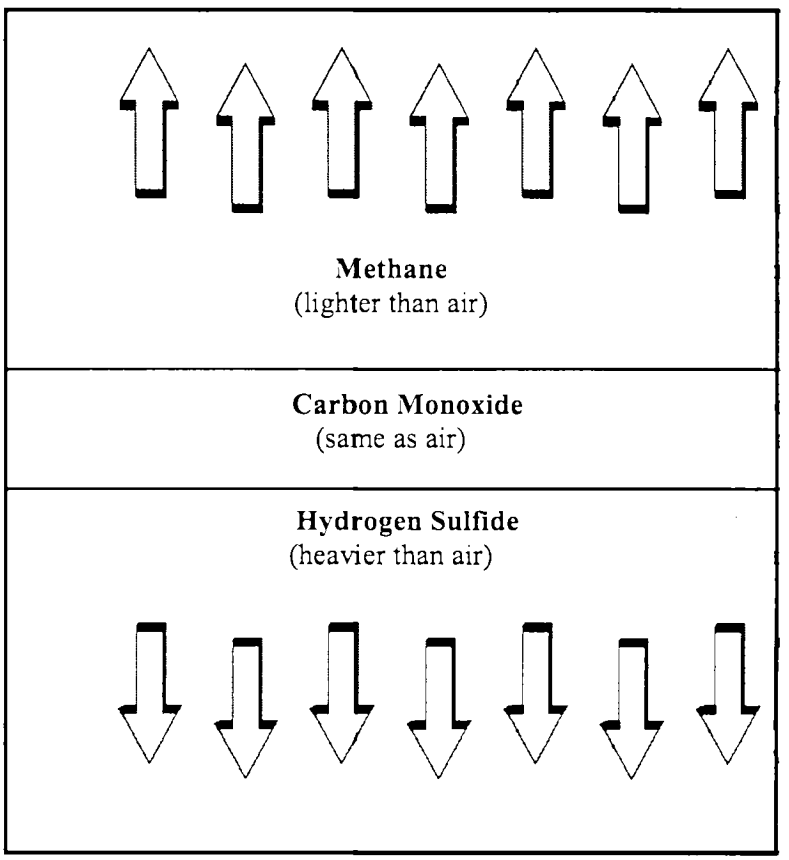


Figure 12.1 Atmospheric Testing: From outside, Top to Bottom

If atmospheric readings do not comply with acceptable entry parameters, then ventilation of the space is required. A blower for positive displacement of the atmosphere is often used. Allow sufficient time for the blower to displace five times the volume of the space. Next, re-test the space to verify that acceptable concentrations have been met before entry. The blower shall remain in operation throughout occupancy of the space.

When using gasoline or diesel-powered blowers, ensure that the exhaust gas from the engine is not drawn into the space by the blower. If a hazardous atmosphere persists in spite of ventilation, it will be necessary for the employee to use proper respiratory protection equipment. A positive-pressure self-contained breathing apparatus or positive-pressure airline respirator with a 5-minute escape tank are often used for permit-required confined space operations.

Personnel working in a permit-required confined space must be equipped with a continuous atmospheric monitoring device. This is true even if the atmosphere was found to be safe initially, because conditions can change. Equipment used for continuous monitoring of the

atmosphere shall be explosion-proof and equipped with an audible alarm that will alert employees when a hazardous condition develops.

An employee's well-being depends on the proper functioning of safety equipment. Careful, regular maintenance of the monitoring equipment is essential. All monitoring instruments must be calibrated prior to use and maintained according to manufacturer's specifications. The Health and Safety Representative shall keep records of instrument calibration and maintenance.

12.3.7 Isolating The Permit Space

Before entering a permit-required confined space, isolate the space from all other systems to ensure that injury does not occur. Blanks must be used to physically isolate all pipelines connected to the confined space. Shut-off valves or pipelines to the space must be locked in the closed position and tagged for identification. In continuous systems, where complete isolation is not possible (e.g., sewer lines), specific written safety procedures should be developed and implemented.

Electrical isolation of the confined space is necessary to prevent accidental activation of moving parts that would be hazardous to the worker. Circuit breakers or disconnects should be locked out and tagged in the off position with a key-type padlock. The only key is to remain with the person who locked the breaker. If more than one person is inside the space, each person must place his or her own lock on the circuit breaker.

Mechanical isolation of moving parts can be achieved by disconnecting linkages or removing drive belts or chains. Equipment with moving mechanical parts must also be blocked in such a manner that there can be no accidental rotation. Lockout and tagout procedures must conform to OSHA standards (see 29 CFR part 1910.147) which are addressed in SOP-11.

12.3.8 Responsibilities and Duties of Personnel Conducting Permit-Required Confined Space Operations

As stated in Section 12.3.4, the permit-required confined space entry program should designate personnel who have active roles in the program. Every permit-required confined space operation requires an authorized entrant(s), an attendant, an entry supervisor, and a rescue team or service. Any subcontractors performing confined space entry will be required to have proper certification and training.

Any person entering a permit-required confined space must know the potential hazards of the space, including the signs or symptoms of exposure. Entrants must be familiar with the proper use of safety equipment and should be in constant communication with the outside attendant. When an entrant recognizes the signs or symptoms of exposure in another entrant or himself, or detects a prohibited condition, the entrant must inform the attendant of the problem and initiate evacuation.

The attendant remains outside the permit space during the entire operation and is responsible for maintaining an accurate count of entrants in the confined space. The attendant should communicate with entrants as necessary to monitor status. The attendant must also know potential hazards during entry, including signs, symptoms, and behavioral effects of exposure to hazardous substances. The attendant monitors activities inside and outside the space to determine if it is safe for the entrants to remain. The attendant is required to order an immediate evacuation of the space when one of the following conditions occur:

- A prohibited condition is detected in the space.
- The attendant detects the symptoms of exposure in an entrant.

- The attendant detects a situation outside the space that could endanger the entrants.

In the event of an emergency requiring the rescue of an entrant, the attendant is only permitted to perform a non-entry rescue (i.e., extracting personnel by use of retrieval system) or to summon a rescue team.

The entry supervisor (usually the Site Health and Safety Representative) is the individual responsible for the development of the permit, and has overall accountability for the safety of the operation. The entry supervisor checks permit entries, verifying that all tests specified have been conducted and that all procedures and equipment are in place prior to entry. Additionally, the entry supervisor ensures that a rescue team or service is available and readily accessible.

The nature of work in permit-required confined spaces makes emergencies a continual possibility, no matter how infrequently they actually occur. Emergencies occur quickly and unexpectedly and require immediate response. In an emergency, rescue personnel would either enter a permit space to remove entrants or would remain outside and pull out entrants by use of retrieval lines. The plant may either establish an in-house rescue team or make arrangements for off-site services (i.e., fire department). If off-site emergency rescue services are to be used, the response time to the space must be within 8 minutes.

12.3.9 Training For Permit-Required Confined Space Work

Anyone entering a permit-required confined space must recognize and understand the potential hazards to health and safety associated with the operation. Personnel involved in permit space activities must be thoroughly familiar with the plant's permit-required confined space program and must receive training. The objectives of the confined space training program are to:

- Make workers aware of the potential hazards they may encounter.
- Provide the knowledge and skills necessary to perform the work with minimal risk to worker health and safety.
- Make workers aware of the purpose and limitations of safety equipment.
- Ensure that workers can safely avoid or escape from emergencies.

The level of training provided by the Health and Safety Representative should be consistent with the worker's job function and responsibilities. The training program must involve both classroom instruction and hands-on practice. Hands-on instruction should consist of entry and rescue drills. Employees must demonstrate proficiency in the knowledge and skills necessary for safe entry and response (proficiency may be demonstrated through oral or written examination or evaluation of field simulations). The Health and Safety Representative will issue certificates documenting the successful completion of training.

Training is required before the employee is assigned to a permit-required confined space operation and when the employee's assigned duties change (e.g., when assignment changes from entrant to rescue team member). .

Reviewed and Approved by:

Parsons Health and Safety Officer:_____

Date: _____

SOP-13
CONVEYANCE PIPELINE FLUSHING PROCEDURE

13.1 PURPOSE

The following procedure is for flushing the sumps conveyance pipeline. Flushing should be conducted annually, between May and October. This maintenance procedure cleans scaling and other debris from the conveyance pipelines between the sumps and the groundwater treatment plant.

13.2 RELATED SECTIONS

1. SOP-10 Routine Operation, Maintenance, and Recordkeeping

13.3 EQUIPMENT AND MATERIALS

- **Preferred Pump** - Godwin HL4M 4"x4" (or equivalent) pump, capable of 195 psi at approx 200gpm.
- **Hoses** - 20 feet of 4-inch diameter hard-wall suction hose, 20 to 40 feet of 4-inch diameter high pressure discharge hose (can be rented with the pump), and 20 to 50 feet of 2-inch diameter high pressure hard-wall conveyance hose that connects to the sump pump valve assembly.
- **Vehicle** – 4 x 4 open-bed pickup truck with a hitch assembly to move the flushing pump between sumps, and to transport clean water from the treatment plant to each sump.
- **Water Storage** – Two 300-gallon water tanks (one for receiving flushed water at the treatment plant, and the second for transporting clean water to each sump).
- **Communication** - Two way radios and or cell phone capability.
- **Other** - Plastic sheeting to be used around the sump enclosures; Lockout/Tagout kit or materials; sorbent pads and rags; cones, barricades and or caution tape; appropriate PPE.

13.4 STANDARD OPERATING PROCEDURS

1. Notify NYSDEC with two weeks advance notice that the line flushing is scheduled.

2. Reserve an appropriate high-volume pump from a pump or mechanical contractor supplier (see attached specification for an example pump – use this or equivalent). Obtain all hoses, fittings barricades, etc. that will be needed during the flushing event.

3. Turn off power to Sumps 1 thru 4 in the control room at the treatment plant building. Follow all standard Lockout/Tagout procedures.

4. Turn off the power to each of the four sumps individually at each of the control panel enclosures. These enclosures are located near each of the four sumps. Follow all standard Lockout/Tagout procedures.

5. After the pumps have been de-energized, lay out plastic sheeting surrounding the sump enclosure. This prevents any LNAPL or impacted groundwater from the sump from contacting the ground surface. Secure the area around the sump with the appropriate cones or barricades. Open the sump access door and lock into the open position.

6. Using the lifting cable attached to the pump, pull the associated piping and pump up the guide rails and out of the sump enclosure. This may be done by hand with two people or with the tripod stored at the treatment plant.

7. Remove the pump impeller assembly from the pump motor and soak impeller assembly in muriatic acid for 2 to 3 hours until the impeller assembly spins freely. If impeller assembly does not spin freely after soaking, the impellers should be replaced)

8. After disconnecting the pump from the tee valve assembly, connect the 2-inch diameter hard-wall conveyance hose to the tee valve. Slide the tee valve and hose assembly down the pump guide rails and onto the pitless adaptor. This will be under the water in the sump. Connect the black conveyance hose to the flushing pump. Alternately, a rigid steel pipe assembly could be used to connect to the pitless adapter, with the conveyance hose remaining above grade.

9. Two-way communications is necessary for this process to be completed safely. Do not start pumping until clearance is obtained from the observer at the treatment building. Before flushing water can be pumped to the acidification tank, the acidification tank must be drained into the 300-gallon tank. Place the 300-gallon tank on the floor of the treatment plant near a floor drain, and fill it with water from the acidification tank. Start the flushing process. Flush the pipeline at up to **160 psi** and or **50 gpm** until the water runs clear in the acidification tank. Once the acidification tank is full with the flushing water from the sumps, drain the water from the 300-gallon tank into the floor drain for treatment, and repeat the draining of the acidification tank process. Place filter bags on the outlet of the tank prior to draining.

10. Transport clean water to the first sump, using a 300-gallon tank. Flush the sump conveyance pipeline, using the high head centrifugal pump. Start at Sump No. 4 (closest to treatment plant) and continue downstream to Sump No. 1 (furthest from plant). If necessary, switch order in which sumps are flushed, or re-flush a section as needed. In each section of pipeline, the discharge pressure at the pump should not exceed **160 psi** (the working pressure of the pipeline). The pump discharge should be fitted with a pressure gauge and pressure relief valve, to prevent exceeding the working pressure limit. Flush each section of pipeline until water runs clear at the discharge point in the treatment plant.

11. Pressure in the pipeline should be maintained as high as possible with out exceeding 160 psi. Along with monitoring the pressure, the flow should be monitored at the Isco flow monitor, located in the control room of the treatment plant. Note that the flow meter for the sumps will max out at 50 gpm.

12. After the flushing has been completed at each sump location, re-assemble the clean impeller assemblies to the motors, and then re-install into the sumps. Turn the power back on at the control boxes and in the control room, then check for normal system operation. (Note sumps flow rates should be checked one at a time to insure that a tight connection has been made at the pit-less adaptor under the sump water).

13. Upon completion of the flushing event. Remove all plastic, pads, rags, barricades and materials used at each sump location and dispose of the refuse properly.

14. Return the treatment system to normal operation.

779 Two Mile Creek Road • Tonawanda, New York 14150 • (716) 693-4900 • Fax (716) 693-0601

Town of Tonawanda Water Resources Department

Wastewater Treatment Division

JOHN S. CAMILLERI
Director of Water Resources

November 9, 2005

Parsons
180 Lawrence Bell Rd. Suite 104
Williamsville, New York 14221

Attn: Mark Raybuck,

Dear Sir:

This correspondence shall act as official notification that the Town of Tonawanda has made a determination to renew an Industrial Sewer Connection Permit to Parsons. Your permit # 439 will be in effect from January 1, 2006 and expire on December 31, 2008.

An invoice for One thousand dollars ($1000.00) has been included and is payable within twenty (20) business days.

Please feel free to call me at (716) 693-4900 ext. 250 if you have any questions.

Sincerely,

William Mucci
Office of the Compliance Coordinator

Permit No. 439

TOWN OF TONAWANDA

INDUSTRIAL SEWER CONNECTION PERMIT

Company Name: Parsons- as agent for Cherry Farms/River Road PRP
Group
Division Name (if Applicable)

Mailing Address: 180 Lawrence Bell Drive Suite 104
Street or P.O. Box
Williamsville, New York, 14221
City, State and Zip Code

Facility Address: Cherry Farms 4000 River Road
Street or P.O. Box
Tonawanda, New York, 14150
City, State and Zip Code

The above Industrial User is authorized to discharge industrial wastewater to the Town of Tonawanda sewer system in compliance with the Town's Sewer Use Ordinance Number 2-2000, any applicable provisions of Federal or State law or regulation, and in accordance with discharge point(s), effluent limitations, monitoring requirements, and other conditions set forth herein.

This permit is granted in accordance with the application filed on September 28, 2005 in the office of the Pretreatment Administrator, and in conformity with plans, specifications, and other data submitted to the Town in support of the above application.

Effective Date: January 1, 2006

Expiration Date: December 31, 2008

Permit No. 439

Date: 11/8/2005 Signed: William Mucci

William Mucci
Town of Tonawanda
Office of the Compliance Coordinator

Permit No. 439

Modified Date: _____

PART 1 - WASTEWATER DISCHARGE LIMITATIONS AND MONITORING REQUIREMENTS

A. LOCALLY DERIVED LIMITATIONS

The industrial user shall comply with the following locally derived effluent limitations effective as of January 1, 2006 through December 31, 2008

MONITORING LOCATION #1: **Outlet of Carbon column Following Oil/Water Separator Prior to Mixing with Other Non-Oily Wastewater.**

PARAMETER	MONTHLY AVERAGE	DAILY MAXIMUM
	mg/l (lbs/day)	mg/l (lbs/day)
Oil and Grease		100 mg/l
Polychlorinated Bi-Phenyls (PCB's)		<PQL *****

MONITORING LOCATION #2: **Discharge Point of Total Mixed wastes to the Town Sewer**

PARAMETER	MONTHLY AVERAGE	DAILY MAXIMUM
	mg/l (lbs/day)	mg/l (lbs/day)
Oil and Grease		100 mg/l
Polychlorinated Bi-Phenyls (PCB's)		<PQL

MONITORING SPECIFICATIONS

A. *Monitoring for compliance with these locally derived limitations at both Monitoring Point 1 and at Monitoring Point 2 shall be performed as follows:*

PARAMETERS	SAMPLE FREQUENCY	SAMPLE TYPE	PURPOSE
Oil and Grease	**Monthly**	**Grab**	**Compliance**
PCB's (All Arochlors)	**Monthly**	**Grab**	**Compliance**
pH	**Monthly**	**Grab/Field Test**	**Compliance**
PCB's (Recovered Oil)	**Monthly**	**Grab**	**Compliance**

Monitoring for SUO Compliance, Surcharge Evaluation and other reasons shall be performed at Monitoring Point # 2 only as follows:

PARAMETERS	SAMPLE FREQUENCY	SAMPLE TYPE	PURPOSE
pH	Semi-Annual	Grab	5.0-9.5 su
Total Petroleum Hydrocarbons	"	"	100 mg/l
BOD	"	"	250 mg/l *
TSS	"	"	250 mg/l *
Total Phosphorous	"	"	6.0 mg/l *
Zinc	"	"	4.4 mg/l

* = Concentrations at which surcharge begins.

All Self-Monitoring reports shall be submitted to this office no later than the twenty-fifth (25) day of the month following when the sample was taken.
Flows must be mailed, faxed, or called to this office no later than the 10th of the month.

PART II - SPECIAL CONDITIONS/COMPLIANCE SCHEDULE

1. *The Industrial User shall develop, within 6 months of the effective date of this permit, an accidental spill prevention plan to eliminate or minimize the accidental or slug discharge of pollutants into the sewer system, which could have an effect on the Town's treatment plant, sludge, or cause the Town to violate its SPDES permit.*

PART III - REPORTING REQUIREMENTS

1. *All Industries requiring submittal of self-monitoring reports (SMR's) must submit all laboratory results on all discharged samples. If a lab analysis was performed using an EPA approved test method, then those results must be included in the SMR.*
   Persons signing SMR's must be a responsible company official, ie; owner, corporate manager, or supervise more than two hundred fifty (250) employees. Any of the above may appoint a company representative to sign SMR's but written notice must be supplied to this office authorizing said employee to sign.

The following statement will be required on all SMR's and baseline monitoring reports (BMR):

" I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who managed the system, or those persons directly responsible for gathering the information, the information submitted is to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violation."

2. *The Industrial User shall notify the Town immediately upon any accidental or slug discharge to the sanitary sewer system. Formal written notification discussing circumstances and remedies shall be submitted to the Town within 5 days of the occurrence.*

3. *The Industrial User shall notify the Town 30 days prior to the introduction of new wastewater or pollutants or any substantial change in the volume or characteristics of the wastewater being introduced into the POTW from the User's industrial processes.*

4. *Any upset experienced by the Industrial User of its treatment that places it in a temporary state of non-compliance with wastewater discharge limitations contained in this permit or other limitations specified in the Town's Ordinance shall be reported to the Town within 24 hours of first awareness of the commencement of the upset. Immediate resampling for the non-compliance pollutant shall begin. A detailed report shall be filed within 5 days.*

5. *The Industrial User is required to submit to the Town reports on the results of its sampling of the pollutants specified in Part I of this Permit. This report shall also contain monthly flows.*

6. *Analytical procedures must be performed in accordance with 40 CFR Part 136. Additional pollutants not contained in Part 136 must be performed using validated analytical methods approved by EPA (40 CFR 403.12 [g] [4]).*

7. *All reports shall be submitted to the following address:*

Daniel G. O'Leary, Compliance Coordinator
Wastewater Treatment Facility
779 Two Mile Creek Road
Tonawanda, New York 14150

PART IV - STANDARD CONDITIONS

1. *The Industrial User shall comply with all the general prohibitive discharge standards in Article IV of the Local Law 2-2000.*

   a. *BOD 250 mg/l, TSS 250 mg/l, P 6 mg/l are not to be construed as discharge limits of the above pollutants but as a baseline for generating abnormal sewer charges.*

2. RIGHT OF ENTRY

The Industrial User shall, after reasonable notification by the Town, allow the Town or its representatives, exhibiting proper credentials and identification, to enter upon the premises of the User, at all reasonable hours, for the purposes of inspection, sampling, or records inspection. Reasonable hours in the context of inspection and sampling includes any time the Industrial User is operating any process which results in a process wastewater discharge to the Town's sewerage system.

3. RECORDS RETENTION

The Industrial User shall retain and preserve for no less than three (3) years, any records, books, documents, memoranda, reports, correspondence and all summaries thereof, relating to monitoring, sampling and chemical analysis made by or in behalf of the User in connection with its discharge.

a) *All records that pertain to matters that are the subject of special orders or any other enforcement or litigation activities brought by the Town shall be retained and preserved by the Industrial User until all enforcement activities have concluded and all periods of limitation with respect to any and all appeals have expired.*

4. CONFIDENTIAL INFORMATION

Except for data determined to be confidential under Article VII, Section 4 of the Town's Ordinance, all reports required by this permit shall be available for public inspection at the office of the Compliance Coordinator, Wastewater Treatment Facility, 779 Two Mile Creek Road, Tonawanda, New York 14150.

5. RECORDING OF RESULTS

For each measurement or sample taken pursuant to the requirements of this permit, the user shall record the following information:

a) The exact place, date and time of sampling;
b) The dates the analyses were performed;
c) The person(s) who performed the analyses;
d) The analytical techniques or methods used, and
e) The results of all required analyses.
f) Where sanitary sewer discharge is measured by a mechanical or electronic device, accuracy of device shall be certified correct every year by the manufacturer. Certification shall begin September 2006.
g) Where sanitary sewer discharge is measured by percentage of consumed water, percentage shall be certified correct every year by a licensed professional engineer .Certification shall begin September 2006.

6. DILUTION

No Industrial User shall increase the use of potable or process water or, in any way, attempt to dilute a discharge as a partial or complete substitute for adequate treatment to achieve compliance with the limitations contained in this permit

7. PROPER DISPOSAL OF PRETREATMENT SLUDGES AND SPENT CHEMICALS

The disposal of sludges and spent chemicals generated shall be done in accordance with Section 405 of the Clean Water Act and Subtitles C and D of the Resource Conservation and Recovery Act.

8. TOXIC SUBSTANCES

All waters shall be maintained free of toxic substances in concentrations that are toxic to or produce detrimental physiological responses in human, plant, animal, or aquatic life.

9. SIGNATORY REQUIREMENTS

All reports required by this permit shall be signed by a principal executive officer of the User, or his designee.

10. REVOCATION OF PERMIT

The permit issued to the Industrial User by the Town may be revoked when after inspection, monitoring or analysis it is determined that the discharge of wastewater to the sanitary sewer is in violation of Federal, State, or local laws, ordinances, or regulations. Additionally, falsification or intentional misrepresentation of data or statements pertaining to the permit application or any other required reporting form, shall be cause for permit revocation.

11. LIMITATIONS ON PERMIT TRANSFER

Transfer of permit. Industrial waste permits are issued to a specific user for a specific operation. In the event of any change in ownership of the industrial facility, the permittee shall notify the new owner of the existence of the permit by letter, a copy of which shall be forwarded to the Pretreatment Administrator 30 days prior to change of ownership. A new industrial waste permit must be issued to the new owner.

12. FALSIFYING INFORMATION OR TAMPERING WITH MONITORING EQUIPMENT

Knowingly making any false statement on any report or other document required by this permit or knowingly rendered any monitoring device or method inaccurate, may result in punishment under the criminal law of the Town, as well as being subjected to civil penalties and relief.

13. MODIFICATION OR REVISION OF THE PERMIT

a) The terms and conditions of this permit may be subject to modification by the Town at any time as limitations or requirements as identified the Town's Ordinance, are modified or other just cause exists.

b) This permit may also be modified to incorporate special conditions resulting from the issuance of a special order.

c) The terms and conditions may be modified as a result of EPA promulgating a new federal pretreatment standard.

d) Any permit modifications which result in new conditions in the permit shall include a reasonable time schedule for compliance if necessary.

B. MISDEMEANORS

(1) Any violation of sections 165-20 through 165-30 of this Part 1 is hereby declared a misdemeanor except as otherwise provided by law

14. DUTY TO REAPPLY

The Town shall notify a User one hundred and eighty (180) days prior to the expiration of the User's Permit. Within ninety (90) days of the notification, the User shall reapply for re-issuance of the permit on a form provided by the Town.

15. SEVERABILITY

The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance is held invalid, the application of such provision to other circumstances, and the remainder of this permit shall not be affected thereby.

16. LIMITATIONS

The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any invasion of personal rights, nor any infringement of Federal, State or Local regulations.

17. A. VIOLATIONS

(1) Any violation of sections 165-3 through 165-19 of this Part 1 of Local Law 2-2000 is hereby declared a violation except as otherwise provided by law.

(2) Any person who violates the provisions of sections 165-3 through 165-19 of the Part 1, upon conviction thereof in a court of competent jurisdiction, may be punished by a fine of not more than two hundred fifty dollars ($250.), and each day on which there is a failure to comply shall be and is hereby declared to be a distinct and separate offense and punishable as such.

(3) The Town of Tonawanda may also maintain an action of proceeding in the name of the Town of Tonawanda in a court of competent jurisdiction to collect a civil penalty of not over two hundred dollars ($200.) for each violation of sections 165-3 through 165-19 of this Part 1.

(4) The Town of Tonawanda may also maintain an action or proceeding in the name of the Town of Tonawanda in a court of competent jurisdiction for injunctive relief for any violation Articles III, IV or V of this Part 1.

APPENDIX A

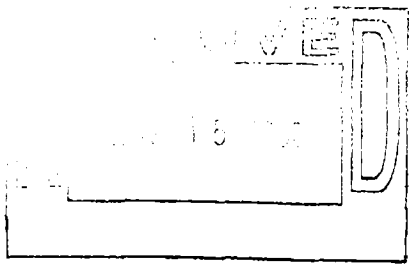
INDUSTRIAL SEWER CONNECTION PERMIT AND SEWER USE ORDINANCE

tonawanda, new york 14150 • 779 two mile creek road • 693-4900 • fax 693-0601

town of tonawanda water resources department

wastewater division

JOHN S. CAMILLERI
director of water resources



November 12, 2002

Parsons
180 Lawrence Bell Drive, Suite 104
Williamsville, NY 14221

Attn: Mark Raybuck

Dear Mark:

Enclose please find a copy of the Town of Tonawanda Sewer Use Ordinance 2-2000. This is referred to in the new permit # 439 and supercedes the old Sewer Use Ordinance 3-1984.

If you have any questions please call me.

Sincerely,

William Mucci
Office of Compliance Coordinator

Parsons Dr. DATE 11/9/05

180 Lawrence Bell Rd. Suite 104

Williamsville, New York 14221 INVOICE 003738

Attn. Mr. Raybuck

Mail To TOWN OF TONAWANDA, N. Y.
WASTEWATER TREATMENT FACILITY
PRETREAMENT DIVISION
779 TWO MILE CREEK ROAD
TONAWANDA, NEW YORK 14150

Make Check Payable to XXXXXXXXXXXXXXX ***Supervisor***

DATE	DESCRIPTION	AMOUNT	AMOUNT
11/9/05	Permit Renewal #439	$1000.00	
	Net Payable Twenty (20) Business Days		

PLEASE DETACH AND RETURN WITH YOUR REMITTANCE. INVOICE 003738