OPERATION AND MAINTENANCE MANUAL

102nd Street Landfill Site
Niagara Falls, New York

Prepared by: Conestoga-Rovers & Associates

Prepared for: Miller Springs Remediation Management, Inc.
and Olin Corporation

932022/31

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Division of Environmental Remediation, Region 9
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Erin M. Crotty
Commissioner

May 6, 2002

Mr. Donald Tubridy
Manager - Operations
Miller Springs Remediation Management
805 97th Street
Niagara Falls, New York 14304

Dear Mr. Tubridy:

102nd Street Landfill Site #932022
and #932031
Operation and Maintenance (O&M)

We have received your letter dated April 26, 2002, regarding storage and disposal of NAPL from 102nd Street Landfill.

The proposal to store the NAPL temporarily at the Love Canal Storage Facility, as required by the regulations, before its shipment off site for incineration is acceptable. Please note that the chronological data for each event of transport of NAPL from the 102nd Street to the Love Canal, period of storage, quantity of NAPL, off-site shipment, and name and location of the incineration facility must be documented in the 102nd Street quarterly progress report.

Should you have any questions, please contact Mr. Abul Barkat, the project manager of the site, at (716) 851-7220.

Sincerely,

Daniel K. King

Daniel K. King, P.E.
Regional Hazardous Waste Remediation
Engineer

/sz
cc: Mr. Abul Barkat, NYSDEC
Mr. Brian Sadowski, NYSDEC
Mr. Paul Olivo, USEPA

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EXECUTIVE SUMMARY

The following report describes the Operation and Maintenance (O&M) requirements for the 102nd Street Landfill Site (Site) located in Niagara Falls, New York. The Site covers approximately 22.1 acres and consists of two separate properties owned by Occidental Chemical Corporation (OxyChem) (15.6 acres) and Olin Corporation (6.5 acres). OxyChem's responsibilities at the Site are currently handled by Miller Springs Remediation Management, Inc. (MSRM), a subsidiary of Glenn Springs Holdings, Inc. (GSHI) and an affiliate of OxyChem.

The Remedial Action (RA) system components that require O&M and are described in this report are as follows:

- a landfill cap;
- a perimeter slurry wall;
- an aqueous phase liquid (APL) collection and discharge system;
- a non-aqueous phase liquid (NAPL) collection system;
- post-RA system performance monitoring;
- a perimeter fence; and
- shallow water environment monitoring.

A post-RA system performance monitoring program that includes groundwater quality, groundwater level, and NAPL presence monitoring has been established to monitor the effectiveness of the RA system components. All monitoring activities will be performed in accordance with the Health and Safety Plan (HASP) and the Quality Assurance Project Plan (QAPP) developed for the O&M activities at the Site. Each component of the monitoring program shall be reassessed annually to determine the need for any modifications. The post-closure care and monitoring will be performed for a minimum of thirty (30) years.

Water levels will be measured in 10 overburden monitoring wells and 10 piezometers to ensure an inward gradient exists across the slurry wall. Additional water levels will be measured at three bedrock wells. Water levels will be measured monthly for 2 years after startup of the system and quarterly thereafter. Groundwater samples will be collected and analyzed from 10 overburden and 3 bedrock monitoring wells. Samples will be collected and analyzed on a quarterly basis after startup for the first 2 years, semi-annually for the next 8 years, and once every year thereafter. A Quality Assurance/Quality Control (QA/QC) evaluation will be performed by Miller Springs

Remediation Management, Inc./Olin Corporation (MSRM/Olin) on all analytical results to determine if the data are acceptable for use in the respective program components. The data will be used to determine the effectiveness of the containment system by comparing concentrations of chemicals in the groundwater outside the slurry wall over time.

After startup, NAPL presence monitoring will be conducted at eight NAPL recovery wells on a monthly basis for 3 months and quarterly thereafter. If, during monitoring, more than 3 gallons of NAPL (6 inches deep in the 12-inch diameter well) are present in a NAPL recovery well, the NAPL will be removed for off-Site disposal in accordance with all applicable Federal and New York State Regulations.

The overburden groundwater level inside the slurry wall and along the APL collection trench will be lowered to an elevation of 562.6 feet above mean sea level (AMSL) to create an inward gradient for the Site. This elevation is approximately 1 foot below the average water level in the Niagara River adjacent to the Site. The APL will be transferred to the Love Canal Treatment Facility (LCTF) via a forcemain and will be treated at the LCTF. Treated effluent will be discharged to the City of Niagara Falls sanitary sewer system in accordance with the Occidental Chemical Corporation (OCC) Love Canal discharge permit. After the initial dewatering of the APL collection trench, the gradient established by the APL collection trench will be maintained by level-controlled pumping at each wet well. The estimated flow rate to maintain the steady state groundwater level is 2,800 gallons each week. Individual pump flow rates at each wet well, total flow, and APL levels in the Site's wet wells will be monitored through the LCTF control system.

Site requirements will include routine inspections, sampling, scheduled preventative maintenance, unscheduled maintenance in response to inspection reports or component failures, and record keeping.

The near shore shallow water environment will be inspected annually for a period of 5 years or until a functional shallow water environment becomes established based on a performance objective. The performance objective is to produce beds of wild celery and other submerged aquatic plant species with an areal coverage of 80 percent or more.

An O&M Report form will be completed by MSRM/Olin and submitted to the Environmental Protection Agency (USEPA) and New York State Department of Environmental Conservation (NYSDEC) annually.

1.0 INTRODUCTION

This plan describes the Operation and Maintenance (O&M) Manual for the 102nd Street Landfill Site (Site) located in Niagara Falls, New York. The purpose of the O&M Manual is to provide the detailed operation, maintenance, and monitoring requirements for the various components of the Remedial Actions (RA) that have been implemented at the Site and to ensure that the components continue to function as intended. The Site covers approximately 22.1 acres and consists of two separate properties owned by Occidental Chemical Corporation (15.6 acres) and Olin Corporation (6.5 acres). The Site is bordered by the Niagara River to the south, Buffalo Avenue to the north, Griffon Park to the west, and privately owned land to the east. A perimeter fence restricts Site access. Authorized vehicular traffic access is provided from Buffalo Avenue by fence gates.

Site contacts are listed in Table 1.1.

The RA system components at the Site that have associated O&M activities are as follows:

- a landfill cap;
- a perimeter slurry wall;
- an aqueous phase liquid (APL) collection and discharge system;
- a non-aqueous phase liquid (NAPL) recovery system;
- post-RA system performance monitoring;
- a perimeter fence; and
- shallow water environment monitoring.

The scope of this O&M Plan includes all on-Site RA system components and the forcemain system that discharges collected APL from the Site to Pumping Chamber #3 at the Love Canal property.

2.0 MONITORING AND TESTING

2.1 MONITORING PLAN

Monitoring at the Site, plus sample collection, sample analyses, and reporting tasks will be completed to ensure the integrity and to evaluate the performance of the RA system components. Monitoring tasks are required for groundwater and NAPL wells at the Site.

A groundwater monitoring program has been established to monitor the effectiveness of the slurry wall, landfill cap, and APL collection system. The groundwater monitoring program consists of water level monitoring and groundwater quality monitoring. The data collected will be used to evaluate the performance of the APL collection and discharge system and the slurry wall. The data also are used to determine when operation of the APL collection and discharge system may cease, subject to Environmental Protection Agency (USEPA) approval.

2.1.1 WATER LEVEL MONITORING

Water level monitoring consists of the measurement of water levels in monitoring wells to determine groundwater elevations. Water levels in 20 wells (PZ-01 through PZ-10 inside the slurry wall and PCM-01 through PCM-10 outside the slurry wall) will be measured. This information will be used to evaluate Site performance toward establishment of an inward gradient. Water level monitoring will begin after APL collection and discharge system startup. Water level monitoring locations are shown on Plan 594000-30K-01. Water levels will be measured at the following frequencies:

- monthly for 2 years after startup; and
- quarterly thereafter.

Water level data will be converted to elevations and listed in tabular form for each round of data collected.

After steady-state conditions are achieved, in the event that water level monitoring indicates that the inward hydraulic gradients across the slurry wall and/or vertical upward gradient across the clay/till are not adequate, the APL collection system pumping level controls will be adjusted to achieve the target and minimum head differences across the slurry wall which are one foot and one and one-half foot, respectively.

After one year, the water level monitoring program will be reassessed. The program may be reassessed annually thereafter until water level monitoring is no longer required.

2.1.2 GROUNDWATER QUALITY MONITORING

Groundwater quality monitoring consists of the collection of water samples from ten overburden monitoring wells (PCM-01 through PCM-10) and three bedrock monitoring wells (PCBM-01 through PCBM-03), and the analysis of these samples to determine the concentrations of Site specific indicators in the groundwater. The samples will be analyzed for the parameters listed in Table 2.1. All of these monitoring wells are located outside of the slurry wall as shown on Plan 594000-30K-01. Groundwater sampling will begin after APL collection and discharge system startup. Groundwater samples will be collected at the following frequencies:

- quarterly for 2 years;
- semi-annually for the next 8 years; and
- once every year thereafter.

Laboratory analysis will be performed as per Table 2.1.

Upon receipt of validated groundwater quality monitoring data, the data will be evaluated by MSRM and Olin to determine if the data are acceptable for use in the monitoring program.

The ground-water quality monitoring will be one of the data sets used to monitor the performance of the ground-water collection system and to determine the effectiveness of the slurry wall with respect to its design criteria and the Record of Decision requirements that an inward gradient be maintained across, and that the NAPL plume be contained by, the slurry wall.

2.1.3 NAPL PRESENCE MONITORING

After the startup of the APL collection and discharge system each of the eight NAPL recovery wells (NR-1 through NR-5, NR-7, NR-8, and NR-10) will be checked for NAPL at the following frequencies:

- monthly for 3 months; and
- quarterly thereafter.

If more than 3 gallons of NAPL (6 inches deep in a 12-inch diameter well) are present in a NAPL recovery well during monitoring, the NAPL will be removed for off-Site disposal in accordance with the procedure detailed in Section 3.2 and in accordance with all applicable Federal and New York State Regulations. This is the minimum depth of NAPL required to allow removal.

Monitoring for NAPL shall be reassessed annually to determine the suitability of the monitoring or until NAPL monitoring is no longer required. NAPL monitoring will no longer be required when the recharge rate for a well is less than 1 gallon/year.

3.0 OPERATION OF 102ND STREET LANDFILL SYSTEMS

The following sections provide information on the operation of the Site RA systems, including startup operation, NAPL recovery, and system controls and instrumentation.

3.1 APL COLLECTION AND DISCHARGE SYSTEM OPERATION

The individual APL pumps in the APL collection wet wells operate on level control. Power to individual APL pumps is turned off automatically when the level in the wet well falls to the low-level elevation of the probe. Power to the APL pump is restored automatically when the level in the wet well rises to the high-level elevation of the probe. APL levels within each wet well, the flow rate from each wet well, and the total flow to the LCTF will be monitored at the LCTF.

Leak detection for the APL discharge force main is provided in the on-Site Meter Chamber and in each off-Site manhole. If a leak is detected in any of these manholes, all four APL pumps will stop pumping automatically and a remote message will be sent to the LCTF. Pumps will be restarted manually after the problem has been identified and corrected.

When the pumps shut down due to a high level in the LCSCT, the control system will alarm the operator via the process computer.

Level instrumentation in the Love Canal South Collector Tank (LCSCT) will also shut down the four 102nd Street Wet Well pumps when the LCSCT capacity is reached. Pumps will restart automatically after the tank level decreases to a set elevation.

A hand/off/auto switch is located in each wet well control panel. Under normal operating conditions the switch will be in the auto position. This will allow the pump to run under normal operating conditions. For testing operations, the switch will be in the hand position. This will allow the pump to bypass the controls and locally operate. For maintenance operations the switch will be in the off position. A light located on each wet well control panel will show when the pumps are on.

3.1.1 APL COLLECTION STARTUP OPERATION

The high level (pump start) points for each of the wet wells will be set at 562.6 feet above mean sea level (AMSL) which is 1 foot below the average Niagara River level. The

pump shut off points will be set at 562.1 foot AMSL. This will allow a 1-foot inward gradient to be established at the APL Collection Trench.

Once the levels are set the pumps will be allowed to start automatically and begin pumping groundwater to the LCSCT at Love Canal. These pumps will be shut down at the LCTF as necessary or when the LCSCT is filled. It is anticipated that eventually a steady state flow of 2,800 gallons per week will be required to maintain the inward gradient across the slurry wall.

Individual pump flow rates, total flows, and APL levels in the wet wells will be recorded whenever water levels in the piezometers and monitoring wells are recorded. Total flow and individual wet well flow data in conjunction with the groundwater levels will be used to adjust the level in the wet wells to ensure that an inward gradient is developed and maintained.

3.2 NAPL COLLECTION SYSTEM OPERATION

Each of the NAPL recovery wells will be monitored for the presence of NAPL. NAPL found during the monitoring will be removed if a well contains at least 3 gallons of NAPL (approximately 6-inch depth of NAPL in the 12-inch diameter wells). Monitoring will be accomplished by lowering an APL/NAPL interface probe into the well. If the NAPL depth exceeds 6 inches the NAPL will be pumped out into an approved drum for disposal in accordance with all applicable Federal and New York State Regulations.

It is anticipated that NAPL recharge rates for the individual wells will be low, possibly ranging from 1 to 10 gallons per month for the first 3 months and 0 to 5 gallons per quarter thereafter.

The Site's NAPL will be characterized for disposal after the first recovery event. Laboratory analysis to be performed will be selected based on the necessary disposal/treatment permits.

Every five (5) years the collected NAPL will be re-characterized to determine if there are any changes in the NAPL.

4.0 SITE MAINTENANCE AND INSPECTIONS

Site maintenance requirements will include routine Site inspections, scheduled preventative maintenance, and unscheduled maintenance in response to inspection reports or component failures, and recordkeeping for any maintenance activities.

4.1 SITE INSPECTIONS

An outline of the semi-annual inspection and preventative maintenance schedule for O&M Plan for the 102nd Street Landfill Site is presented in Table 4.1. This schedule, that includes the landfill cap, the APL collection and discharge system, and swales may be revised as more experience with the particular maintenance requirements of the Site systems are gained. No confined space entry will be required for these inspections.

The Site will be inspected on a semi-annual basis in the Spring and Fall of each year. Semi-annual inspections will ensure that the remedial system components are functioning effectively as designed. The inspections will include an overall Site inspection of all access roads and perimeter security fencing. Required maintenance as identified by the semi-annual inspections will be performed in a timely manner.

Semi-annual inspections will be recorded and the results will be included in annual O&M reports (see Section 5.0).

The NYSDEC shall be notified of the date and time of the inspection at least ten (10) working days before the planned event.

4.2 SHALLOW WATER ENVIRONMENT MONITORING

The objective of the habitat mitigation for the 102nd Street Embayment is to produce beds of wild celery and other submerged aquatic plant species with an aerial coverage of 80% or more. As part of the 102nd Street remediation the original embayment soils were removed and placed on the landfill in 1996 and clean off-site soils were placed in the embayment area. New water celery buds were planted in 1997.

The embayment will be monitored annually for a period of five years to ensure that the performance objectives (80% aerial coverage) have been met. Inspections will begin after the second growing season (1998). Appropriately trained individuals will conduct inspections.

If the performance objective is not met by the end of the fifth growing season, additional planting of wild celery buds shall be done as necessary to achieve the performance goal.

4.3 MAINTENANCE

Maintenance will be performed periodically or as required.

Typical activities covered by the O&M Plan are listed in Tables 4.1 and 4.2.

Unique or complex maintenance activities including maintenance of the slurry wall, restoring embayment vegetation, APL collection and discharge system repairs, soil and landfill work beneath the geomembrane layer of the cap, well installation or abandonment, electrical or control system repair, and any other maintenance activity not specifically covered by this O&M Manual will require activity-specific work and health and safety plans.

4.4 MAINTENANCE RECORDS

A log book of maintenance activities will be maintained. A description of work and date of completion will be included in the log book.

5.0 RECORDS AND REPORTS

In accordance with Section X, Paragraph 35 of the Consent Decree entered October 1, 1999, OCC/Olin are required to submit '...an annual report for the Site, outlining the activities performed at the Site, including site monitoring. The report shall describe the overall effectiveness of the Remedial Action in achieving remedial action objectives, including the operation of the leachate collection system and the maintenance of gradients.' The annual report shall include a list of all monitoring events and the results of all water-level monitoring (including any changes in pumping-level controls to maintain inward ingredients across the slurry wall), all ground-water quality monitoring data, NAPL-presence monitoring data, and the findings from the shallow-water environment monitoring. The annual report will also contain a summary of RA system operation parameters, and a description of inspections and major maintenance performed during the previous year. OCC and Olin shall submit these annual O&M reports to USEPA/NYSDEC by June 1st of every year. In addition to the annual report, OCC/Olin shall submit copies of the ground-water quality monitoring data following each sampling round to USEPA/NYSDEC within two weeks of the completion of the QA/QC Officer's report as set forth in Appendix C hereto.

TABLES

TABLE 1.1

SITE CONTACTS
OPERATION AND MAINTENANCE PLAN
102ND STREET LANDFILL SITE
NIAGARA FALLS, NEW YORK

Site Supervisor:

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Fax: 716-283-2856

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Olin Corporation

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Agency Contacts:

United States Environmental Protection Agency

Paul Olivo
New York/Caribbean Superfund Branch II
Emergency and Remedial Response Division
U.S. Environmental Protection Agency
290 Broadway
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Fax: 212-637-4284

TABLE 1.1

SITE CONTACTS
OPERATION AND MAINTENANCE PLAN
102ND STREET LANDFILL SITE
NIAGARA FALLS, NEW YORK

New York State Department of Environmental Conservation

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Miscellaneous

Olin Corporation
James Strassburg
Plant Manager
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Niagara Falls, New York 14303
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Fax: 716-278-6495

TABLE 2.1
SITE-SPECIFIC PARAMETERS - GROUNDWATER
OPERATION AND MAINTENANCE PLAN
102ND STREET LANDFILL SITE
NIAGARA FALLS, NEW YORK

Parameter	*Survey Level (µg/L)*	*Analytical Method Reference* [1]
Benzene	5	SW-846 8260B
Monochlorobenzene	5	SW-846 8260B
1,2-Monochlorotoluene	5	SW-846 8260B
1,2-Dichlorobenzene	10	SW-846 8270C
1,4-Dichlorobenzene	10	SW-846 8270C
1,2,3-Trichlorobenzene	10	SW-846 8270C
1,2,4-Trichlorobenzene	10	SW-846 8270C
1,2,4,5-Tetrachlorobenzene	10	SW-846 8270C
alpha-Hexachlorocyclohexane	10	SW-846 8081
beta-Hexachlorocyclohexane	10	SW-846 8081
gamma-Hexachlorocyclohexane	10	SW-846 8081
delta-Hexachlorocyclohexane	10	SW-846 8081
Phenol	10	SW-846 8270C
2-Chlorophenol	10	SW-846 8270C
4-Chlorophenol	10	SW-846 8270C
2,4-Dichlorophenol	10	SW-846 8270C
2,5-Dichlorophenol	10	SW-846 8270C
2,4,5-Trichlorophenol	50	SW-846 8270C
arsenic	50	SW-846 6010B

Notes:

(1) Referenced from "Test Methods for Evaluating Solid Waste", USEPA Office of Solid Waste (SW-846), 3rd Edition, 1986 and subsequent revisions.

TABLE 4.1

SEMI-ANNUAL INSPECTION AND PREVENTATIVE MAINTENANCE
OPERATION AND MAINTENANCE PLAN
102ND STREET LANDFILL SITE
NIAGARA FALLS, NEW YORK

	Item	*Inspect For*
1.	**APL Collection System** (Figure 1)	
	Wet Wells (4 Total)	- cover on securely and locked - condition of cover - condition inside wet well, piping, electronics - condition of safety platform - condition of electrical panel - flow unrestricted, wet well free of obstructions
	APL Collection Pipe	- caps on all cleanouts - condition of cleanouts
2.	**APL Discharge System** (Figure 2)	
	Cleanout Manholes (7 Total)	- cover on securely - condition of covers - condition of interior of manhole - condition of piping in manholes
	Leak Detection Manholes (2 Total)	- cover on securely and locked - condition of cover - condition of interior - condition of piping - condition of leak detection
	Metering Manhole (1 Total)	- cover on securely - condition of cover - condition of interior - condition of piping - condition of leak detection
	Meter Building	- condition of building - door lock/security
3.	**Landfill Cap** (Figure 3)	
	Vegetation and Topsoil	- erosion, bare areas, washouts, dead/dying vegetation, remove woody growth
	Access Roads	- erosion, obstructions, potholes, puddles, debris
	Perimeter Fence	- integrity of fence, gates, locks, placement and condition of signs
	Drainage Ditches	- sediment buildup, erosion, condition of erosion protection, obstructions, dead/dying vegetation
	Drainage Culverts	- obstructions, plugging
4.	**Bulkhead** (Figure 4)	
	Rip Rap	- missing, erosion
	Drainage System	- vegetation

TABLE 4.2

POTENTIAL SITUATIONS THAT REQUIRE MAINTENANCE AND APPROPRIATE CORRECTIVE ACTIONS
OPERATION AND MAINTENANCE PLAN
102ND STREET LANDFILL SITE
NIAGARA FALLS, NEW YORK

RA System Components	*Situations that Require Maintenance*	*Appropriate Corrective Actions*
APL Collection and Discharge System		
APL Collection Drain/Forcemain	Blockage in collection drain pipe restricting groundwater flow. Water level may not be maintained at desired elevations.	Pressure flush pipe sections that are plugged. Remove sediments and debris from wet wells.
	Decrease in discharge rate. Leak detected in on-Site manhole. Leaking forcemain.	Shut down pumping system. Repair forcemain or use quick connects to reroute flow to secondary forcemain.
	Leak detected in off-Site manhole.	Shut down pumping system. Drain leaking pipe. Pull the damaged forcemain out through the containment pipe from the nearest manhole and replace.
Landfill Cap		
Cover Soils and Vegetation	Washout and erosion of vegetation, topsoil, or cover fill. Typically on steep slopes.	Take immediate action to prevent further erosion and to protect exposed geomembrane liner. Recover washed out soil. This material may be used to restore the eroded area. Backfill with additional soil to original cap design thickness. Reseed. If seeding slopes, cover with erosion control
	Bare areas. Dead/dying vegetation (potential for erosion).	Loosen and till topsoil. Reseed and mulch as necessary.
	Settlement of original cover. Standing water. Dry bare areas.	Assess size of settlement and potential impact to drainage or low permeability layers. Till topsoil and grade. Add additional topsoil if necessary. Check final elevation to ensure adequate drainage. Reseed and mulch. Regrading of topsoil should be sufficient to correct minor ponding. Additional soil may be required for significant ponding. If seeding slopes, cover with erosion control (jute) mat.
	Trees/bushes. Deterioration of desired vegetation.	Remove all bushes and woody vegetation. Reseed as required.

TABLE 4.2

POTENTIAL SITUATIONS THAT REQUIRE MAINTENANCE AND APPROPRIATE CORRECTIVE ACTIONS
OPERATION AND MAINTENANCE PLAN
102ND STREET LANDFILL SITE
NIAGARA FALLS, NEW YORK

RA System Components	*Situations that Require Maintenance*	*Appropriate Corrective Actions*
Landfill Cap		
Access Roads	Washouts.	Recover washed out gravel. Use this material to restore the eroded area. Backfill to original grade.
	Potholes or puddles (potential safety hazard).	Backfill to original grade.
	Obstruction (safety hazard).	Remove obstruction. Place in secure area pending off-Site disposal.
Other Site Systems		
Gates and Locks	Vandalism. Site security.	Replace and secure locks as necessary. Ensure locks are secured.
Perimeter Fence	Forced entry or seasonal damage.	Repair or replace as needed.
Signs	Tampering or theft.	Repair or replace signs.
Drainage Ditches	Vegetation drying out. Obstructions or debris.	Irrigate dry areas. Remove obstructions or debris which may affect flow.
	Sediment in ditch or swale. Smothering and killing of vegetation and interruption of normal surface water flow pattern.	Remove sediment and stockpile as topsoil for future repairs. Replace sod or reseed and mulch if damaged.
Other Unforeseen Problems		Record problem on Inspection Log. Notify Site Supervisor for appropriate action.

APPENDICES

APPENDIX A

HEALTH AND SAFETY PLAN (HASP)
FOR O&M ACTIVITIES

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1.0 INTRODUCTION

This document describes the Health and Safety Plan (HASP) for Operation and Maintenance (O&M) activities at the 102nd Street Landfill Site (Site) located in Niagara Falls, New York.

The Site remedial construction activities have been completed. Those activities were directed at containment of all hazardous materials within a slurry wall and cap. Certain O&M activities, such as groundwater sampling, present a potential for chemical exposure. However, if no such activities are underway, there is no potential for direct exposure. The chemical exposure aspects of this plan apply to those specific activities presenting potential for exposure.

2.0 SITE DESCRIPTION

The Site covers approximately 22 acres and consists of two separate properties owned by Occidental Chemical Corporation (OCC) (15 acres) and Olin Corporation (Olin) (7 acres).

3.0 ACTIVITY HAZARD/RISK ANALYSIS

This section identifies the general hazards associated with specific O&M activities and presents the documented or potential health and safety hazards that exist at the Site. Every effort will be made to reduce or eliminate these hazards. Those hazards that cannot be eliminated must be guarded against by use of engineering controls and/or personal protection equipment (PPE).

In addition to the chemical hazards at the Site, physical hazards including uneven terrain, dense grassy areas, steep slopes, slippery surfaces, potential confined spaces, the use of heavy equipment, the use of decontamination equipment, and potential heat and cold stresses. It will be the responsibility of all personnel to recognize the hazards posed by O&M activities and to implement preventative and corrective action.

3.1 CHEMICAL EXPOSURE

Preventing exposure to chemicals is a primary concern. Chemical substances can enter the unprotected body by inhalation, skin absorption, ingestion, or through a puncture

wound (injection). A chemical can cause damage at the point of contact or can cause a toxic effect at a part of the body distant from the point of initial contact.

Chemical exposures are divided into two categories: acute and chronic. Acute exposures symptoms usually occur during or shortly after exposure to a sufficiently high concentration of a chemical. The concentration required to produce such effects varies from chemical to chemical. The term "chronic exposure" refers to exposures to lower concentrations of chemicals over a longer period of time. The lower concentrations required to produce symptoms of chronic exposure depend on the chemical, the duration of each exposure, and the number of exposures. For a given chemical (e.g., mercury, benzene) the symptoms of an acute exposure may be completely different from those resulting from chronic exposure.

For either chronic or acute exposure, the toxic effect may be temporary and reversible, or may be permanent (disability or death). Some chemicals may cause obvious symptoms such as burning, coughing, nausea, tearing eyes, or rashes. Other chemicals may cause health damage without any warning signs (this is a particular concern for chronic exposures to low concentrations). Health effects such as cancer or respiratory disease may not be apparent for several years or decades after exposure. In addition, some chemicals may be colorless and/or odorless, may dull the sense of smell, or may not produce any immediate or obvious sensations. Thus, a worker's senses or feelings cannot be trusted in all cases to warn of toxic exposure.

The effects of exposure also may be influenced by personal factors such as the worker's smoking habits, alcohol consumption, medication use, nutrition, age, and gender.

An important exposure route of concern at the Site is inhalation of vapors from chemicals in non-aqueous phase liquids (NAPL) or groundwater. The lungs are extremely vulnerable to chemical exposure. Even chemicals that do not directly affect the lungs may pass through lung tissue into the bloodstream, where they are transported to other vulnerable areas of the body. Respiratory protection is extremely important if there is a possibility that the work site atmosphere may contain such hazardous substances. Chemicals also can enter the respiratory tract through punctured eardrums. Workers with punctured eardrums should be medically evaluated to determine if their condition would place them at an unacceptable risk during the particular O&M activity that they will be performing.

Direct contact with hazardous substances by the skin and eyes is another route of exposure. Some chemicals directly injure the skin. Some pass through the skin into the bloodstream where they are transported to vulnerable organs. Abrasions, cuts, heat,

and moisture enhance skin absorption. Eyes are particularly vulnerable because airborne chemicals can dissolve on their moist surfaces and be carried to the rest of the body through the bloodstream. Wearing protective equipment, keeping hands away from the face, and eliminating direct contact with liquids, such as groundwater, NAPL, cleaning fluids, and gasoline, and solids, such as landfilled materials, will protect against skin and eye contact. Contact lenses cannot be used at the Site during O&M activities where direct contact is possible because they may trap chemicals against the eye surface.

Deliberate ingestion of chemicals is unlikely; however, habits such as chewing gum or tobacco, drinking, eating, smoking cigarettes, and applying cosmetics or lip balm at the Site may provide a route of entry for chemicals.

The last primary route of chemical exposure is injection, whereby chemicals are introduced into the body through puncture wounds (i.e., by stepping or tripping and falling onto sharp objects that have been in contact with chemicals). Wearing safety shoes, avoiding physical hazards, and taking common sense precautions are important protective measures against injection.

3.2 CHEMICAL HAZARDS

Most O&M activities do not involve chemical exposure or chemical hazards. However, for those activities that involve excavation beneath the geomembrane liner of the cap, groundwater monitoring, or NAPL measurement or recovery, chemicals may be encountered.

Site specific chemicals of concern are as follows:

- benzene;
- monochlorobenzene;
- 2-monochlorotoluene;
- 1,2-dichlorobenzene;
- 1,4-dichlorobenzene;
- 1,2,3-trichlorobenzene;
- 1,2,4-trichlorobenzene;
- 1,2,3,4-tetrachlorobenzene;
- 1,2,4,5-tetrachlorobenzene;
- alpha-hexachlorocyclohexane;

- beta-hexachlorocyclohexane;
- gamma-hexachlorocyclohexane;
- delta-hexachlorocyclohexane;
- phenol;
- 2-chlorophenol;
- 4-chlorophenol;
- 2,4-dichlorophenol;
- 2,5-dichlorophenol;
- 2,4,5-trichlorophenol;
- arsenic;
- mercury; and
- dioxins and furans.

NAPL

NAPL is a general term describing any liquid that will not mix with water. NAPL will be encountered during NAPL measurement and recovery activities and may be encountered during wet well repair activities, collection drain and forcemain cleaning and repair activities, and excavation beneath the geomembrane liner of the cap. NAPL at the Site has been found to contain ppb to ppm concentrations of dioxins and furans. Most NAPL at the Site consists of tetrachlorobenzene, trichlorobenzene, and pentachlorobenzene. Concentrations greater than 1 percent hexachlorocyclohexane have been detected. Some NAPL samples collected at the Site contained benzene and some were mostly chlorodecane. Specific gravity of Site NAPL ranges from 1.1 to 1.6.

Modified Level D PPE are required when working with NAPL (see Section 5.1) unless personnel exposure monitoring indicates that Level C is required.

Dioxins and Furans

Although dioxins and furans represent a chemical family, most often 2,3,7,8-tetrachlorodibenzo-para-dioxin (TCDD) is referred to as dioxin. TCDD is extremely toxic in some animals. Chloracne and hyperkeratosis are common effects of TCDD exposure. Dioxin may be found in Site NAPL and soils and landfilled materials beneath the geomembrane layer of the cap.

Modified Level D PPE are required when working on intrusive activities unless personnel exposure monitoring indicates that Level C is required.

Phosphorus

White phosphorus is a colorless or wax-like solid that darkens when exposed to light and glows in the dark. It ignites spontaneously when exposed to air and burns with a bright blue flame and intense heat producing a characteristic odor somewhat similar to garlic. Acute phosphorus poisoning damages the gastrointestinal tract, liver, and kidneys. Chronic toxicity affects the jaw bones. Phosphorus presents a physical hazard based on its tendency to spontaneously ignite or explode on contact with air. Phosphorus may be found in landfilled materials beneath the geomembrane layer of the cap.

Extra caution should be taken to prevent wet phosphorus from getting on PPE, skin, or clothing as it will spontaneously ignite when it dries. No exposure is expected unless intrusive activities are undertaken.

4.0 PERSONNEL TRAINING

All personnel assigned to work at the Site will receive specific training concerning the potential health hazards at the Site. The training will stress the importance that each worker understands the basic principles of personnel protection and safety, be able to perform their assigned job tasks in a safe and responsible manner, and be prepared to respond appropriately to any emergency that may arise. A brief history of the Site will be included and the various components of this HASP will be presented followed by an opportunity to ask questions to ensure each attendee understands the health and safety requirements. Personnel not successfully completing this training will not be permitted to work at the Site.

Individuals involved in activities where there is potential exposure to hazardous materials shall be OSHA 1910.120 trained.

5.0 PERSONAL PROTECTION EQUIPMENT

The following section describes the requirements for PPE and the specific levels of protection required for each work task to be conducted at the Site during O&M

activities. PPE requirements for visitors to the Site will be established based on anticipated activities. In some cases, such as tours, PPE may not be required.

5.1 PROTECTION LEVELS

Personnel will wear protective equipment when O&M activities involve potential exposure to chemicals from vapors, gases, or dust that may be generated on-Site, or when direct contact with potentially hazardous substances, such as groundwater, NAPL, cleaning fluids, and landfilled materials, may occur. Respiratory protection levels will be based on real-time air monitoring results and the action levels presented in Section 5.3 for activities involving confined space entry or excavation beneath the geomembrane layer of the cap. Respirators will be required for NAPL measurement and recovery activities if needed.

The specific protection levels to be used at the Site are as follows:

Level C

- Tyvek coveralls (polycoated Tyvek when handling or working with liquids);
- disposable inner gloves - chemical resistant;
- outer work gloves - chemical resistant;
- full-face air purifying respirator (APR), equipped with combination cartridges for organic vapors and dust (particulates); and
- steel toe work boots and disposable boot covers.

Level C protection will be required for the following activities:

- NAPL presence checks and measurements (based on personnel exposure monitoring results - see Section 5.2);
- NAPL recovery;
- confined space entry (based on personnel exposure monitoring results - see Section 5.2);
- APL collection and discharge system maintenance (based on personnel exposure monitoring results - see Section 5.2); and
- Intrusive activities on the landfill (based on personnel exposure monitoring results - see Section 5.2).

Modified Level D

- Tyvek coveralls (polycoated Tyvek when handling or working with liquids);
- disposable inner gloves - chemical resistant;
- outer work gloves - chemical resistant;
- safety glasses with side shields;
- full-face air purifying respirator (APR), equipped with combination cartridges for organic vapors and dust (particulates) easily accessible but not worn unless protection level is upgraded to Level C; and
- steel toe work boots and disposable boot covers.

Modified Level D protection will be required for the following activities:

- equipment decontamination (based on personnel exposure monitoring results - see Section 5.2);
- confined space entry (based on personnel exposure monitoring results - see Section 5.2); and
- APL collection and discharge system maintenance (based on personnel exposure monitoring results - see Section 5.2).

Level D

- steel toe work boots; and
- safety glasses and gloves as necessary.

Level D protection will be required for the following activities:

- groundwater sampling
- water level measurements;
- cap inspection and maintenance (including cutting vegetation) that does not involve excavation beneath the geomembrane liner;
- APL collection and discharge system inspection; and
- inspection of other Site systems such as fencing, roads, surface structures, and surface water flow controls.

The potential exists that confined space entry work may be necessary during maintenance activities for the APL collection and discharge system. If it becomes necessary to enter a confined space, this work will be completed under a permit system that requires specific air monitoring to be completed. The use of supplied air respiratory

equipment, along with any additional PPE, will be indicated on the confined space entry permit.

PPE will be maintained in a clean sanitary condition and ready for use. Respirators shall be cleaned after each day's use and cartridges discarded.

5.2 RESPIRATORY PROTECTION PROGRAM

Prior to arriving at the Site, personnel will have received training in the use of, and have been fit tested for a full-face respirator.

Personnel exposure monitoring to determine the need for respiratory protection will be required during the following O&M activities:

- confined space entry;
- APL collection and discharge system maintenance; and
- NAPL monitoring and collection.

Action levels to determine the level of respiratory protection necessary during O&M activities are based on the known concentration of the Site chemicals measured within the breathing zone. The action levels and appropriate respiratory protection are as follows:

Sustained Organic Vapor Reading Above Background within Worker Breathing Zone in Parts Per Million (ppm)	*Action Taken*	*PPE Required*
0 or background	full-face respirator available	Modified Level D
1 - 5 ppm	wear full-face respirator	Level C
>5 ppm	shutdown activities, implement additional engineering controls	

The appropriate air purifying respirator cartridge to be used at the Site is a combination organic vapor particulate filter cartridge. The cartridge used must be of the same manufacturer as the respiratory face piece. Used cartridges will be discarded at the end of each working day.

5.3 SITE CONTROL

Designated work areas will be set up as appropriate during the O&M activities. The purpose of these procedures is to limit access to areas in which personnel may be potentially exposed to chemicals, and prevent the migration of potentially hazardous materials into adjacent areas. Designated work areas are required for the following activities:

- NAPL recovery; and
- APL collection and discharge system maintenance where personnel may be exposed to APL.

6.0 CONFINED SPACE ENTRY

A confined space has the potential for unusually high concentrations of chemicals, explosive atmospheres, oxygen deficient atmospheres, limited visibility and restricted movement. This section establishes requirements for safe entry into, work in, and safe exit from confined spaces. At this Site, confined spaces may be encountered during excavation activities and inspection and maintenance activities involving wet well or manhole entry.

Confined spaces will be scrutinized to determine whether they are or are not "Permit Required". 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 an entrant;
- Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross section;
- Contains any other recognized safety or health hazard.

Permit required confined space entries shall be completed in accordance with all OSHA requirements. These include but are not limited to:

- Posting signs and erecting barriers to prevent unauthorized entry;
- Identifying hazards;
- Developing safe entry practices with authorized entrants;
- Providing proper equipment in good condition;
- Testing for acceptable entry conditions;
- Providing trained attendants and emergency response;
- Providing a written permit system.

7.0 EMERGENCY CONTINGENCIES

It is essential that Site personnel be prepared in the event of an emergency. Emergencies can take many forms; illnesses or injuries, chemical exposure, fires, explosions, spills, leaks, releases of harmful chemicals, or sudden changes in the weather. The following sections outline the general procedures for emergencies. Emergency information should be posted as appropriate.

The MSRM/GSHI and Olin Project Managers and Olin Plant Manager will be notified in the event of an emergency, illness, or injury. Contact names and phone numbers are listed in Table 1.1.

7.1 EMERGENCY CONTACTS

Fire:	911
Police:	911
Ambulance:	911
Hospital:	Niagara Falls Memorial Medical Center 10th and Walnut Streets Niagara Falls, New York Telephone: Emergency Dept. 716-278-4000
Directions to Hospital:	From the Site, travel west on Buffalo Avenue to Cayuga Drive. Turn right at the four-way stop onto Cayuga Drive and proceed

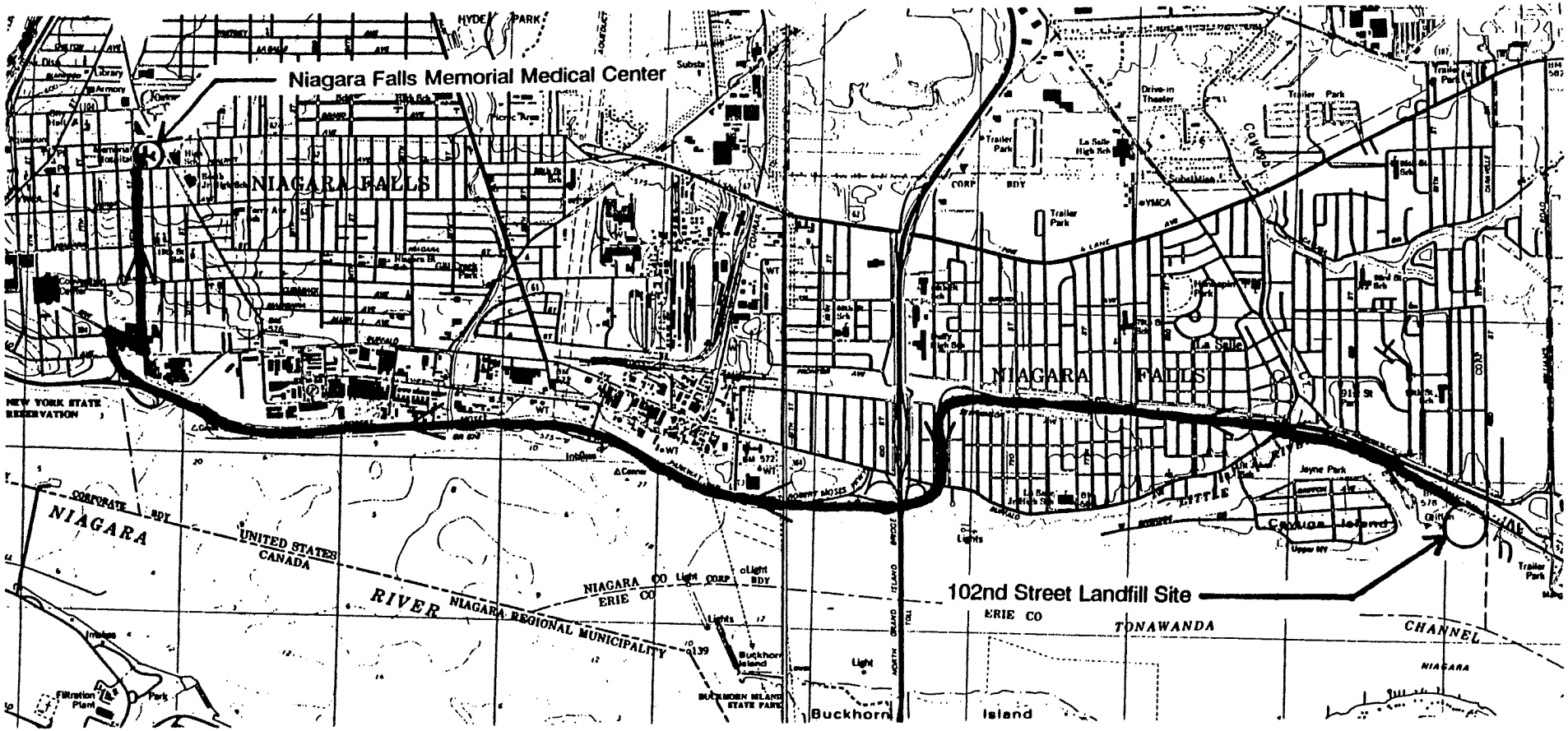

FIGURE A-1

NIAGARA FALLS MEMORIAL MEDICAL CENTER ROUTE MAP

Address: 10th and Walnut Streets
Niagara Falls, NY
(716) 278-4000

DIRECTIONS: From the 102nd Street Site, travel west on Buffalo Avenue to Cayuga Drive. Turn right at four way stop sign onto Cayuga Drive and proceed under LaSalle Parkway overpass. Turn left onto west bound entrance ramp of LaSalle Parkway and exit to the right onto Robert Moses Parkway. Take Robert Moses Parkway to the Niagara Falls Memorial Medical Center exit. Exit to the right and at the second right, turn right onto Buffalo Avenue. Travel 2 blocks and turn left onto 10th Street. Travel on 10th Street for 4 blocks to Walnut Street and the hospital is on the right side, on the corner of 10th and Walnut Streets.

under the Lasalle Parkway overpass. Turn left onto the westbound ramp of the Lasalle Parkway and exit to the right onto Robert Moses Parkway. Take Robert Moses Parkway to the Niagara Falls Memorial Medical Center exit. Exit to the right and at the second light, turn right on Buffalo Avenue. Travel two blocks and turn left on 10th Street. Travel on 10th Street for 4 blocks to Walnut Street. The hospital is on the right side, on the corner of 10th and Walnut Streets. A map with the route to the hospital is presented on Figure A-1.

7.2 ADDITIONAL EMERGENCY NUMBERS

National Response Center (NRC)	800-424-8802
Agency for Toxic Substances and Disease Registry (24-Hour)	404-488-4100
Chemtrec	800-424-9300
Poison Control Center	800-382-9097
Niagara County Health Department	716-284-3128
Coast Guard - Marine Safety Office	716-846-4168
Utilities:	
Underground Locates	716-893-1133
Niagara Mohawk - Trouble	716-285-9311
New York Telephone - Repair Service	716-282-9061
National Fuel Gas Emergency	716-285-6915
City of Niagara Falls Utilities	716-278-8138

7.3 EMERGENCY EQUIPMENT AVAILABLE ON SITE

A cellular phone or radio will be required when performing maintenance activities at the Site.

7.4 FIRE OR EXPLOSION

In the event of a fire or explosion, the local fire department should be summoned immediately. Upon their arrival, O&M personnel will advise the fire commander of the location, nature and identification of the hazardous materials on Site.

If it is safe to do so, O&M personnel may:

- use fire fighting equipment available on Site; or
- remove or isolate flammable or other hazardous materials which may contribute to the fire.

APPENDIX B

ANNUAL REPORT FORM

ANNUAL OPERATION AND MAINTENANCE REPORT

102ND STREET LANDFILL SITE

NIAGARA FALLS, NEW YORK

YEAR: _____

MONITORING - Water Level Measurements

Month	*Day*	*Inspector*	*PCM-01*	*PZ-01*	*PCM-02*	*PZ-02*	*PCM-03*	*PZ-03*	*PCM-04*
January									
February									
March									
April									
May									
June									
July									
August									
September									
October									
November									
December									

Month	*Day*	*Inspector*	*PZ-04*	*PCM-05*	*PZ-05*	*PCM-06*	*PZ-06*	*PCM-07*	*PZ-07*
January									
February									
March									
April									
May									
June									
July									
August									
September									
October									
November									
December									

Month	*Day*	*Inspector*	*PCM-08*	*PZ-08*	*PCM-09*	*PZ-09*	*PCM-10*	*PZ-10*
January								
February								
March								
April								
May								
June								
July								
August								
September								
October								
November								
December								

FORM 1

ANNUAL OPERATION AND MAINTENANCE REPORT

102ND STREET LANDFILL SITE

NIAGARA FALLS, NEW YORK

YEAR: _____

GROUNDWATER - Quality Monitoring

Quarter	*Date Sample Taken*	*Inspector*	*Comments*
1st			
2nd			
3rd			
4th			

Results of analyses are attached.

NAPL PRESENCE - Monitoring

	Date	*Inspector*
1st Month		
2nd Month		
3rd Month		
2nd Quarter		
3rd Quarter		
4th Quarter		

NR-01	
Depth of NAPL	*Gallons Removed*

NR-02	
Depth of NAPL	*Gallons Removed*

NR-03	
Depth of NAPL	*Gallons Removed*

	Date	*Inspector*
1st Month		
2nd Month		
3rd Month		
2nd Quarter		
3rd Quarter		
4th Quarter		

NR-04	
Depth of NAPL	*Gallons Removed*

NR-05	
Depth of NAPL	*Gallons Removed*

NR-07	
Depth of NAPL	*Gallons Removed*

	Date	*Inspector*
1st Month		
2nd Month		
3rd Month		
2nd Quarter		
3rd Quarter		
4th Quarter		

NR-08	
Depth of NAPL	*Gallons Removed*

NR-10	
Depth of NAPL	*Gallons Removed*

FORM 1

ANNUAL OPERATION AND MAINTENANCE REPORT

102ND STREET LANDFILL SITE
NIAGARA FALLS, NEW YORK

YEAR: _____

OPERATION

APL COLLECTION AND DISCHARGE SYSTEM

APL Flow for Previous Year (gallons)	*APL Flow for Current Year (gallons)*

NAPL REMOVAL SYSTEM

	NAPL Removed for Previous Year (gallons)	*NAPL Removed for Current Year (gallons)*
NR-01		
NR-02		
NR-03		
NR-04		
NR-05		
NR-07		
NR-08		
NR-10		
Total		

Where was NAPL treated/disposed?

Facility _____ Date _____

Facility _____ Date _____

Facility _____ Date _____

Facility _____ Date _____

FORM 1

ANNUAL OPERATION AND MAINTENANCE REPORT

102ND STREET LANDFILL SITE
NIAGARA FALLS, NEW YORK

YEAR: _____

INSPECTION AND MAINTENANCE

Scheduled inspections performed:

	Date	*Inspector*
April	_____	_____
October	_____	_____

Was maintenance required?

	Yes	*No*
April	☐	☐
October	☐	☐

What maintenance was required?

Maintenance Required	Date Performed
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Attach additional sheets as necessary.

Describe any maintenance activity that required an activity specific work plan and health and safety plan.

_____

_____

_____

Form Completed By:

_____ _____ _____
NAME SIGNATURE DATE

FORM 1

ANNUAL OPERATION AND MAINTENANCE REPORT

102ND STREET LANDFILL SITE
NIAGARA FALLS, NEW YORK

YEAR: _____

Send completed copies of this form to the following for review:

George Luxbacher
Glenn Springs Holdings, Inc.
2480 Fortune Drive, Suite 300
Lexington, KY 40509

and

Lorraine Miller
Olin Corporation
P.O. Box 248
1186 Lower River Road
Charleston, TN 37310

and

Mike Bellotti
Olin Corporation
P.O. Box 248
1186 Lower River Road
Charleston, TN 37310

After review is complete, send 5 copies to the following:

Chief-New York Remedial Branch
Emergency and Remedial Response Divison
U.S. Environmental Protection Agency - Region II
290 Broadway, 20th Floor
New York, NY 10007-1866
Attn: 102nd Street Landfill Superfund Site Manager

and

Director, Division of Environmental Remediation
New York State Dept. of Environmental Conservation
Room 260B
50 Wolf Road
Albany, NY 12233-7010

and

Regional Remediation Engineer
New York State Dept. of Environmental Conservation
270 Michigan Avenue
Buffalo, NY 14203-2999

FORM 1

APPENDIX C
QUALITY ASSURANCE PROJECT PLAN
102nd STREET LANDFILL SITE
NIAGARA FALLS, NEW YORK

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1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) presents the policies, organization, objectives, functional activities, and specific Quality Assurance/Quality Control (QA/QC) activities designed to achieve the specific data quality goals associated with the operation and maintenance (O&M) requirements for the 102nd Street Landfill Site (Site) located in Niagara Falls, New York. It has been prepared in accordance with the references found at the end of the document.

The objectives of this QAPP are to provide sufficiently thorough and concise descriptions of the measures to be applied during this program such that the data generated will be of a known and acceptable level of precision and accuracy. The QAPP has been prepared to identify procedures for sample preparation and handling, sample Chain of Custody, laboratory analyses, and reporting to be implemented during this investigation to ensure the accuracy and integrity of the data generated.

2.0 PROJECT DESCRIPTION

2.1 GENERAL

A post-remedial action system performance monitoring program that includes groundwater quality, groundwater levels, and NAPL presence monitoring has been established at the Site. This QAPP governs the groundwater sampling portion of the O&M plan. Groundwater samples will be collected from 10 overburden and three bedrock monitoring wells. Samples will be collected quarterly for 2 years, semi-annually for the next 8 years, and once every 5 years thereafter. The samples will be analyzed for site-specific parameters selected based on historical data.

2.2 SITE BACKGROUND

The 102nd Street Landfill Site is located in Niagara Falls, New York. It covers approximately 22 acres and consists of two separate properties owned by Occidental Chemical Corporation (15 acres) and Olin Corporation (7 acres). A description of the remedial action and required monitoring, testing, and O&M activities are detailed in the O&M Manual.

3.0 PROJECT MANAGEMENT

The project management structure for QA/QC activities associated with the program is discussed below, along with a brief description of the duties of the key personnel as listed in the O&M Manual.

Project Managers

- provide overall project management
- ensure professional services provided are cost effective and of the highest quality
- ensure all necessary resources are available on an as-required basis
- participate in key technical negotiations with the agencies involved
- provide managerial and technical guidance to the Site Supervisor

Site Supervisor - Field Activities

- provides day-to-day project management
- provides managerial guidance to the project technical group
- provides technical representation at meetings as appropriate
- acts as liaison between the technical group and the client
- prepares and review reports
- conducts preliminary chemical data interpretation
- provides immediate supervision of all on-site activities
- provides field management of sample collection and field QA/QC
- assists in preparation and review of final report
- provides technical representation for field activities
- is responsible for maintenance of the field equipment

Quality Assurance/Quality Control Officer - Analytical Activities

- overviews and reviews laboratory activities
- determines laboratory data corrective action
- performs analytical data validation and assessment
- reviews laboratory QA/QC
- assists in preparation and review of final report
- provides technical representation for analytical activities

Laboratory Project Manager, Analytical Contractor

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

- oversees preparation of analytical reports
- approves final analytical reports prior to submission to CRA

Laboratory Quality Assurance/Quality Control Officer, Analytical Contractor

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

Laboratory Sample Custodian - Analytical Contractor

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

Primary responsibility for data quality rests with the QA/QC Officers. Ultimate responsibility for project quality rests with the Project Managers. Independent quality assurance will be provided by the laboratory's Project Manager and QA/QC Officer prior to release of the data.

The analytical laboratory chosen to perform the analyses will be certified by the New York State Department of Health (NYSDOH) for the category and parameters of interest.

4.0 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA

Data quality objectives (DQOs) are qualitative and quantitative statements that specify the quality of the data required to support decisions made during site-related activities and are based on the end uses of the data collected.

The specific DQOs for this program are as follows:

- To collect representative samples of the groundwater monitoring wells selected.
- To analyze these samples using analytical method referenced and approved by the USEPA.
- To generate data which are analyte-specific, with confirmation of analyte identity and concentration. The methods will provide raw data in the form of paper printouts or computer-generated electronic files.
- To produce data of sufficient precision, accuracy, and sensitivity for the project.
- To use these definitive data to monitor and evaluate groundwater quality.

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

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

4.1 QUANTITATIVE QA OBJECTIVES - ACCURACY, PRECISION AND ESTIMATED QUANTITATION LEVELS (EQLS)

The fundamental quantitative QA objective with respect to the accuracy, precision and EQLs of the analytical data is to produce reliable data of sufficient sensitivity. This data will be used to evaluate groundwater quality at the Site.

The analytical method and EQLs are listed in Table 1. The method and EQLs were selected to meet the objectives of the sampling activity and the project sensitivity requirements.

The method accuracy (percent recovery) for samples will be determined by spiking selected samples (matrix spikes) with all representative spiking compounds. Accuracy

will be reported as the percent recovery of the spiking compound(s). Recoveries will be compared to the method QC limits when available. Laboratory QC limits will be used if method limits are not available.

The method(s) precision (reproducibility between duplicate analyses) will be determined based on the duplicate analysis of matrix spike samples. Precision will be reported as RPDs between duplicate analyses; acceptance criteria will be established by the analytical laboratory.

4.2 COMPLETENESS, REPRESENTATIVENESS, AND COMPARABILITY

All analyses conducted in accordance with the standard method selected will provide data meeting the QC acceptance criteria cited in the method. Any reasons for variances will be documented.

The procedures used to obtain the planned analytical data are documented in this QAPP. Comparability of laboratory analyses will be ensured by the use of consistent methodology and units. Following completion of data collection, the existing data base will be evaluated for representativeness.

The analytical method selected for this study is consistent with that used for previous studies to assure comparability of the data. All standards used by the laboratory will be traceable to reliable sources and will be checked with an independent standard.

4.3 FIELD MEASUREMENTS

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

i) measuring groundwater elevations in wells; and

ii) inspection of non-aqueous phase liquid (NAPL) presence/depth in wells.

Program-specific field measurements will be performed using standardized operating procedures. The general QA objective for measurement data is to obtain reproducible and comparable measurements to a degree of accuracy consistent with the use of standardized procedures.

5.0 SAMPLING PROCEDURES

All monitoring and sampling activities specified in the O&M Plan shall be conducted in accordance with the protocols defined. Site-dedicated equipment will be used whenever possible.

Sampling equipment will be properly decontaminated prior to use. Required sample containers, sample preservation methods, maximum holding times and filling instructions are summarized in Table 2. Sample containers provided by the laboratory will be purchased from a certified manufacturer and will be precleaned.

All waste materials generated from sampling will be disposed of in accordance with Federal and State regulations as part of the routine waste handling procedures at the Site.

The NYSDEC shall be notified of the date and time of the sampling at least ten (10) working days in advance so as to enable the NYSDEC to schedule its participation and split the samples if desired by the NYSDEC.

6.0 SAMPLE CUSTODY AND DOCUMENT CONTROL

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

i) field log books (bound with numbered pages) to document sampling activities in the field;

ii) labels to identify individual samples;

iii) Chain of Custody record sheets to document sample identification and analyses to be performed;

iv) laboratory sample custody log books; and

v) evidentiary files.

6.1 FIELD LOG BOOK

Log books will be used in the field to record information. The field log book will be bound and the information will be entered in indelible ink. Each field log book page will be signed by the sampler. Field measurements and observations will assist in the interpretation of analytical results obtained and it is important that these measurements and observations be as complete as possible.

For each sample collected, the following shall be recorded in indelible ink in the field log book:

i) Site location identification (102nd Street Landfill);

ii) unique sample identification number;

iii) date and time (in 2400 hour time format) of sample collection;

iv) weather conditions;

v) designation as to the type of sample (groundwater);

vi) designation as to the means of collection;

vii) brief description of the sample;

viii) name of sampler and employer;

ix) analyses to be performed on sample;

x) departure from established QA/QC field procedures;

xi) equipment problems;

xii) any other relevant comments such as odor, staining, etc.; and

xiii) well number.

6.2 SAMPLE LABELS

Sample labels are necessary to identify and prevent misidentification of the samples. The labels shall be affixed to the sample container (not the caps) prior to the time of sampling. The labels shall be filled out in waterproof ink at the time of collection. The labels will include the following information:

i) sample number/identification code;

ii) name of collector;

iii) date and time of collection;

iv) client and geographic location;

v) required analysis; and

vi) type of preservation.

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

Example:	GW-121799 - AA-XXX
where:	GW - Designates sample type (GW - Groundwater)
121799:	date of collection (mm,dd,yy)
AA:	sampler initials
xxx:	unique sample number

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

Sample container labels will include sample number, place of collection,date, and time of collection.

6.3 CHAIN OF CUSTODY RECORDS

Chain of Custody forms will be completed for all samples collected during the program. Chain of Custody forms will be completed to document the transfer of sample containers.

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

The Chain of Custody form will consist of four copies which will be distributed to the shipper, the receiving laboratory, and two copies to the Site Supervisor. The shipper will keep one copy while the other three copies will be enclosed in a waterproof envelope within the cooler with the samples. The laboratory, upon receiving the samples, will complete the three remaining copies. The laboratory will maintain one copy for their records; one copy will be returned to the Site Supervisor upon receipt of the samples by the laboratory; one copy will be returned to the Site Supervisor with the data deliverables package.

6.4 SAMPLE SHIPMENT

All samples will be refrigerated using wet ice at 4°C (±2°C). Custody seals will be placed around each cooler and the coolers will then be sealed with packing tape for shipment to the analytical laboratory within 24 to 48 hours of collection by either commercial courier or Contractor personnel.

6.5 LABORATORY SAMPLE CUSTODY LOG BOOKS

Upon receipt of at the laboratory, the shipping cooler and the custody seal will be inspected by the designated sample custodian. The condition of the cooler and the custody seal will be noted on the Chain of Custody record sheet by the Sample Custodian.

The sample custodian will record the temperature of one sample (or temperature blank) from each cooler and the temperature will be noted on the Chain of Custody. If the shipping cooler seal is intact, the sample containers will be accepted for analyses. The

sample custodian will document the date and time of receipt of the container, and sign the form.

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

6.6 EVIDENTIARY FILES

The laboratory will be responsible for maintaining analytical log books and laboratory data as well as a sample (on hand) inventory for submittal on an "as required" basis. Raw laboratory data produced from the analysis of samples submitted for this program will be inventoried and maintained by the laboratory or site supervisor through the life of the project plus five years. The laboratory will notify the QA/QC Officer prior to the disposal of any records.

Evidentiary files for the entire project shall be inventoried and maintained by the Site Supervisor.

7.0 CALIBRATION PROCEDURES AND FREQUENCY

7.1 INSTRUMENT CALIBRATION AND TUNING

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

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

7.2 GAS CHROMATOGRAPHY/MASS SPECTROMETRY (GC/MS)

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

Calibration of the GC/MS system will be performed daily at the beginning of the day or with each 12 hours of instrument operating time.

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

Quantification of samples that are analyzed by GC/MS will be performed by internal standard calibration. For quantification, the nearest internal standard free of interferences must be used.

8.0 ANALYTICAL PROCEDURES

8.1 ANALYTICAL METHODS

All investigative samples will be analyzed using the method referenced in Table 1. This method has been selected to meet the DQOs for the sampling activity.

8.2 COMPOUND IDENTIFICATION

Compounds which will be analyzed by GC/MS will be identified by comparison of the sample mass spectrum with the mass spectrum of a standard of the suspected compound (standard reference spectrum). Mass spectra for standard references should be obtained on the user's GC/MS within the same 12 hours as the sample analysis. These standard reference spectra may be obtained through analysis of the calibration standards. The following criteria must be satisfied to verify identification: (1) elution of the sample component at the same GC relative retention time (RRT) as the standard component; and (2) correspondence of the sample component and the standard component mass spectrum.

8.3 QUANTITATION

The procedures for quantitation of analytes are discussed in the analytical method. Sample results are calculated using internal standards for analyte quantitation. The procedure for target analyte quantitation are detailed in the GC/MS method.

8.4 ESTIMATED QUANTIFICATION LEVEL (EQL)

Targeted EQLs will be consistent with those referenced in Table 1. When matrix interferences are noted during sample analysis, actions will be taken by the laboratory to try to achieve the specified detection limits. Samples will only be diluted to reduce matrix effects or if analytes of concern generate responses in excess of the linear response of the instrument. The laboratory will re-extract, and/or use any of the cleanup methods available to eliminate matrix interferences. In such cases, the Laboratory QA/QC Officer will assure that the laboratory demonstrates good analytical practices and that such practices are documented in order to achieve the specified quantitation levels.

9.0 DATA REDUCTION, VALIDATION, ASSESSMENT AND REPORTING

9.1 GENERAL

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

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

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

iii) upon completion of all reviews and acceptance of the raw data by the Laboratory Operations Manager, a computerized report will be generated and sent to the Laboratory QA Officer;

iv) the laboratory quality assurance officer will complete a thorough inspection of all reports;

v) the QA Officer and area supervisor will decide whether any sample reanalysis is required; and

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

Validation of the analytical data will be performed by the QA/QC Officer for analytical activities. The data validation will be performed in accordance with the analytical method. Additional validation guidance will be referenced from "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review", EPA 540/R-94-012, Feb. 1994.

Assessment of analytical and in-house data will include checks on data consistency by looking for comparability of duplicate analyses, comparability to previous data from the same sampling location (if available), adherence to accuracy and precision control criteria detailed in this QAPP and anomalously high or low parameter values. The results of these data validations will be reported to the project manager and the contract laboratory, noting any discrepancies and their effect upon acceptability of the data.

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

9.2 LABORATORY REPORTING

Table 3 summarizes the minimum level of deliverables required from the laboratory. Supplemental requests for additional QA/QC data including raw chromatograms and spectra, etc., may be made periodically by the QA/QC Officer.

All sample data and corresponding QA/QC data as specified in the analytical methods shall be maintained accessible to the Site Supervisor either in hard copy or on magnetic tape or disk.

10.0 INTERNAL QUALITY CONTROL CHECKS AND FREQUENCY

10.1 QC FOR FIELD MEASUREMENTS

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

10.2 QC FOR LABORATORY ANALYSES

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

10.2.1 REAGENT BLANKS

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

10.2.2 MS/MSD ANALYSES

An MS/MSD sample will be analyzed at a minimum frequency of 1 per 20 investigative samples. Acceptable criteria will be provided by the laboratory. Percent spike recoveries will be used to evaluate analytical accuracy while the relative percent difference (RPD) between duplicate analyses will be used to assess analytical precision.

10.2.3 SURROGATE ANALYSES

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

The compounds that will be used as surrogates and the levels of recommended spiking are specified in the methods. Surrogate spike recoveries must fall within the control limits specified in the method or established by the laboratory. If surrogate recoveries

are excessively low (<10 percent), the laboratory will contact the QA/QC Officer for further instructions.

Dilution of samples to bring the analyte concentration into the linear range of calibration may dilute the surrogates out of the quantification limit. Reanalysis of these samples is not required. Assessment of analytical quality in these cases will be based on the blank spike sample analysis results.

10.3 QC FOR SAMPLING PROTOCOL

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

10.3.1 FIELD DUPLICATE SAMPLES

Field duplicate samples will be collected at a frequency of one per twenty investigative samples. These samples will be submitted "blind" to the laboratory for analysis and the results will be compared and assessed based on control limits of +/-50 RPD.

10.3.2 FIELD BLANK SAMPLES

Rinse blanks will be used to assess decontamination procedures of collection equipment used for multiple samples. The rinse blank will be prepared using analyte-free deionized water when non-dedicated equipment is used in the field. The rinse blanks will be analyzed by the laboratory as samples. Rinse blanks will be prepared at a frequency of one per twenty investigative samples.

11.0 PERFORMANCE AND SYSTEM AUDITS AND FREQUENCY

11.1 LABORATORY

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

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

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

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

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

11.2 FIELD

Audits of field techniques may be conducted by the QA/QC Officer. These audits will include review of the sample collection and instrument calibration logbooks and chain of custody documents. Field inspections will also be performed to review sample collection and handling techniques, on-Site supplies of sampling equipment and standards, and availability of relevant project documents.

12.0 PREVENTIVE MAINTENANCE

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

Daily checks of each instrument will be performed by the analyst who has been assigned responsibility for that instrument. Manufacturers' recommended procedures will be followed in every case.

Maintenance procedures and schedules and instrument logbooks will be documented in bound notebooks and made available to the project QA/QC Officer upon request.

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

13.1 QA MEASUREMENT QUALITY INDICATORS

13.1.1 PRECISION

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

Matrix Spike/Matrix Spike Duplicate

$$\text{Precision} = \left| \frac{\{D2 - D1\}}{\{D1 + D2 / 2\}} \right| \times 100$$

D_1 = matrix spike recovery
D_2 = matrix spike duplicate spike recovery

13.1.2 ACCURACY

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

$$\text{Accuracy} = \frac{A\text{-}B}{C} \times 100$$

A = The analyte determined experimentally from the spike sample
B = The background level determined by a separate analysis of the unspiked sample
C = The amount of spike added

13.1.3 COMPLETENESS

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

To be considered complete, the data set must contain all QC check analyses verifying precision and accuracy for the analytical protocol.

13.1.4 OUTLIERS

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

14.0 CORRECTIVE ACTION

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

i) checking the predetermined limits for data acceptability beyond which corrective action is required;

ii) identifying and defining problems;

iii) assigning responsibility for investigating the problem;

iv) investigating and determining the cause of the problem;

v) determination of a corrective action to eliminate the problem (this may include reanalysis or resampling and analyses);

vi) assigning and accepting responsibility for implementing the corrective action;

vii) implementing the corrective action and evaluating the effectiveness;

viii) verifying that the corrective action has eliminated the problem; and

ix) documenting the corrective action taken.

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

15.0 QUALITY ASSURANCE REPORT TO MANAGEMENT

The QA/QC Officer will report on the performance of the measurement system and the data quality following each sampling round and at the conclusion of the project.

Minimally, these reports will include:

i) assessment of measurement quality indicator; i.e. data accuracy, precision and completeness;

ii) results of system audits; and

iii) QA problems and recommended solutions.

The QA/QC Officer will be responsible within the organizational structure for preparing these periodic reports. The final report for the project will also include a separate QA section which will summarize data quality information contained in the periodic QA/QC reports to management, and present an overall data assessment and validation in accordance with the data quality objectives outlined in this QAPP.

REFERENCES

"Preparation Aids for the Development of Quality Assurance Project Plans", United States Environmental Protection Agency, Office of Research and Development, EPA/600/8-91/005, February 1991.

"RCRA Quality Assurance Project Plan Guidance", NYSDEC, August 1989.

"USEPA Region II CERCLA Quality Assurance Manual", Revision 1, October 1989.

"Test Methods for Evaluating Solid Waste" USEPA Office of Solid Waste, SW846 Third Edition, November 1986 (with revisions).

TABLES

TABLE C-1

SITE-SPECIFIC PARAMETERS - GROUNDWATER
QUALITY ASSURANCE PROJECT PLAN
102nd STREET LANDFILL SITE
NIAGARA FALLS, NEW YORK

Parameter	*Estimated Quantification Level (µg/L)*	*Analytical Method Reference* [1]
1,2-Dichlorobenzene	10	SW-846 8270
1,4-Dichlorobenzene	10	SW-846 8270
1,2,3-Trichlorobenzene	10	SW-846 8270
1,2,4-Trichlorobenzene	10	SW-846 8270
1,2,4,5-Tetrachlorobenzene	10	SW-846 8270
Phenol	10	SW-846 8270
2-Chlorophenol	10	SW-846 8270
2,4-Dichlorophenol	10	SW-846 8270
2,4,5-Trichlorophenol	10	SW-846 8270

Notes:

(1) Referenced from "Test Methods for Evaluating Solid Waste" USEPA Office of Solid Waste (SW-846), 3rd Edition, 1986 and subsequent revisions.

TABLE C-2

REQUIRED SAMPLE CONTAINERS, PRESERVATION, AND HOLDING TIMES
QUALITY ASSURANCE PROJECT PLAN
102nd STREET LANDFILL SITE
NIAGARA FALLS, NEW YORK

Analytical Parameter	*Sample Container*	*Preservation*	*Maximum Holding Times*	*Volume of Sample*	*Shipping Means*
SSPL SVOCs	2 x 1L Amber Glass Bottle	Cool to 4°C (±2°C)	7 Days from collection to extraction 40 Days from extraction to analysis	Fill Completely	Overnight Courier

Notes:
SSPL Site-Specific Parameter List.
SVOCs Semi-Volatile Organic Compounds.

TABLE C-3

LABORATORY REPORTING DELIVERABLES
QUALITY ASSURANCE PROJECT PLAN
102nd STREET LANDFILL SITE
NIAGARA FALLS, NEW YORK

A detailed report narrative should accompany each submission, summarizing the contents and results.

A. Chain of Custody Documentation and Detailed Narrative[1].

B Sample Information:
1. Date collected.
2. Date extracted.
3. Date analyzed.
4. Analytical method and reference.

C. Final Results:
1. Samples.
2. Method blanks.
3. Spikes, spike duplicates [2][3].
4. Surrogate recoveries (2).
5. Internal standard recoveries.

D. Miscellaneous:
1. Method detection limits and/or instrument detection limits.
2. Dates of extraction and analysis for method blanks and blank spikes.

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

Notes:

(1) Any quality control outliers must be addressed and corrective action taken must be specified.

(2) Laboratory must specify applicable control limits for all quality control sample results.

(3) A blank spike must be prepared and analyzed with each sample batch.

APPENDIX D

APL DISCHARGE SYSTEM OPERATING INSTRUCTIONS

APL DISCHARGE SYSTEM

OPERATING INSTRUCTIONS

Wet Wells 1 through 4 collect leachate through the underground collection system. Level controllers in each well automatically start the pumps on high level and shut down the pumps when low levels are reached. The entire system is completely automated to the point where no operators are required.

Operators need to only monitor the flow and respond to alarm indications for problems.

APPENDIX E

APL DISCHARGE SYSTEM TROUBESHOOTING CHART

APL DISCHARGE SYSTEM

TROUBLESHOOTING CHART

PROBLEM:

Leak detection alarm indicates a leak at one of the following chambers;

- LDMH 8
- LDMH 9
- Metering Manhole
- Love Canal Manhole

Automatic Response

Computer system shuts down all four Wet Well pumps and alerts operators at Love Canal of the type and location of the problem.

Operator Response

Check chamber where leak detection occurred. Rectify problem. Manually restart pumps.

PROBLEM

One pump shuts down and will not restart.

Automatic Response

Computer system alerts operators at Love Canal. Remaining pumps will keep operating. Due to the hydraulic connectivity between Wet Wells water levels will be maintained.

Operator Response

Check system electronics including level controls. Determine problem. Replace damaged components.

APPENDIX F

SPARE PARTS LIST

SPARE PARTS LIST

Grundfos Pump 10 E 8

Drexelbrook Level Probe & Switch

Flowdata Flow Meter BR 3000

APPENDIX G

MANUFACTURERS DATA

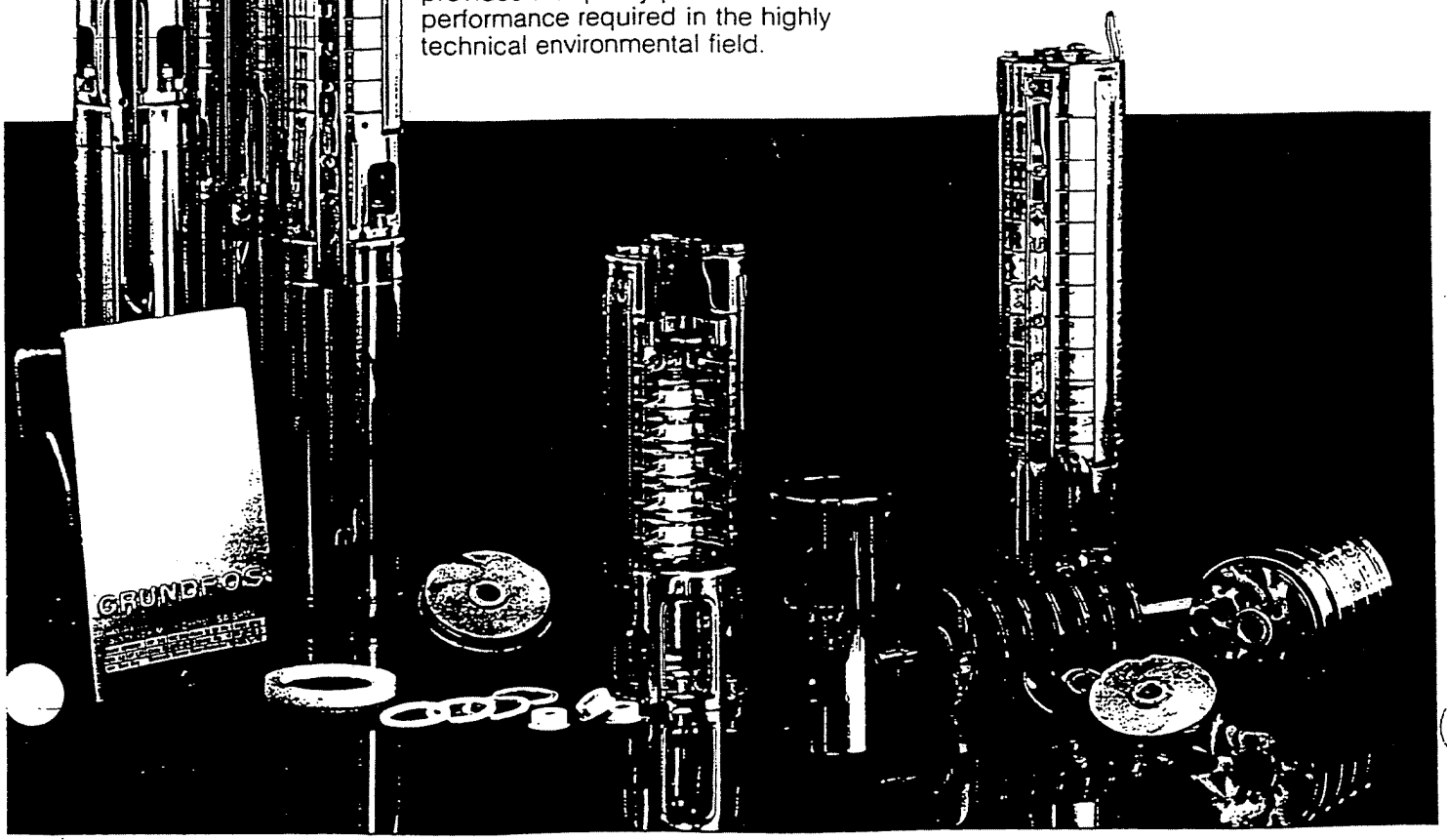
GRUNDFOS

Redi-Flo4

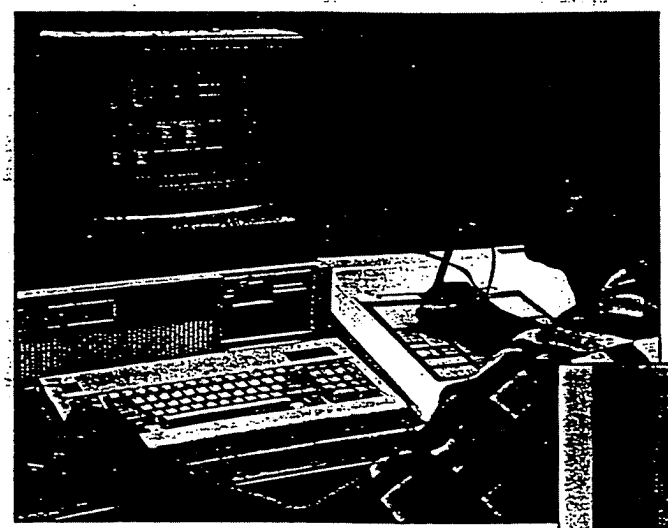
Grundfos Sets the Industry Standar
...Redi-Flo4 Stainless Steel and Teflo

In an industrialized world such as ours, large volumes of fuels, oils and other hydrocarbons, as well as industrial wastes and toxic contaminants are routinely moved and stored. Spills, seepage, leaks and the accumulation of agrichemical products contribute daily to the contamination of our underground water supplies.

Environmental monitoring and clean-up operations require the best equipment available. For years hydrogeologists and environmental engineers have recognized the unique qualities of Grundfos stainless steel submersibles and have used them extensively in environmental applications. With their automated design and manufacturing techniques, Grundfos engineers have combined their time-proven stainless steel submersible with the environmental requirement of Teflon® bearings and seals. The resulting 4-inch *Redi-Flo4* submersible features the combination of stainless steel and Teflon® as its *standard materials of construction.* With off-the-shelf availability in sizes to 32 gpm, *Redi-Flo4* provides the quality product and reliable performance required in the highly technical environmental field.

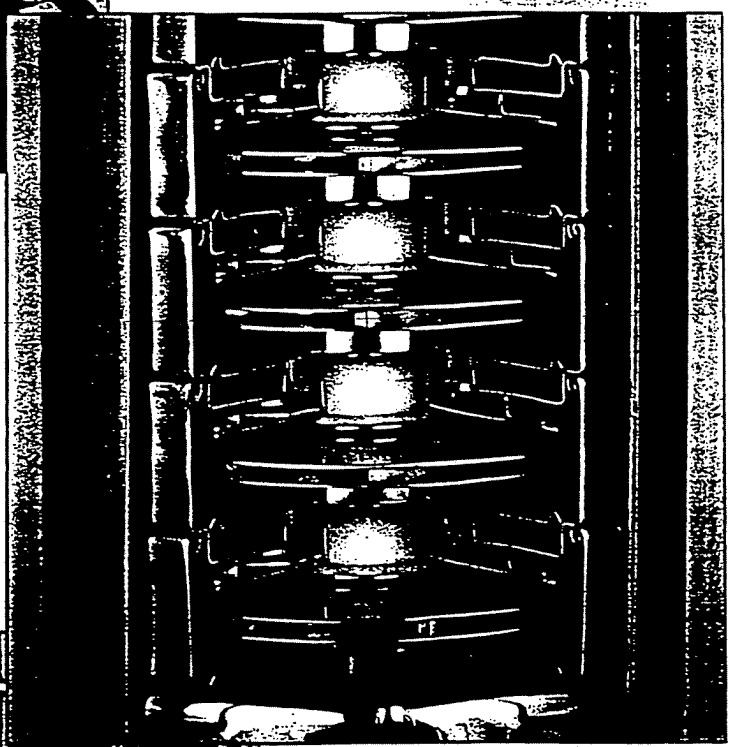


with Quality and Performance Submersible Pumps



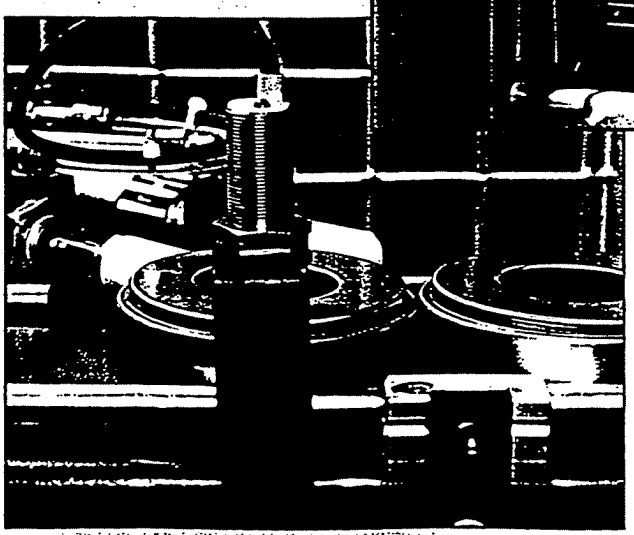
"Computer assisted design allows specified performance without compromising materials of construction..."

Through the application of modern CAD/CAM design technology, Grundfos engineers have been able to overcome the difficulties of fabricating stainless steel while maintaining the benefits of *durable construction and top performance.*



"Redi-Flo4 submersibles meet government guidelines for sample integrity..."

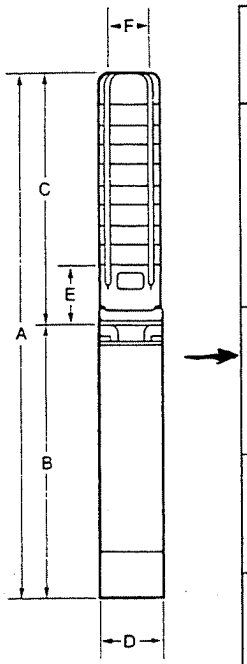
Stainless steel and Teflon® are the only materials used in Grundfos *Redi-Flo4* submersible pump ends. Bowls, impellers, guide vanes, pump shaft, check valve... even the nuts, bolts and washers are stainless steel. With Teflon® bearings, seals, and motor leads, the *Redi-Flo4* is the *industry's choice in 4-inch submersible pumps.*



"Automated manufacturing techniques form stainless steel into state-of-the-art environmental pumps..."

Computerized manufacturing processes form single sheets of stainless steel into fully tested stainless steel and Teflon® submersible pumps. With rigid quality assurance procedures combined with the most inert materials available, *Redi-Flo4* submersibles *meet the strict specifications of environmental engineers.*

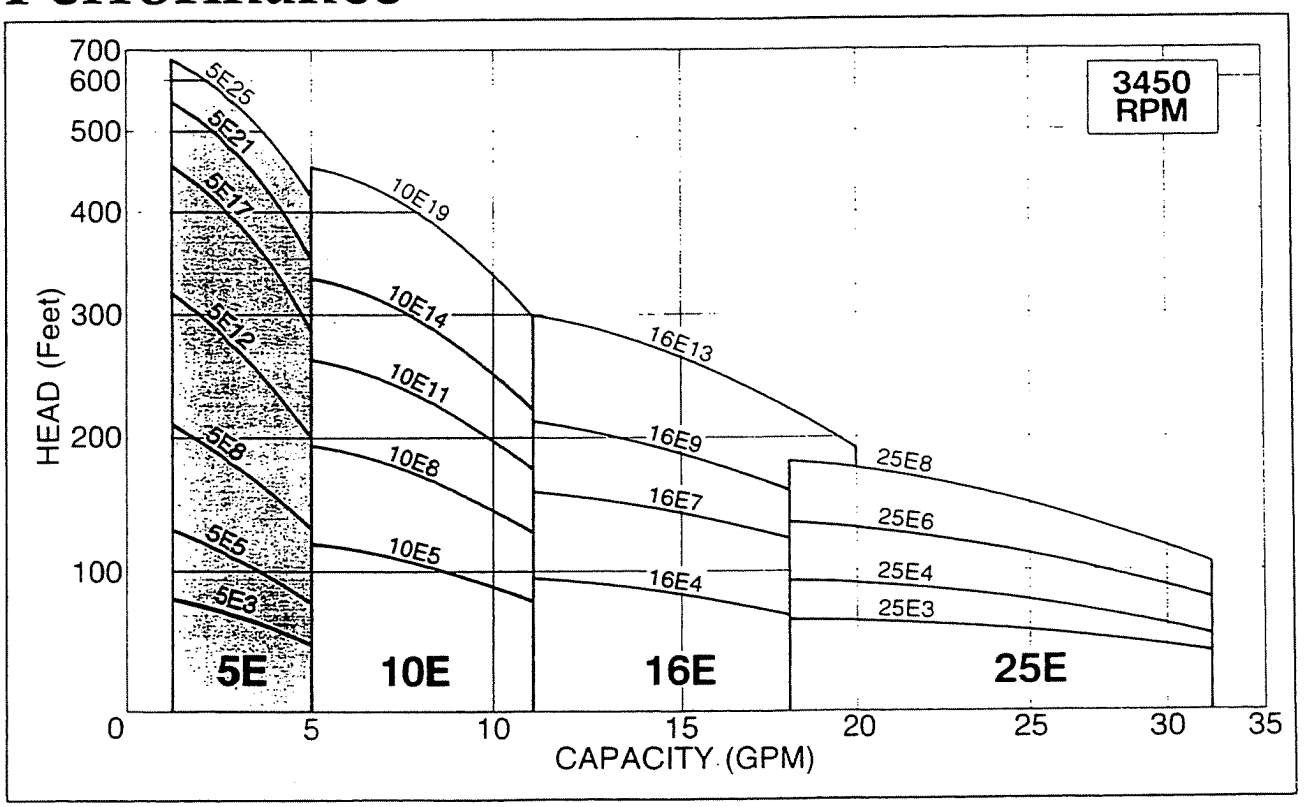
Dimensions

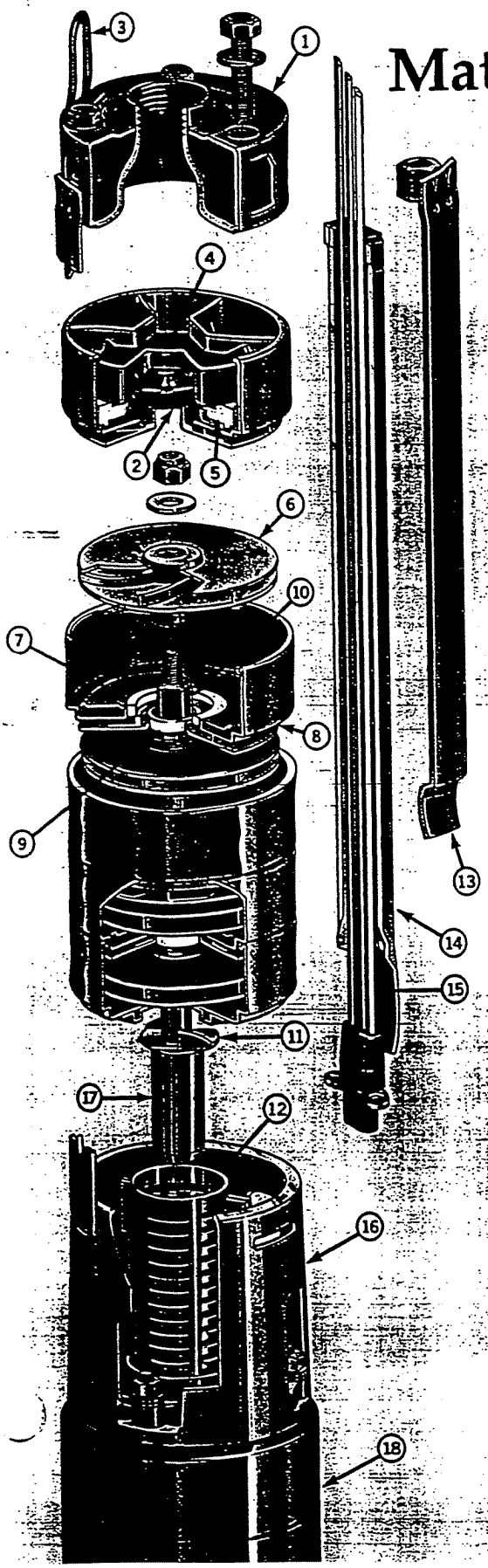


PUMP MODEL	MOTOR HP	MOTOR DIA.	OVERALL A	MOTOR LENGTH B	PUMP END LENGTH C	MAX. DIA. D	INLET E	DISCH. PIPE SIZE F
5E3	1/3	4"	18 9/16"	10"	8 9/16"	3 31/32"	3 1/4"	1" NPT
5E5	1/3	4"	20 5/16"	10"	10 5/16"	3 31/32"	3 1/4"	1" NPT
5E8	1/3	4"	22 3/4	10	12 3/4	3 31/32	3 1/4	1" NPT
5E12	1/2	4"	26 13/16	10 13/16	16	3 31/32	3 1/4	1" NPT
5E17	3/4	4"	31 7/16	12 3/8	20 3/16	3 31/32	3 1/4	1" NPT
5E21	1	4"	35 7/16	12	23 7/16	3 31/32	3 1/4	1" NPT
5E25	1 1/2	4"	40 5/16	13 9/16	26 3/4	3 31/32	3 1/4	1" NPT
10E5	1/3	4"	20 5/16	10	10 5/16	3 31/32	3 1/4	1 1/4" NPT
10E8	1/2	4"	23 9/16	10 13/16	12 3/4	3 31/32	3 1/4	1 1/4" NPT
10E11	3/4	4"	26 9/16	11 3/8	15 3/16	3 31/32	3 1/4	1 1/4" NPT
10E14	1	4"	29 11/16	12	17 11/16	3 31/32	3 1/4	1 1/4" NPT
10E19	1 1/2	4"	35 3/8	13 9/16	21 13/16	3 31/32	3 1/4	1 1/4" NPT
16E4	1/2	4"	20 1/4	10 13/16	9 7/16	3 31/32	3 1/4	1 1/4" NPT
16E7	3/4	4"	23 1/4	11 3/8	11 7/8	3 31/32	3 1/4	1 1/4" NPT
16E9	1	4"	25 9/16	12	13 9/16	3 31/32	3 1/4	1 1/4" NPT
16E13	1 1/2	4"	30 7/16	13 9/16	16 7/8	3 31/32	3 1/4	1 1/4" NPT
25E3	1/2	4"	19 3/8	10 13/16	8 9/16	3 31/32	3 1/4	1 1/2" NPT
25E4	3/4	4"	20 13/16	11 3/8	9 7/16	3 31/32	3 1/4	1 1/2" NPT
25E6	1	4"	23 1/16	12	11 1/16	3 31/32	3 1/4	1 1/2" NPT
25E8	1 1/2	4"	26 5/16	13 9/16	12 3/4	3 31/32	3 1/4	1 1/2" NPT

NOTE: Dimensions are for single phase motors. Specifications subject to change without notice.

Performance





Materials and Components

1. **Stainless Steel Discharge (304 SS)** – light, yet durable construction is corrosion resistant with built-in stratifiers to create a smooth transition from pump to discharge connection.

2. **Stainless Steel Check Valve (304 SS)** – will not stick, slam, or jam. Self-cleaning.

3. **Stainless Steel Safety Cable Connector (304 SS)** – Non-fray loop design attaches to discharge head.

4. **Stainless Steel Check Valve Retainer (304 SS)** – ensures positive seating of check valve, reduces water turbulence, and eliminates vortexing at pump discharge.

5. **Teflon® Check Valve Seat** – provides for positive seating of check valve.

6. **Stainless Steel Impeller (304 SS)** – long-wearing, abrasion and corrosion resistant, with high strength-to-mass ratio. Fabricated design allows optimum hydraulic performance.

7. **Teflon® Impeller Seal Ring** – provides internal seals for maximum sample integrity.

8. **Stainless Steel Chambers and Guide Vanes (304 SS)** designed to reduce upthrust, resist corrosion, and eliminate clogging.

9. **Teflon® Intermediate Bearings** – placed at each stage to ensure positive shaft alignment, eliminate vibration, and maintain pump efficiency.

10. **Stainless Steel Splined Shaft (304 SS)** – prevents slippage of impellers on the shaft while allowing easy service and disassembly of the pump for cleaning.

11. **Stainless Steel Priming Inducer (304 SS)** – prevents dry running, lubricates the bearings and permits long low-flow operation.

12. **Stainless Steel Slotted Inlet Screen (304 SS)** – non-corrosive with slot size matched to impeller size to prevent clogging.

13. **Stainless Steel Straps (304 SS)** – durable and strong design allows pump end to be easily serviced.

14. **Stainless Steel Motor Cable Guard (304 SS)** – protects cable.

15. **Teflon® Motor Cable** – corrosion resistant Teflon® coated wire reduces the risk of sample bias.

16. **Stainless Steel Suction Interconnector (304 SS)** – rugged, NEMA design with large flow openings. Provides positive pump and motor alignment.

17. **Stainless Steel Shaft Coupling (329/420/431 SS)** – heavy-duty, corrosion resistant design.

18. **Sealed Stainless Steel Motor** – constructed of stainless steel, Teflon®, and Viton® and designed to meet the strict specifications required in environmental applications.

Glauber Equipment Pump Quote

To: Smith Technologies Date:July 8, 1997

ATTN: Jason Aigner

Tel: 716 283 1615 Fax: 716 283 2566

Item	Description	Totals
A		
→ (B)	Grundfos Submersible Environmental Pump Model 10E8, ½ HP 3450RPM, 3/60/460V motor	
C	Cord Options: 25 foot cord set 75 foot cord set 100 foot cord set	

FOB: Factory, motor stock subject to priors

6 weeks, ARO

Delivery: Weeks, ARO

Signed: MIKE THOMAS

Michael Thomas/Applications Specialist

CC:Kevin McKenzie/sales

RITEC FAX

BUFFALO OFFICE

159 GODFREY TERRACE, EAST AURORA, NY 14052-2040
PHONE: 716-655-1919 FAX: 716-655-3340

07/11/97 09:51 AM

e-mail: billw@ritec.com homepage: http://www.ritec.com

TO: CIR Industrial Automation, Inc.

AT: Gus Siuta, Instrument Engineer

COPIES TO: Jill Peterson, RITEC, Rochester Office

FR: BILL WHITFORD PAGE: 1 of 11

REF: Smith Technologies, Inc.
Oxy/Chem 102nd Street Site
Groundwater Remediation Project

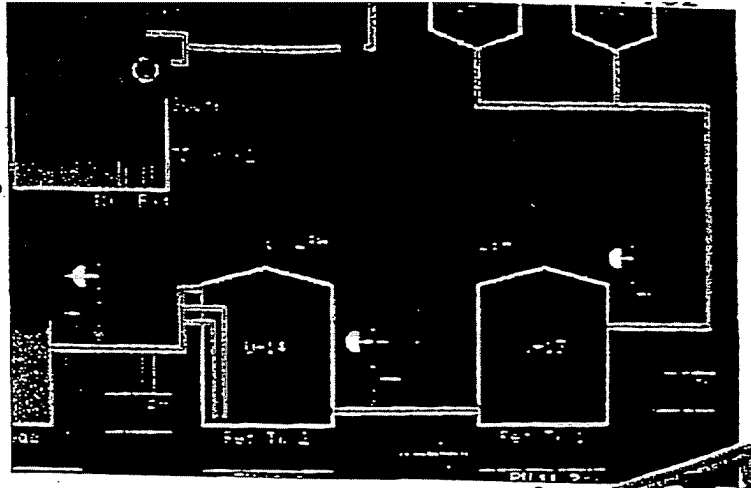
Your P.O. # 12185-1
FOR: Drexelbrook Engineering Company Level Systems
Level System Tag No.'s: LS-1, LS-2, LS-3, LS-4

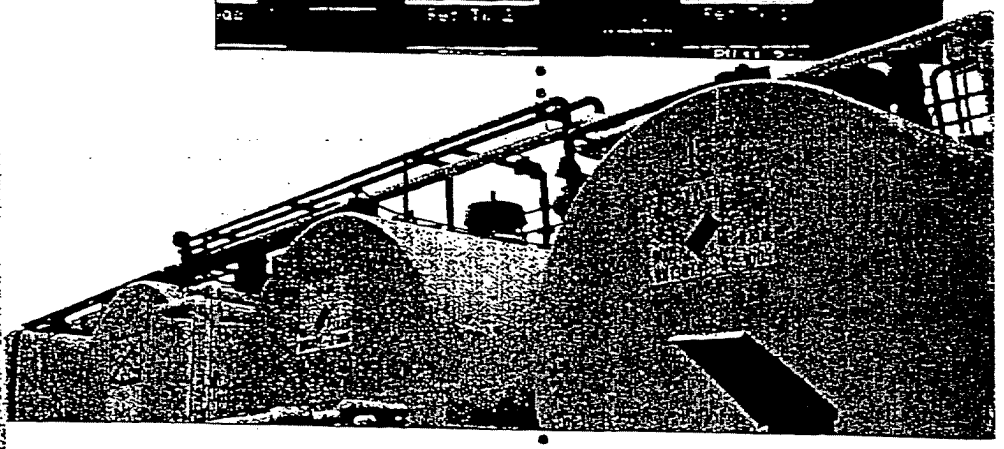
Gus,
At your request, during our recent telephone conversation, attached are copies of the submittal drawings for the Drexelbrook Level Systems required for this project. Original, "hard copies", of these same drawings will be sent, under separate mailing, from our Rochester office.

Please call if you have any questions or need additional information.

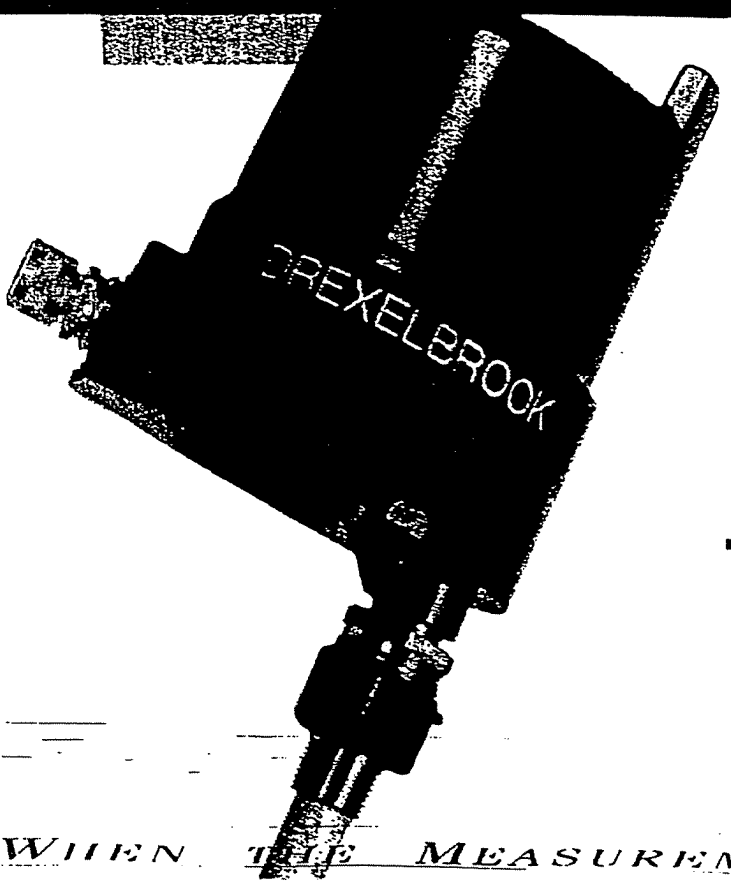
Regards,
Bill Whitford

Drawings sent: 506-3000-CD2 (4 sheets), 700-5054CD, "Multi Point II Level Control, Series 506-3000 (2 or 3 points)" Brochure & DECO "Level Measurement Solutions" Brochure





LEVEL MEASUREMENT SOLUTIONS



DREXELBROOK

Engineering Company

An ISO 9001 Certified Company

WHEN THE MEASUREMENT MATTERS

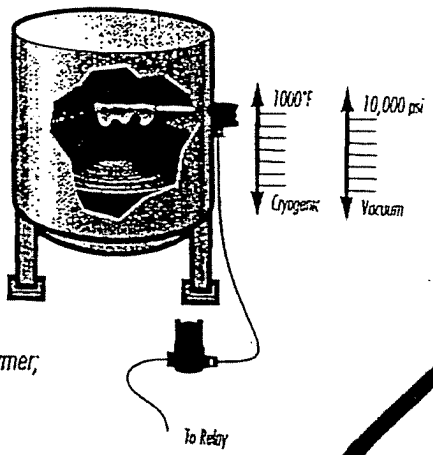
RF Point Level Controls...for Versatility and Reliability

Drexelbrook's comprehensive line of RF/Admittance point level control instruments covers a wide range of applications...from economical on/off switching to multipoint systems to premium, high performance line-powered and two-wire controls. Even in the harshest conditions, you can be confident that Drexelbrook point level controls will provide maximum reliability.

All Purpose Line Powered Point Level Control

The LCS™ line powered point level control is our most versatile instrument for all types of materials, including liquids, granulars and interfaces.

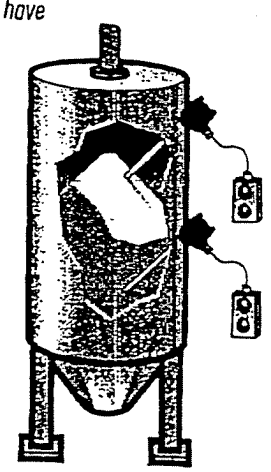
- *Provides accurate measurements despite coatings or material build-up*
- *No-moving-parts design provides maintenance-free operation*
- *For applications from cryogenic to molten polymer; vacuum to 10,000 psi.*
- *FM and CSA approved*



Low Cost On-Off Point Level Control

A low cost, general purpose point level control for many liquids, slurries, granulars and interfaces, the Z-tron™ level switch is an excellent choice for applications that do not have heavy coatings or extremes of temperature, pressure or vibration.

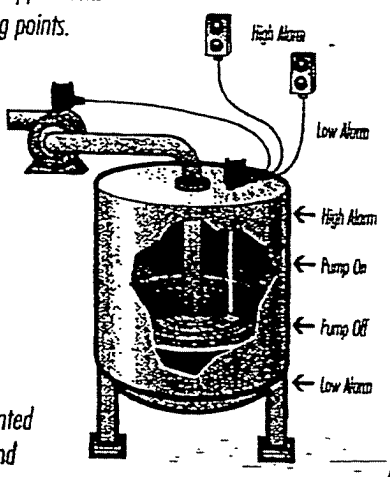
- *Competitively priced with many electromechanical level switches*
- *No moving parts – no paddles, vibrating tines or other components – to jam, break, or wear out.*
- *Ignores coatings and material build-up*



Multiple Control Points with a Single Penetration

The Multi Point II™ provides economical measurements in batch process and sump applications requiring multiple operating points.

- *Up to four setpoints on a single sensor, offers ease of installation and limits potential fugitive emission points*
- *Reliable readings regardless of material build-up on sensor*
- *Integral or remote-mounted transmitter for safety and convenience*



Level Controls – Protecting The Environment

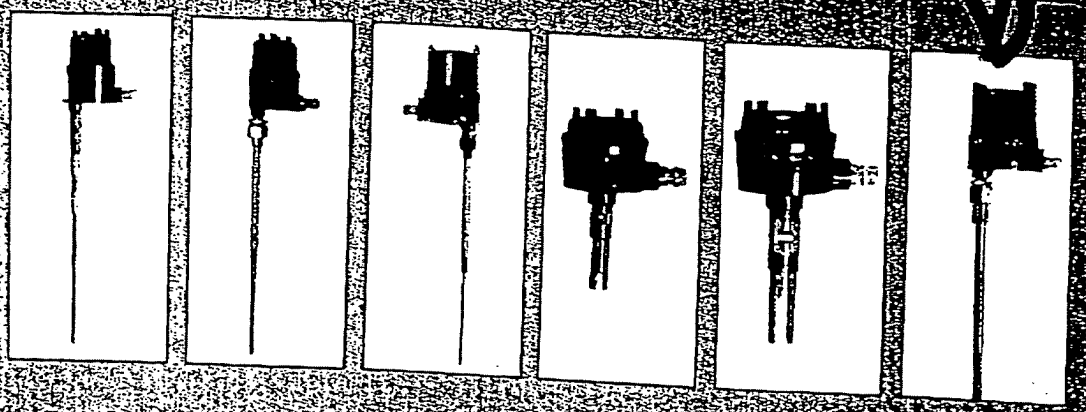
The cost of spill prevention is far less than the risk of leaving above-ground storage tanks unprotected. High-level spill prevention controls help meet environmental and industry regulations and prevent unnecessary clean-up costs. Drexelbrook offers a multiple technology approach to spill prevention and reducing fugitive emissions.

Point Level Control for Reducing Fugitive Emissions

The Pump-It-Seal™ RF point level control has an injection-molded seal design that reduces or eliminates fugitive emissions.

- *Requires only a single penetration into the vessel*
- *Seals or mounts on top of the vessel — no need to penetrate below the material level*
- *Process seals maintain their integrity, even when subjected to severe temperature cycling*

POINT LEVEL PRODUCTS



	Ztron™	LCS™	LCT	VariGAP™	SpudFork™	Multipoint
Material						
Liquid	☑	☑	☑	☑	☑	☑
Granular	☑	☑	☑			
Slurry	☑	☑	☑			
Interface	○	☑	☑			☑
Buildup						
None	☑	☑	☑	☑	☑	☑
Some	☑	☑	☑			☑
Heavy		☑	☑			☑
Power Source						
Line Power	☑	☑		☑	☑	☑
Two-Wire			☑	☑		
Temperature						
Low	☑	☑	☑	☑	☑	☑
Medium	○	☑	☑	☑		
High		☑	☑			
Pressure						
Vacuum	☑	☑	☑	☑	☑	☑
Atmos. to Medium	☑	☑	☑	☑	☑	☑
High		☑	☑	○		
Corrosives	○	☑	☑	☑	○	☑
No Calibration	○*	○*	○*	☑	☑	
Verify Other Level Instruments	☑	☑	☑	☑	☑	

☑ = Yes ○ = Sometimes

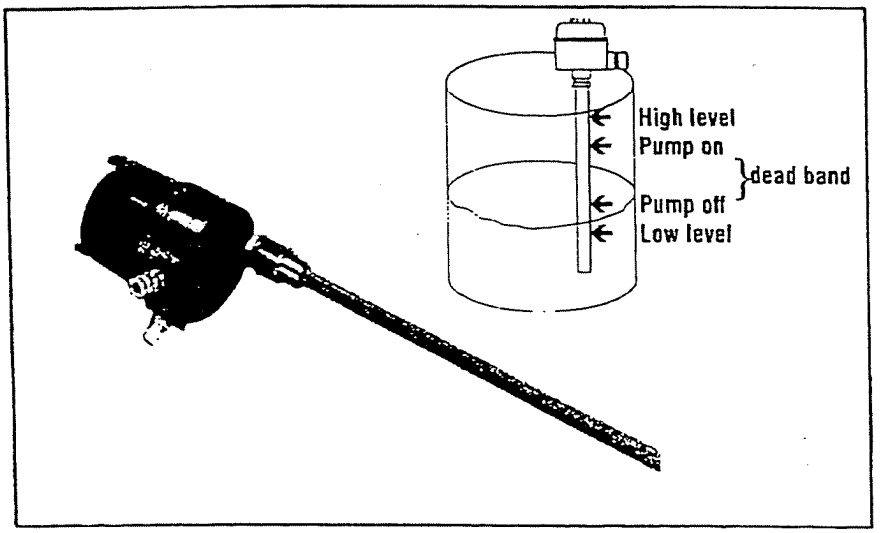
* = No calibration in conductive material

DREXELBROOK Engineering Company

Level and Flow Controls

Multi Point II Level Control

Series 506-3000 (2 or 3 points)



Key Benefits

Reliability

Field-proven technology and coating rejection circuitry ensure dependable level control time after time.

Low Maintenance

No moving parts to break or wear out. No need for regular cleaning or recalibration.

Easy Installation

Sensing element is easily installed. Only one entry in the top of the vessel is needed for 2 or 3 separate measurement points.

Economical

Low cost. One 2-point control costs less than two or more single-point controls. A variety of span ranges are available in the standard unit and are field-selectable.

Safe Operation

Sensing element and cable are intrinsically safe for hazardous areas.

TM: Trade name of Drexelbrook Engineering Co.

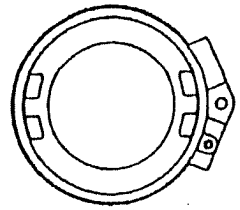
The Drexelbrook MultiPoint II level control provides either 2 or 3 discrete level measurement points along a single sensing element.

The Drexelbrook 506-3000 Series Multipoint 2 level control is a liquid level to relay transducer with 2 or 3 independent and non-interacting setpoints along a single rigid sensing element. There are no moving parts to break or wear out, and systems include time-proven Cote-Shield™ circuitry to ignore the effects of build-up or coatings on the sensing element.

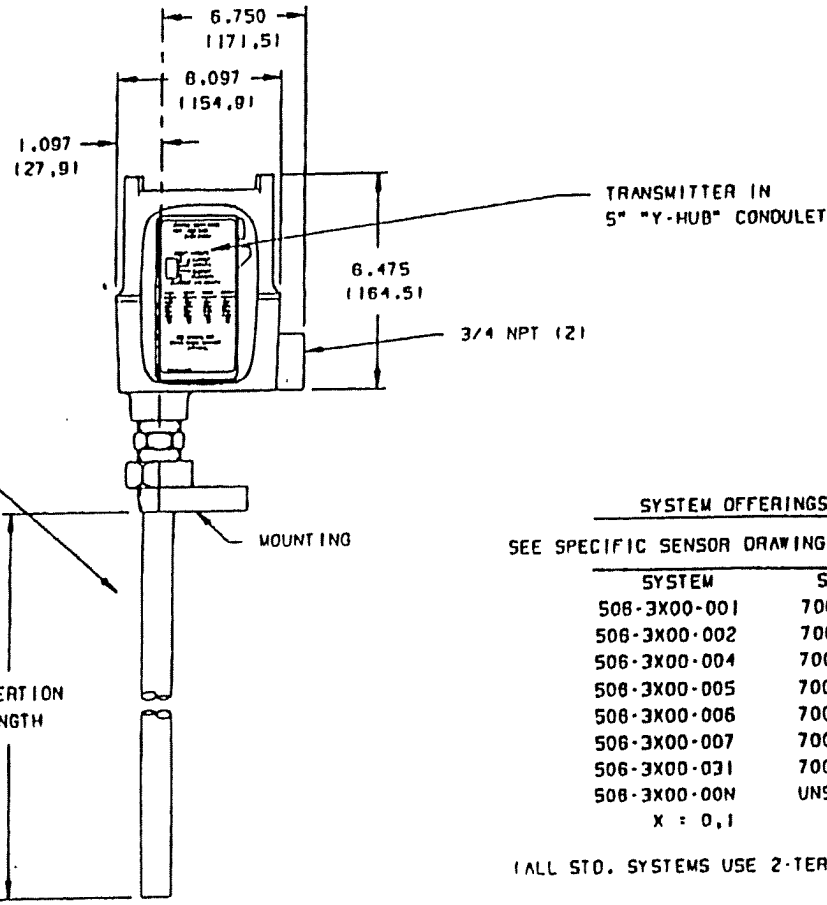
The sensing element is mounted through an opening in the top of the vessel. The electronics can be mounted integrally at the head of the sensing element or mounted remotely and connected to the sensing element by a three-terminal coaxial cable up to 150 feet long. As the material being measured rises and falls, the customer determined setpoints activate corresponding DPDT relays that can be used to operate low power alarm and control devices.

On the standard two-point unit, one setpoint relay has a 0-90 sec adjustable time delay, and the second setpoint relay has an adjustable differential (dead band). Both the upper and lower points of the differential can be adjusted over the entire range of the instrument. This makes the unit an ideal and economical approach for pump control applications. An optional third setpoint relay is a plain on/off circuit.

Field-selectable fail-safe switches are provided for each of the setpoints. LED's for each setpoint are used to indicate the state of its relay.



A.C. POWER & RELAY CONNECTIONS



HOUSING IS NEMA 1,3,4,5 AND 12.
EXPLOSIONPROOF FOR
CLASS I, GROUPS A,B,C&D, DIV. 1 OR 2,
CLASS II, GROUPS E,F&G, DIV. 1 OR 2.
ALSO, INCLUDES I.P.65 (PROTECTED
AGAINST DUST AND WATER FROM
NOZZLE).

SYSTEM OFFERINGS

SEE SPECIFIC SENSOR DRAWING FOR DIMENSIONS

SYSTEM	SENSOR
506-3X00-001	700-1-22
506-3X00-002	700-1-24
506-3X00-004	700-2-57
506-3X00-005	700-5-54
506-3X00-006	700-2-37
506-3X00-007	700-2-27
506-3X00-031	700-2-52
506-3X00-00N	UNSPECIFIED
X = 0,1	

(ALL STD. SYSTEMS USE 2-TERMINAL SENSORS)

ISS	EDO/DSR NO.	APP'D	DATE
1	7-95-243	[illegible]	7-3-95
D	9-15-92 TJC	TLR	8-27-93

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DREXELBROOK ENG CO.

SCALE NONE
UNLESS OTHERWISE STATED
ALL DIMENSIONS IN INCHES (MM)

DR. J.R.S.
CK. [signature]

DREXELBROOK
Engineering Company
205 KEITH VALLEY RD
HORSHAM, PA 19044-9998
215-674-1234
FAX 215-674-2731

506-3000 SYSTEM MOUNTING & WIRING FOR TRANSMITTER INTEGRALLY MOUNTED WITH SENSOR

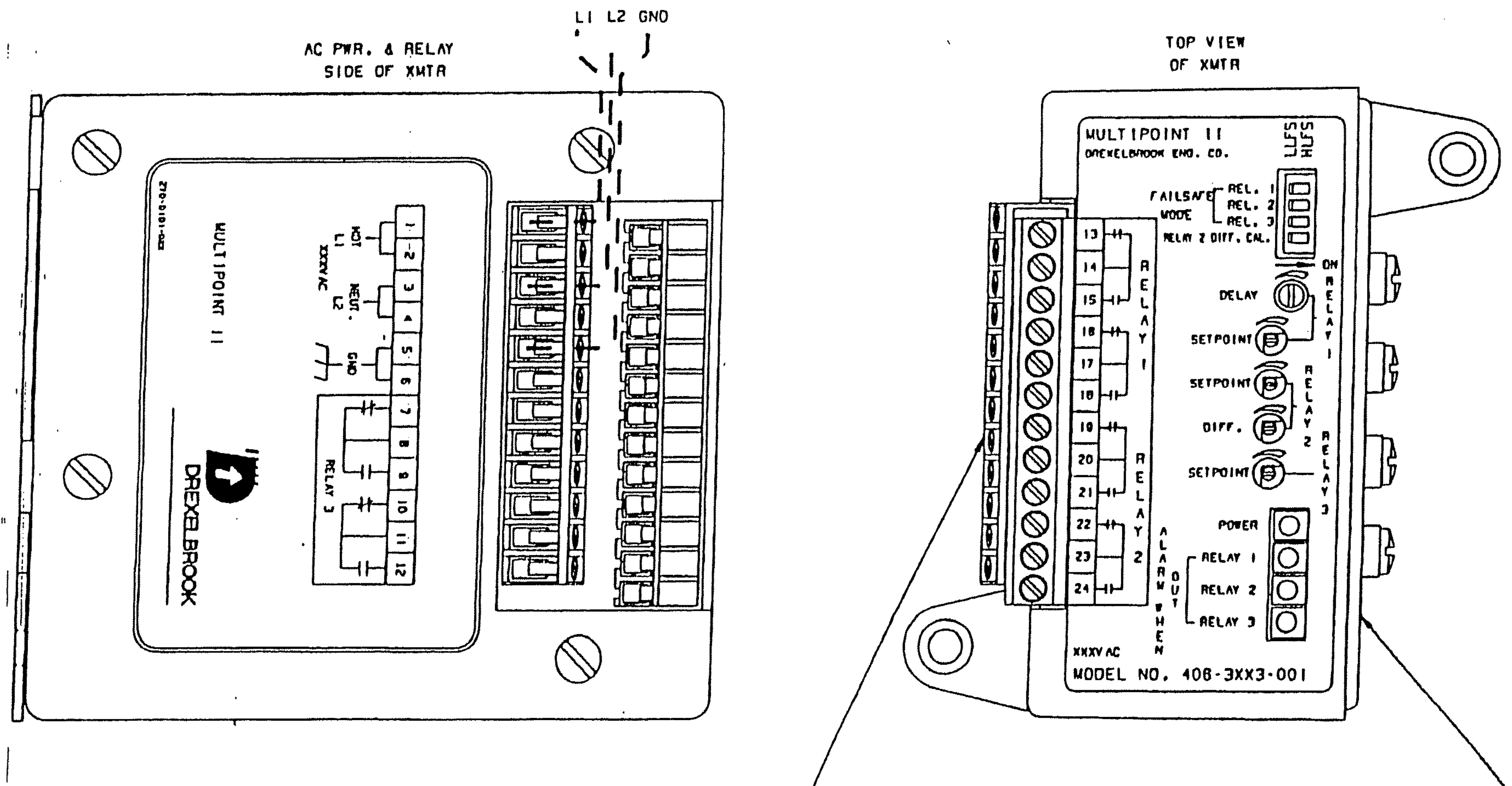
506-3000-00X CD2

SHT 1 OF 1

ISS 1

RITEC Buffalo Office 716 655 3340
P.06
NO. 506-3000-00X-CD2

THREE RELAY VERSIONS
(406-3XX3-001 TRANSMITTER)



A.C. POWER & RELAY CONNECTION SIDE
(WIRE SIZE #12 TO #28 AWG)
(DPDT CONTACTS RATED 5 AMPS @ 220VAC)

SENSOR CONNECTION SIDE
(DONE BY FACTORY)

CERTIFIED by				
1	7-95-243	[signature]	7-3-95	
D	9-15-92 TJC	TLR	8-27-93	
ISS	EDO/DSR NO.	APP'D	DATE	

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DR. J.R.S.
CK. WWC

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Engineering Company
205 KEITH VALLEY RD
HORSHAM, PA 19044-9986
215 674-1234
FAX 215-674-2731

506-3000 SYSTEM MOUNTING & WIRING FOR TRANSMITTER INTEGRALLY MOUNTED WITH SENSOR

506-3000-00X-CD2 SHT. 3 OF 4 ISS 1

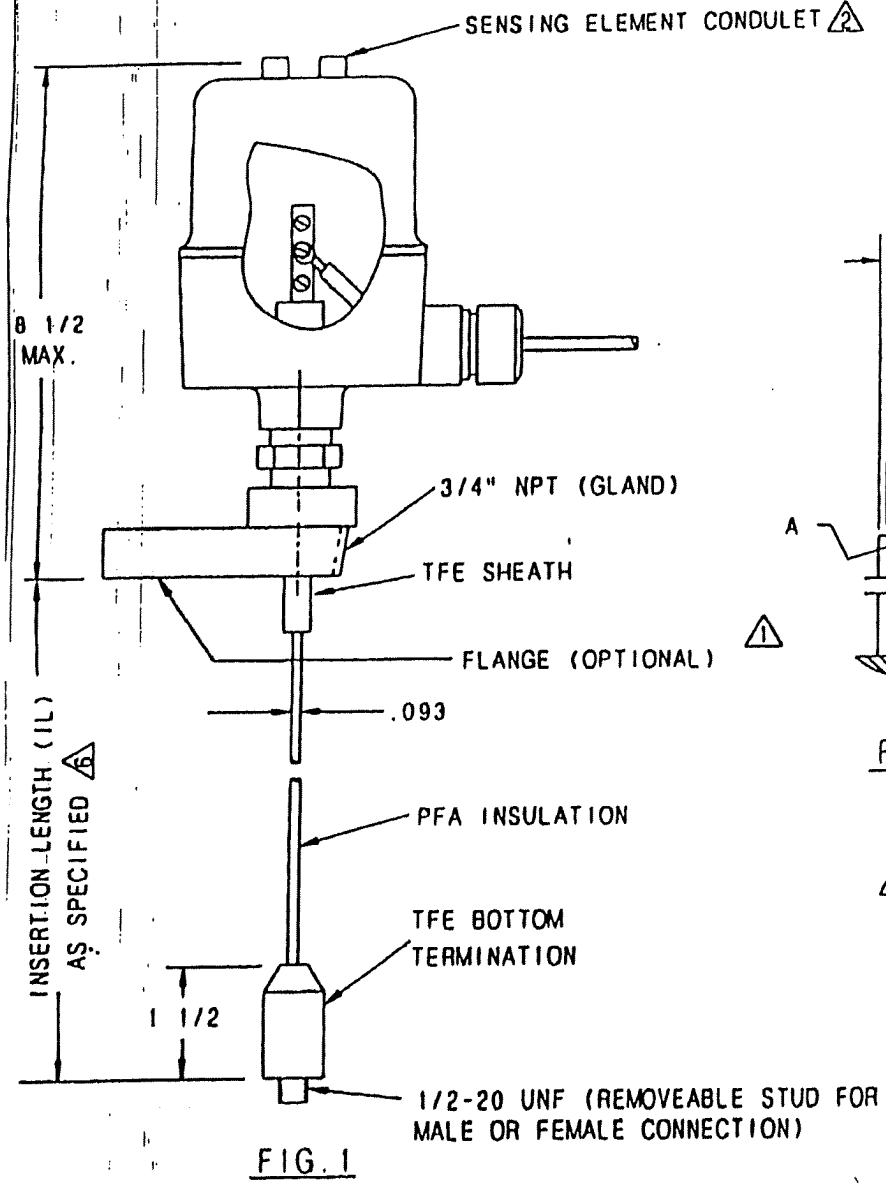


FIG. 1

BOTTOM WEIGHT #	FIG #	SEE NOTE	A	B MAT'L	C INSUL	D	E
722-25-40	2	3,4	1/2-20	TFE		3 1/2	1 1/2
722-58-4	2	3,5	10-32/OR1/2-20	316 SST		2	4
752-25-4	2	3,5	10-32/OR1/2-20	316 SST		4	7/8
752-58-10	2	3,5	10-32/OR1/2-20	TFE		2 1/2	2 1/2
752-756-40	2	3,4,7	1/2-20 (MALE)	TFE		6	3/4

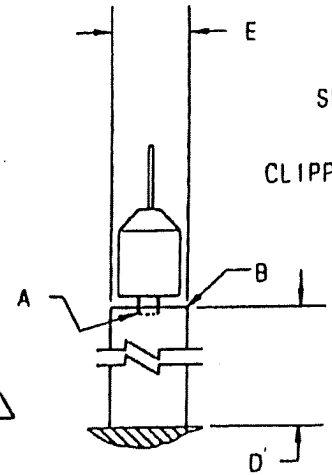
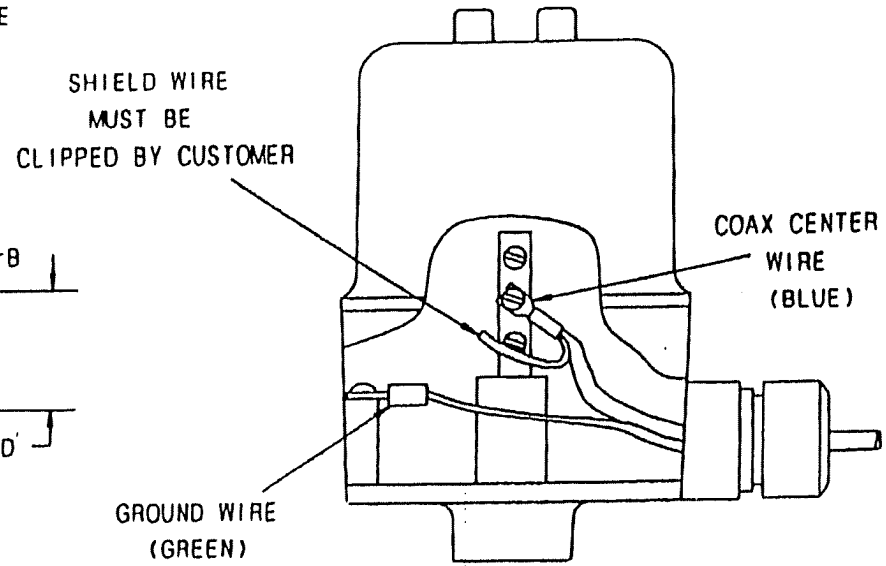


FIG. 2



WIRING DETAIL

△NOTES:

1 FLANGE WELDED TO GLAND. MAT'L & SIZE AS SPECIFIED. TEFLON FACING AVAILABLE.
2 SENSING ELEMENT CONDULET IS NOT PART OF THE PROBE ASSEMBLY.
3 ANY LISTED WEIGHT MAY BE USED. ONLY 3/4" & 7/8" O.D. FITS THRU 3/4" NPT.
4 STEEL WEIGHT COMPLETELY TEFLON ENCLOSED.
5 WEIGHT DRILLED & TAPPED 10-32 ONE SIDE 1/2-20 OTHERSIDE.
6 SEE 700-5-54-CD1 FOR SHORTENING INSTRUCTIONS.
7 WEIGHT HAS 1/2-20 STUD ONE END.

CERTIFIED by
PO #
ENG
USER
E #

ISS.	EDO/DSR NO.	APP'D	DATE
5	8-96-252	[illegible]	7-16-96
4	3-93-163	WAW	4-8-93
3	7-92-161	WAW	7-27-92
2	9-91-161	ELL	9-18-91
1	9-90-163	WAW	11-28-90

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DR. PJM
CK. WWL

DREXELBROOK
Engineering Company
205 KEITH VALLEY RD
HORSHAM, PA 19044-8988
215-674-1234
FAX 215-674-2731

MOUNTING OF 700-5-54
FLEXIBLE SENSING ELEMENT

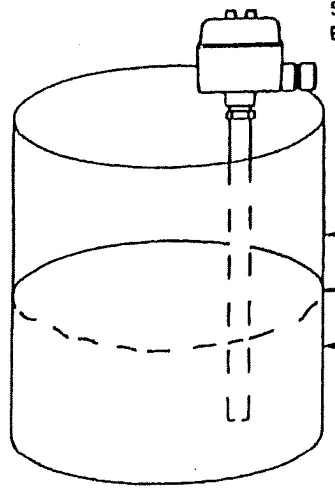
700-5-54CD

SHT. 1 OF 1 | ISS 5

RELAY OPERAT...

NOTE

ANY SETPOINT MAY BE SET TO
ANY POINT ON THE PROBE



TYPICAL RELAY BEHAVIOR UNDER VARIOUS CONDITIONS

SELECTED FAIL SAFE	LEVEL	LED OUTPUT	RELAY CONDITION	
HLFS	BELOW TRIP POINT	ON	ENERGIZED - OKAY	NOC NCNOC NC
LLFS	BELOW TRIP POINT	OFF	DEENERGIZED - ALARM	NOC NCNOC NC
HLFS	ABOVE TRIP POINT	OFF	DEENERGIZED - ALARM	NOC NCNOC NC
LLFS	ABOVE TRIP POINT	ON	ENERGIZED - OKAY	NOC NCNOC NC

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1	7-95-243	[signature]	7-31-95
0	8-15-92 TJC	TLR	8-27-93

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DR. J.R.S.
CK. WWL.

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Engineering Company
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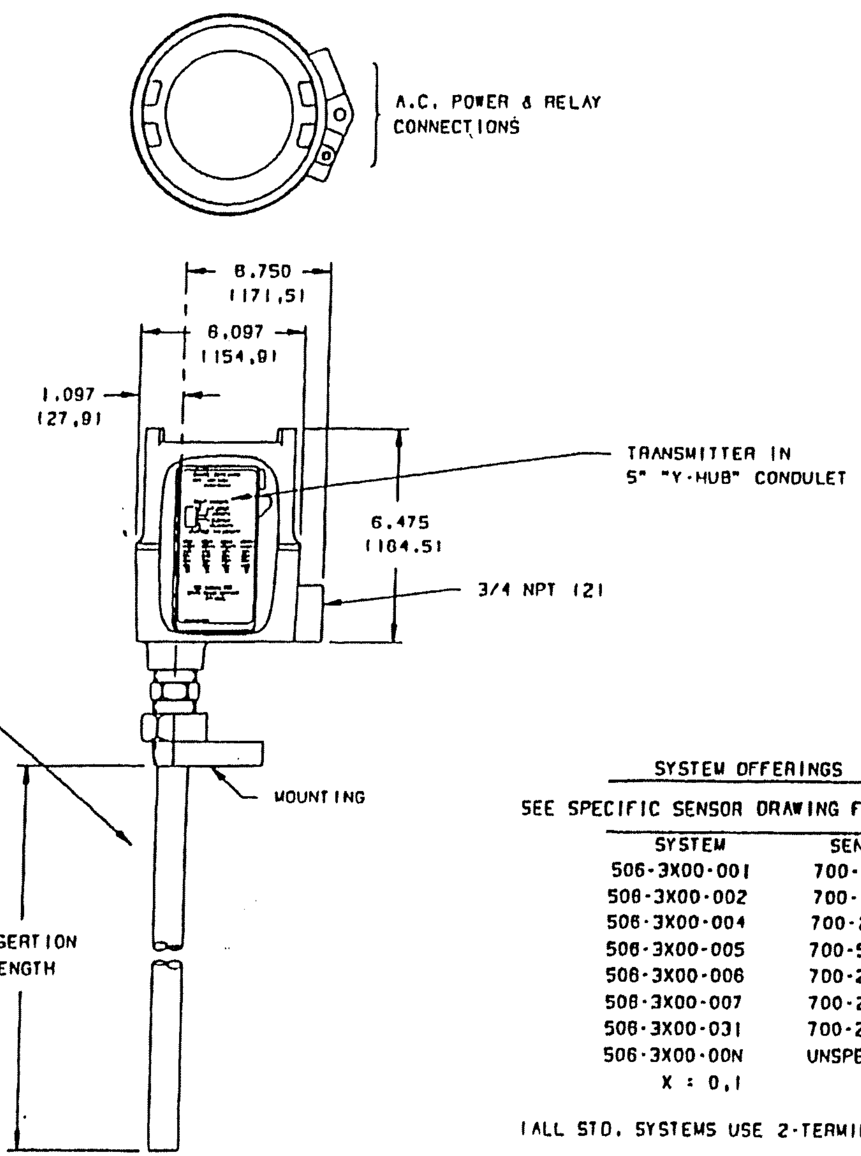
215-674-1234
FAX 215-674-2731

506-3000 SYSTEM MOUNTING
& WIRING FOR TRANSMITTER
INTEGRALLY MOUNTED
WITH SENSOR

506-3000-00X-CD2

SHT. 4 OF 4 ISS 1

NO. 506-3000-00X-CD2



SYSTEM OFFERINGS

SEE SPECIFIC SENSOR DRAWING FOR DIMENSIONS

SYSTEM	SENSOR
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506-3X00-002	700-1-24
506-3X00-004	700-2-57
506-3X00-005	700-5-54
506-3X00-006	700-2-37
506-3X00-007	700-2-27
506-3X00-031	700-2-52
506-3X00-00N	UNSPECIFIED
X = 0,1	

(ALL STD. SYSTEMS USE 2-TERMINAL SENSORS)

HOUSING IS NEMA 1,3,4,5 AND 12.
EXPLOSIONPROOF FOR
CLASS I, GROUPS A,B,C&D, DIV. 1 OR 2,
CLASS II, GROUPS E,F&G, DIV. 1 OR 2.
ALSO INCLUDES I.P.65 (PROTECTED AGAINST DUST AND WATER FROM NOZZLE).

CERTIFIED by				
PO #				
ENG				
USER	1	7-95-243	[signature]	7-3-95
	0	9-15-92 TJC	TLR	8-27-93
R #	ISS	ECO/OSR NO.	APP'D	DATE

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DR. J.R.S.
CK. [signature]

DREXELBROOK
Engineering Company
205 KEITH VALLEY RD
HORSHAM, PA 19044-0900
215-674-1234
FAX 215-674-2731

506-3000 SYSTEM MOUNTING & WIRING FOR TRANSMITTER INTEGRALLY MOUNTED WITH SENSOR

506 3000-00X-CD2 SHT. 1 OF 4 ISS 1

NO. 506-3000-00X-CD2 SHT 1 OF 4

440-115-104 (2)

Typical Standard Systems (For other systems, consult Drexelbrook or your local representative.)

Model # (Sensing Element)	Process Pressure/ Temperature	Applications	Sensing Element Dimensions	Standard Mounting*	Materials of Construction
†506-3000-X01 (700-1-22)	1000 psi @100°F (70 BAR @ 38°C) 500 psi @ 300°F (34 BAR @ 149°C)	Light or non-coating conducting liquids**	3/8 in (9.5mm) O.D. 20 ft(6m) max length (6 ft/1.8m and 10 ft/3m std.)	3/4 in NPT	TFE covered metal rod
†506-3000-X02 (700-1-24)	1000 psi @100°F (70 BAR @ 38°C) 500 psi @ 300°F (34 BAR @ 149°C)	Insulating liquids	3/8 in(9.5mm) O.D. center rod 1.66 in (42mm) O.D. Concentric shield 20 ft (6m) max length	1 1/2 in NPT	TFE covered metal center rod with C.S. concentric shield
†506-3000-X04 (700-2-57)	1000 psi @100°F (70 BAR @ 38°C) 500 psi @ 250°F (34 BAR @ 120°C)	For strength and modest coatings	.84 in (21.3mm) O.D. 20 ft (6m) max length 6 ft/1.8m and 10 ft/3m std.)	1 in NPT	"X" covered metal rod
†506-3000-X05 (700-5-54)	1000 psi @100°F (70 BAR @ 38°C) 500 psi @ 300°F (34 BAR @ 149°C)	Longer lengths in water-like liquids	.093 in (2.4mm) O.D. 400 ft (122m) max length	3/4 in NPT	PFA insulated cable
†506-3000-X06 (700-2-37)	1000 psi @100°F (70 BAR @ 38°C) 500 psi @ 250°F (34 BAR @ 120°C)	For best coating rejection	.54 in (13.7mm) O.D. 13 ft (4m) max length	3/4 in NPT	"X" covered metal rod

† 506-3000 systems are two-point controls; 506-3100 systems are three-point controls. *Flange mountings available. Consult local representative or Drexelbrook factory. **Will work with insulating liquids, but must be linearized during calibration.

Electronic Specifications

1. Power Requirements
(Field changeable) 95-145 Vac 50/60 Hz 1 watt (or) 205-255 Vac 50/60 Hz 1 watt.

2. Level Output
Two-point unit:(2)DPDT relays, one with 0-90 sec. adj. time delay, one with adj. differential*
Three-point unit: (3) DPDT relays, one with 0-90 sec adj. time delay, one with adj. differential*, one plain on/off.

3. Contact Ratings
120 Vac; 5A non-inductive, 3A inductive

4. Recommended Operating Temperature
(Electronics) -40°F to 140°F (-40°C to 60°C)

5. Ambient Temperature Effect
(Operating point) 1%/86°F (30°C) std.

6. Sensitivity
2% standard

7. Operating Point Range
0-200 ft (depending on sensing elements)
Range selection: Four-position adjustable switch, 16 ranges available

8. RFI Protection
(Built in) Less than 1/2 inch shift in operating point for unit in explosionproof housing, 5W field @ 27, 150, or 450 MHz at a distance of 5 ft (1.5m) from exposed cable, or power line.

9. Fail-Safe
(2 or 3 separate adjustments) Switchable to either Low-Level Fail-Safe (LLFS) or High-Level Fail-Safe (HLFS)

10. Connecting Cable
(Remote units only) Three-terminal coaxial up to 150 ft (45.7m). For greater length, consult factory. Rated to 160°F (70°C) std.; to 450°F (230°C) optional

11. Standard Housing
5-inch integral explosionproof std.
5-inch remote explosionproof or Nema 4 remote housings are optional

12. Sensing Element and Cable
Intrinsically safe for Class I Groups A,B,C,D and Class II Groups E,F,G (Div. 1 and 2)

13. Approvals
Consult factory

14. Other Options
Drexelcote™ corrosion resistant conduit/ housing
For 4-point MultiPoint controls, ask for data sheet 506-4000-A.

***Note:** Adj. differential can be selected as a locked band. If adj. diff. is locked in, the differential remains the same, even if the setpoints are moved.

DREXELBROOK
Engineering Company
An ISO 9001 certified company

World Headquarters: Drexelbrook Engineering Co., 205 Keith Valley Road, Horsham, PA 19044 U.S.A. (Tel) 215/674-1234, (Fax) 215/674-2731

Europe Headquarters: Drexelbrook Instrumenten, Bedrijvencentrum Rede, Waalreseweg 17, 5554 Ha Valkenswaard, Netherlands (Tel) 4902-89298, (Fax) 4902-47933

Japan Headquarters: Nihon Drexelbrook, Sankee White Bldg. 5F, 29-12 Taitoh 2-Chrome, Taitoh-Ku Tokyo 110, Japan

506-3000-A
EDO# 3-94-249

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Flowdata, inc.

1817 Firman Drive Richardson, TX 75081-1826 Ph. 972/907-2787 Fax 972/907-8016

June 30, 1997

Gus Suita
CIR Industrial Automation, Inc.
1067 Harlem Road
Buffalo, NY 14227

Re: Purchase Order #12185

Mr. Suita:

Thank you for the above referenced purchase order. Based on the details of your application, Flowdata strongly recommends the use of grooved bore impellers for each flowmeter. If grooved bore impellers are not used, premature wear will not be covered under warranty.

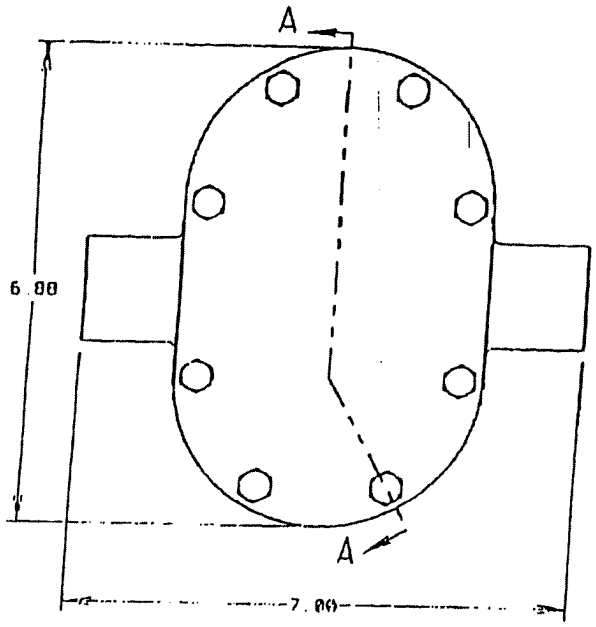
Should you have any questions, please contact me at 800-833-2448.

Regards,

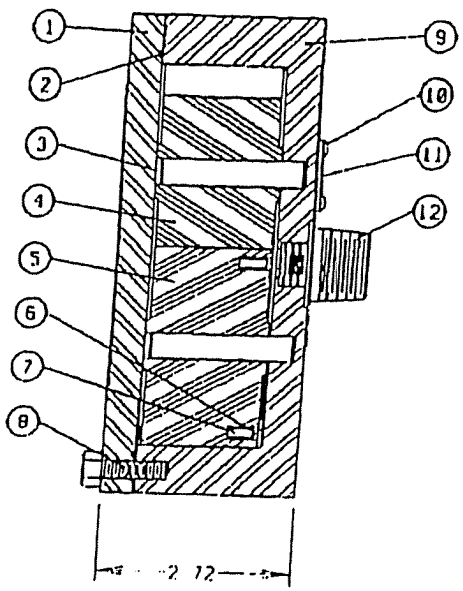
Jennifer G. Keith

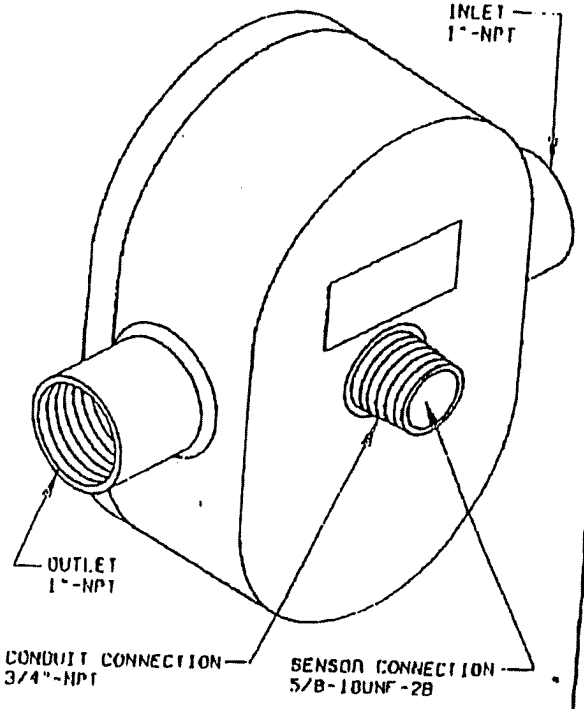
Jennifer G. Keith
Senior Sales Representative

cc: Bill Whitford, Ritec Enterprises, Inc.



SECTION A – A





BILL OF MATERIALS

ITEM	DESCRIPTION	QTY.	PART NUMBER	NOTES
1	FRONT COVER - EC10	1	291-XX-10 R0	-
2	O-RING - 10	1	551-XX-10 R0	REF. AS-568A-048 (4.739 I.D., 0.070 C/S DIA.)
3	SHAFT - EC10, IMPELLER	2	345-XX-10 R0	PART OF INTEGRAL BODY
4	NORTH IMPELLER - 10	1	411-XX-10v02r3	-
5	SOUTH IMPELLER - 10	1	412-XX-10v02r3	-
6	MAGNET SHEATH	20	641-XX-00v02r0	PART OF IMPELLERS
7	MAGNET	20	650-30-00v01r0	PART OF IMPELLERS
8	COVER BOLT - EC10	8	500-XX-10 R0	REF. 1/4-28UNC X 1.00 LONG HEX HEAD BOLT
9	INTEGRAL BODY - EC10	1	191-XX-10 R0	1"-NPT CONNECTIONS
10	DRIVE SCREW	4	590-03-00 R0	REF. #4 X 0.250 LONG, SS
11	STANDARD NAMEPLATE	1	981-96-00 R0	INSTALL HORIZONTALLY
12	3/4"-NPT ADAPTER	1	818-04-00v02r0	PART OF INTEGRAL BODY

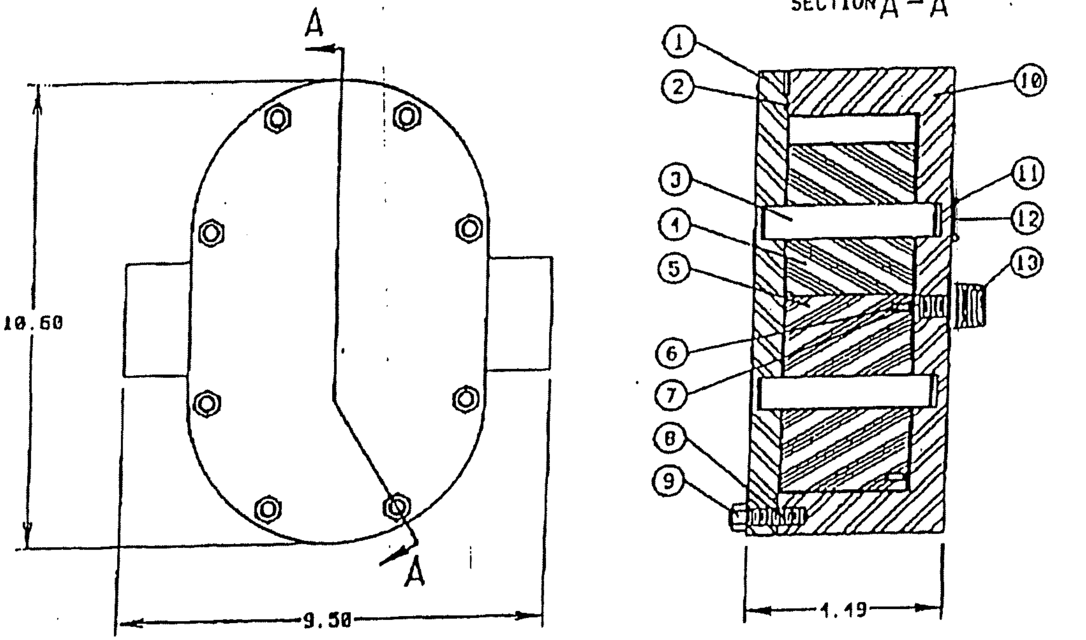
PROPRIETARY DWG
Not To Be Reproduced
Property Of Flowdata, Inc.

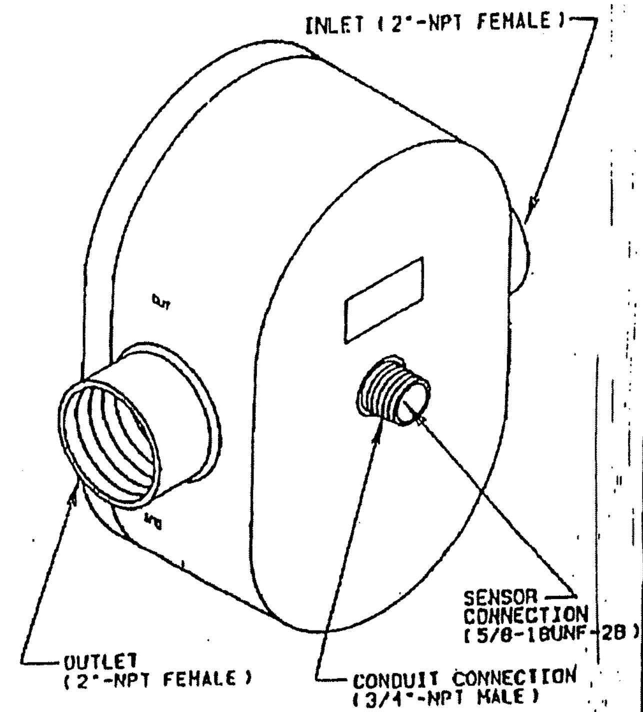
FLOWDATA, INC.

EC101-15XX-2110-00 ASSY
1"-NPT CONNECTIONS

DR. G. WALTON	DATE 08-22-91	SIZE
CK.	SCALE NONE	SHEET 1 OF
APP.	821-XX-10 R0	

REV.	NOTES	DATE	BY
1	REDRAWN, SHAFTS MOVED TO COVER, CHG THRU HOLE DIA. TO 2.070	09-06-90	G.V.
2	UPDATED BODY AND COVER P/N. CORRECTED STUD REFERENCE	01-31-91	GJW
3	UPDATED BODY, COVER, AND SHAFT STUD INSTALLATION, SHAFT DIA	10-31-91	GJW





BILL OF MATERIALS

ITEM	DESCRIPTION	QTY.	PART NUMBER	NOTES
1	FRONT COVER - FD201	1	201-XX-20 R3	-
2	CASE O-RING - 20	1	551-XX-20 R0	REF. AS-568A-169 (7.487 I.D., 0.103 C/S DIA.)
3	SHAFT - FD201, IMPELLER	2	331-XX-20 R2	PART OF FRONT COVER
4	NORTH IMPELLER - 20	1	411-XX-20 R3	-
5	SOUTH IMPELLER - 20	1	412-XX-20 R3	-
6	MAGNET	20	850-50-00v01r0	PART OF IMPELLERS
7	MAGNET SHEATH	20	641-XX-00v02r0	PART OF IMPELLERS
8	THREADED STUD - 20	8	342-XX-20 R0	REF. 3/8-16UNC X 1.75 LONG THREADED STUD
9	CASE NUT - 20	8	311-XX-20 R0	REF. 3/8-16UNC HEX NUT
10	INTEGRAL BODY - FD201	1	111-XX-20 R3	2"-NPT CONNECTIONS
11	DRIVE SCREW	4	590-XX-00 R0	REF. #4 X 0.250 LONG, SS
12	NAMEPLATE, STANDARD	1	900-06-00 R1	INSTALL HORIZONTALLY
13	3/4"-NPT ADAPTER	1	610-XX-00v02r0	PART OF INTEGRAL BODY

PROPRIETARY DWG
Not To Be Reproduced
Property Of Flowdata, Inc.

FLOWDATA, INC.

FD201-XXXX-X120-000 ASSY.
2"-NPT CONNECTIONS

DR. C.ORSHONSKY	DATE 10-18-89	SCALE 1:2.5	SHEET 1 OF 1
CK.			
APPR.	801-XX-20 R3		

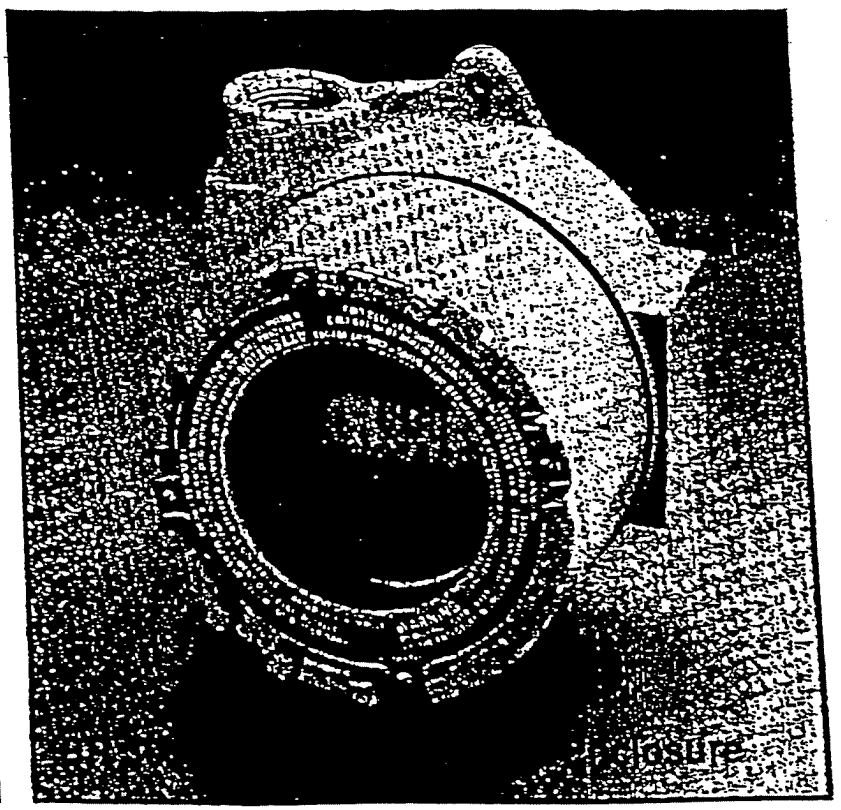
BR 3000 Series
Battery Powered Rate/Totalizer

Description

Battery power and a compact size make the BR 3000 Series Rate/Totalizer a versatile local indicator. It accepts magnetic pickup, DC pulse, and switch closure inputs. Rate and total are shown simultaneously on the easy-to-read, two-line, LCD display. When the input frequency varies, linearization compensates for changing K-Factors, thereby increasing the accuracy. Scaled pulse and 4-20 mA output options allow the unit to send data to other devices. Batteries can provide all of the unit's power or serve as a back-up when DC or 4-20 mA loop power is used. When mounted in its explosion-proof enclosure, the BR 3000 can be attached directly to the conduit connection on the side of Flowdata industrial flowmeters. Other mounting configurations allow the BR 3000 to be used in many different applications.

Features

- ❑ Magnetic Pickup, DC Pulse (Optically Isolated), and Contact Closure Input
- ❑ Displays Rate & Total Simultaneously
- ❑ Internal Battery, External DC, or 4-20 mA Loop Power Supply
- ❑ Isolated Scaled Pulse or 4-20 mA Analog Output
- ❑ 8 Digit Totalizer Display
- ❑ 4-1/2 Digit Rate Display
- ❑ 10 Point Linearization
- ❑ Low Battery Indicator
- ❑ Password Protection
- ❑ Explosion-proof, Waterproof, and Panel Mounting Options



Operation

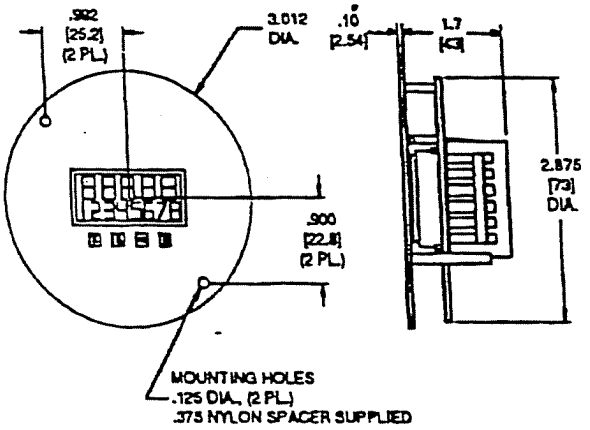
Once the BR 3000 is properly wired and programmed, operation is automatic. Prompts at each step simplify the process of programming. In addition to K-Factors, the BR 3000 allows users to program the units of measurement that will be displayed on the ratemeter and totalizer. A lockout code option keeps the total from being reset and prevents the settings from being changed.

Once the BR 3000 is in Run Mode, then the flow rate and total will be displayed continuously. The total can be reset from the front panel or from a remote location using the reset terminal.

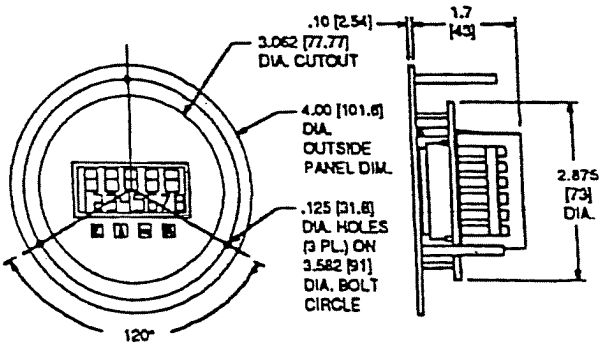
Dimensions

Inches [cm]

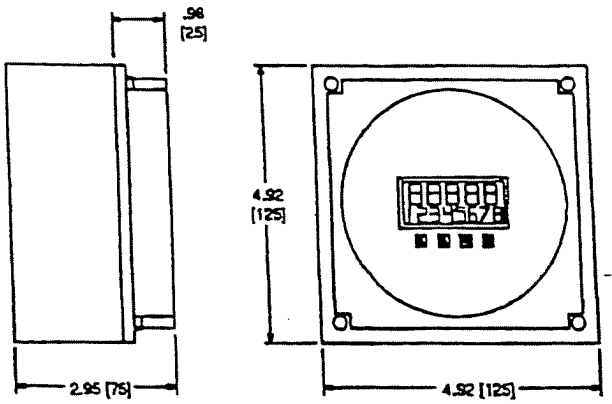
BR 30-0-X
No Enclosure or
Mounting



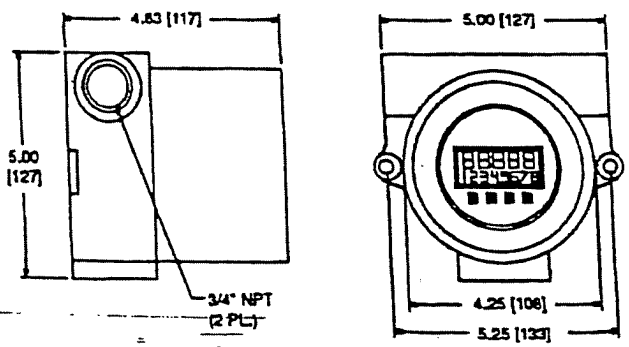
BR 30-1-X
Panel Mount
NEMA 4 Front



BR 30-2-X
Waterproof Enclosure
NEMA 4



BR 30-3-X
Explosion-Proof Enclosure
NEMA 3, 4, 7BCD, 9EFG
NEC Class I, Groups B, C, and D
NEC Class II, Groups E, F, and G
UL Standard 1203
CSA Standard C22.2-30
FM Class. No. 3615



Specifications

Operating Temperature:
-4°F [-20°C] to +158°F [70°C]
Extended Temperature:
-22°F [-30°C] to +158°F [70°C]
Humidity: 0 - 90% Noncondensing
Accuracy (Other than Analog Output):
0.01% Reading, ±1 count
Temperature Drift: 50 ppm/°C worst case
K-Factor:
Range: 0.001 to 59999
Decimal Point Locations: XX.XXX to XXXXX
10-Point Linearization Option:
This feature allows the user to enter 10 different frequencies with 10 different corresponding K-factors to linearize non-linear signals
Displays:
Rate Display: (Selectable decimal) 4.5 Digits (19999), 0.35" high, Display updates once every 2-8 seconds depending on frequency
Rate Descriptors: /SEC,/MIN,/HR
Totalizer Display: (Selectable decimal)
8 digits (99999999), 0.2" high
Totalizer Descriptors: GAL, LIT, FT3, M3, "blank"
Warning Display: Low battery warning
Power Input:
External Power:
Voltage: 8.5 to 30 VDC
Current: Less than 5mA
Supplied with 1 C size lithium battery
Protection: Reverse polarity protection on DC power input
Battery Powered:
Supplied with 2 C size lithium battery pack
Loop Powered (Analog Output Option):
Voltage: 8.5 to 30 VDC
Supplied with 1 C size lithium battery
Protection: Reverse polarity protection on current loop
Loop Burden: 8.5V maximum
Battery Life Expectancy — See Table:
(1-10 years depending on usage)

Magnetic Pickup Input:
Frequency Range: .125 Hz to 3.5 KHz
Trigger Sensitivity: 30 mV p-p
Over Voltage Protected: ±30 VDC
Opto-Isolated DC Pulse Input:
High (logic 1): 4-30 VDC
Low (logic 0): Less than 1 VDC
Minimum Current: .5 mA
Hysteresis: 0.4 VDC
Frequency Range: .125 to 5 KHz
Min. Pulse Width: 0.1 msec
Contact Closure Input:
Internal Pullup Resistor: 100 KΩ to +3.6 VDC
High (logic 1): Open or 4-30 VDC
Low (logic 0): Less than .5 VDC
Internal Switch Debounce Filter: 0 to 40 Hz
Reset Input:
(Contact Closure to Common)
Internal Pullup Resistor: 100 kΩ to +3.6 VDC
High (logic 1): Open or 4-30 VDC
Low (Logic 0): Less than .5 VDC
Minimum On: 25 msec
Caution: Sustained contact closure will shorten battery life
Pulse Output (Sinking):
Type: Opto-isolated open collector transistor
Max Voltage: 30 VDC
Current: 5 mA @ .9 V drop, .1 mA @ .7 drop
Pulse Duration: 32 msec
Count Speed: 10 CPS max.
Pulse Output Divider: User selectable, +1, +10, +100 or OFF
Note: Select OFF for maximum battery life
Analog Output Option:
(Power Source is Current Loop)
Type: 4-20 mA follows rate display, two wire hookup
Accuracy: 0.15% full scale at 20° C
Temperature Drift: 50 ppm/°C Typ.
±200 ppm/° C worst case
Reverse polarity protected

Battery Life Expectancy		Run Time			
		Idle	2 Hrs/Day	8 Hrs/Day	24 Hrs/Day
Part No.	BR 30-X-A	5 yrs	4.5 yrs	3.5 yrs	2.1 yrs
	BR 30-X-A-4	5 yrs	3.7 yrs	2.7 yrs	1.5 yrs
	BR 30-X-B,C	10 yrs	10 yrs	10 yrs	10 yrs
	BR 30-X-B,C Operating on Battery During External Power Loss	2.5 yrs	2.25 yrs	1.75 yrs	1 yr

All specifications are subject to change without notice.

Note: All of the battery life times are calculated with the pulse output ON. Turn the pulse output OFF to prolong battery life up to 30%.

Flowdata Products and Services

Flowmeters

FD-I Series - Versatile, industrial flowmeters with 1/8" to 4" line sizes.

FD-F Series - Sanitary flowmeters for "clean industry" applications in food, beverage, dairy, and pharmaceutical.

HP-I Series - High pressure flowmeters for industrial applications with pressure requirements of 3000 psi or higher.

AP-I Series - Engineered thermoplastic flowmeters for "ultra-pure" or aggressive chemical applications.

EC Series - Economical, easy-to-order flowmeters to handle basic industrial flow applications.

Controls

Flow Controls - Flowdata offers a full range of instrumentation including:

Rate/Totalizers	Sensors
Batch Controllers	Transmitters
Mass Flow Computers	Enclosures
Signal Conditioners	And more...

Services

Custom Engineered Solutions - For applications that require customizing, Flowdata will help find a solution. Our engineers can modify designs to meet a variety of flow measurement challenges.

OEM Applications - Flowdata customizes its flowmeters to meet the technical and economic requirements of volume users.

Ordering

Part Number ——— BR30-☐-☐-☐

Mounting
- 0 None
- 1 Panel Mount
- 2 NEMA 4X Enclosure
- * 3 NEMA 7 Enclosure

Power Supply
- * A Battery
- B External Power Supply
- C Loop Powered

Options

Leave blank if no options are needed
- * 4 10 Point Linearization

* Standard Configuration

Limited Warranty

Seller warrants that the goods described in this Warranty are free from defects in workmanship and materials only and for a period of one (1) year from the original date of shipment. Seller shall not be liable for any incidental or consequential damages. This Warranty extends to the original purchaser of the product warranted hereunder and to each transferee owner of the product during the term of the Warranty. In the event of a defect, malfunction, or failure of the product not caused by any misuse or damage to the product while in possession of the owner, the warrantor will remedy the failure or defect, within a reasonable amount of time after written notification from the owner of same. The remedy will consist of repair or replacement of the product, at the warrantor's option. The owner must return the defective or malfunctioning component part(s), to the factory for such repair or replacement. If this product or one of its component parts is modified in any way by the owner, his agent or employee, this Warranty shall become null and void.

Local Representative:

flowdata, inc.

1784 Firman Drive
Richardson, TX 75081

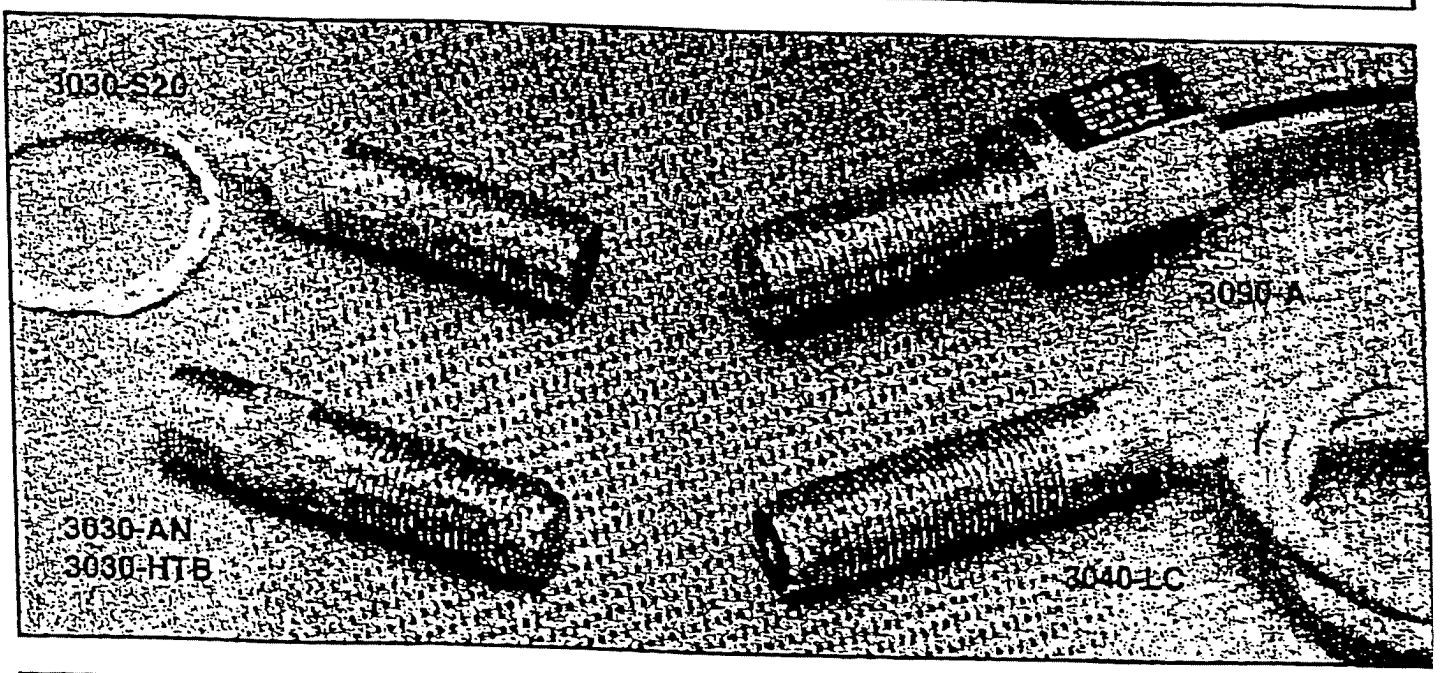
Phone (214) 907-2787
Fax (214) 907-8016
Toll Free 1-800-833-2448

3030-S20, 3030-AN, 3030-HTB, 3090-A, 3040-LC

Magnetic Pick-Up Sensors

Description

Magnetic pick-up sensors are devices which sense the rotation of the magnets in the tips or faces of the Flowdata flowmeter's impellers and typically produce a low voltage sine-wave signal whose frequency and amplitude is proportional to the rotational velocity of the impellers. The magnetic pick- up sensor acts essentially like a small generator, producing a current as lines of magnetic flux are cut. These magnetic pick-up sensors come in non-powered and external powered varieties.



Features:

3030-S20: Supplied with 12 inch integral pigtail signal cable leads. Recommended primarily where close-coupling to a transmitter or local display is required.

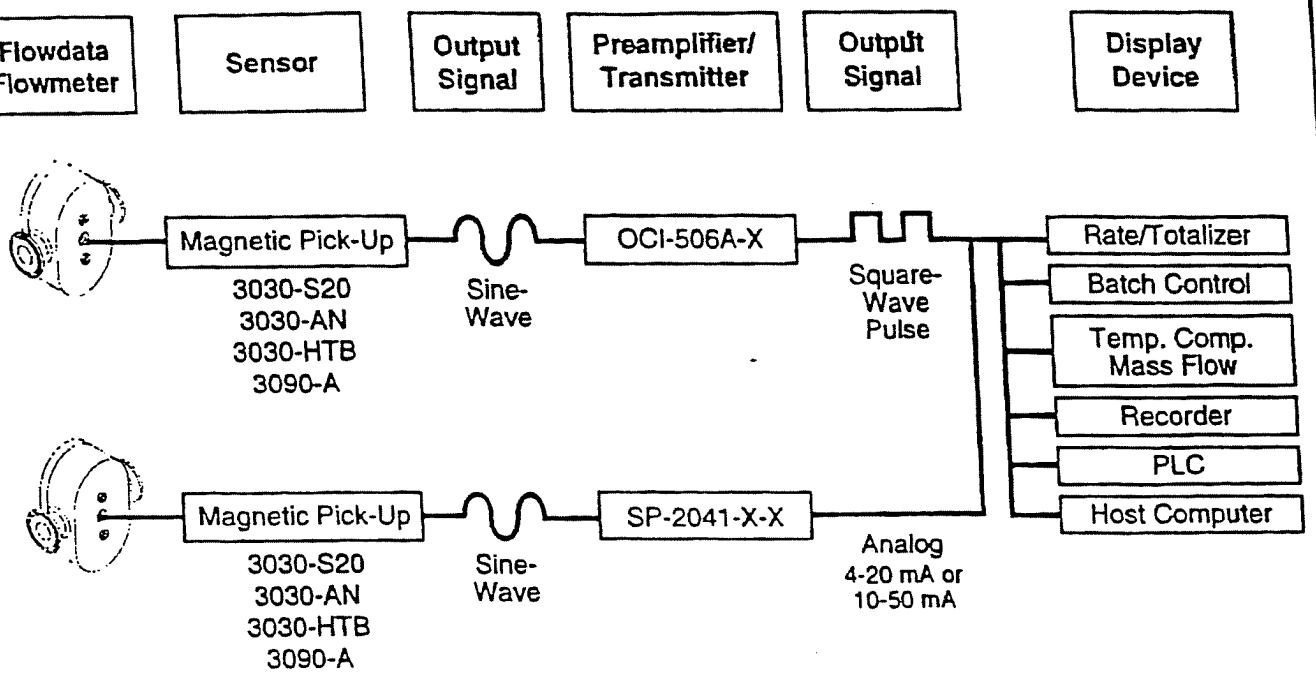
3030-AN: Uses an amphenol quick disconnect for coupling to a separate signal cable. Recommended where occasional or frequent removal of the sensor may be necessary.

3030-HTB: Uses an amphenol quick disconnect for coupling to a separate signal cable. Recommended for operating temperatures from 250°F to 450°F.

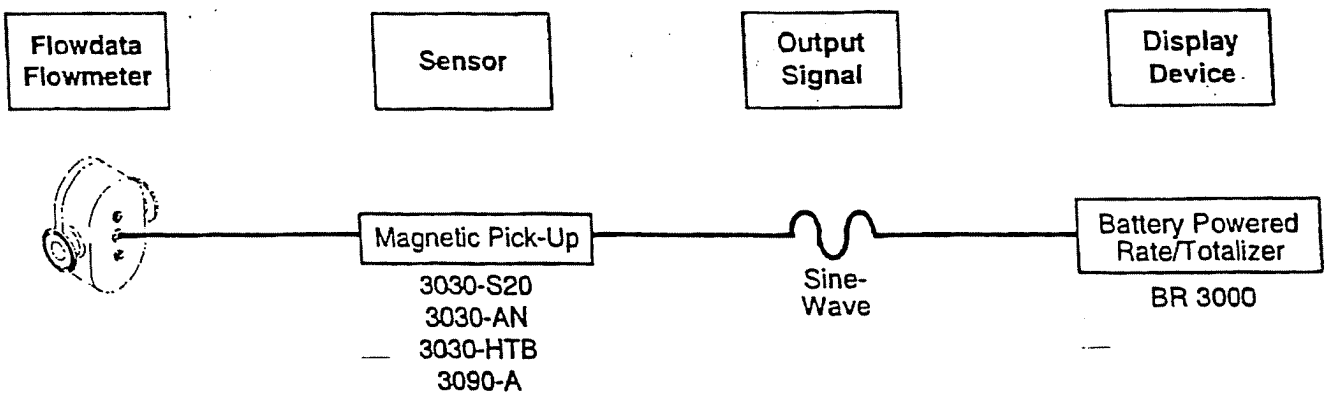
3090-A: Supplied with an integral 6-foot signal cable. UL-listed and CSA-approved as explosion-proof for Class I, Div. I, Groups A,B,C & D and Class II, Groups E, F & G. Recommended for applications in hazardous environments and is generally the preferred sensor for the AP-I or FD-F series flowmeters in hazardous environments.

3040-LC: Has a low current internal preamplifier designed to convert low level sign-wave signals into stable square wave pulses. Supplied with integral 24" cable. Recommended for applications where very low power is available, such as in battery-powered instruments, and where a square-wave DC voltage pulse is desired. Often times the useful range of the flowmeter can be greatly improved.

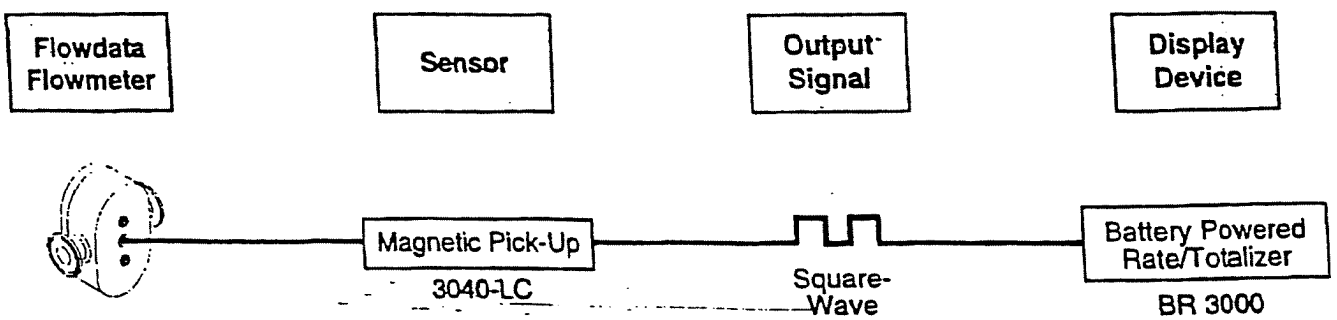
Application – Standard Magnetic Pick-Up to Preamplifier/Transmitter



Application – Magnetic Pick-Up to BR 3000



Application – Standard 3040-LC Magnetic Pick-Up (Internal Amplified)



Specifications

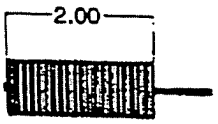
Sensor	3030-S20, 3030-AN, 3090-A	3030-HTB	3040-LC
Operating Principle	Non-Pre-amplified	Non-Pre-amplified	Pre-amplified
Operating Temperature	-100°F to +225°F -73°C to +107°C	-100°F to +450°F -73°C to +232°C	-20°F to +160°F -29°C to +71°C
Maximum Unamplified Signal Trans. Dist.	10 Feet 3.05 Meters	10 Feet 3.05 Meters	Internal Amp.
Max. Turndown (Over 100cP)	100:1 (With OCI-506A) 10:1 (With SP-2041)	100:1 (With OCI-506A) 10:1 (With SP-2041)	50:1
Conditions for use in Hazardous Areas	NEMA 7 in Explosion-Proof Conduit (Required)	NEMA 7 in Explosion-Proof Conduit (Required)	NEMA 7 in Explosion-Proof Conduit (Required)
Output Signal Cable(s) Required	3030-S20: 12" Integral Leads 3030-AN: 30-XX-CBL 10 3090-A: 6' Integral Cable	30-XX-CBL 10	24" Integral Cable (Standard)
Shell Material	Stainless Steel	Stainless Steel	Stainless Steel
Output Voltage mV (P-P) (Sine-Wave)	20	20	N/A
Resistance ohms (max.)	3030-S20: 1200 3030-AN: 1200 3090-A: 260	1400	N/A
Inductance ohms (max.)	3030-S20: 450 3030-AN: 450 3090-A: 115	470	N/A
Voltage (V DC)			2.5 to 9
Output V P-P Square-Wave			2 to 8
Current (mA)			.040
Amplifier or Signal Conditioner Type		OCI-506-A SP-2041 BR 3000	None Required

Ordering - Sensors/Cable

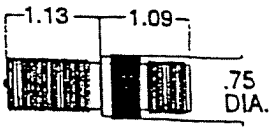
3030-S20	Sensor with 12" Integral Cable
3030-AN	Sensor with Quick Disconnect (Cable Required)
3030-HTB	Sensor (High Temperature) with Quick Disconnect (Cable Required)
3090-A	Sensor (Explosion-Proof, UL-Listed) with 6 Ft. Integral Cable
30-XX-CBL 10	10 Ft. Cable for 3030-AN and 3030-HTB Sensors
3040-LC	Internal Pre-amplified Sensor with 24" Integral Cable

Dimensions

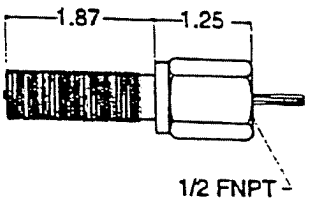
3030-S20



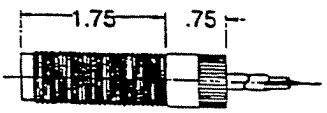
3030-AN
3030-HTB



3090-A



3040-LC



Installation

3030-S20

White	Output (Sine-wave) No Polarity
White	Output (Sine-wave) No Polarity

3030-AN
3030-HTB

Pin	Output (Sine-wave)
Pin	Output (Sine-wave)

3090-A

Green	Earth Ground
White	Output (Sine-wave)
Black	Output (Sine-wave)

3040-LC

Green	Signal (Square-wave)
Red	Supply (2.5 - 9 VDC)
Black	DC Common

Limited Warranty

Seller warrants that the goods described in this Warranty are free from defects in workmanship and materials only and for a period of one (1) year from the original date of shipment. Seller shall not be liable for any incidental or consequential damages. This Warranty extends to the original purchaser of the product warranted hereunder and to each transferee owner of the product during the term of the Warranty. In the event of a defect, malfunction, or failure of the product not caused by any misuse or damage to the product while in possession of the owner, the warrantor will remedy the failure or defect, within a reasonable amount of time after written notification from the owner of same. The remedy will consist of repair or replacement of the product, at the warrantor's option. The owner must return the defective or malfunctioning component part(s), to the factory for such repair or replacement. If this product or one of its component parts is modified in any way by the owner, his agent or employee, this Warranty shall become null and void.

Local Representative:

flowdata, inc.
1784 Firman Drive
Richardson, TX 75081
Phone 214/907-2787 Toll Free 800/833-2448 Fax 214/907-8016

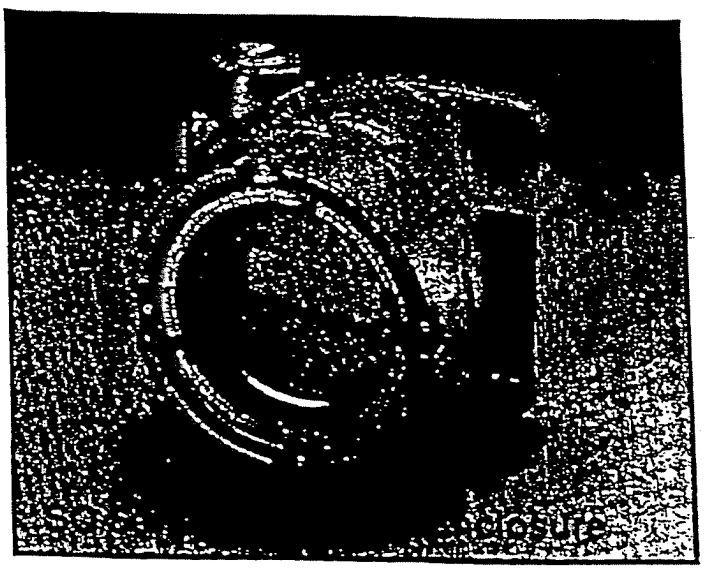
SQ Series
Loop Powered
Rate and Total Display

Description

The SQ Series Rate/Totalizer is a loop-powered indicator that simultaneously displays rate and total. It accepts either linear or square root 4-20 mA inputs and can deliver a scaled pulse output. Programming the SQ Series is simplified by prompts at each step. Once programmed and wired properly, the unit runs automatically.

Features

- ❑ Linear or Square Root Extraction of Input
- ❑ 3-1/2 or 4-1/2 Digit Rate Display (Selectable)
- ❑ Calibration and Rate Ranges Fully Programmable Through Keypad
- ❑ Password Protection
- ❑ 8 Digit Totalizer Display
- ❑ 16 Bit A/D Resolution
- ❑ No Dipswitches or Pots to Adjust
- ❑ Scaled Pulse Output



Specifications

Power:
Loop-Power: 4 mA to 20 mA
Internal Battery (memory only): 3 V, 250 mA-H lithium (2 yr. standby life)
Operating Temperature: -4 to +158°F [-20 to 70°C]
Extended Range Option: -22 to +158°F [-30 to 70°C]
Humidity: 0-90% noncondensing
Signal Input:
Full Scale Range: 4 to 20 mA DC
Loop Voltage Drop: 6 Volts maximum
Reverse polarity protected
Over current protection to 60 mA
16 Bit Resolution: 1 sample every 2 seconds
Low cutoff inhibits indications at low flow rates
Reset Input (contact closure):
Internal Pullup Resistor: 100 kΩ to +3 VDC
High (logic 1): Open or 3-30 VDC
Low (logic 0): Less than .5 VDC
Minimum On: 25 msec
Caution: Sustained closures shorten battery life.

Pulse Output:
Type: Opto-isolated open collector transistor
Maximum Voltage (off state): 30 VDC
Current (on state): 5mA @ .9V drop, .1mA @ .7V drop
Pulse Duration: 15 msec
Pulse Output Rate: 25 CPS max.
Output Driver (Selectable): +1, +10, +100, or off
Rate Display (selectable decimal):
3.5 or 4.5 digits (selectable), 0.35" high, display updates every two seconds
Rate Descriptors: /SEC, /MIN, /HR or "blank"
Totalizer Display (selectable decimal):
8 digits (99999999), 0.2" high
Totalizer Descriptors: GAL, LIT, FT3, M3, "blank"
Low battery error detection
Under/over range indication
Accuracy (Rate at 20°C):
0.1% full scale resolution, ±1 count
Temperature Drift:
55 ppm/°C typ., 200 ppm/°C worst case

SQ Series
Loop Powered
Rate and Total Display

Description

The SQ Series Rate/Totalizer is a loop-powered indicator that simultaneously displays rate and total. It accepts either linear or square root 4-20 mA inputs and can deliver a scaled pulse output. Programming the SQ Series is simplified by prompts at each step. Once programmed and wired properly, the unit runs automatically.

Features

- ❑ Linear or Square Root Extraction of Input
- ❑ 3-1/2 or 4-1/2 Digit Rate Display (Selectable)
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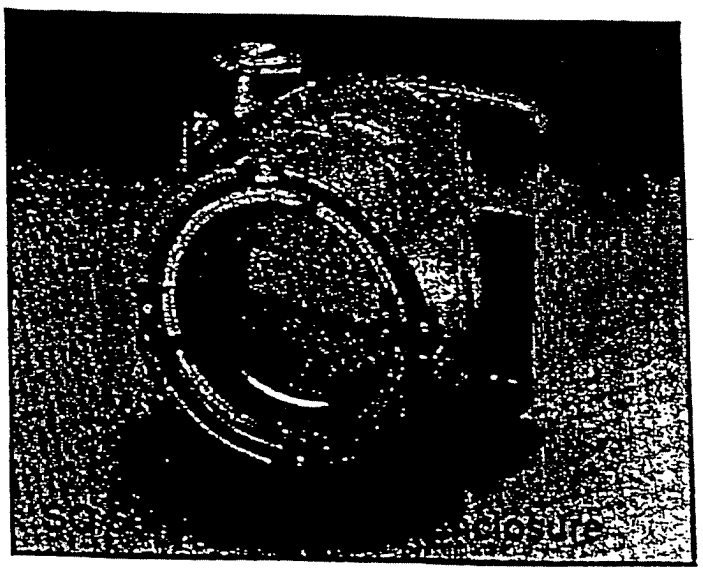
- ❑ Password Protection
- ❑ 8 Digit Totalizer Display
- ❑ 16 Bit A/D Resolution
- ❑ No Dipswitches or Pots to Adjust
- ❑ Scaled Pulse Output



Specifications

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Loop-Power: 4 mA to 20 mA
Internal Battery (memory only): 3 V, 250 mA-H lithium (2 yr. standby life)
Operating Temperature: -4 to +158°F [-20 to 70°C]
Extended Range Option: -22 to +158°F [-30 to 70°C]
Humidity: 0-90% noncondensing
Signal Input:
Full Scale Range: 4 to 20 mA DC
Loop Voltage Drop: 6 Volts maximum
Reverse polarity protected
Over current protection to 60 mA
16 Bit Resolution: 1 sample every 2 seconds
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Low battery error detection
Under/over range indication
Accuracy (Rate at 20°C):
0.1% full scale resolution, ±1 count
Temperature Drift:
55 ppm/°C typ., 200 ppm/°C worst case

Specifications

Sensor	3030-S20, 3030-AN, 3090-A	3030-HTB	3040-LC
Operating Principle	Non-Pre-amplified	Non-Pre-amplified	Pre-amplified
Operating Temperature	-100°F to +225°F -73°C to +107°C	-100°F to +450°F -73°C to +232°C	-20°F to +160°F -29°C to +71°C
Maximum Unamplified Signal Trans. Dist.	10 Feet 3.05 Meters	10 Feet 3.05 Meters	Internal Amp.
Max. Turndown (Over 100cP)	100:1 (With OCI-506A) 10:1 (With SP-2041)	100:1 (With OCI-506A) 10:1 (With SP-2041)	50:1
Conditions for use in Hazardous Areas	NEMA 7 in Explosion-Proof Conduit (Required)	NEMA 7 in Explosion-Proof Conduit (Required)	NEMA 7 in Explosion-Proof Conduit (Required)
Output Signal Cable(s) Required	3030-S20: 12" Integral Leads 3030-AN: 30-XX-CBL 10 3090-A: 6' Integral Cable	30-XX-CBL 10	24" Integral Cable (Standard)
Shell Material	Stainless Steel	Stainless Steel	Stainless Steel
Output Voltage mV (P-P) (Sine-Wave)	20	20	N/A
Resistance ohms (max.)	3030-S20: 1200 3030-AN: 1200 3090-A: 260	1400	N/A
Inductance ohms (max.)	3030-S20: 450 3030-AN: 450 3090-A: 115	470	N/A
Voltage (V DC)			2.5 to 9
Output V P-P Square-Wave			2 to 8
Current (mA)			.040
Amplifier or Signal Conditioner Type		OCI-506-A SP-2041 BR 3000	None Required

SQ Series
Loop Powered
Rate and Total Display

Description

The SQ Series Rate/Totalizer is a loop-powered indicator that simultaneously displays rate and total. It accepts either linear or square root 4-20 mA inputs and can deliver a scaled pulse output. Programming the SQ Series is simplified by prompts at each step. Once programmed and wired properly, the unit runs automatically.

Features

- ❑ Linear or Square Root Extraction of Input
- ❑ 3-1/2 or 4-1/2 Digit Rate Display (Selectable)
- ❑ Calibration and Rate Ranges Fully Programmable Through Keypad
- ❑ Password Protection
- ❑ 8 Digit Totalizer Display
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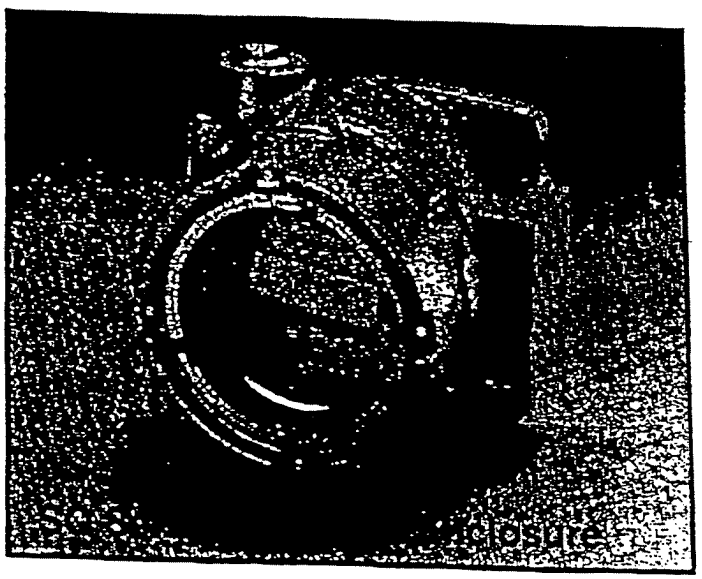

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Humidity: 0-90% noncondensing
Signal Input:
Full Scale Range: 4 to 20 mA DC
Loop Voltage Drop: 6 Volts maximum
Reverse polarity protected
Over current protection to 60 mA
16 Bit Resolution: 1 sample every 2 seconds
Low cutoff inhibits indications at low flow rates
Reset Input (contact closure):
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High (logic 1): Open or 3-30 VDC
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Minimum On: 25 msec
Caution: Sustained closures shorten battery life.

Pulse Output:
Type: Opto-isolated open collector transistor
Maximum Voltage (off state): 30 VDC
Current (on state): 5mA @ .9V drop, .1mA @ .7V drop
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Low battery error detection
Under/over range indication
Accuracy (Rate at 20°C):
0.1% full scale resolution, ±1 count
Temperature Drift:
55 ppm/°C typ., 200 ppm/°C worst case

Specifications

Sensor	3030-S20, 3030-AN, 3090-A	3030-HTB	3040-LC
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Resistance ohms (max.)	3030-S20: 1200 3030-AN: 1200 3090-A: 260	1400	N/A
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Output V P-P Square-Wave			2 to 8
Current (mA)			.040
Amplifier or Signal Conditioner Type		OCI-506-A SP-2041 BR 3000	None Required

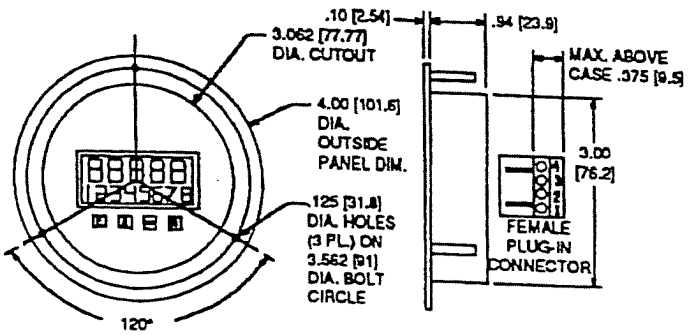
Dimensions

Inches [cm]

Note: *Other Enclosure Options Available*

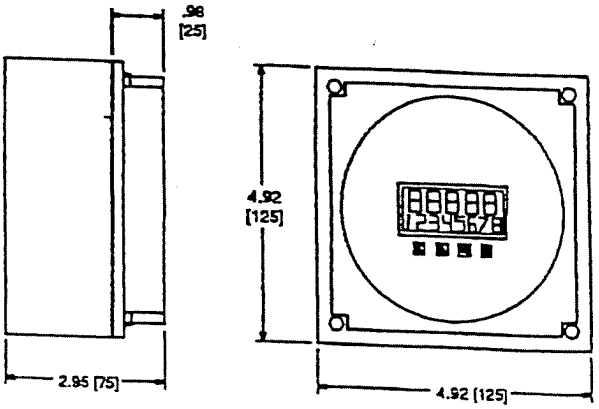
SQX-1-XX

Panel Mount
Cased PCB
NEMA 4X sealed keypad membrane



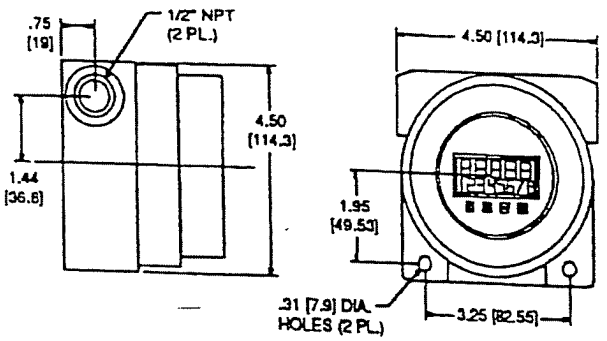
SQX-2-XX

Waterproof Enclosure
NEMA 4X
Material: Glass-filled polycarbonate



SQX-3-XX

Explosion-Proof Enclosure
NEMA 7, NEMA 4
Class I, Groups B, C, and D
Class II, Groups E, F, and G



Ordering

Part Number ——— SQ[ ]-[ ]-00

Display
* T Rate and Total
R Rate Only

Mounting
0 None (OEM Only)
1 Panel
2 NEMA 4X/IP65 Enclosure
* 3 NEMA 7 Enclosure

Options
* 00 Standard Configuration

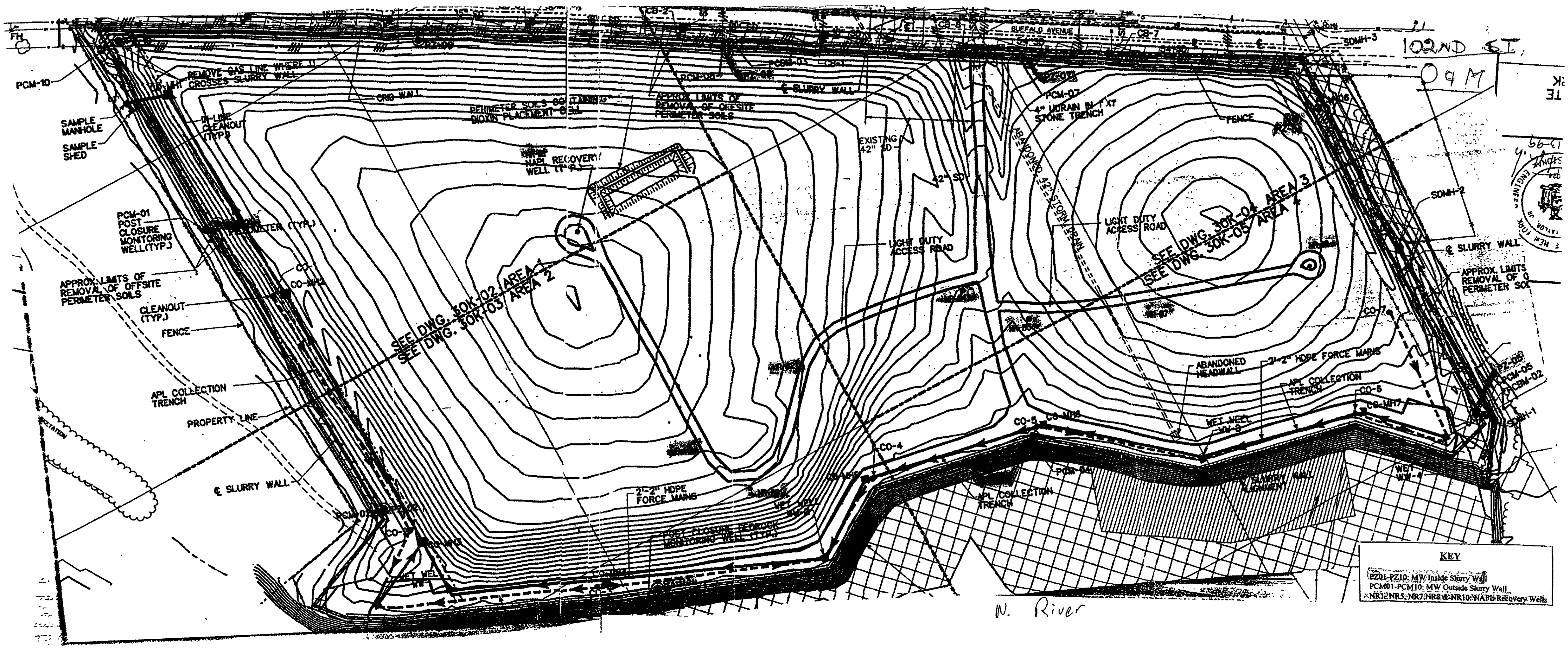
* Standard Configuration

Limited Warranty

Seller warrants that the goods described in this Warranty are free from defects in workmanship and materials only and for a period of one (1) year from the original date of shipment. Seller shall not be liable for any incidental or consequential damages. This Warranty extends to the original purchaser of the product warranted hereunder and to each transferee owner of the product during the term of the Warranty. In the event of a defect, malfunction, or failure of the product not caused by any misuse or damage to the product while in possession of the owner, the warrantor will remedy the failure or defect, within a reasonable amount of time after written notification from the owner of same. The remedy will consist of repair or replacement of the product, at the warrantor's option. The owner must return the defective or malfunctioning component part(s), to the factory for such repair or replacement. If this product or one of its component parts is modified in any way by the owner, his agent or employee, this Warranty shall become null and void.

Local Representative:

Flowdata, inc.
1784 Firman Drive
Richardson, TX 75081
Phone (214) 907-2787
Fax (214) 907-8016
Toll Free 1-800-833-2448



102ND ST.
PCM-10
REMOVE GAS LINE WHERE IT CROSSES SLURRY WALL
SAMPLE MANHOLE
SAMPLE SHED
IN-LINE CLEANOUT (TYP.)
CRIB WALL
PERIMETER SOILS CONTAINING DIOXIN PLACEMENT CELL
APPROX. LIMITS OF REMOVAL OF OFFSITE PERIMETER SOILS
SLURRY WALL
NAPL RECOVERY WELL (TYP.)
PCM-01 POST CLOSURE MONITORING WELL(TYP.)
CLEANOUT (TYP.)
FENCE
APL COLLECTION TRENCH
PROPERTY LINE
SEE DWG. 30K-02 AREA 1
SEE DWG. 30K-03 AREA 2
LIGHT DUTY ACCESS ROAD
EXISTING 42" SD
42" SD
2"-2" HDPE FORCE MAINS
POST CLOSURE BEDROCK MONITORING WELL (TYP.)
PCM-07
4" UDRAIN IN 1' X1' STONE TRENCH
ABANDONED 42" STORM DRAIN
SEE DWG. 30K-04 AREA 3
SEE DWG. 30K-05 AREA 4
BUFFALO AVENUE
SDMH-3
SDMH-2
SDMH-1
APPROX. LIMITS REMOVAL OF PERIMETER SOILS
ABANDONED HEADWALL
CO-4
CO-5
CO-6
CO-7
WET WELL
PCM-05
N. River
KEY
PZ01-PZ10: MW Inside Slurry Wall
PCM01-PCM10: MW Outside Slurry Wall
NR1, NR5, NR7, NR8 & NR10: NAPL Recovery Wells

Inserted 8/12/03 GS

ADDENDUM NO. 1 TO THE OPERATION AND MAINTENANCE MANUAL
102ND Street Landfill site
Niagara Falls, New York

Prepared by: **Conestoga-Rovers and Associates**
Prepared for: **Miller Springs Remediation Management, Inc and Olin Corporation**

NAPL PRESENCE MONITORING

NAPL Recovery Well NR-02

Due to the recovery rates which exceed the anticipated rate of 0 to 5 gallons per quarter presence checks at NR-02 will be conducted monthly from April through October. Due to the severe winter weather at the site no presence check will occur during January.

If more than 3 gallons of NAPL (6 inches deep in the 12-inch diameter well) are present during monitoring, the NAPL will be removed for off-Site disposal in accordance with the procedure detailed in Section 3.2 of the O&M Manual and in accordance with all applicable Federal and New York State Regulations. This is the minimum depth of NAPL required to allow removal.

Monitoring for NAPL in NR-02 shall be reassessed annually to determine the suitability of the monitoring or until NAPL monitoring is no longer required. If NAPL depths are less than 6" for three consecutive months quarterly monitoring will be resumed. NAPL monitoring will no longer be required when the recharge rate for this well is less than 1 gallon/year.

NAPL Recovery Wells NR-01, NR-03, NR-04, NR-05, NR-07, NR-08, and NR-10

NAPL presence checks will be conducted quarterly from April through October. Due to the severe winter weather at the site no presence check will occur during January.

If more than 3 gallons of NAPL (6 inches deep in the 12-inch diameter well) are present during monitoring, the NAPL will be removed for off-Site disposal in accordance with the procedure detailed in Section 3.2 of the O&M Manual and in accordance with all applicable Federal and New York State Regulations. This is the minimum depth of NAPL required to allow removal.

Monitoring for NAPL shall be reassessed annually to determine the suitability of the monitoring or until NAPL monitoring is no longer required. If NAPL depths are less than 6" for three consecutive months quarterly monitoring will be resumed. NAPL monitoring will no longer be required when the recharge rate for this well is less than 1 gallon/year.

NAPL COLLECTION SYSTEM OPERATION

NAPL Recovery Well NR-02

Due to the recovery rates which exceed the anticipated rate of 0 to 5 gallons per quarter presence checks at NR-02 will be conducted monthly from April through October. Due to the severe winter weather at the site no presence check will occur during January.

NAPL found during the monitoring will be removed if the well contains at least 3 gallons of NAPL (approximately 6-inch depth of NAPL in the 12-inch diameter well). Monitoring will be accomplished by lowering an APL/NAPL interface probe into the well. If the NAPL depth exceeds 6 inches the NAPL will be pumped out into an approved drum for disposal in accordance with all applicable Federal and New York State Regulations.

NAPL Recovery Wells NR-01, NR-03, NR-04, NR-05, NR-07, NR-08, and NR-10

NAPL presence checks will be conducted quarterly from April through October. Due to the severe winter weather at the site no presence check will occur during January.

NAPL found during the monitoring will be removed if the well contains at least 3 gallons of NAPL (approximately 6-inch depth of NAPL in the 12-inch diameter well). Monitoring will be accomplished by lowering an APL/NAPL interface probe into the well. If the NAPL depth exceeds 6 inches the NAPL will be pumped out into an approved drum for disposal in accordance with all applicable Federal and New York State Regulations.

TABLE 1.1

SITE CONTACTS
OPERATION AND MAINTENANCE PLAN
102ND STREET LANDFILL SITE
NIAGARA FALLS, NEW YORK

Site Supervisor:

Donald Tubridy
Miller Springs Remediation Management, Inc.
805 - 97th Street
Niagara Falls, New York 14304
Phone: 716-283-0112
Fax: 716-283-2856

Project Managers:

Glenn Springs Holdings, Inc. (for OCC)

George Luxbacher
Glenn Springs Holdings, Inc.
2480 Fortune Drive, Suite 300
Lexington, Kentucky 40509
Phone: 859-543-2159
Fax: 859-543-2171

Olin Corporation

Michael J. Bellotti
Olin Corporation
P.O. Box 248
1186 Lower River Road
Charleston, Tennessee 37310
Phone: 423-336-4587
Fax: 423-336-4166

Lorraine Miller
Olin Corporation
P.O. Box 248
1186 Lower River Road
Charleston, Tennessee 37310
Phone: 423-336-4381
Fax: 423-336-4166

Agency Contacts:

United States Environmental Protection Agency

Paul Olivo
New York/Caribbean Superfund Branch II
Emergency and Remedial Response Division
U.S. Environmental Protection Agency
290 Broadway
New York, New York 10007-1866
Phone: 212-637-4280
Fax: 212-637-4284

TABLE 1.1

SITE CONTACTS
OPERATION AND MAINTENANCE PLAN
102ND STREET LANDFILL SITE
NIAGARA FALLS, NEW YORK

New York State Department of Environmental Conservation

Daniel King
New York State Dept. of Environmental Conservation
Division of Hazardous Waste Remediation
Region 9
270 Michigan Avenue
Buffalo, New York 14203-2999
Phone: 716-851-7220
Fax: 716-851-7226

Jeffrey A. Konsella
New York State Dept. of Environmental Conservation
Division of Hazardous Waste Remediation
Region 9
270 Michigan Avenue
Buffalo, New York 14203-2999
Phone: 716-851-7220
Fax: 716-851-7226

Brian Sadowski
New York State Dept. of Environmental Conservation
Division of Hazardous Waste Remediation
Region 9
270 Michigan Avenue
Buffalo, New York 14203-2999
Phone: 716-851-7220
Fax: 716-851-7226

Miscellaneous

Olin Corporation
James Strassburg
Plant Manager
Olin Corporation
2400 Buffalo Avenue
Niagara Falls, New York 14303
Phone: 716-278-6567
Fax: 716-278-6495

TABLE 4.1

SEMI-ANNUAL INSPECTION AND PREVENTATIVE MAINTENANCE
OPERATION AND MAINTENANCE PLAN
102ND STREET LANDFILL SITE
NIAGARA FALLS, NEW YORK

Item	*Inspect For*
1. **APL Collection System** (Figure 1)	
Wet Wells (4 Total)	- cover on securely and locked - condition of cover - condition inside wet well, piping, electronics - condition of safety platform - condition of electrical panel - flow unrestricted, wet well free of obstructions
APL Collection Pipe	- caps on all cleanouts - condition of cleanouts
2. **APL Discharge System** (Figure 2)	
Cleanout Manholes (7 Total)	- cover on securely - condition of covers - condition of interior of manhole - condition of piping in manholes
Leak Detection Manholes (2 Total)	- cover on securely and locked - condition of cover - condition of interior - condition of piping - condition of leak detection
Metering Manhole (1 Total)	- cover on securely - condition of cover - condition of interior - condition of piping - condition of leak detection
Meter Building	- condition of building - door lock/security
3. **Landfill Cap** (Figure 3)	
Vegetation and Topsoil	- erosion, bare areas, washouts, dead/dying vegetation, remove woody growth
Access Roads	- erosion, obstructions, potholes, puddles, debris
Perimeter Fence	- integrity of fence, gates, locks, placement and condition of signs

WW 1	WW 2	WW 3	WW 4

CO-1	CO-2	CO-3 W	CO-3 E	CO-4	CO-5 W	CO-5 E	CO-6 W	CO-6 E	CO-7

CO-MH-1	CO-MH-2	CO-MH-3	CO-MH-4	CO-MH-5	CO-MH-6	CO-MH-7

LD-MH-8	LD-MH-9

MM-1

Drainage Ditches	-	sediment buildup, erosion, condition of erosion protection, obstructions, dead/dying vegetation
Drainage Culverts	-	obstructions, plugging

4. **Bulkhead** (Figure 4)

Rip Rap	-	missing, erosion, excessive vegetation or woody growth
Drainage System	-	vegetation

5. **Storm Sewer System**

Outlet to river	-	build up of debris, condition of grate

6. **Monitoring Wells**

Well caps	-	on and secure
Concrete pads	-	erosion, settlement, excessive cracking, animal burrows