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Report.HW.932052.1998-11-09.EW-13_Installation_Report.pdf

Type of document . Site Number . Year-Month . File *Year-Year* or Report name . pdf

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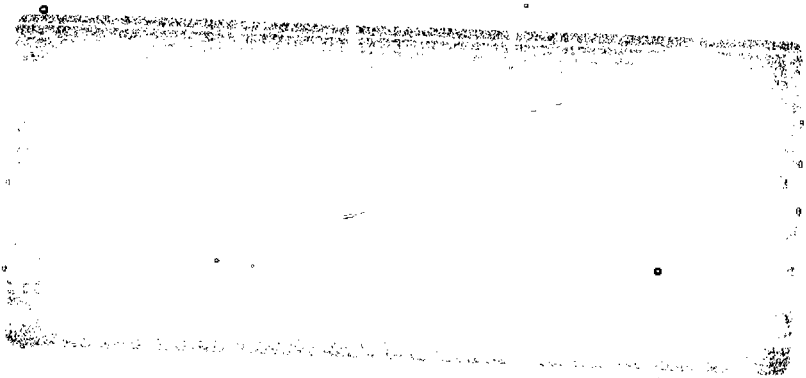
example: *letter . Year-Month . File Year-Year . pdf*

_____ . _____ - ____ . _____ .pdf

example: *report . Site Number . Year-Month . Report Name . pdf*

Project Site numbers will be proceeded by the following:

Municipal Brownfields - B
Superfund - HW
Spills - SP
ERP - E
VCP - V
BCP - C




Golder
Associates

Golder Associates Inc.

2221 Niagara Falls Boulevard, Suite 9
Niagara Falls, NY USA 14304
Telephone (716) 731-1560
Fax (716) 731-1652

REPORT ON

INSTALLATION OF EXTRACTION WELL EW-13 FOR ON-SITE GROUNDWATER EXTRACTION SYSTEM 2221 NIAGARA FALLS BOULEVARD WHEATFIELD, NEW YORK

Submitted to:

Textron Inc.
40 Westminster Street
Providence, RI 02903-2596

DISTRIBUTION:

8 Copies - Textron Inc.; Providence, Rhode Island
1 Copy - Golder Associates Inc.; Buffalo, New York

November 1998

983-9180

Golder Associates Inc.

2221 Niagara Falls Boulevard, Suite 9
Niagara Falls, NY USA 14304
Telephone (716) 731-1560
Fax (716) 731-1652

November 9, 1998

983-9180

Textron Inc.
40 Westminster Street
Providence, RI 02903-2596

Attention: Ms. Leslie Alden

RE: REPORT ON INSTALLATION OF EXTRACTION WELL EW-13 FOR ON-SITE GROUNDWATER EXTRACTION SYSTEM
2221 NIAGARA FALLS BOULEVARD
WHEATFIELD, NEW YORK

Dear Ms. Alden:

Golder Associates Inc. (Golder Associates) is pleased to submit to Textron, Inc. (Textron) the above referenced report on the installation of extraction well EW-13 as an additional pumping well for the On-Site Groundwater Extraction System at the former Textron Realty Operations (Wheatfield) Inc. facility located at 2221 Niagara Falls Boulevard, Wheatfield, New York. Golder Associates provided design, construction management, and construction oversight services for the project. This report documents that the construction activities on the installation of the new extraction well were conducted in substantial compliance with the plans and specifications as presented in the Design Report entitled, "Final Design of Extraction Well EW-13, On-Site Groundwater Extraction System, Textron Realty Operations (Wheatfield), Inc. Facility, Wheatfield, New York (Revision 2)", Golder Associates, March 1998.

Golder Associates appreciates the opportunity to provide professional engineering services to Textron. If you have any questions regarding this report, please do not hesitate to call.

Very truly yours,

GOLDER ASSOCIATES INC.

David C. Wehn
Project Hydrogeologist

Anthony L. Grasso, P.G.
Associate

DCW/ALG:dml
F/N: FINAL/RECDOC.DOC

STATEMENT OF CERTIFICATION

Golder Associates Inc. (Golder Associates) certifies that the Construction Quality Assurance (CQA) program was conducted under the supervision of a Licensed New York State registered Professional Engineer (P.E.). Based on the CQA monitoring of the installation of Extraction Well EW-13 performed by Golder Associates and Wendel Engineers, P.C. (Wendel), Golder Associates certifies that Extraction Well EW-13 has been constructed in substantial compliance with the plans and specifications in the Final Design of Extraction Well EW-13 (Revision 2) dated March 1998 and approved design modifications and design clarifications. The limits and scope of the portion of Extraction Well EW-13 that Golder Associates is certifying are identified in the attached report. The letter of certification from Wendel accompanies this report. Design changes made during the construction are documented on the as-built drawings accompanying this report. It is the opinion of Golder Associates and Wendel that the changes are minor and did not change the intent of the design. This certification for the work completed by Golder Associates is issued under the seal of Mr. Richard F. Weimer, P.E., of Golder Associates Inc., with New York State License No. 53492.

Richard F. Weimer

Richard F. Weimer, P.E.

11/9/98
Date

TABLE OF CONTENTS

1. INTRODUCTION

1.1 General

Golder Associates Inc. (Golder Associates) was retained by Textron, Inc. (Textron) to prepare design specifications and drawings for the construction of Extraction Well EW-13, an additional pumping well for the On-Site Groundwater Extraction System to be located approximately midway between existing wells EW-7 and EW-8 (See attached drawings B-1 through B-4 and E-1 and E-2 for details) at the former Textron Realty Operations (Wheatfield) Inc. (TRO) facility. This additional extraction well was requested by the New York State Department Of Environmental Conservation (NYSDEC) in order to provide a more robust hydraulic barrier to offsite migration of Zone 1 groundwater along the southern boundary of the former TRO facility. Golder Associates presented the final design package "Final Design of Extraction Well EW-13, On-Site Groundwater Extraction System, Textron Realty Operations (Wheatfield), Inc. Facility, Wheatfield, New York (Revision 2)", to Textron in March 1998, which was subsequently approved by the NYSDEC. Golder Associates also provided construction management services (including hiring the subcontractors) and full and part time Construction Quality Assurance (CQA) monitoring during construction. The design and CQA monitoring of electrical portions of the project were subcontracted to Wendel, of Buffalo, New York. Construction on the project began on April 6, 1998, with the drilling of the well and construction of the well was substantially complete (except for drying the pipe annulus) by August 8, 1998. Startup of the well occurred on September 25, 1998, once the leak detection cable was dry. The construction observation summary, final record drawings, and other pertinent project documentation are presented herein.

1.2 Extraction Well EW-13

This system consists of the operation of a submersible well pump in an 8-inch nominal diameter open-rock borehole located in the Lockport Dolomite. The borehole is located north of piezometer 96-01(1) (approximately midway between extraction wells EW-7 and EW-8) and approximately 10 feet north of the centerline of the existing On-Site

Groundwater Extraction System header pipe. The borehole was cased with 10-inch diameter High Density Polyethylene (HDPE) pipe through the overburden soil and approximately 3 feet into the top of the bedrock; the remainder of the borehole was uncased. The pump, controls, and associated piping and valving are housed in a 4-foot diameter by 4-foot tall HDPE vault buried nearly flush with the ground surface. The pump level sensors, consisting of high, low, and reference detectors, extend into the well bore through the well pump support plate. When the extraction well is operating, the water level is designed to be maintained between the high and low detector positions. The pump controls are connected to an existing signal from the treatment plant which deactivates the pump in the event of treatment plant shutdown. At the well vault panel, the pump can also be controlled by an automatic/off/hand selector switch. A pump overload signal is returned to the treatment plant in the event of pump overload and shutdown. The pump overload signal was combined with that from EW-7 such that a failure of either will be reported as "pump EW-7/EW-13 overload". The discharge from the pump is routed to a tie-in with the existing On-Site Groundwater Extraction System header pipe and delivered to the On-Site Groundwater Extraction System treatment plant.

2. CONSTRUCTION SUMMARY

2.1 General

This section presents a summary of the field observations performed by Golder Associates during the installation of EW-13. Field observations consist of field notes of construction progress, pipe pressure test data, air monitoring data, safety briefing documentation, photographic documentation, and survey data. Additionally, considering the construction activities were performed in areas potentially impacted by groundwater contamination, Golder Associates conducted air monitoring for volatile organic vapors and combustible gases during the well drilling and excavation process. As the vaults at EW-7 and EW-8, and the EW-13 excavation (when greater than 4-feet deep) were considered confined spaces, Golder Associates also conducted air monitoring for volatile organic vapors, combustible gases, and oxygen in these spaces prior to entry into them. Field observations of the electrical portions of the project were noted by Wendel and are included as Appendix A. The location of EW-13 is provided on Figure B-2. Specific details of as-built conditions for EW-13 are provided on Figures B-3 and B-4. The general electrical plan and details, as provided by Wendel, are located on Figures E-1 and E-2, respectively. Occasionally, design clarifications and modifications were necessary to allow for changing conditions; these are presented in Appendix B.

2.2 Subcontractors

Golder Associates retained Marcor Remediation, Inc. (Marcor) of Buffalo, New York, as the piping and excavation contractor. Marcor retained Cayuga Piping of Niagara Falls, New York, for portions of the extrusion welding of the containment piping. Weydman Electric, Inc. (Weydman) of Tonawanda, New York, was utilized by Golder Associates as the electrical contractor; Maxim Technologies Inc. of Hamburg, New York, was retained for drilling the extraction well and installing the overburden casing; and Klettke Land Surveyors, P.C. of Niagara Falls, New York, provided surveying. Friend Laboratory Inc. of Waverly, New York, was utilized as the analytical laboratory for the testing of soil-cuttings sample obtained from the soil cuttings generated during drilling of

EW-13. Wendel, of Buffalo New York, was subcontracted by Golder Associates to provide design and CQA services for the electrical portions of the project. Subcontractors' submittals are provided in Appendix C. Acknowledgment of Safety Briefing Sheets, indicating that contractor personnel were briefed on site safety issues, are provided in Appendix D.

2.3 Construction Observation Summary

2.3.1 Extraction Well Drilling

Maxim mobilized drilling equipment and materials to the site on April 6, 1998. Preparation for drilling the extraction well included: laying out the location of the well, clearing the location with the local utility companies and site personnel, and setting up traffic barriers.

The overburden soil material was drilled 0.8 feet into the bedrock surface (Zone 1) using auger (12-inch inside diameter (ID)) drilling techniques. Drilling continued by advancing the borehole 3 feet into bedrock with a 12-inch diameter drilling bit using appropriate air rotary drilling techniques. A 750 scfm air compressor, provided with an oil trap on the air line, was used for all air drilling operations. All drill cuttings and circulated fluids were contained and collected into 55-gallon drums. Ten-inch outside diameter (OD) SDR 11 HDPE overburden casing was installed through the augers into the borehole and pressure grouted in-place by the tremie method using a cement/bentonite grout mixture. Cement/bentonite grout was mixed in the appropriate proportions of:

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

The grout was allowed to cure over a weekend. Subsequent drilling was completed by advancing through the inside of the casing and into the Zone 1 bedrock with a nominal 8-inch diameter bit using air rotary techniques to a depth of approximately 25 feet below ground surface. At this depth, drilling proceeded with an HQ-size air coring bit for 10 feet

(35 feet below ground surface), in order to secure a 10-foot long sample of bedrock which was provided to Richard Yager of the United States Geological Survey for sampling and research purposes. This interval was then reamed to a nominal 8-inch diameter, as above, to a depth of 35 feet below ground surface following collection of the core sample. A well installation log documenting the drilling of extraction well EW-13 is provided in Appendix E.

Following reaming of the borehole, it was developed by blowing air through the drill rods in a "pulsing" fashion until drill cuttings were removed and clear water was returned to the surface. Drilling was completed on April 8, 1998. Groundwater produced during drilling was transported by Maxim on April 9, 1998, to the On-Site Groundwater Extraction System treatment plant where it was treated prior to discharge. The empty, hose-washed drums were later removed by Maxim. Drill cuttings were containerized and representatively sampled by Golder Associates for Toxicity Characteristic Leaching Procedure (TCLP) Volatile Organic Compound (VOC) analysis. No analytical detections were noted. Sample results are presented in Appendix F.

Air monitoring conducted by Golder Associates during the well drilling operations did not indicate any detections of volatile organic compounds or combustible gases. Air monitoring results are presented in Appendix G.

2.3.2 Excavation and Piping

Marcor mobilized equipment and materials to the site on May 26, 1998, after delays in obtaining the requisite double-wall piping. Preparation for construction of EW-13 included laying out the limits of the excavation, locking out the power and valving off the 2-inch line to vaults EW-7 and EW-8, and setting up traffic barriers. Following these activities, Marcor initiated construction by saw-cutting the asphalt parking lot. After cutting of the parking lot asphalt, the vault excavation was completed with a tractor-mounted backhoe and the HDPE vault placed in position over a approximately 0.5 foot-thick layer of New York State Department of Transportation (NYSDOT) #1A stone.

Concurrently, the pump support plate, pump, riser, stilling well, and motor starter were removed from extraction well DW-9 and stored in plastic sheeting near DW-9 until they were needed for EW-13. The pump itself was cleaned prior to its use in EW-13 by the operation and maintenance personnel for the On-Site Groundwater Extraction System treatment plant (employees of CRA Services, formerly TreaTek-CRA, of Niagara Falls, New York). The 2-inch line leading into vault DW-9 was capped with a blind flange at the closest point possible to the interior vault wall. The 8-inch diameter well casing in DW-9 was closed with an expandable well plug to prevent debris from entering the well.

South of the vault for EW-13, the excavation was hand-dug (below a depth of approximately 4 feet below ground surface) to expose the existing conduits and header line running from EW-7 to EW-8. The excavation was shored on June 1, 1998 after its depth exceeded 4 feet.

Golder Associates performed air monitoring for organic vapors and combustible gases periodically during the excavation process and prior to entry of the excavation. Air monitoring results for organic vapors and combustible gases were not above background levels during construction. Air monitoring results are presented in Appendix G. The excavated soils were spread and seeded at an on-site location designated by site personnel, and approved by the NYSDEC.

On June 3, 1998, the existing header line was cut and the process of splicing in the "T" connection to EW-13 began. First, the 2-inch carrier pipe connections were made using electrofusion couplers. Next, the 6-inch containment connections were made using prefabricated HDPE couplers which were extrusion-welded at each end to the HDPE pipe. The leak detection cable was cut and spliced with cable connectors to enable it to pass through the horizontal section of the prefabricated "T". The leak detection cable was protected from the heat of extrusion welding the 6-inch containment pipe by passing the cable through lengths of 1-1/4 inch conduit in the areas of the welds.

On June 9, 1998, while Marcor was continuing to assemble the pipe connections, a representative of the Occupational Safety and Health Administration (OSHA) arrived and cited Marcor for deficiencies in the excavation shoring. These were corrected by June 12, 1998, and work resumed on the piping connections.

The 6-inch pipe annulus was sealed for leak-testing purposes by removing the leak detection cable fittings, pushing the cable into the pipe, and plugging the fitting holes with threaded plugs. The 2-inch pipe was sealed for leak-testing by removing piping inside vaults EW-7, EW-8 and EW-13 so blind flanges could be installed. The pre-backfill leak tests on both the 2-inch and 6-inch pipes from EW-7 to EW-13 to EW-8 were successfully completed by June 23, 1998. Pipe pressure testing certificates are presented in Appendix H. Once the tests were completed, the excavation was backfilled with NYSDOT #1A stone up to the level of the conduit. The pump and associated equipment from DW-9 were placed in EW-13 at this time.

Weydman began placing conduit and performing other electrical work on June 29, 1998, completed work in the excavation by July 7, 1998, and were essentially finished on July 21, 1998. The excavation was backfilled to the level of the asphalt on July 9, 1998, and post-backfill leak-testing was initiated. The 6-inch pipe failed its leak test on July 15, 1998. Due to a scheduling delay, Marcor could not re-mobilize to the site until August 3, 1998. The pipe was re-excavated and re-shored on August 3, 1998, and the leak in the west extrusion weld of the eastern lower coupling was repaired. The shoring was removed and the excavation was backfilled on August 8, 1998. Both pre-backfill and post-backfill leak tests were successfully completed by August 9, 1998. The system was tested on September 21, 1998, following drying of the leak detection cable between EW-7 and EW-8 with compressed air and nitrogen. Following adjustment of the water level sensor cables, the system was successfully started on September 25, 1998.

3. SUMMARY

Based on the results of field observations, it is Golder Associates' professional opinion that the installation of Extraction Well EW-13 was conducted in substantial compliance with the plans and specifications as presented in the Design Report entitled, "Final Design of Extraction Well EW-13, On-Site Groundwater Extraction System, Textron Realty Operations (Wheatfield), Inc. Facility, Wheatfield, New York (Revision 2)", Golder Associates, March, 1998.

Golder Associates appreciates the opportunity to provide professional engineering services to Textron. Should you have any questions regarding the content of this report, please call.

GOLDER ASSOCIATES INC.

David C. Wehn
Project Hydrogeologist

Anthony L. Grasso, P.G.
Associate

F/N: FINAL/RECDOC.DOC

TEXTRON

RECORD DRAWINGS - EXTRACTION WELL EW-13
ONSITE GROUNDWATER EXTRACTION SYSTEM
2221 NIAGARA FALLS BOULEVARD
WHEATFIELD, NEW YORK

Provided by:

Golder Associates
Buffalo, New York

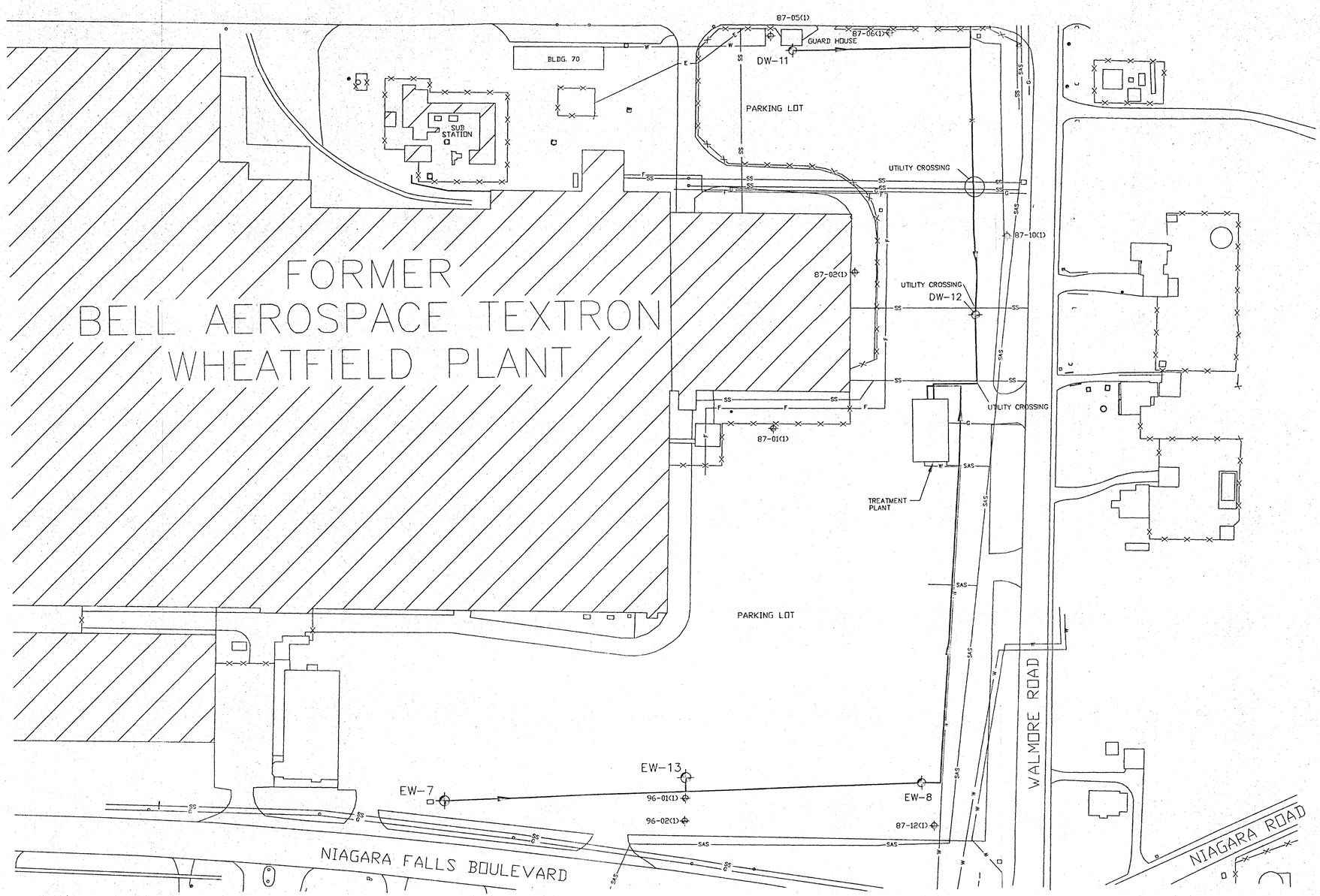
DRAWING LIST

Drawing No.	Drawing Title
B-1	COVER SHEET
B-2	EW-13 RECORD DRAWING PROJECT LOCATION
B-3	EW-13 RECORD DRAWING MECHANICAL DETAILS (SHEET 1 OF 2)
B-4	EW-13 RECORD DRAWING MECHANICAL DETAILS (SHEET 2 OF 2)
E-1	EW-13 RECORD DRAWING ELECTRICAL PLAN
E-2	EW-13 RECORD DRAWING ELECTRICAL DETAILS

NOVEMBER 1998

NOV 09 1998

BELL-111



LEGEND

- 87-12(1) — MONITORING WELL LOCATIONS
- DW — DNAPL WELL
- EW — EXTRACTION WELL
- EXTRACTION SYSTEM BURIED PIPELINE
- INDICATES DIRECTION OF FLOW
- W — WATER UTILITY
- F — FIRE PROTECTION UTILITY
- G — GAS UTILITY
- E — ELECTRICAL UTILITY
- SS — STORM SEWER UTILITY
- SAS — SANITARY SEWER UTILITY

NOTES

1. BASE TOPOGRAPHIC MAP PREPARED BY AERO-METRIC ENGINEERING, INC. ON 5/3/91.
2. THE UNDERGROUND UTILITIES SHOWN ARE BASED ON MAPS PROVIDED BY BELL AEROSPACE TEXTRON. THERE MAY BE ADDITIONAL UTILITIES NOT SHOWN. GOLDER ASSOCIATES IS NOT RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF THE UTILITY MAPS PROVIDED BY BELL AEROSPACE TEXTRON. APPROXIMATE LOCATIONS OF UTILITIES ARE FOR SURVEYED LOCATIONS OF UTILITIES WHICH ARE CROSS EXTRACTION SYSTEM.

60 0 60 120
scale feet

REV.	DATE	DESCRIPTION	DR. BY	APP. BY

CLIENT/PROJECT: TEXTRON, NIAGARA FALLS, NEW YORK

NOV 09 1993

TITLE: EW-13 RECORD DRAWING
PROJECT LOCATION
Buffalo, New York

Golder Associates

DRAWN	DEC	DATE	9/30/93
CHECKED	DGW	SCALE	AS SHOWN
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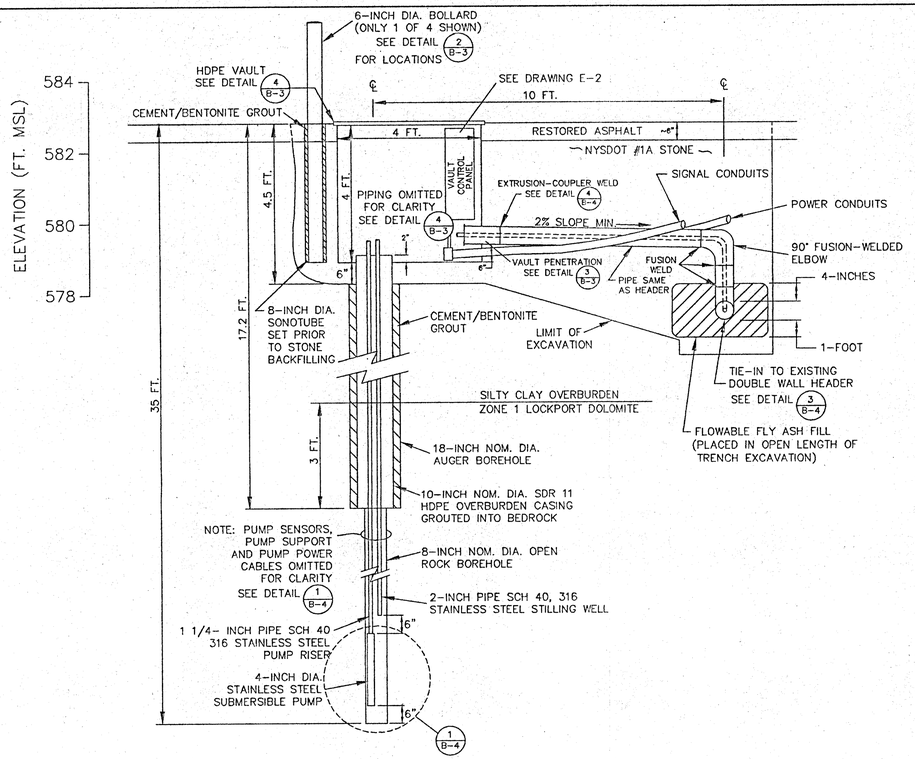
APPROVED	ALG	DEG. NO.	BELL-128
FILE NO.	933-6170	FIGURE	B-2



1/B-3 GENERAL LAYOUT - EXTRACTION WELL EW-13
CROSS SECTION VIEW
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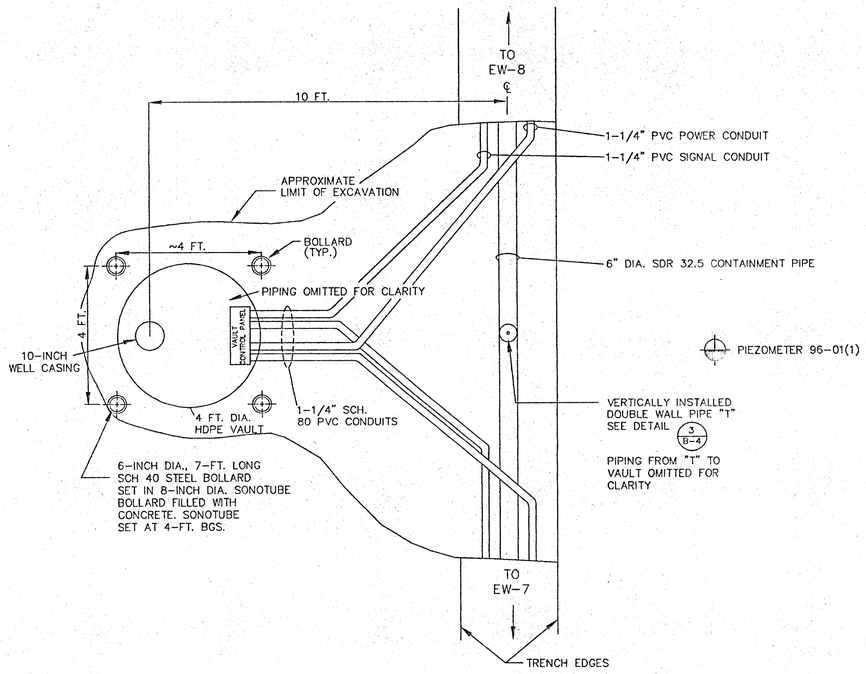
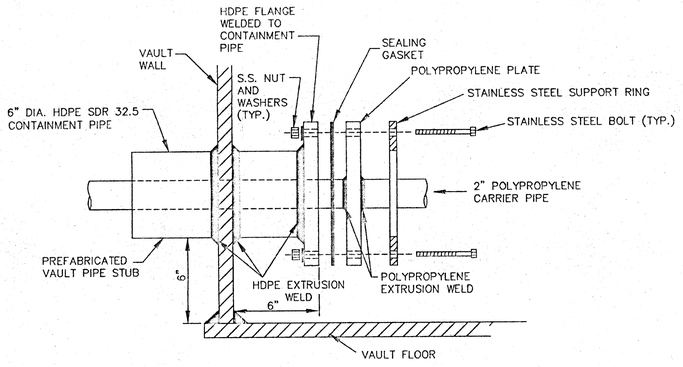


2/B-3 GENERAL LAYOUT
EXTRACTION WELL EW-13
PLAN VIEW
NOT TO SCALE



3/B-3 VAULT PENETRATION DETAIL
EXPLODED VIEW
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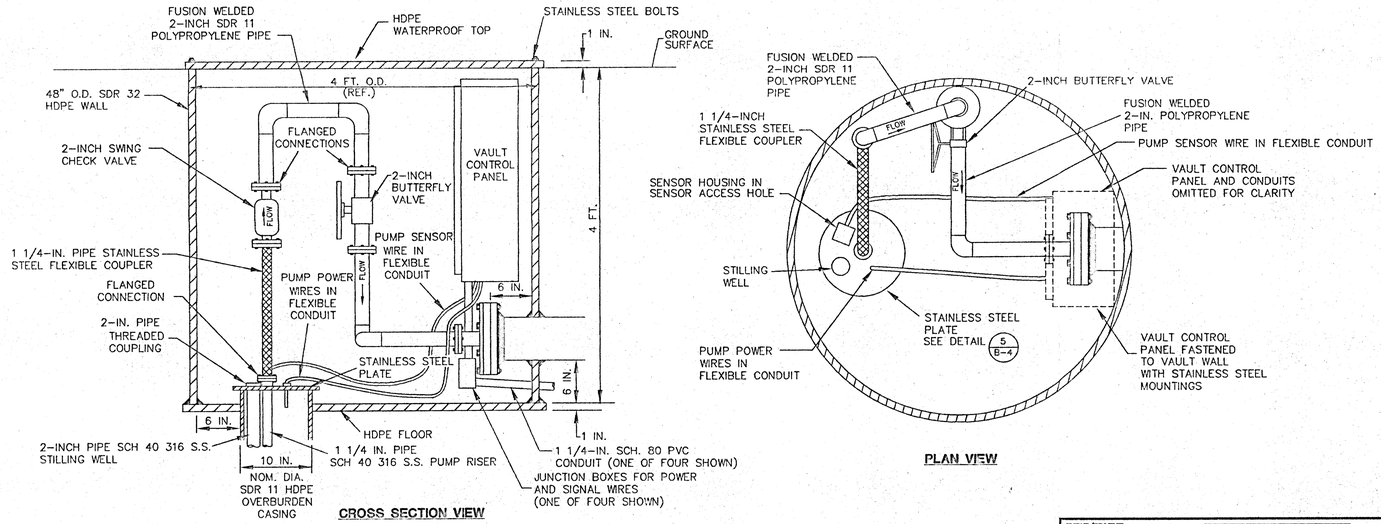

4/B-3 VAULT AND PIPING DETAILS
NOT TO SCALE

ENV.	DATE	DESCRIPTION	DR. BY	APP. BY

CLIENT/PROJECT: TEXTRON, NIAGARA FALLS, NEW YORK

NOV 09 1999

TITLE: EW-13 RECORD DRAWING MECHANICAL DETAILS SHEET 1 OF 2

Buffalo, New York

Golder Associates

DRAWN	BEC	DATE	9/30/98
CHECKED	DGW	SCALE	AS SHOWN
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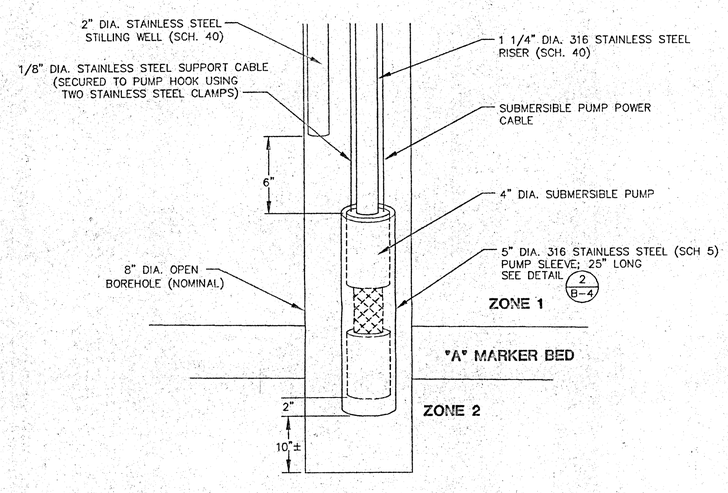
APPROVED	ALG	DWG. NO.	BELL-126
FILE NO.	973-9170	FIGURE	B-3



1 B-4 **WELL BOTTOM DETAIL**
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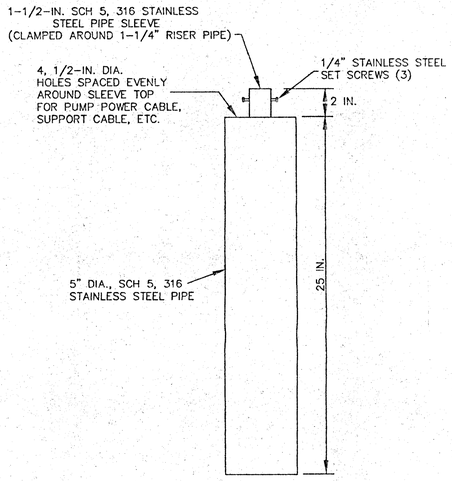

2 B-4 **PUMP SLEEVE DETAIL**
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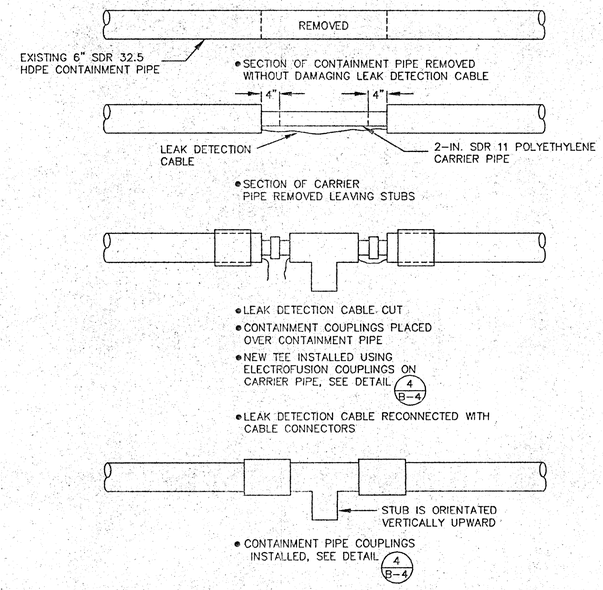

3 B-4 **HEADER TIE-IN PROCEDURE**
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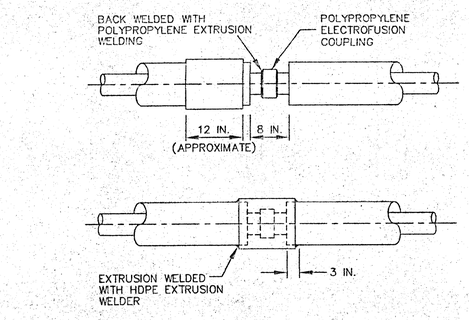
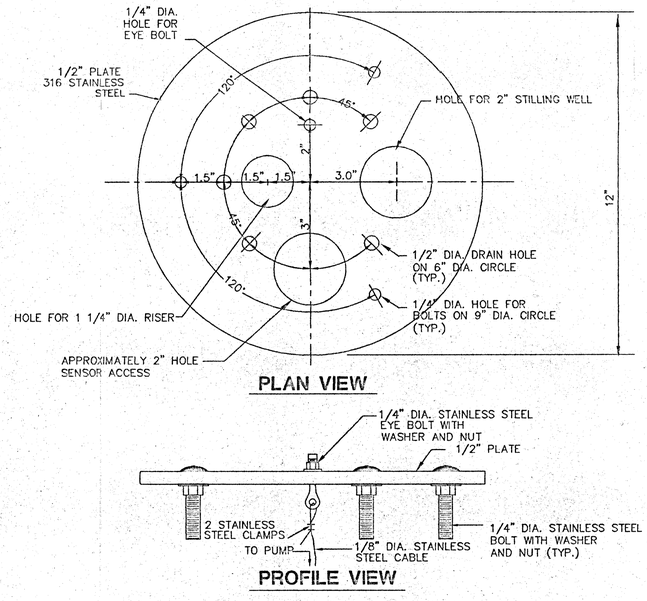


4 B-4 **HEADER TIE-IN COUPLING DETAILS/PROCEDURES**
NOT TO SCALE



5 B-4 **STAINLESS STEEL PLATE**
NOT TO SCALE

REV.	DATE	DESCRIPTION	DR. BY	APP. BY

CLIENT/PROJECT: TEXTRON, NIAGARA FALLS, NEW YORK — NOV 09 1999

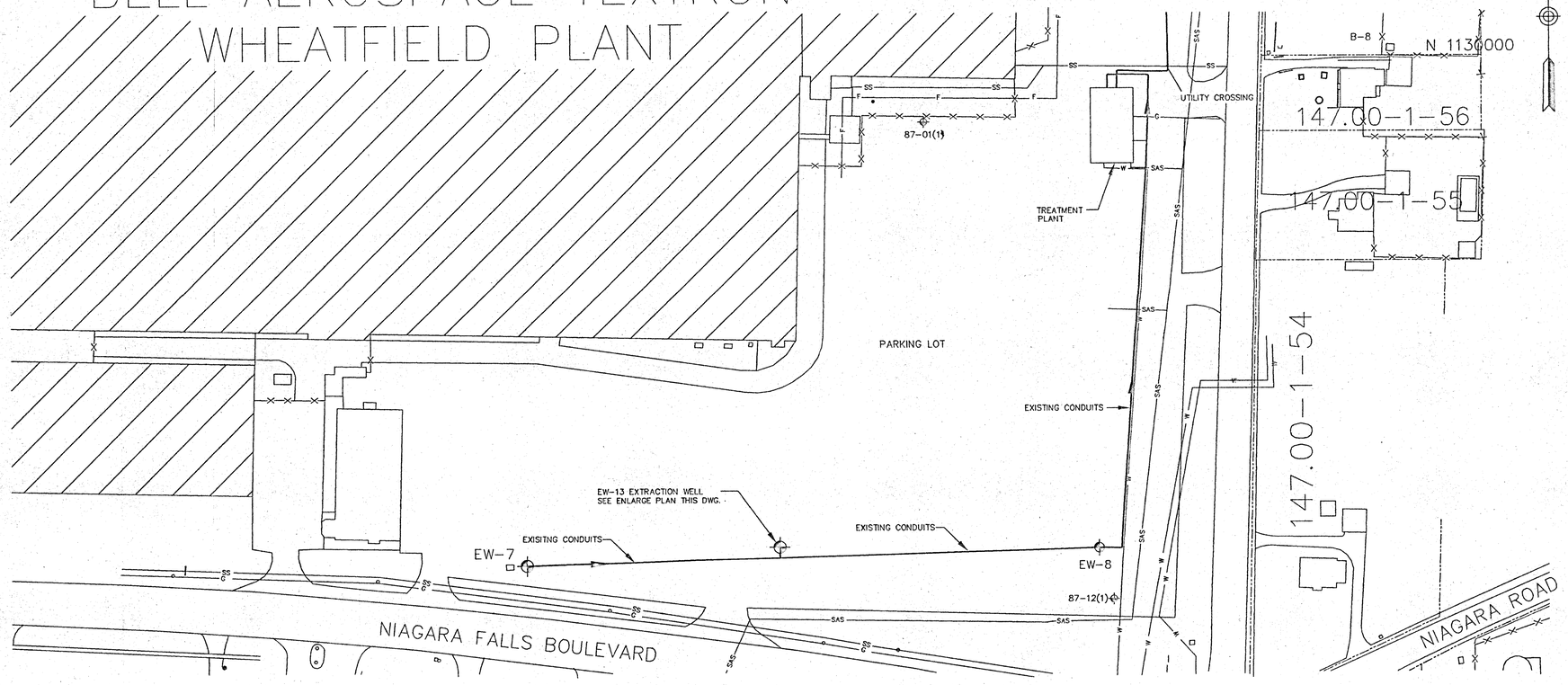
TITLE: **EW-13 RECORD DRAWING MECHANICAL DETAILS SHEET 2 OF 2**

Buffalo, New York — Golder Associates

DRAWN	BEC	DATE	9/30/08
CHECKED	DCW	SCALE	AS SHOWN
REVIEWED	ALG	JOB NO.	983-9150
APPROVED	ALG	DWG. NO.	BELL-127
FILE NO.	973-6170	FIGURE	B-4

ON

FORMER BELL AEROSPACE TEXTRON WHEATFIELD PLANT



LEGEND

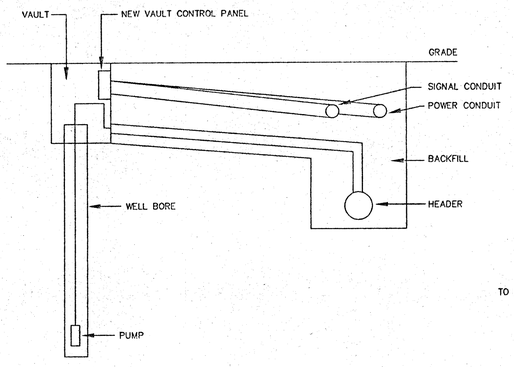
87-12(1)	EXISTING MONITORING WELL LOCATIONS	W	WATER UTILITY
EW	EXTRACTION WELL	F	FIRE PROTECTION UTILITY
	EXTRACTION SYSTEM BURIED PIPELINE	G	GAS UTILITY
	INDICATES DIRECTION OF FLOW	E	ELECTRICAL UTILITY
		SS	STORM SEWER UTILITY
		SAS	SANITARY SEWER UTILITY

GENERAL NOTES:

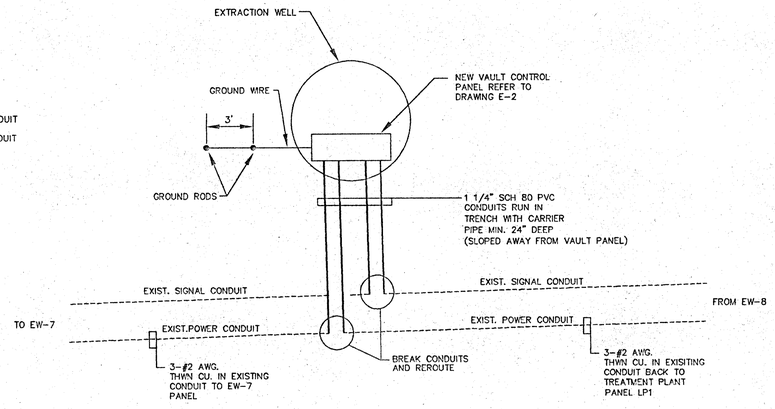
1. THE DRAWINGS ARE DIAGRAMMATIC AND INDICATE GENERALLY THE LOCATIONS OF THE MATERIAL AND EQUIPMENT.

SITE PLAN

SCALE: 1"=60'



SECTION



PLAN

EXTRACTION WELL

NO SCALE

60 0 60 120
scale feet

REV	DATE	DESCRIPTION	DR BY	RVW BY

SCALE:	AS SHOWN	
PROJECT No.	2847-13	
DES BY	JJR	11/97
DR BY	JJR	11/97
CHK BY		
RVW BY		

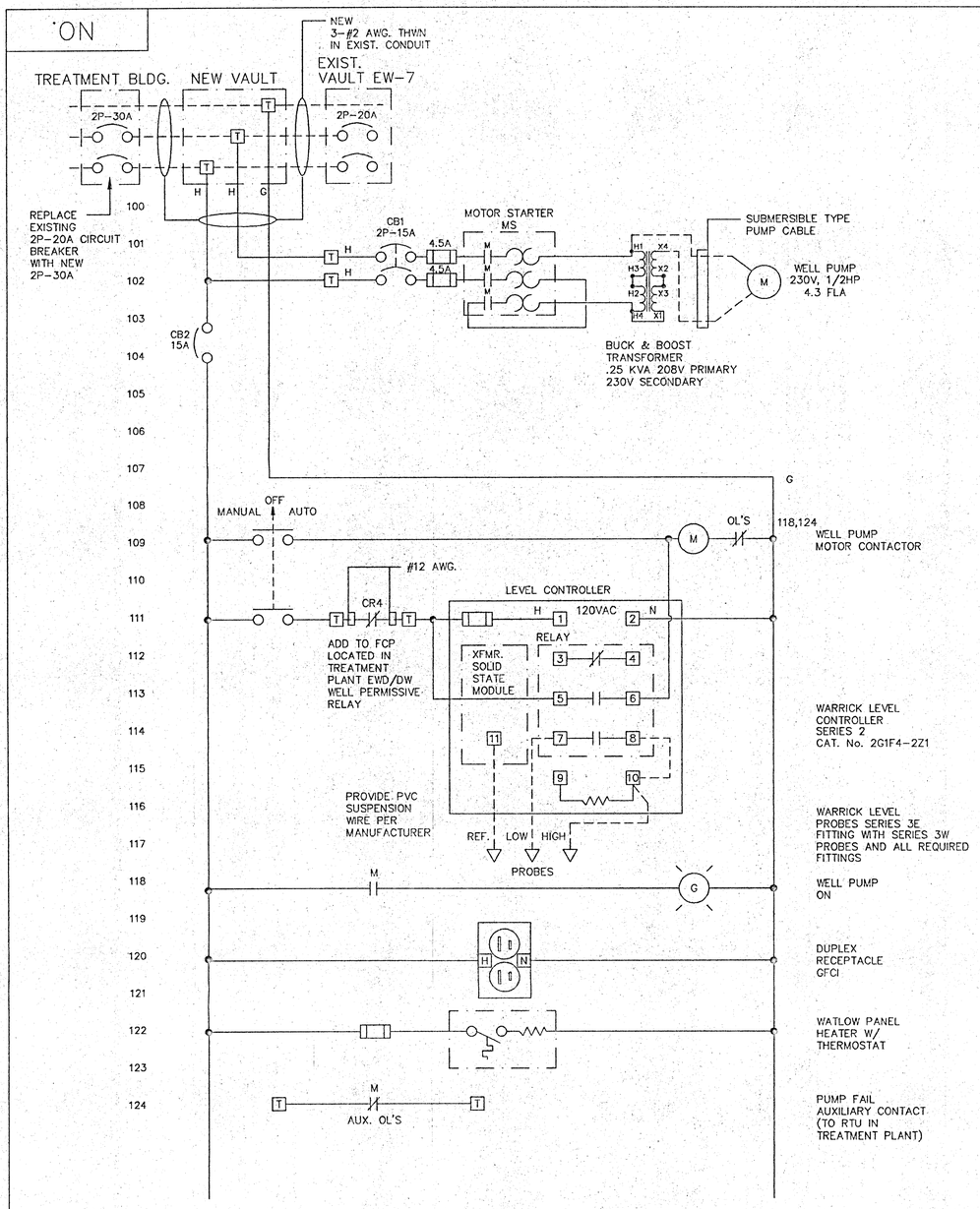
PROJECT: TEXTRON WHEATFIELD, NEW YORK NOV 09 1998

SHEET TITLE: EW-13 RECORD DRAWING ELECTRICAL PLAN

WENDEL
BUFFALO, N.Y. LOCKPORT, N.Y.
ENGINEERING • ARCHITECTURE • SURVEY • CONSTRUCTION

SHEET OF
FILE No. XXX
E-1

ON

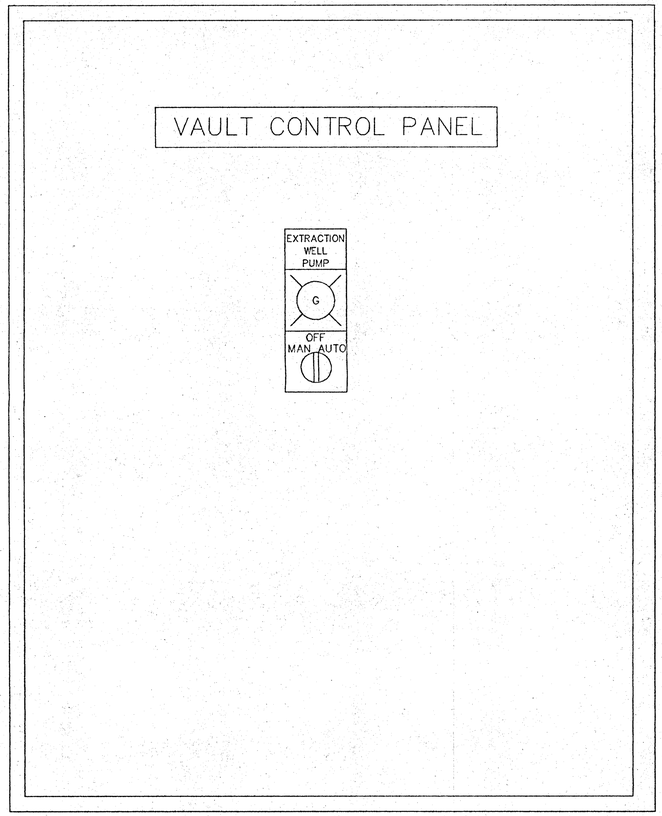


COORDINATE LENGTHS OF PROBE WIRES AND
SET POINT WITH EXTRACTION WELL CONTRACTOR

VAULT CONTROL PANEL SCHEMATIC

KEY

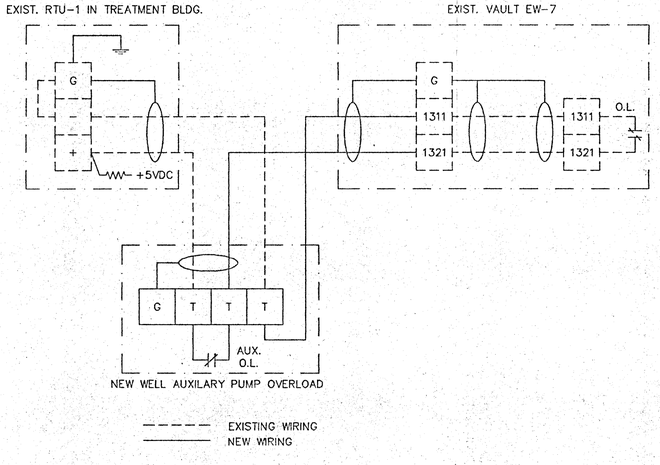
- ------ INDICATES EXTERNAL PANEL WIRING
- ——— INDICATES INTERNAL PANEL WIRING
- [T] TERMINAL BLOCK LOCATED IN PANEL



VAULT CONTROL PANEL IS NEMA 4X STAINLESS STEEL
WITH HINGED COVER HOFFMAN CAT. No. A-XXH2408SSLP

VAULT CONTROL PANEL

NO SCALE



MOTOR OVERLOAD WIRING

REV	DATE	DESCRIPTION	DR BY	RVW BY

SCALE:	AS SHOWN	
PROJECT No.	2847-13	
DES BY	JJR	11/97
DR BY	JJR	11/97
CHK BY		
RVW BY		

PROJECT: WHEATFIELD, NEW YORK

NOV 09 1998

SHEET TITLE:
EW-13 RECORD DRAWING
VAULT PANEL

WENDEL
BUFFALO, N.Y. LOCKPORT, N.Y.
ENGINEERING • ARCHITECTURE • SURVEY • CONSTRUCTION

SHEET OF
FILE No. XXX

E-2

APPENDIX A

Wendel's Electrical Certification Report

WENDEL

SUITE 100
95 JOHN MUIR DRIVE
BUFFALO, NEW YORK 14228
716/688-0766 or 625-6867
FAX 716/625-6825
e-mail: wendel@wendel-design.com

October 20, 1998

Mr. Anthony Grasso, P.G., Associate
Golder Associates Inc.
2221 Niagara Falls Boulevard
L.P.O. Box 4069
Niagara Falls, New York 14304-4069

SUBJECT: CQA CERTIFICATION OF ELECTRICAL INSTALLATION
FOR CONSTRUCTION OF GROUND WATER EXTRACTION WELL - 13
TEXTRON REALTY OPERATIONS INC. FACILITY
WHEATFIELD, NEW YORK
WENDEL PROJECT NO. 2847-13
GOLDER PROJECT NO. 983-9180

Dear Mr. Grasso:

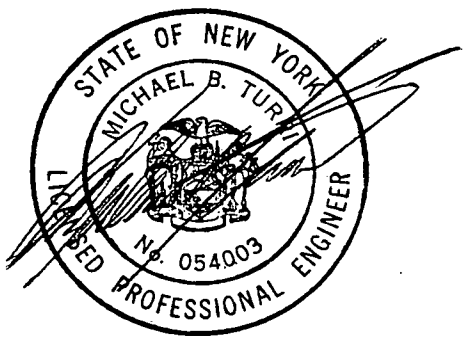
Wendel Engineers, P.C., provided site observation of the electrical components for the facility during the construction of the Ground Water Extraction Well – 13 at the former Textron Realty Operations Inc. Facility, Wheatfield, New York. Our site observations included the review of all visible and above ground electrical work involving instrumentation, control and power. Based on our site observations, Wendel certifies to the best of our knowledge that the electrical installation for the Ground Water Extraction Well – 13 has been constructed in substantial accordance with the permit drawings E1 and E2.

The certification for the work completed is issued for Wendel under the seal of Michael B. Turri, P.E., Principal of Wendel Engineers, P.C., with New York State License No. 54003.

If you have any questions with regard to the contents of this certification report, please contact the undersigned.

Very Truly Yours,

WENDEL



Michael B. Turri, P.E.
Principal

Robert J. McNamara, P.E.
Project Engineer

WENDEL

Field Report

PROJECT: Bell Aerospace Textron Extraction Well EW-13 **FR NO: 1**

PROJECT #: 284713

DATE: June 18, 1998

PERIOD: 10:00 am

Owner: Textron Realty Operations
Engineer: Wendel
Observer: John Rauen
Contractor: Weydman Electric

Observations and directives are as follows:

Looked in existing Extraction Wells for grounding conditions. Found ground wire running through side wall of EW-7. The remainder of the wells had grounds running through vault walls with conduit penetrations. Each vault panel was grounded.

WENDEL

Field Report

PROJECT: Bell Aerospace Textron Extraction Well EW-13 **FR NO: 2**

PROJECT #: 284713

DATE: June 30, 1998

PERIOD: 9:30 am

Owner: Textron Realty Operations
Engineer: Wendel
Observer: John Rauen
Contractor: Weydman Electric

Observations and directives are as follows:

Observed installation of conduit for new extraction well. Contractor cut existing conduits and attached a 45 deg bend, then ran straight into well. One conduit remains to be attached. Conduit entries into well vault must be sealed. Two ground rods were in place for grounding of panel in vault.

WENDEL

Field Report

PROJECT: Bell Aerospace Textron Extraction Well EW-13 **FR NO: 3**

PROJECT #: 284713

DATE: July 24, 1998

PERIOD: 9:00 am

Owner: Textron Realty Operations
Engineer: Wendel
Observer: John Rauen
Contractor: Weydman Electric

Observations and directives are as follows:

Observed installation of vault control panel in extraction well. Control panel was installed with components as shown on Drawings E1 and E2. Open items from FR2 were confirmed by Golder representative to have been completed.

Submitted by: WENDEL

APPENDIX B

Design Clarifications/Modifications

SPECIFICATION / DESIGN MODIFICATION FORM

PROJECT NUMBER: 983-9180
PROJECT TITLE: Textron/EW-13 Eng. Serv./NY
OWNER: Textron Inc.
CONSTR. MNGR. Golder Associates Inc.
LOCATION: Textron Realty Operations
Wheatfield (Inc.) Facility, NY

FORM NUMBER 1

LOCATION / REFERENCE OF MODIFICATION: Drawing details 2/B-3 and 1/B-4, and relevant portions of Specifications.

MODIFICATION MADE: Standard dimensional ratio (SDR) of HDPE overburden casing changed from SDR 17.6 as specified to SDR 11 which has thicker walls. Reduced inside diameter of this pipe (approximately 8 inches) necessitated reducing the rock borehole diameter from 9 inches to 8 inches and shortening the stilling well from 6 inches above the bottom of the pump sleeve to 6 inches above the top of the pump sleeve. The above borehole diameter and stilling well configuration are consistent with the design of the Off-Site Groundwater Extraction System.

	NAME	COMPANY	DATE
APPROVED BY DESIGNER:	David Wehn	Golder Associates Inc.	4/9/98

OWNER NOTIFIED OF MODIFICATION:
[X] YES
[ ] NO

	NAME	COMPANY	DATE
	Leslie Alden	Textron Inc.	4/9/98

REMARKS: SDR of pipe changed to accommodate pipe availability relative to project schedule.

ATTACHMENTS:
None.

DISTRIBUTION:
Leslie Alden - Textron Inc.
Kevin Thompson - Marcor Remediation Inc.
Robert Hobba - Weydman Electric Inc.
Robert McNamara - Wendel
Golder Associates Inc.

GOLDER ASSOCIATES INC.

SPECIFICATION / DESIGN MODIFICATION FORM

PROJECT NUMBER: 983-9180
PROJECT TITLE: Textron/EW-13 Eng. Serv./NY
OWNER: Textron Inc.
CONTRACTOR: Golder Associates Inc.
LOCATION: Textron Realty Operations
Wheatfield (Inc.) New York Facility

FORM NUMBER 2

LOCATION / REFERENCE OF MODIFICATION: Drawing detail 2/B-3, and relevant portions of Specifications.

MODIFICATION MADE: Butt-Fusion weld joining vault penetration piping to exterior piping replaced by coupler weld as in detail 4/B-4.

APPROVED BY DESIGNER:	Anthony Grasso	Golder Associates Inc.	5/29/98
	NAME	COMPANY	DATE

OWNER NOTIFIED OF MODIFICATION:

[ ] YES
[X] NO

	Leslie Alden	Textron Inc.	5/29/98
	NAME	COMPANY	DATE

REMARKS:

ATTACHMENTS:
None.

DISTRIBUTION:
Leslie Alden - Textron Inc.
Kevin Thompson - Marcor Remediation Inc.
Robert Hobba - Weydman Electric Inc.
Robert McNamara - Wendel

GOLDER ASSOCIATES INC.

SPECIFICATION / DESIGN MODIFICATION FORM

PROJECT NUMBER: 983-9180
PROJECT TITLE: Textron/EW-13 Eng. Serv./NY
OWNER: Textron Inc.
CONTRACTOR: Golder Associates Inc.
LOCATION: Textron Realty Operations
Wheatfield (Inc.) New York Facility

FORM NUMBER 3

LOCATION / REFERENCE OF MODIFICATION: Drawing detail 2/B-3 and relevant portions of Specifications.

MODIFICATION MADE: NYSDOT #1A stone replaced by flowable (flyash) fill from approximately one foot below the bottom of the 6-inch containment pipe to approximately 4-inches above the top of the pipe. Modification applies only to the lower portion of the pipe, not that connecting EW-13 to the "T".

APPROVED BY DESIGNER:

Anthony Grasso	Golder Associates Inc.	8/6/98
NAME	COMPANY	DATE

OWNER NOTIFIED OF MODIFICATION:

[ ] YES
[X] NO

Leslie Alden	Textron Inc.	
NAME	COMPANY	DATE

REMARKS: Modification made to better support pipe during backfill operations.

ATTACHMENTS:
See attached design data.

DISTRIBUTION:
Leslie Alden - Textron Inc.
Kevin Thompson - Marcor Remediation Inc.
Robert Hobba - Weydman Electric Inc.
Robert McNamara - Wendel

SJB SERVICES, INC.

Contract Drilling and Testing

1951-1 Hamburg Turnpike, Buffalo, NY 14218 — Phone: (716) 821-5911, Fax: (716) 821-0163
55 Oliver Street, Cohoes, New York 12047 — Phone: (518) 238-1145, Fax: (518) 238-1249
P.O. Box 416 • 208 Le Fevre Road, Stockertown, PA 18083 — Phone: (610) 746-2870, Fax: (610) 746-2669
TOLL FREE: 1-800-821-5911

May 9, 1997

Pine Hill Concrete
2255 Bailey Avenue
Buffalo, New York 14211-1798
Ph: 894-2255/Fax: 894-6572

Attention: *Brian Kirchmeyer*

Reference: *Flowable Fill*

Gentlemen,

As requested, SJB SERVICES performed a series of Laboratory Tests on 6" x 12" cylinder specimens which were fabricated using flowable fill. A copy of the Laboratory Test Results are attached for your review.

Based on this data and our experience with flowable fill, we expect that a bearing value of 2000 PSF could be assigned to a material with these properties. These properties are typical for most flowable fill supplied in the Western New York area.

Flowable fill being a mixture of sand, flyash and cement mixed with water, when properly placed, should consolidate in place to 95% of its maximum unit weight.

If you have any further questions, please contact the undersigned.

Respectfully Submitted.

SJB SERVICES INC.

Stanley J. Blair
President

vah
Attachment

NIAGARA MOHAWK POWER CORPORATION
ASH UTILIZATION GROUP
FLOWABLE MIX DESIGN SUBMITTAL
PHONE: (716) 879-3914 FAX: (716) 879-3858

DATE: _____

TO: _____

PROJECT: _____

SUBJECT: FLOWABLE FILL SUGGESTED DESIGN MIX

WE SUBMIT FOR REVIEW THE USE OF THE FOLLOWING MATERIALS AND PROPORTIONS PER CUBIC YARD TO SUPPLY *FLOWABLE FILL* TO THE ABOVE REFERENCED PROJECT.

QUALITATIVE DATA

PINE HILL MIX NO.	300001 / 199
SPECIFIED STRENGTH	MINIMUM 100 psi @ 28 Days
ASTM - C33 AGG. SIZE	---
AREAS OF USE	Fill Materials

MATERIALS:	SOURCE	QUANTITIES/CU.YD. (S.S.D.)
CEMENTITIOUS: CEMENT TYPE:	LAFARGE CEMENT	100 #
FINE AGGREGATE: COAL FLY ASH	NMPC HUNTLEY STATION	2273 #
BATCHED WATER IN #:	CITY	417 #
ADMIXTURES:	NONE	

PLASTIC PROPERTIES:

W/C RATIO:	4.20 lb./lb.
AIR CONTENT RANGE:	2% - Entrapped Only
SLUMP RANGE:	8 to 10 inches
UNIT WEIGHT:	103.1 lb./cu.ft.

The Flyash used from Niagara Mowak meets the requirements of 711-10 indentified in the New York State specification (Item 17502.95) for Flowable Fly Ash Material. The finished product as well is certified to meet the requirements of Item 17203.80 - Controlled Low Strength Material (CLSM).

RESPECTFULLY SUBMITTED:

SJB SERVICES, INC.
Contract Drilling and Testing

1951-1 Hamburg Turnpike, Buffalo, NY 14218 — Phone: (716) 821-5911 Fax: (716) 821-0183
55 Oliver Street, Cohoes, New York 12047 — Phone: (518) 238-1145 Fax: (518) 238-1249
P.O. Box 416 • 208 Le Fevre Road, Stockertown, PA 18083 — Phone: (610) 746-2670 Fax: (610) 746-2669
TOLL FREE: 1-800-821-5911

Laboratory Test Report

PROJECT : MATERIAL TESTING : PINE HILL CONCRETE

CLIENT : PINE HILL CONCRETE

DATE : MAY 8, 1997

PROJECT NO.: SJB-T691
REPORT NO.: LTR-8

SAMPLE INFORMATION :
Sample No. 97-218 and 97-219 were collected by the client and received at SJB Services, Inc. on May 7, 1997. Samples are described as two (2) 6"x12" flowable fill cylinders representing Mix 99 of the Easy Fill material placed on April 23, 1997.

Unconfined Compressive Strength Utilizing a Pocket Penetrometer

Sample Number	Penetrometer Reading
97-218	Exceeded the limits of the gauge (4.5 tons per square foot)
97-219	Exceeded the limits of the gauge (4.5 tons per square foot)

Unit Weight of the Flowable Fill Cylinders

Sample Number	Unit Weight
97-218	95.82 lbs./ft^3
97-219	94.99 lbs./ft^3

ASTM C-39: Compressive Strength of Cylindrical Concrete Specimens

Sample Number	Maximum Load lbs.	Diameter in.	Area in.^{2}	Compressive Strength PSI
97-218	2880	5.955	27.852	103.4
97-219	3430	5.958	27.880	123.0

SJB Services, Inc.

Paul Gregorczyk
Laboratory Manager

Ray J. Kron
Testing Services Manager

New York State Department of Environmental Conservation
50 Wolf Road, Albany, New York 12233

Thomas C. Jorling
Commissioner

JUL 22 1991

Mr. James F. Sullivan
Niagara Mohawk Power Corporation
300 Erie Boulevard West
Syracuse, NY 13202

RECEIVED
JUL 26 1991
GAS SUPPLY
SYRACUSE

Dear Mr. Sullivan:

Re: Beneficial Use Determination
Coal Ash Utilization
(BUD #076-7-34)

This is in response to your July 3, 1991 petition for a beneficial use determination (BUD) regarding the use of fly ash from Niagara Mohawk Power Corporation's (NMPC) coal-fired units in Dunkirk and North Tonawanda, New York, as a flowable fill in construction projects.

We have reviewed the metal analyses of the raw fly ash leachate based on the USEPA Toxic Characteristic Leaching Potential (TCLP) and the Monofilled Waste Extraction Procedure, USEPA Technical Resource Document SW-924; and the arsenic analyses of leachate from a stabilized NMPC fly ash flowable fill cylinder based on the SW-924 protocol. Our review indicates that in this stabilized form the 6 NYCRR Section 703.6 groundwater discharge standards for TCLP metals will not be exceeded.

Accordingly, the use of NMPC fly ash as a stabilized (flowable fill) product is approved in accordance with 6 NYCRR Paragraph 360-1.2(a)(5), with the following conditions:

- For each project location, NMPC must notify the project sponsor in writing, in advance, that the flowable fill contains coal combustion fly ash.
- Any contractual arrangements that are made between NMPC and the user of the fly ash, must indicate that the user has the necessary equipment to perform the work; will only use the fly ash as an ingredient for flowable fill; and will incorporate the fly ash directly into the flowable fill production process.
- All flowable fill mixes must be properly formulated. NMPC will be responsible to conduct, and keep appropriate records on, all testing necessary to ensure finished product quality.
- A semiannual report on the amount of fly ash which is being utilized in this manner must be submitted to the Bureau of Resource Recovery, Division of Solid Waste, NYSDEC, so that we may keep track of the amount of material beneficially reused throughout the State. This report should include the location, amount used at each location, and type of use.

NIAGARA MOHAWK
GENERATION
BUSINESS GROUP

Niagara Mohawk Power Corporation
Ash Utilization Group
3300 River Road
Tonawanda, NY 14150

FLOWABLE FILL
COAL COMBUSTION FLY ASH

Major Constituents in Coal Fly Ash		Huntley %	Dunkirk %
Silicon Dioxide (SiO_2)		47.35	40.24
Iron Oxide (Fe_2O_2)		19.28	17.38
Aluminum Oxide (Al_2O_3)		13.48	16.17
Calcium Oxide CaO)		3.58	3.81
Magnesium Oxide (MgO)		0.52	0.48
Potassium Oxide (K_2O)		2.39	1.81
Sodium Oxide (Na_2O)		0.77	0.76
Titanium Oxide (TiO_2)		1.22	1.17
Manganese Dioxide (MnO_2)		0.02	0.02
Sulfur Trioxide (SO_3)		0.95	1.31
Loss-On-Ignition (unburned carbon)*		10.46	16.87
*varies on average from 8-17%	Total	100.00	100.00

Mix Design CF100

Specifications:

Strength: Minimum 100 psi @ 28 Days
Slump: 8" to 10"
Cement: Type I/II Amount: 100 lbs./cu.yd.
W/C Ratio: 4.2 lb./lb.
Aggregates: Coal Fly Ash
Admixtures: None

Design Mix Per Cubic Yard:

Cement: 100 lbs.
Conditioned Fly Ash: 2273 lbs.
Aggregates: None
Water: 417 lbs.
Fresh Unit Weight: 103 lbs./cu.ft.

Compressive Strength Tests (psi):

3 days - 85; 7 days - 85; 14 days - 150; 21 days - 160; 28 days - 175

Shrink and Swell Potential

ASTM D 2216-92 Moisture Content
ASTM D 4318-84 (Method A) Liquid and Plastic Limits
ASTM D 427-83 Shrinkage Limit
Swell Potential: After testing for 12 days, no volume change was measured

LAFARGE CORPORATION

CEMENT MILL TEST REPORT

Period Represented: DECEMBER 1996
Plant: BATH
Cement Type: II

PHYSICAL DATA	
Specific Surface (Blaine) (sq.m./ kg.).....	361
Percent Passing 325 Mesh....	97.9
Compressive Strength (psi)	
Mortar Cubes	
1 day...	NA
3 day...	3340
7 day...	4360
28 day...	6000
Vicat Time Of Set (min.)	109
Air Content (%).....	6
Autoclave Expansion (%).....	0.01

CHEMICAL DATA	Percent
Silicon Dioxide (SiO2).....	22.1
Aluminum Oxide (Al2O3).....	4.3
Ferric Oxide (Fe2O3).....	3.1
Calcium Oxide (CaO).....	63.5
Magnesium Oxide (MgO).....	2.17
Sulphur Trioxide (SO3).....	2.7
Loss on Ignition.....	1.2
Insoluble Residue.....	0.20
Free Lime.....	1.2
Tricalcium Silicate (C3S)...	48
Tricalcium Aluminate (C3A)..	7.0
Total Alkali as Sodium Oxide	0.64

CERTIFIED BY: _____
Quality Control Supervisor

We hereby certify that this cement complies with current ASTM C-150 specifications using applicable ASTM standard test procedures. This mill test represents a monthly average.

CEMENT GROUP / NORTHEAST SALES
6265 Sheridan Drive #218, Williamsville, NY 14221
Office: (716) 634-8953 Fax: (716) 634-8988

- A representative sample of the fly ash must be obtained annually on or about September 30 of each year to form a flowable fill cylinder. This cylinder should be analyzed in accordance with SW-924 for all TCLP metals and the results reported in writing, to Mr. Jeffrey Schmitt, Bureau of Resource Recovery, Division of Solid Waste, NYSDEC.

- The Department reserves the right to rescind this approval at any time, should conditions warrant. Further, this approval does not exempt this activity from any other federal, State, and local requirements.

If you have any questions regarding this matter, please contact Mr. Schmitt, of my staff, at 518-457-7336. We look forward to the receipt of your "Fly Ash Testing and Utilization Options Report," which should greatly enhance the potential opportunities for beneficial uses of coal combustion ash.

Sincerely,

Norman H. Nosenchuck, P.E.
Director
Division of Solid Waste

SPECIFICATION / DESIGN MODIFICATION FORM

PROJECT NUMBER: 983-9180
PROJECT TITLE: Textron/EW-13 Eng. Serv./NY
OWNER: Textron Inc.
CONTRACTOR: Golder Associates Inc.
LOCATION: Textron Realty Operations
Wheatfield (Inc.) New York Facility

FORM NUMBER 4

LOCATION / REFERENCE OF MODIFICATION: Drawing E-2

MODIFICATION MADE: Warrick controller specified, No. 2D1F4-2Z1, is incorrect; correct catalog number is 2G1F4-2Z1

APPROVED BY DESIGNER: David Wehn (NAME) Golder Associates Inc. (COMPANY) 6/24/98 (DATE)

OWNER NOTIFIED OF MODIFICATION:

[ ] YES
[X] NO

Leslie Alden (NAME) Textron Inc. (COMPANY) 6/24/98 (DATE)

REMARKS: None.

ATTACHMENTS:
None.

DISTRIBUTION:
Leslie Alden - Textron Inc.
Kevin Thompson - Marcor Remediation Inc.
Robert Hobba - Weydman Electric Inc.
Robert McNamara - Wendel

GOLDER ASSOCIATES INC.

SPECIFICATION / DESIGN CLARIFICATION FORM

PROJECT NUMBER: 983-9180
PROJECT TITLE: Textron/EW-13 Eng. Serv./NY
OWNER: Textron Inc.
CONTRACTOR: Golder Associates Inc.
LOCATION: Textron Realty Operations
Wheatfield (Inc.) New York Facility

FORM NUMBER 1

LOCATION / REFERENCE OF CLARIFICATION: Detail 4/B-4.

CLARIFICATION MADE: Fiberglass-reinforced heat shrink sleeve not required by pipe manufacturer; omit.

APPROVED BY DESIGNER:	Anthony Grasso	Golder Associates Inc.	6/4/98
	NAME	COMPANY	DATE

OWNER NOTIFIED OF CLARIFICATION:

[ ] YES
[X] NO

	Leslie Alden	Textron Inc.	6/4/98
	NAME	COMPANY	DATE

REMARKS:

ATTACHMENTS:
None.

DISTRIBUTION:
Leslie Alden - Textron Inc.
Kevin Thompson - Marcor Remediation Inc.
Robert Hobba - Weydman Electric Inc.
Robert McNamara - Wendel

GOLDER ASSOCIATES INC.

SPECIFICATION / DESIGN CLARIFICATION FORM

PROJECT NUMBER: 983-9180
PROJECT TITLE: Textron/EW-13 Eng. Serv./NY
OWNER: Textron Inc.
CONTRACTOR: Golder Associates Inc.
LOCATION: Textron Realty Operations
Wheatfield (Inc.) New York Facility

FORM NUMBER 2

LOCATION / REFERENCE OF CLARIFICATION: Section 4.2 of Specifications (Revision 2).

CLARIFICATION MADE: Elevation settings for the pump start and stop points shall be as follows:
Pump ON point to be six feet above top of pump sleeve, or approximately 22.3 feet below top of HDPE well casing.
Pump OFF point to be two feet above top of pump sleeve, or approximately 26.3 feet below top of HDPE well casing.

APPROVED BY DESIGNER:

Anthony Grasso	Golder Associates Inc.	7/2/98
NAME	COMPANY	DATE

OWNER NOTIFIED OF CLARIFICATION:

[ ] YES
[X] NO

Leslie Alden	Textron Inc.	7/2/98
NAME	COMPANY	DATE

REMARKS: None.

ATTACHMENTS:
None.

DISTRIBUTION:
Leslie Alden - Textron Inc.
Kevin Thompson - Marcor Remediation Inc.
Robert Hobba - Weydman Electric Inc.
Robert McNamara - Wendel

APPENDIX C

Submittals

CHECK VALVES
INTRODUCTION

Introduction

( ) APPROVED
(X) APPROVED AS NOTED
( ) REVISE AND RESUBMIT

BY D Wehn DATE 4/8/98
GOLDER ASSOCIATES INC.

THESE DOCUMENTS HAVE BEEN REVIEWED FOR COMPLIANCE WITH THE PLANS AND SPECIFICATIONS. WE HAVE NO GUARANTEE FOR PERFORMANCE AND ASSUME NO LIABILITY FOR INSTALLATION METHODS.

For over 15 years Asahi/America has been at the forefront of thermoplastic valve technology. The Asahi/America line is now the broadest in the industry in terms of size range, valve types, materials, features, and options. Advanced molding techniques, rigid engineering standards, and a wide choice of corrosion resistant thermoplastic and elastomeric materials insure the highest level of reliability for all Asahi/America valves, even in the most severe corrosive applications.

The valves in this catalog represent one segment of the Asahi/America line. Other valves are grouped according to type or special function in separate catalogs. On the back cover of this brochure you will find a brief representation of the complete product line as an aid to requesting additional information.

If, however, you have a requirement for a valve with features not contained in any of our literature, please contact our engineering department to discuss our custom fabrication capability. Chances are we have already encountered a similar request and can accommodate your special needs with a minimum of effort.

Check Valves: Discussion

Check valves are self-contained, automatic valves which are used to prevent reversal of flow in a line. When open and under flow pressure; the checking mechanism will move freely in the media, offering very little resistance and minimal pressure drop. Asahi/America provides two basic types of check valves: Swing Check Valves and Ball Check Valves. Swing Check Valves utilize a swinging disc which requires only minimal back pressure to close the valve. This valve can also be modified with a lever and weight or spring to assist valve in seating faster to eliminate shock. Asahi/America's Ball Check Valve employs a free-moving ball which unseats to permit flow in one direction but seals against a seat to prevent backflow. Both types of valves may be installed either vertically or horizontally.

Warranty and Liabilities

To the best of our knowledge the information contained herein is accurate. However, neither Asahi/America, Inc. nor any of its affiliates assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of the suitability of any information or material for the use contemplated, or the manner of use, is the sole responsibility of the user.

Due to our policy of continuous product improvement, we reserve the right to change or modify design without incurring any obligation to furnish or install such changes or modifications on products previously or subsequently sold.

WARRANTY
THE SALE BY ASAHI/AMERICA, INC. OF ITS PRODUCTS IS EXPRESSLY CONDITIONED UPON AND SUBJECT TO ALL TERMS AND CONDITIONS SET FORTH ON THE BACK COVER OF THIS CATALOG.

CHECK VALVES continued

Thermoplastic Materials

PVC (POLYVINYL CHLORIDE) TYPE 1, GRADE 1 Asahi/America uses an unplasticized PVC polymer in all of its PVC valves. This material has excellent chemical resistance, strength, rigidity, and modulus of elsticity. It resists attack by most acids and strong alkalis, as well as gasoline, kerosene, aliphatic alcohols and hydrocarbons, and salt solutions. Aromatics, chlorinated organic compounds, and lacquer solvents do have effect upon PVC's chemical properties. Its temperature range is 140° F. Pvc's low cost and overall balance of properties make it the material best suited to the widest number of corrosive applications.

CPVC (CHLORINATED POLYVINYL CHLORIDE) TYPE 4, GRADE 1 The properties of CPVC and its advantages are very similar to those of PVC; however, its working temperature range is higher (200°F.) than that of PVC. It should be specified in some instances where hot corrosive liquids are being handled and an extra margin of safety is required.

PP (POLYPROPYLENE) TYPE 1 Polypropylene, a member of the polyolefin family, is one of the lightest plastics known. It is highly crystalline, thus is strong and hard. It possesses excellent chemical resistance to many acids, alkalies and organic solvents. PP is not recommended for use with chlorinated hydrocarbons and aromatics. Its upper temperature limit is slightly lower than that of CPVC.

PVDF (POLYVINYLIDENE FLUORIDE) PVDF is a high molecular weight fluorocarbon that has superior abrasion resistance, chemical resistance, dielectric properties, and mechanical strength. The remarkable fact is that it maintains these characteristics over a temperature range of −40°F. to 250°F. PVDF is highly resistant to wet or dry chlorine, bromine and other halogens, most strong acids and bases, aliphatics, aromatics, alcohols, and chlorinated solvents. It is not, however, recommended for ketones or esters. Asahi/America's PVDF resin conforms with FDA No. 177.2510 requirements for contact with food.

Elastomeric Materials

TEFLON® (TFE FLUOROCARBONS) This fluorocarbon is almost totally insoluble and chemically inert. Teflon® in application on bearing surfaces exhibits a natural lubricity that makes lubrication completely unnecessary. It has a very high thermal stability, is nonflammable, and exhibits a very low dielectric constant.

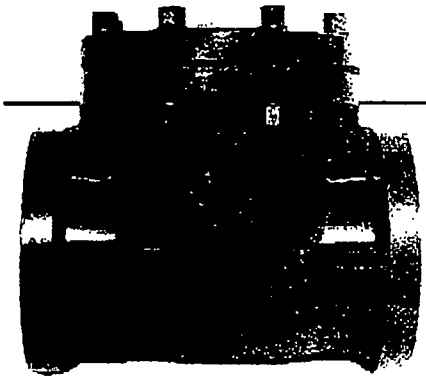
VITON® Viton® is a fluoroelastomer which is used as an "O" ring material in many Asahi/America valves. It resists a wide range of chemicals, including mineral acids, salts, and chlorinated hydrocarbons. The maximum temperature is 250° F.

EPDM (ETHYLENE PROPYLENE TERPOLYMER) This elastomer is particularly suited to diaphragms, valve seats, and "O" rings. It can stand up to a variety of acids, bases, alcohols, and oxidizing chemicals. The maximum temperature is 212°F.

Note

Caution: Asahi/America valves are not recommended for use in compressed air service. When testing, only hydrostatic pressure testing is recommended with a gradual increase in pressure.

SWING CHECK



FEATURES

- Minimum resistance to flow.
- May be installed in horizontal or in vertical lines.
- Disc seats tightly with minimum back pressure.
- Top entry valve facilitates cleaning without removing from line.
- EPDM seat and seal.
- All sizes rated for vacuum service.

OPTIONS

- External lever and weight to assist the disc in closing faster.
- External spring to assist disc in closing faster.
- Teflon® or Viton® seat and seals.

DCW

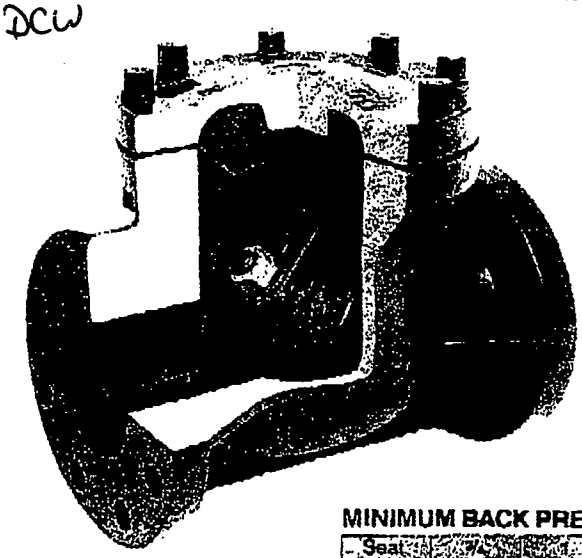
SPECIFICATIONS

SIZES: ¾–8"
MODELS: Flanged
BODIES: PVC, PP, PVDF

DCW

SAMPLE SPECIFICATIONS

All swing check valves shall be of a solid thermoplastic construction having no metal to media contact. Valves must incorporate a single disc design suitable for either horizontal or vertical installations as manufactured by Asahi/America.



C_v VALUES

Size	C_v
¾"	19.0
1"	24.0
1¼"	70.0
2"	95.0
2½"	233.0
3"	300.0
4"	480.0
5"	750.0
6"	1100.0
8"	1900.0

MINIMUM BACK PRESSURE REQUIRED TO CLOSE VALVE (PSI)

Seat	¾	1	1¼	2	2½	3	4	6	8
EPDM	2.8	5.0	8.0	5.0	5.0	5.7	6.7	6.4	6.4
Teflon	8.0	8.5	8.5	8.5	8.5	8.5	9.2	10.0	10.0

OPERATING PRESSURE VS. TEMPERATURE (PRESSURE IN PSI. WATER NON SHOCK)

	PVC				PP				PVDF				
	Rubber			Teflon®	Rubber			Teflon®	Rubber				Teflon®
Size	32°F 70°F	105°F	120°F	30° 120°F	32°F 105°F	140°F	175°F	32°F 175°F	32°F 140°F	175°F	190°F	210°F	32°F 210°F
¾"	150	150	100	40	150	100	90	40	150	120	100	85	85
1"	150	150	100	40	150	100	90	40	150	120	100	85	85
1¼"	150	150	100	40	150	100	90	40	150	120	100	70	85
2"	150	150	100	40	150	100	80	40	150	120	90	85	85
2½"	150	100	100	40	100	85	70	40	150	100	80	55	85
3"	150	100	100	30	100	70	60	30	150	100	80	40	70
4"	100	70	70	30	70	65	40	30	100	85	60	40	70
6"	100	70	70	30	70	60	35	30	100	85	60	30	60
6"	100	70	60	20	70	40	30	20	100	70	50	30	40
8"	70	40	40	20	40	40	30	20	70	60	40	30	40

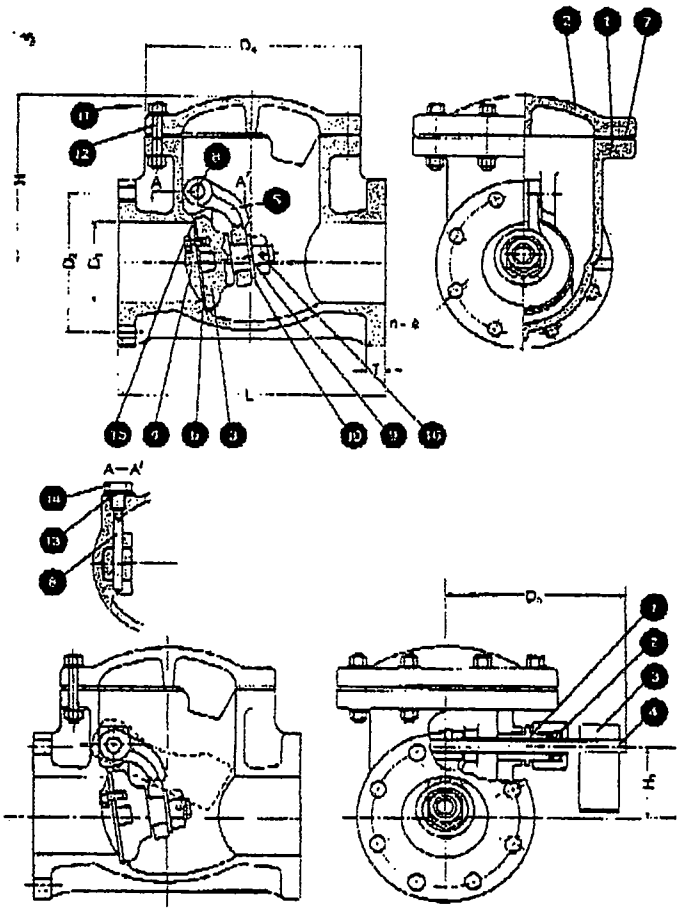
SWING CHECK continued

Parts
Dimensions

PARTS

No.	Parts	Pcs.	Materials
1	Body	1	PP, PVC, PVDF
2	Bonnet	1	PP, PVC, PVDF
3	Disc	1	PP, PVC, PVDF
4	Seat Holder	1	PP, PVC, PVDF
5	Swing Arm	1	PP, PVC, PVDF
6	Seat	1	EPDM, PTFE, VITON
7	Sheet Gasket Seal	1	EPDM, PVDF, VITON
8	Shaft	1	PP, PVC, PVDF
9	Nut	1	PP, PVC, PVDF
10	Washer	1	PP, PVC, PVDF
11	Bolt and Nut	Set	PVC, SS
12	Washer	Set	Stainless Steel
13	Sheet Gasket	1	EPDM or PTFE
14	Bolt	1	PP, PVC, PVDF
15	Bolt	Set	PP, PVC, PVDF
16	Set Pin	1	PP, PVC, PVDF

DCW



LEVER & WEIGHT OPTION

PARTS—LEVER AND WEIGHT

No.	Parts	Pcs.	Materials
1	Fitting	1	PVDF
2	"O" Ring	1	EPDM, PTFE
3	Weight	1	PVC
4	Arm	1	PP, PVC, PVDF

LEVER & WEIGHT DIMENSIONS

Size	D₁	H
¾"	4.00	1.18
1"	4.5	1.57
1½"	5.0	1.77
2"	5.5	2.17
2½"	6.0	2.56
3"	6.5	2.76
4"	8.0	3.54
5"	10.0	4.33
6"	12.0	5.31
8"	16.0	6.69

DIMENSIONS (IN INCHES UNLESS OTHERWISE NOTED.)

Size	Weight (lbs.)	D₁	D₂	ø	n	D₃	L	T	H
¾"	1.8	0.79	2.76	0.63	4	3.39	5.51	0.59	3.54
1"	3.6	0.98	3.13	0.63	4	3.12	6.30	0.63	4.72
1½"	6.0	1.57	3.86	0.63	4	5.71	7.09	0.71	5.43
2"	8.9	1.97	4.74	0.75	4	7.09	7.87	0.79	6.16
2½"	11.3	2.56	5.49	0.75	4	7.87	9.45	0.87	6.81
3"	12.2	3.15	6.00	0.75	4	8.07	10.24	0.87	6.73
4"	21.0	3.94	7.50	0.75	8	10.43	11.81	0.94	8.39
5"	36.1	4.92	8.50	0.87	8	12.99	13.78	0.94	8.78
6"	46.0	5.91	9.51	0.87	8	14.57	15.75	0.98	11.14
8"	76.2	7.87	11.75	0.87	8	16.73	19.69	1.18	13.23

DCW →

BUTTERFLY VALVES
INTRODUCTION

Introduction

For over 15 years Asahi/America has been at the forefront of thermoplastic valve technology. The Asahi/America line is now the broadest in the industry in terms of size, range, valve types, materials, features, and options. Advanced molding techniques, rigid engineering standards, and a wide choice of corrosion resistant thermoplastic and elastomeric materials insure the highest level of reliability for all Asahi/America valves, even in the most severe corrosive applications.

The valves in this catalog represent one segment of the Asahi/America line. Other valves are grouped according to type or special function in separate catalogs. On the back cover of this brochure you will find a brief representation of the complete product line as an aid to requesting additional information.

If, however, you have a requirement for a valve with features not contained in any of our literature, please contact our engineering department to discuss our custom fabrication capability. Chances are we have already encountered a similar request and can accommodate your special needs with a minimum of effort.

Butterfly Valves: Discussion

The name of this valve comes from the wing-like action of the flow-controlling disc which operates at right angles to the flow. The disc has about the same diameter as the connecting pipe and the flow is straight-through with a low pressure drop. Maintenance is easy because of the minimum number of moving parts. The butterfly valve can be used either as an "ON/OFF" type of valve, wherein the seating of the disc against an elastomeric seal is important, or it can be used as a control valve, wherein seating materials are unnecessary.

Asahi/America butterfly valves with seats are self-gasketing, eliminating the need for flange gaskets. These valves can be operated manually, electrically or pneumatically.

Asahi/America thermoplastic valves provide a dependable and economical way to handle corrosive chemicals like sulfuric and hydrofluoric acid, nitric acid, and other oxidizing chemicals, as well as caustics, solvents, halogens and other problem materials, at temperatures to 250° F, pressures to 150 PSI and flows up to 18,500 gpm.

When we speak of corrosion resistance, we refer to the ability of a material to withstand physical and chemical deterioration when it reacts with its environment, and particularly with oxygen. Corrosion, itself, has become a term which applies mostly to metals because the process is primarily an electrochemical one. There is ionization or corrosion at the surface due to electrical potentials that are created between positive and negative poles formed when unlike metals are joined in the same electrically conductive medium or when fluids that surround the metals have different ionic concentrations. Because thermoplastics are dielectric, meaning that they cannot easily support a charge, they are practically immune from corrosion in the conventional sense. There are some chemicals that can cause thermoplastics to deteriorate. For this reason, we have a thermoplastic chemical resistance chart, which we will be happy to send you upon request.

To the best of our knowledge the information contained herein is accurate. However, neither Asahi/America, Inc. nor any of its affiliates assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of the suitability of any information or material for the use contemplated, or the manner of use, is the sole responsibility of the user.

Due to our policy of continuous product improvement, we reserve the right to change or modify design without incurring any obligation to furnish or install such changes or modifications on products previously or subsequently sold.

Warranty and Liabilities

WARRANTY—THE SALE BY ASAHI/AMERICA, INC. OF ITS PRODUCTS IS EXPRESSLY CONDITIONED UPON AND SUBJECT TO ALL TERMS AND CONDITIONS SET FORTH ON THE BACK COVER OF THIS CATALOG.

BUTTERFLY VALVES continued

Thermoplastic Materials

PVC (POLYVINYL CHLORIDE) TYPE 1, GRADE 1 Asahi/America uses an unplasticized PVC polymer in all of its PVC valves. This material has excellent chemical resistance, strength, rigidity,and modulus of elasticity. It resists attack by most acids and strong alkalies, as wellas gasoline, kerosine, aliphatic alcohols and hydrocarbons, and salt solutions. Aromatics, chlorinated organic compounds, and lacquer solvents do have effect upon PVC's chemical properties. Its temperature range is 140° F. PVC's low cost and overall balance of properties make it the material best suited to the widest number of corrosive applications.

PP (POLYPROPYLENE) TYPE 1 Polypropylene, a member of the polyolefin family, is one of the lightest plastics known. It is highly crystalline, thus is strong and hard. It possesses excellent chemical resistance to many acids, alkalies and organic solvents. PP is not recommended for use with chlorinated hydrocarbons and aromatics. Its upper temperature limit is slightly lower than that of CPVC.

PVDF-KYNAR® (POLYVINYLIDENE FLUORIDE) PVDF is a high molecular weight fluorocarbon that has superior abrasion resistance, chemical resistance, dielectric properties, and mechanical strength. The remarkable fact is that it maintains these characteristics over a temperature range of -40° F. to 250° F. PVDF is highly resistant to wet or dry chlorine, bromine and other halogens, most strong acids and bases, aliphatics, aromatics, alcohols, and chlorinated solvents. It is not, however, recommended for ketones or esters.

FRP (FIBERGLASS WRAPPED POLYESTER) Unsaturated polyester thermoset resins are manufactured from glycols, dibasic acids and monomers. Inhibitors are used to control gel and curing during the cross linking process. An initiator is added at the final fabrication process to achieve cure. Working temperature range is 210° F. Chemical and corrosion resistance is excellent for acids, bases and some organics.

Elastomeric Materials

NITRILE (BUNA N) Nitrile rubber is a copolymer of butadiene and acrylonitrile. In addition to its good elastomeric properties, it is resistant to aliphatic hydrocarbons and aromatic solvents.

BUTYL Butyl rubber is a copolymer of isobutylene and isoprene, vulcanized in the same manner as natural rubber. Butyl has good resistance to most acids.

HYPALON® Hypalon® is DuPont's name for its elastomer of chlorosulfonated polyethylene used for diaphragms and valve seals.

EPDM (ETHYLENE PROPYLENE TERPOLYMER) This elastomer is particularly suited for diaphragms, valve seals, and "O"-rings. It can stand up to a variety of acids, bases, alcohols, and oxidizing chemicals.

NEOPRENE Neoprene is a chlorinated synthetic rubber which is used primarily as a diaphragm or sealing material in Asahi/America valves. Its use should be limited to lower temperature applications.

NATURAL RUBBER Natural rubber is a high molecular weight polymer of isoprene derived from the Hevea tree. It is used as a diaphragm and sealing material because of its excellent elastomeric properties and resistance to abrasion.

Sample Specification

All solid thermoplastic butterfly valves shall be of the lined body design and seal bubble tight with only the liner and disc as wetted parts. The disc shall have double "O" ring seals on top and bottom trunnions, of the same material as the valve liner. Line shall be molded and formed around the body, functioning as a gasket on each side of valve. Stem shall be of stainless steel and have engagement over the full length of the disc. Butterfly valves shall be wafer style, as manufactured by Asahi/America, 425 Riverside Avenue, Medford, MA 02155.

Note

Caution: Asahi/America Butterfly Valves are not recommended for use in compressed gas services. When testing, only hydrostatic pressure testing is recommended, with a gradual increase in pressure.

Teflon®, Viton® and Hypalon® are registered trademarks of DuPont.
Kynar® is a registered trademark of Pennwalt.

TYPE 75 BUTTERFLY VALVES
LEVER AND GEAR

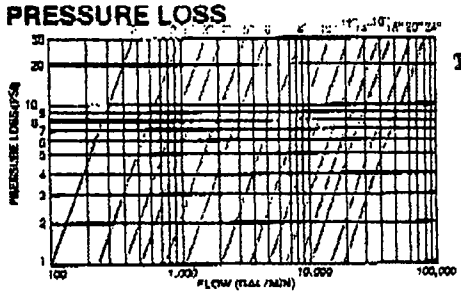
SPECIFICATIONS

SIZES: ½"-24" Lever: 1½"-8" Gear: 8"-24"
MODELS: Wafer style (for ANSI flanges)
OPERATORS: Lever, Gear
BODIES: PVC, PVDF
DISCS: PP, PVDF, PVC (optional)
SEATS: EPDM, VITON®, Nitrile (Buna N) Butyl, Hypalon, Natural Rubber, Neoprene, Chlorinated Polyethylene (CPE)
SEALS: Same as seating material
ACTUATORS: Electric, Pneumatic

FEATURES

- Standard model has PVC body and polypropylene disc for better chemical and abrasion resistance at temperatures higher than can be achieved with PVC.
- Can be fitted with a variety of elastomeric seat materials to provide bubble-tight seating for a wide range of chemicals.
- Stainless steel shaft has full engagement with disc and is a non-wetted part isolated from the media by double "O" ring seals on top and bottom trunnions of disc.
- EDPM and Viton® are standard seat materials. Others are available as options.
- Only disc and liner are wetted parts.

PRESSURE LOSS



OPTIONS

- Stem Extensions.
- Other seat materials available on special order.
- Gear operators for all sizes.
- Sprocket and chain wheel: all sizes.
- Teflon® or PVDF stem coatings.
- Handle locking devices.
- 2" square operating nut.
- Stem of any commercially available metal.
- Lug style butterfly valves.
- Lever handle on 8".
- Tandem arrangements (patented).
- Disc and/or body in PVDF for better temperature range or chemical resistance.

PRESSURE VS. TEMPERATURE (PSI, WATER, NON-SHOCK)

Size (Inches)	PVC Body With PP Disc and appropriate elastomer* 30° F 70° F	120° F	140° F	180° F	PVDF Body With PVDF Disc and appropriate elastomer* -5° F 140° F	141° F 175° F	178° F 210° F	211° F 250° F
1-1/2-3	150	100	70	30	150	100	85	70
4-6	150	100	45	30	150	100	85	70
8	150	100	40	20	150	85	70	60
10	150	100	30	15	150	85	70	60
12	100	60	30	15	100	60	40	20
14	100	60	30	7	100	40	30	15
16	85	60	30	7	85	40	30	15
18	70	30	20	7	70	40	30	15
20-24	50	30	20	7	50	30	20	15

*Maximum allowable temperature of Viton is 250° F. All other elastomers have a limit of 210° F

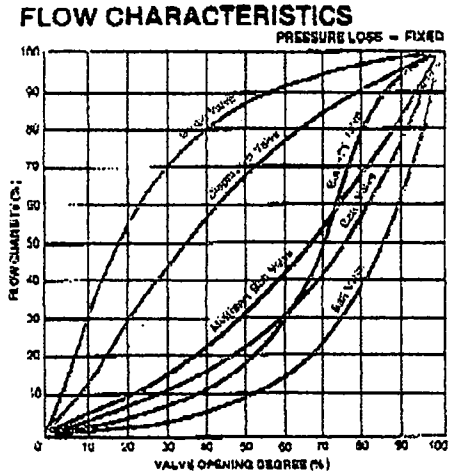
VACUUM SERVICE
(UNIT: INCHES OF MERCURY)

Size		Size	
1½"	-29.92	10"	-27.56
2"	-29.92	12"	-23.62
2½"	-29.92	14"	-23.62
3"	-29.92	16"	-23.62
4"	-29.92	18"	-19.69
5"	-29.92	20"	-19.69
6"	-27.56	24"	-19.69
8"	-27.56		

Cv VALUES

Size	10°	20°	30°	40°	50°	60°	70°	80°	90°
1½"	0	0.8	2.6	5.4	11.0	22.0	38.0	58.0	75.0
2"	0	1.9	5.2	9.5	25.0	46.8	79.0	91.0	102.0
2½"	0	4.0	9.0	18.2	35.7	59.7	166.0	239.0	260.0
3"	0	7.5	17.7	31.8	58.0	101.0	251.0	366.0	387.0
4"	0.7	10.5	25.3	45.3	85.8	156.2	328.0	466.0	504.0
5"	2.7	21.6	46.3	82.0	140.0	271.0	501.0	710.0	772.0
6"	15.3	42.6	80.5	142.0	220.0	462.0	794.0	1085.0	1183.0
8"	33.0	82.0	147.0	300.0	387.0	816.0	1390.0	1880.0	2040.0
10"	61.0	151.0	270.0	540.0	720.0	1476.0	2490.0	3320.0	3600.0
12"	88.0	233.0	408.0	776.0	1070.0	2140.0	3650.0	4760.0	5160.0
14"	129.0	328.0	535.0	1030.0	1509.0	2770.0	4580.0	5890.0	6440.0
16"	175.0	456.0	750.0	1416.0	2170.0	3760.0	6000.0	7660.0	8340.0
18"	252.0	622.0	1100.0	1860.0	2940.0	5020.0	7960.0	10020.0	10880.0
20"	397.0	845.0	1448.0	2873.0	3940.0	6820.0	10400.0	12920.0	14060.0
24"	463.0	1148.0	2130.0	3700.0	5550.0	9180.0	13900.0	17000.0	18500.0

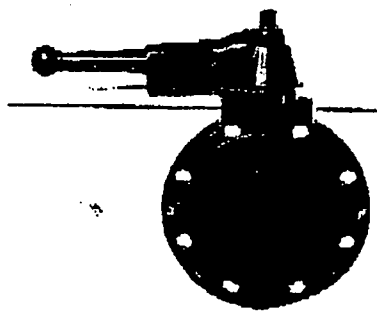
FLOW CHARACTERISTICS

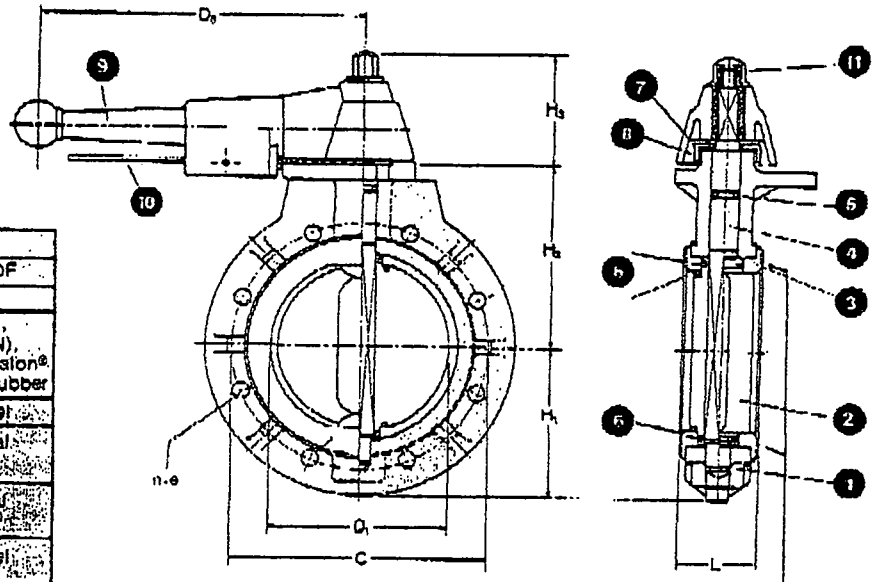


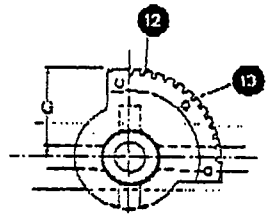
ASAHI/AMERICA

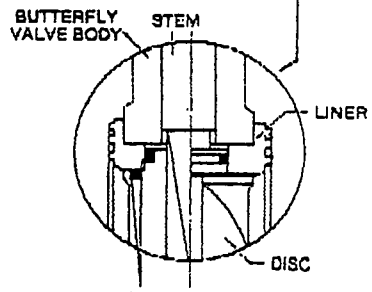
TYPE 75 BUTTERFLY VALVES
LEVER

TO BE GEAR OPERATED, NOT LEVER OPERATED AS SHOWN DCW









"O"-RING SEALS IN TOP & BOTTOM THUNNIONS OF DISC

PARTS—LEVER 1½"-8"

No.	Parts	Pcs.	Materials
1	Body	1	PVC, PP, PVDF
2	Disc	1	PP, PVDF
3	Seat	1	EPDM, Viton®, Nitrile (Buna N), Neoprene®, Hypalon® Butyl, Natural Rubber
4	Stem	1	Stainless Steel
5	Stem Seal "O" Ring	1	Same material as seat
6	Disc Seal "O" Ring	4	Same material as seat
7	Stem Retainer	1	Stainless Steel
8	Retaining Nut	1	PVC
9	Handle	1	PP
10	Trigger	1	Stainless Steel
11	Cap Nut	1	PVC covered
12	Gauge Plate	1	Stainless Steel
13	Machine Screw	3	Stainless Steel

DIMENSIONS—LEVER (IN INCHES—BODY BOLT HOLES ANSI)

Size	Weight (lbs.)	D1	C	n	e	L	H1	H2	H3	D6
1½"	2.00	1.99	3.88	0.63	4	1.54	2.99	3.74	2.76	7.87
2"	2.65	2.22	4.75	0.75	4	1.65	3.25	3.82	2.76	7.87
2½"	3.32	2.76	5.50	0.75	4	1.81	3.66	4.33	2.76	7.87
3"	3.76	3.11	6.00	0.75	4	1.81	3.94	4.53	2.76	7.87
4"	5.08	4.06	7.50	0.75	8	2.20	4.63	5.31	2.76	9.06
5"	10.38	5.12	8.50	0.87	8	2.60	5.00	6.30	4.02	11.81
6"	12.16	5.94	9.50	0.87	8	2.80	5.63	7.01	4.02	11.81
8"	22.00	7.99	11.75	0.87	8	3.43	8.70	8.27	4.02	15.75

DCW →

PERMA-PIPE®

1310 Quarles Drive, Lebanon, TN 37087 Telephone: 615-444-4910

Ship-To: JONES DRILLING
S-5167 SOUTH PARK AVE
HAMBURG, NY 14075

Customer Contact:

Telephone Number: Fax Number

Date: Tuesday, March 31, 1998

Date Shipped : Tuesday, March 31, 1998

PACKING LIST

Page Number: 1

Packaging	Part Number	Assembly/Part Description	Qty Required	Qty Shipped	Piece Weight
	8004329	PIPE, PE 250 SDR 11	40	40 FT	448.00

[✓] APPROVED
[ ] APPROVED AS NOTED
[ ] REVISE AND RESUBMIT

BY D. Walz DATE 4/9/98

GOLDER ASSOCIATES INC.

THESE DOCUMENTS HAVE BEEN REVIEWED FOR [illegible] SPECIFICATIONS [illegible] CONFORMANCE AND [illegible] INSTALLATION METHODS.

10" Well Casing

Shipment Number: 7595

Job Number: GL-8083

Carrier Name: CONWAY SOUTHERN

Pro Number: 539 223053

Trailer Number: MR8558

Truck: 0

Shipment Weight: 175.00

ELECTRICAL SUBMITTAL

ITEM Level Control System

SPECIFICATION SECTION 16000

MANUFACTURER Warrick

PROJECT EW-13 Installation, Textron Realty Operations Inc. Facility

LOCATION Wheatfield, New York

ARCHITECT _____ CHECKED BY _____

ENGINEER Golder Associates CHECKED BY _____

ELECTRICAL CONTRACTOR Weydman Electric, Inc. CHECKED BY KA

OWNER

~~SUB-CONTRACTOR~~ Textron Realty CHECKED BY _____

ELECTRICAL CONTRACTOR (fill out)

1. Lighting Fixtures
   a. Voltage _____
   b. Ballast Type _____
   c. Lens Type _____
   d. Mounting _____
   e. Options _____

2. Equipment
   a. Voltage _____
   b. Load _____
   c. Motor Power Factor _____
   d. Starter(s) _____
   e. Disconnect(s) By _____

3. _____

4. _____

5. _____

I hereby certify that the item submitted herein complies in every respect with the Contract Drawings and Specifications.

SIGNED _____

POSITION Robert E. Hobba, Vice President

DATE 5/1/98

ENGINEER (fill out)

( ) No Exception Taken
(✓) Make Correctiions Noted
(Resubmission Not Required)
( ) Revise and Resubmit
( ) Rejected

Checking is only for conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Contractor is responsible for dimensions to be confirmed and correlated at the job site, for information that pertains solely to the fabrication processed or to techniques of construction, and for coordination of the work of all trades.

SIGNED _____

DATE 5/8/98

COMMENTS _____

( ) Quantities Not Checked
( ) Color(s) As Selected By Architect
( ) Verify Exact Ceiling Type
( ) Submit To Power Company For Approval

_____

_____

_____

RL Stone company inc
630 Cleveland Dr., Buffalo, NY 14225-1098 ▪ Tel: 716-834-2525 ▪ Fax: 716-834-4082

Representatives & Distributors

SUBMITTAL FOR APPROVAL

PROJECT	: BELL AEROSPACE TEXTRON WHEATFIELD NY
ENGINEER	: GOLDER ASSOCIATES
CONTRACTOR	: WEYDMAN ELECTRIC
P.O. #	: 9804
SETS SUBMITTED	: 5 SETS
DATE	: 4/22/98

1215 Mt. Read Blvd., Rochester, NY 14606-2817 ▪ Tel: 716-254-2100 ▪ Fax: 716-254-0889
115 Ainsley Dr., Syracuse, NY 13210-4284 ▪ Tel: 315-479-7979 ▪ Fax: 315-479-5402
257 Osborne Rd., Albany, NY 12211-1894 ▪ Tel: 518-459-7900 ▪ Fax: 518-459-0001

SUBMITTAL FOR APPROVAL
BELL AEROSPACE TEXTRON
WHEATFIELD NY
4/22/98

BILL OF MATERIAL

WARRICK

SPEC. 973-9170 REV. 2

EW 13

		REFERENCE
1 EA.	WARRICK LEVEL CONTROL SYSTEM CONSISTS OF:	B3003D, B3032D 173A

- (1) 2D1F4-2Z1E RELAY MOUNTED IN NEMA 4 ENCLOSURE, 10,000 SENSITIVITY B or C only
- (1) 3E3A THREE POSITION ELECTRODE HOLDER
- (3) 3W2 ELECTRODE 304 SS.
- (3) 3Z1A SUSPENSION CABLE 50'
- (3) 3Z1B ADAPTERS

PLEASE RETURN ONE SET MARKED APPROVED.

Jim Heisler / Chuck DiLullo

JIM HEISLER / CHUCK DILULLO
R.L. STONE CO., INC.

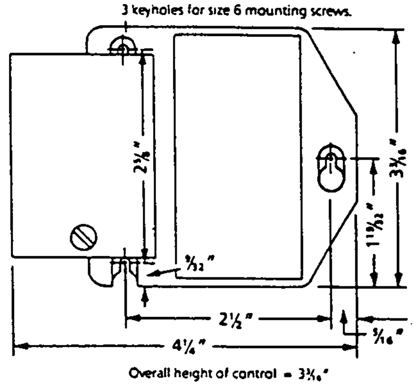
Bw

Controls. (continued)

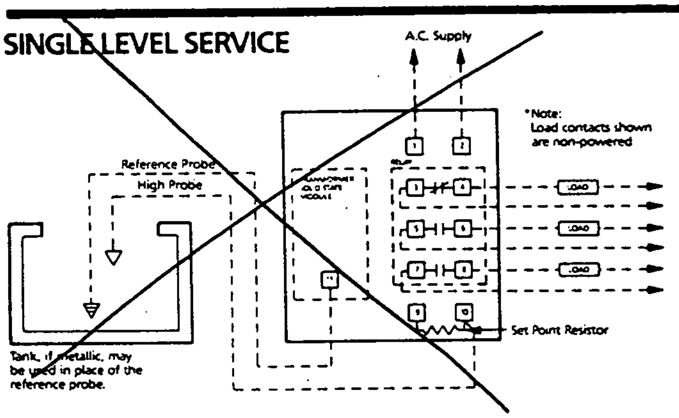
Solid state—high amperage contact rating.

Series 2. The controls have low probe voltage and are U.L. listed. Two or three pole electromechanical relays are available with 16A current ratings, double break bridge type contacts. Sensitivity up to 100,000 OHM-centimeter specific resistance. Sensitivity and mode of operation are field adjustable.

*NOTE: Series 2 control not recommended for interfacing to microprocessor-based systems.



SINGLE LEVEL SERVICE



DIFFERENTIAL SERVICE

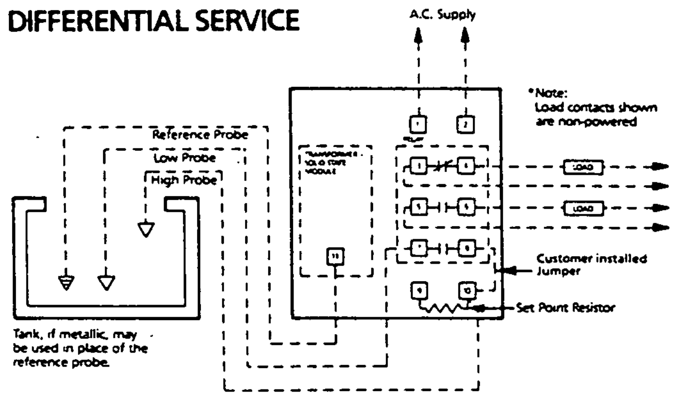


Table 16-1

	Design	Contact Design	Contact Rating at 110 VAC	Mode of [illegible] Operation	Sensitivity	Prim. Volt VAC	Secondary Voltage VAC	[illegible] Listing	Connections	Options and Adjustments	Ordering Information (Page)
Series 2	Electro-mechanical/ solid state	2 Pole 3 Pole single thr. elec-mech. relay	16 AMP Resistive 1 H.P.	Direct/ Inverse field adj.	0-100,000 OHM field adj.	[illegible] 115 230 460 575	10V	[illegible]	All screw type conn.	[illegible]	25

Series 2 Controls

ORDER BY COMPONENT NUMBER--------------- 2XXXX-2Z1X

2ND PLACE SYMBOL — Contact Configuration

	N.O.	N.C.
C	2	0
D	1	1
E	0	2
F	3	0
G	2	1
H	1	2
J	0	3

3RD PLACE SYMBOL — A.C. Line Volts & Freq. 50/60 HZ

1	115V
2	230V
4	460V
5	575V

4TH PLACE SYMBOL — Maximum Sensitivity Capability in Ohms

F	100,000

5TH PLACE SYMBOL — Nema Type Enclosure

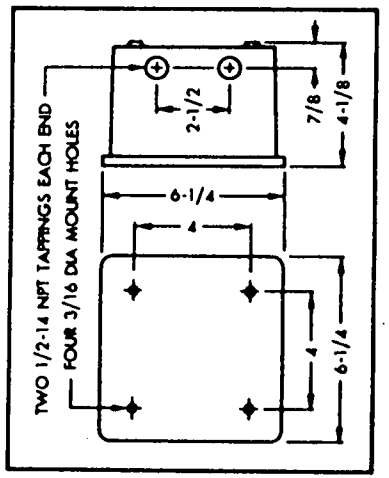
0	Open
1	1
4	3, 4, 5
7	7, 9,
12	12

9TH PLACE SYMBOL — Sensitivity – Ohms

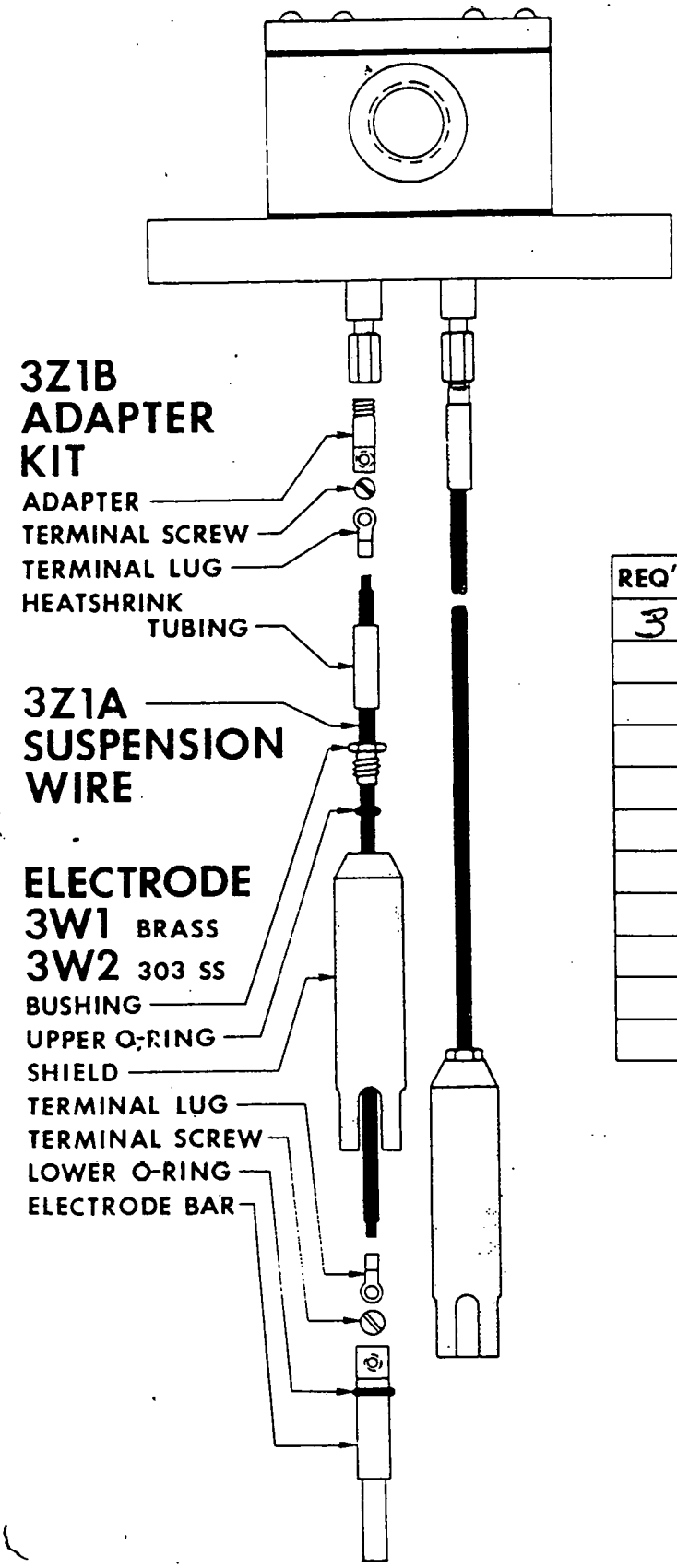
A	470	E	10,000
B	1,000	F	22,000
C	2,200	G	47,000
D	4,700	H	100,000

WEATHERPROOF, NEMA-3
WATERTIGHT, NEMA-4
DUST TIGHT, NEMA-5

This multipurpose enclosure is fabricated from diecast aluminum and provided with a blue, fused epoxy coat. A rubber gasket, retained in a groove in the cover, insures a tight seal between the cover and box. The cover is secured to the box with four captivated screws located at the corners of the cover.



TYPICAL SERIES 3 ELECTRODE FITTING



The type 3Z1B adapter kit facilitates the use of wire suspended electrodes with electrode fittings which possess ¼-20 tapped electrode couplings. One kit is required per wire suspended electrode.

Each kit consists of four parts. These are the adapter, terminal screw, terminal lug and heatshrink tubing. Proceed as follows to perform the installation of the adapter kit.

Mate the threaded end of the adapter with the tapping in the hexagonal coupling of the electrode fitting. Hold the coupling with a small wrench and use a second wrench to tighten the adapter in the coupling. Strip the insulation from the suspension wire a distance of ¼ inch from the end of the wire. Crimp the terminal lug on the wire. Slip the heatshrink tubing over the terminal lug and on to the wire a short distance. Place the terminal lug on the adapter, oriented so the barrel of the terminal lug is in line with the semi-circular cross section portion of the adapter. Secure the terminal lug to the adapter with the terminal screw. Push the heatshrink tubing up over the assembled parts until the upper end of the tubing reaches the lower end of the coupling. Heat the tubing until it shrinks tightly on to the adapter and insulation of the suspension wire. A heat gun, cigarette lighter or even matches may be used for this purpose.

REQ'D	~~3W1~~	3W2	3Z1A	3Z1B	TAG
3		✓	✓	✓	

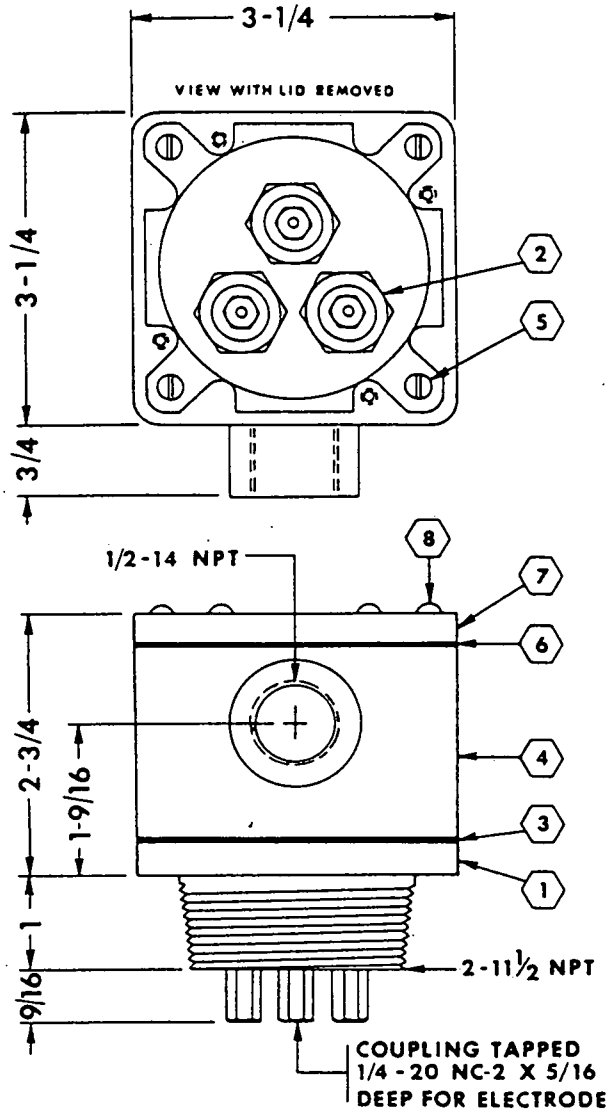
The wire suspended electrode consists of seven parts. These are illustrated in the diagram which shows the unassembled electrode. With the exception of the lower O-ring and electrode bar, none of the parts are preassembled by the manufacturer. Assembly is performed in the field incident to installation of the electrode on the suspension wire.

Assemble as shown in the diagram. Slip the bushing, upper O-ring and shield over the end of the wire in that order before the terminal lug is crimped onto the stripped end of the wire. Otherwise it will be necessary to pull the entire length of wire through those parts after the terminal lug has been fastened to the electrode bar.

NOTE: The suspension wire must have an outside diameter between 0.155 and 0.187 inch, preferrably on the high side. If it is less than 0.155 inch the tubing may not clasp the wire tightly after the shrink operation has been completed. This requirement is satisfied by type 3Z1A suspension wire.

A. C. LINE:	SCALE: NONE	TITLE: SERIES 3WX ELECTRODES & ACCESSORIES
DATE: MAR 87	DRWN BY: JC	
SHEET NO: 1	CHKD BY:	
WARRICK CONTROLS, INC. ROYAL OAK, MI.		DRWG NO: B3032D

	BILL OF MATERIAL
1	BODY: CAST IRON P/N 3P126 RED BRASS P/N 3P127 316 SS P/N 3P128
2	ELECTRODE FITTING: SERIES 383A ON CAST IRON & RED BRASS, SERIES 381B ON 316 SS
3	GASKET P/N 3P108
4	HOUSING P/N 3P102
5	SCREW P/N 3P113
6	GASKET P/N 3P111
7	LID P/N 3P105
8	SCREW P/N 3P115



SERIES 3E3 ~~A~~ B or C ELECTRODE FITTING

BODY MATERIAL

~~A-CAST IRON~~

B-RED BRASS ← OR

C-316 SS ←

Dcw

A. C. LINE:	SCALE: NONE	TITLE: SERIES 3E3X ELECTRODE FITTING	
DATE:- 31 May 1988	DRWN BY: JC		
SHEET NO: 1	CHKD BY:		
WARRICK CONTROLS, INC. 4237 NORMANDY CT., ROYAL OAK MI 48073-2284		DRWG NO: B3003D	

WARRICK CONTROLS

FORM 173A

RECOMMENDED ELECTRODE FITTING GROUNDING METHODS

GENERAL:

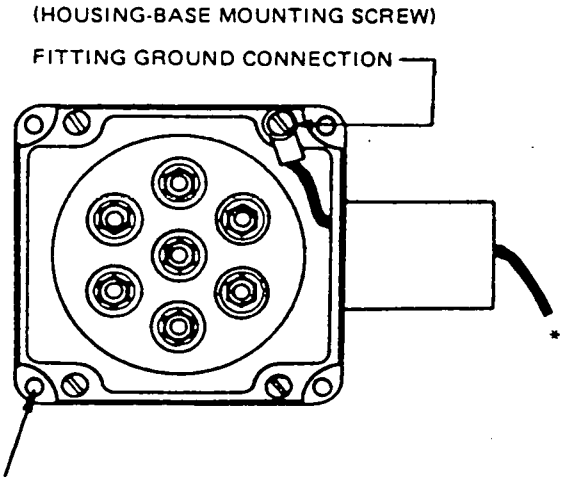
1) Always follow good N.E.C. (C.E.C.) grounding and bonding wiring procedures.
2) Use 'approved' insulated ring terminals for all wiring connections.
3) Use # 14 or # 16 AWG, type MTW or THHN copper wire only.
4) Wiring must be rated higher than nominal voltage and temperature values anticipated in installation.

INSTALLATION:

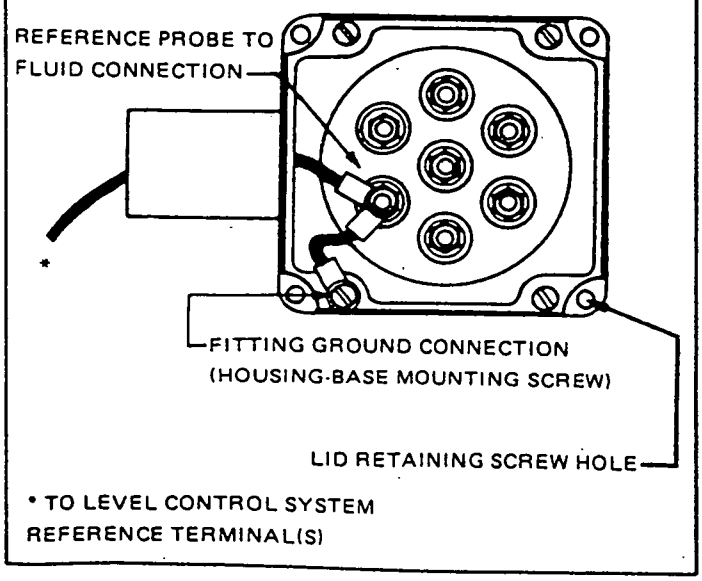
1) During installation orient the fitting so the tapped hub on the terminal housing faces the most favorable direction for receiving the conduit from the control box.

2) After conduit has been installed and conductors pulled through same, fasten the incoming ground conductor(s) as shown below; the ground connection should be facilitated by securing that end of the system ground wire to one of the four screws provided which hold the terminal housing to the body of the electrode fitting.

FOR METALLIC VESSEL



FOR NON-METALLIC VESSEL



*FOR ADDITIONAL INFORMATION, SEE RESPECTIVE LEVEL CONTROLS INSTALLATION INSTRUCTIONS.

WARRICK CONTROLS, INC., 4237 NORMANDY COURT, ROYAL OAK, MI 48073 • PH. 810/549-4900

DOUBLE-PIPE GENERAL NOTES

1.0 2" PRODUCT PIPE SHALL BE STRESS RELIEVED POLYPROPYLENE SDR 11 (PN-10) AND SHALL MEET THE SPECIFICATIONS OF TYPE 1 HOMOPOLYMER AS DETAILED IN ASTM STANDARD SPECIFICATION F-4101.

2.0 PRODUCT PIPE AND CONTAINMENT PIPE FITTINGS SHALL BE UNITIZED. AND FACTORY MANUFACTURED. UNITIZED FITTING ASSEMBLIES SHALL BE BUTT FUSED IN THE FIELD TO STRAIGHT LENGTHS OF PIPE. CARRIER AND CONTAINMENT PIPE FITTINGS SHALL MATCH ADJACENT PIPE. ALL FITTINGS SHALL BE DOUBLE RESTRAINED.

3.0 6" CONTAINMENT PIPE SHALL BE SDR 32.5, HIGH DENSITY POLYETHYLENE PE3408 IN ACCORDANCE WITH ASTM D3350. AND SHALL MEET THE SPECIFICATIONS OF TYPE 1 HOMOPOLYMER AS DETAILED IN ASTM STANDARD SPECIFICATION F-4101.

4.0 ALL SUPPORTS SHALL BE CIRCULAR WELDED TO THE CARRIER PIPE. THE SUPPORTS AT BOTH ENDS OF EVERY STRAIGHT LENGTH SHALL BE FACTORY WELDED TO BOTH THE CARRIER AND CONTAINMENT PIPES. SUPPORTS SHALL FACILITATE THE DRAINAGE OF THE CONTAINMENT PIPE.

5.0 END SEALS SHALL BE FACTORY FABRICATED TO PREVENT THE INGRESS OF MOISTURE INTO THE SYSTEM. FACTORY FABRICATED END SEALS SHALL ALLOW FOR COMPLETE DRAINAGE OF THE SYSTEM.

6.0 PRODUCT LINE DESIGN TEMPERATURE SHALL BE 70 DEG F.
PRODUCT LINE DESIGN PRESSURE SHALL BE 25 PSIG

7.0 FIELD JOINTS SHALL BE ACCOMPLISHED BY SIMULTANEOUSLY WELDING THE CARRIER AND CONTAINMENT PIPES.

8.0 CONNECTIONS TO TANKS AND EQUIPMENT, INCLUDING UNCONTAINED OR EXISTING PIPING, PLUS ALL WALL SLEEVES AND SEALS SHALL BE BY THE INSTALLING CONTRACTOR.

9.0 CONTAINMENT PIPE SHALL BE EQUIPPED WITH PROVISIONS FOR A CABLE LEAK DETECTION SYSTEM. LEAK DETECTION SYSTEM SHALL BE CONNECTED TO THE EXISTING LEAK DETECTION SYSTEM SUPPLIED UNDER A PREVIOUS CONTRACT.

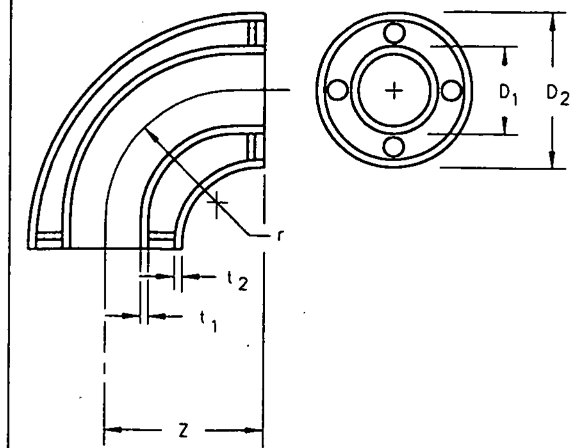
10.0 CABLE AND CABLE CONNECTORS SHALL BE INSTALLED IN ACCORDANCE WITH THE PAL-AT INSTALLATION MANUAL

11.0 CARE MUST BE TAKEN TO STORE ALL PAL-AT COMPONENTS IN A DRY AND PROTECTED AREA AT ALL TIMES. ELECTRONIC ALARM/LOCATOR UNITS AND SENSING CABLE SHOULD BE WRAPPED AND SEALED WITH PLASTIC.

12.0 THE DOUBLE-PIPE SYSTEM MUST BE KEPT DRY DURING INSTALLATION. IF IT BECOMES WET, THE CONTRACTOR MUST DRY THE OUTER PIPE BEFORE ACTIVATING THE LEAK DETECTION SYSTEM.

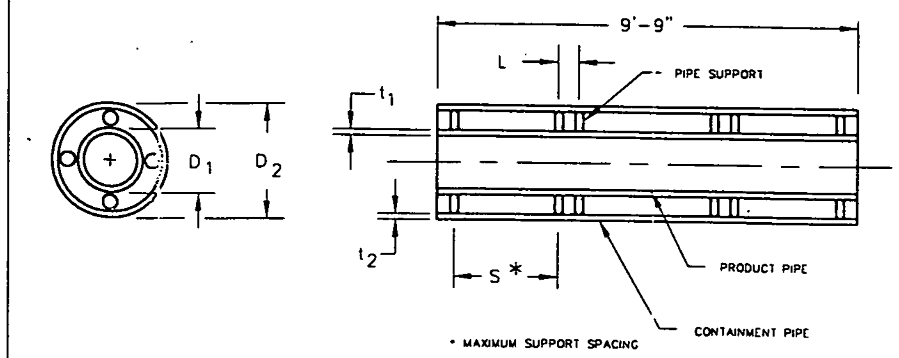
16. THE LEAK DETECTION SYSTEM SHALL INCLUDE THE FOLLOWING MATERIALS.

QTY	DESCRIPTION
5 FEET	AGW LEAK DETECTION CABLE
2	AGW CONNECTORS



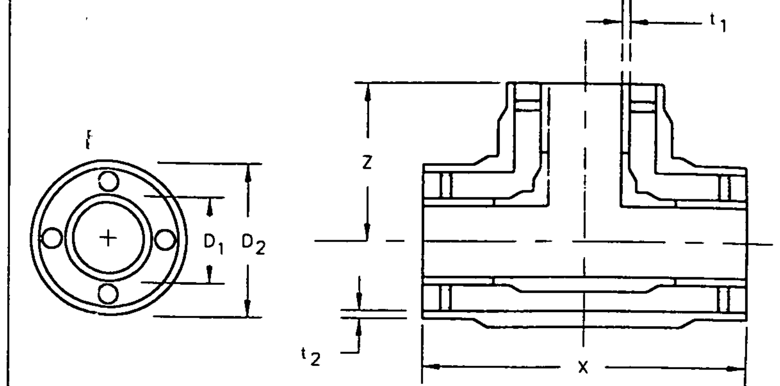
NOMINAL PIPE SIZE		SDR 11		SDR 32.5			
INNER (IN.)	OUTER (IN.)	D_1 (IN.)	t_1 (IN.)	D_2 (IN.)	t_2 (IN.)	r (IN.)	Z (IN.)
2	6	2.48	.23	6.30	.197	3.74	6.53

DOUBLE-QUIK
POLYPROPYLENE
90° ELBOW



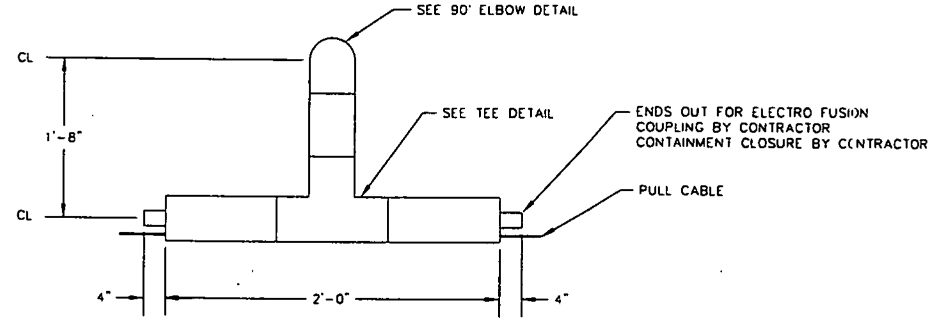
NOMINAL PIPE SIZE		SDR 11		SDR 32.5			
INNER (IN.)	OUTER (IN.)	D_1 (IN.)	t_1 (IN.)	D_2 (IN.)	t_2 (IN.)	S (FT.)	L (IN.)
2	6	2.48	.23	6.30	.197	5	4

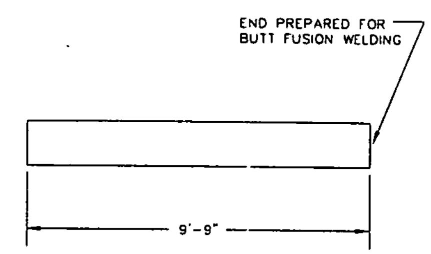
DOUBLE-QUIK
POLYPROPYLENE
STRAIGHT ASSEMBLY

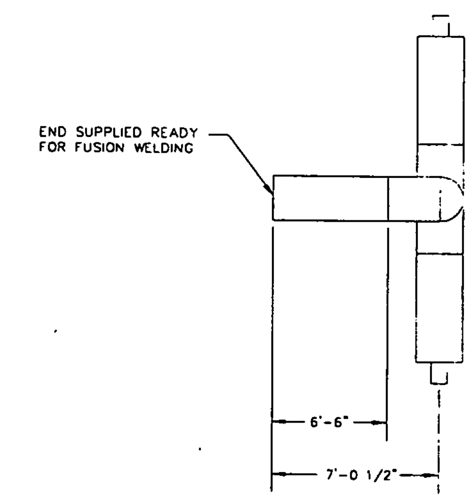


NOMINAL PIPE SIZE		SDR 11		SDR 32.5			
INNER (IN.)	OUTER (IN.)	D_1 (IN.)	t_1 (IN.)	D_2 (IN.)	t_2 (IN.)	Z (IN.)	X (IN.)
2	6	2.48	.23	6.30	.197	6.50	12.99

DOUBLE-QUIK
POLYPROPYLENE
TEE







(✓) APPROVED
( ) APPROVED AS NOTED
( ) REVISE AND RESUBMIT

BY ______ DATE ______

THESE SUBMITTALS DO NOT CONSTITUTE ACCEPTANCE OF YOUR ORDER. A FORMAL ACKNOWLEDGEMENT WILL BE FORWARDED AT TIME OF ACCEPTANCE.

PermAlert A SUBSIDIARY OF PERMA-PIPE, INC.

1/8"=1'

DRAWN BY	KL
APPROVED BY	JC
DATE	5-7-98

NOTICE

REV	DATE	REVISION	BY	APPR.

PermAlert
ENVIRONMENTAL SPECIALTY PRODUCTS INC.
A SUBSIDIARY OF PERMA-PIPE INC.
7720 LEHIGH AVE. NILES ILLINOIS
847-966-2190

FOR

BELL / TEXTRON AEROSPACE

JOB NUMBER	PQA3811	DRAWING NO.	98-230-B
SCALE	NONE	SHEET	1 OF 1
CUSTOMER	MARCOR REMEDIATION, INC.		

APPENDIX D

Acknowledgment of Safety Briefing Sheets

Job No. 983-9180 Short Title: EW-13 SERVICES

ACKNOWLEDGEMENT OF SAFETY BRIEFING

I hereby acknowledge that I have been given a safety briefing on the work I am to do at the above-referenced site. I understand that the site may contain materials classified by EPA or others as potentially hazardous. I have read and understand the safety plans for this project and will adhere to the procedures contained therein. I have been instructed in and understand the use of the safety equipment for this project. I understand that failure to follow the safety plan may result in dismissal from employment.

Employee

DATE 4/6/98

PRINT NAME PHILIP BENCE

SIGNED Philip P. Bence

Project Manager or Representative

DATE 4/6/98

PRINT NAME David Wehn

SIGNED David Wehn

Original - Job File
1 Copy - Personnel File
1 Copy - Safety File

Job No. 983-9180 Short Title: EW-13 ENGINEERING SERVICES

ACKNOWLEDGEMENT OF SAFETY BRIEFING

I hereby acknowledge that I have been given a safety briefing on the work I am to do at the above-referenced site. I understand that the site may contain materials classified by EPA or others as potentially hazardous. I have read and understand the safety plans for this project and will adhere to the procedures contained therein. I have been instructed in and understand the use of the safety equipment for this project. I understand that failure to follow the safety plan may result in dismissal from employment.

Employee

DATE 4-6-98

PRINT NAME MICHAEL J. OUZIEC

SIGNED [signature]

Project Manager or Representative

DATE 4/6/98

PRINT NAME David Wehn

SIGNED [signature]

Original - Job File

1 Copy - Personnel File

1 Copy - Safety File

Job No. 985-9180 Short Title: TEXTRON/EU-13/NY

ACKNOWLEDGEMENT OF SAFETY BRIEFING

I hereby acknowledge that I have been given a safety briefing on the work I am to do at the above-referenced site. I understand that the site may contain materials classified by EPA or others as potentially hazardous. I have read and understand the safety plans for this project and will adhere to the procedures contained therein. I have been instructed in and understand the use of the safety equipment for this project. I understand that failure to follow the safety plan may result in dismissal from employment.

Employee

DATE 5/26/98

PRINT NAME Rob Darger

SIGNED

Project Manager or Representative

DATE 5/26/98

PRINT NAME David Wohnf

SIGNED

Original - Job File

1 Copy - Personnel File

1 Copy - Safety File

Job No. 983-9180 Short Title: TEKTRON/EW-13/NY

ACKNOWLEDGEMENT OF SAFETY BRIEFING

I hereby acknowledge that I have been given a safety briefing on the work I am to do at the above-referenced site. I understand that the site may contain materials classified by EPA or others as potentially hazardous. I have read and understand the safety plans for this project and will adhere to the procedures contained therein. I have been instructed in and understand the use of the safety equipment for this project. I understand that failure to follow the safety plan may result in dismissal from employment.

Employee

DATE 26 May 98

PRINT NAME Lee Blount

SIGNED _____

Project Manager or Representative

DATE 5/26/98

PRINT NAME David Wehn

SIGNED _____

Original - Job File

1 Copy - Personnel File

1 Copy - Safety File

Job No. 983-980 Short Title: TERTRON/EW-13/NY

ACKNOWLEDGEMENT OF SAFETY BRIEFING

I hereby acknowledge that I have been given a safety briefing on the work I am to do at the above-referenced site. I understand that the site may contain materials classified by EPA or others as potentially hazardous. I have read and understand the safety plans for this project and will adhere to the procedures contained therein. I have been instructed in and understand the use of the safety equipment for this project. I understand that failure to follow the safety plan may result in dismissal from employment.

Employee

DATE 26 May 98

PRINT NAME Fred Bell

SIGNED Fred Bell

Project Manager or Representative

DATE 5/26/98

PRINT NAME David Wehn

SIGNED Dave Wehn

Original - Job File

1 Copy - Personnel File

1 Copy - Safety File

Job No. 983-9180 Short Title: TEXTRON / EU-13

ACKNOWLEDGEMENT OF SAFETY BRIEFING

I hereby acknowledge that I have been given a safety briefing on the work I am to do at the above-referenced site. I understand that the site may contain materials classified by EPA or others as potentially hazardous. I have read and understand the safety plans for this project and will adhere to the procedures contained therein. I have been instructed in and understand the use of the safety equipment for this project. I understand that failure to follow the safety plan may result in dismissal from employment.

Employee

DATE 8-3-98

PRINT NAME Christopher Rath

SIGNED [signature]

Project Manager or Representative

DATE 8/3/98

PRINT NAME David Wohn

SIGNED [signature]

Original - Job File

1 Copy - Personnel File

1 Copy - Safety File

Job No. 983-9180 Short Title: Tenton / EW-B / NV

ACKNOWLEDGEMENT OF SAFETY BRIEFING

I hereby acknowledge that I have been given a safety briefing on the work I am to do at the above-referenced site. I understand that the site may contain materials classified by EPA or others as potentially hazardous. I have read and understand the safety plans for this project and will adhere to the procedures contained therein. I have been instructed in and understand the use of the safety equipment for this project. I understand that failure to follow the safety plan may result in dismissal from employment.

Employee

DATE 8/3/98

PRINT NAME Dave Panek

SIGNED Dave Panek

Project Manager or Representative

DATE 8/3/98

PRINT NAME David Wehn

SIGNED David Wehn

Original - Job File

1 Copy - Personnel File

1 Copy - Safety File

Job No. 983-9180 Short Title: TEXTRON / EW-13 / NY

ACKNOWLEDGEMENT OF SAFETY BRIEFING

I hereby acknowledge that I have been given a safety briefing on the work I am to do at the above-referenced site. I understand that the site may contain materials classified by EPA or others as potentially hazardous. I have read and understand the safety plans for this project and will adhere to the procedures contained therein. I have been instructed in and understand the use of the safety equipment for this project. I understand that failure to follow the safety plan may result in dismissal from employment.

Employee

DATE 8/3/98

PRINT NAME Lonnie Hines

SIGNED [signature]

Project Manager or Representative

DATE 8/3/98

PRINT NAME Daniel Wehn

SIGNED [signature]

Original - Job File

1 Copy - Personnel File

1 Copy - Safety File

APPENDIX E

Well Drillhole and Installation Logs

MONITORING WELL INSTALLATION LOG

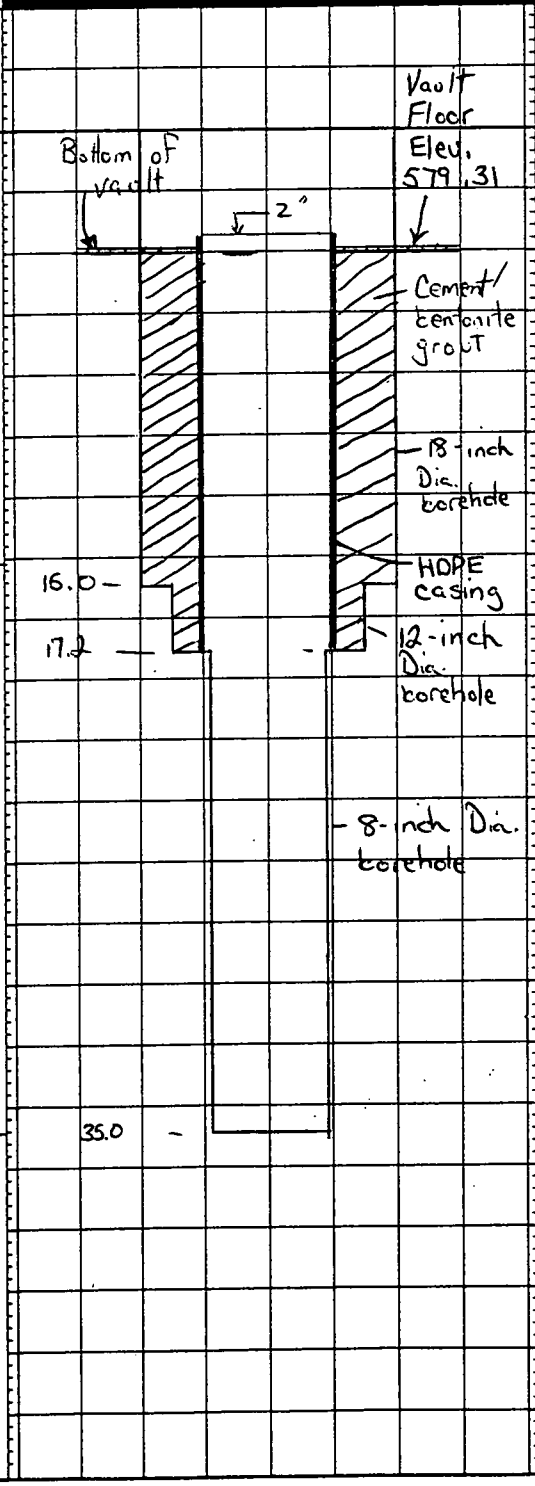
Job No. 983-9180 Project TEXACO / EW-13 ENG. SERVICES / NV Well No. EW-13 Sheet 1 of 1
GA Insp. D. WEHN Drilling Method SEE NOTES Ground Elev. NA Water Depth N/A
Weather RAIN Drilling Company MAXIM TECHNOLOGIES INC. Collar Elev. NA Date/Time N/A
Temp. 50°F Drill Rig FAILING F-10 Driller P. BENCE Started 13:30 (TIME) 4/6/98 (DATE) Completed 14:35 (TIME) 4/8/98 (DATE)

MATERIALS INVENTORY

Well Casing 10 in. dia. ____ l.f. Well Screen N/A in. dia. N/A l.f. Bentonite Seal NONE
Casing Type HDPE SDR 11 Screen Type NONE Installation Method N/A
Joint Type NONE Slot Size N/A Filter Pack Qty. N/A
Grout Quantity 100 Gal. Centralizers NONE Filter Pack Type NONE
Grout Type 5% BENTONITE / 95% CEMENT Drilling Mud Type N/A Installation Method N/A

Elev./Depth	Soil/Rock Description
GROUND SURFACE	
0.0	OVERBURDEN See Field Boring Log for monitoring well 96-01(1) for soil description.
14.2	LOCKPORT DOLOMITE See Record of Drillhole for rock core description.
35.0	END OF BOREHOLE

WELL SKETCH



Installation Notes

Augered to 15.0 ft bgs. with 12¼ inch ID augers. Top of rock noted at 14.2 ft bgs. No split spoon soil samples collected due to proximity of monitoring well 96-01(1). Switched to 12-inch Tri-cone bit using air to cut HDPE casing socket from 15.0 to 17.2 ft bgs. Once casing was set and grouted, borehole was drilled with 8-inch tricone carbide button bit to 25 ft bgs with air. HW wireline core was collected from 25 to 35 ft bgs and taken by USGS. Borehole reamed with air from 25 to 35 ft bgs with same roller bit as before.

Well Development Notes

Approx 100 gal. developed from well by air lift methods through drill rods until water was reasonably clear.

Golder Associates Inc.

RECORD OF DRILLHOLE

Sheet 1 of 1

PROJECT: TEXTRON/ENG. SERVICES DRILLING DATE: 4/8/98
PROJECT NO.: 983-9180
LOCATION: WHEATFIELD, NY DRILL RIG: FAILING F-10

DATUM: MSL COLLAR ELEV.: N/A
COORDINATES: N: 1129549.0 E: 407711.9
AZIMUTH: N/A INCLINATION: 90°

J–Joint, F–Fault, S–Shear, B–Bedding, F–Foliation
PL–Planar, C–Curved, U–Undulating, ST–Stepped, I–Irregular
P–Polished, K–Slickensided, SM–Smooth, R–Rough, VR–V. Rough

DEPTH SCALE (FEET)	DESCRIPTION	GRAPHIC LOG	ELEV / DEPTH (FT)	RUN NO.	CORE RECOVERY	RQD	FRACTURES PER FOOT	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	DISCONTINUITY DATA: GRAPHIC LOG	WEATHERING INDEX (FR, SW, MW, HW, CW)	STRENGTH INDEX (R0, R1, R2, R3, R4, R5)	POINT LOAD INDEX (psi) (Axial / Diametral): R0 1,500, R1 600, R2 300, R3 150, R4 50, R5	NOTES, WATER LEVELS, INSTRUMENTATION
0	NO CORE												
5													
10													
15													
20													
25	LOCKPORT DOLOMITE		25.0	1	3.4/3.4	Estimated 60%	Estimated 3/Ft						Core removed by USGS immediately after retrieval for biologic study. No precise logging possible
30	END OF COREHOLE		30.4										
35													

DEPTH SCALE: SEE ABOVE
DRILLING CONTRACTOR: MARIM
DRILLER: P. BENCE

LOGGED: D. WEHN
CHECKED:
DATE: 4/8/98

Golder Associates

9931114\14507.DWG

APPENDIX F

Drill Cuttings Sample Testing Results

FLI
FRIEND LABORATORY INC

ONE RESEARCH CIRCLE WAVERLY, NY 14892-1532
TELEPHONE (607) 565-3500 FAX (607) 565-4083

DATE : Apr 24, 1998

LAB SAMPLE ID : 77084

Golder Associates, Inc.
David Wehn
2221 Niagara Falls Blvd.
PO Box 4069
Niagara Falls NY 14304-4069

SAMPLE SOURCE	TEXTRON 983-9180
ORIGIN	SOIL
DESCRIPTION	COMPOSITE
SAMPLED ON	04/14/98 by CLIENT
DATE RECEIVED	04/15/98
P.O. NO.	

Analysis Performed	Result	Units	Date Analyzed	Method	Notebook Reference	Analyst
ZHE Extraction	77085		04/17/98	EPA 1311	95-167-47	KAL

For questions regarding this report, please call Customer Services.
cc :

QC QC NY 10252 NJ 73168 PA 68180 EPA NY 00033

Approved by: _____ Lab Director

KEY: ND or U = None Detected < = less than ug/L = micrograms per liter (equivalent to parts per billion)
mg/L = milligrams per liter (equivalent to parts per million) mg/kg = milligrams per kilogram (equivalent to parts per million)
B = analyte was detected in the method or trip blank J = result estimated below the quantitation limit

The information in this report is accurate to the best of our knowledge and ability. In no event shall our liability exceed the cost of these services.
Your samples will be discarded after 14 days unless we are advised otherwise.

"Our family, caring about your analytical needs . . . Since 1963."

FLI
FRIEND LABORATORY I · N · C

ONE RESEARCH CIRCLE WAVERLY, NY 14892-1532
TELEPHONE (607) 565-3500 FAX (607) 565-4083

DATE : Apr 24, 1998

LAB SAMPLE ID : 77084

Golder Associates, Inc.
David Wehn
2221 Niagara Falls Blvd.
PO Box 4069
Niagara Falls NY 14304-4069

SAMPLE SOURCE :	TEXTRON 983-9180
ORIGIN :	SOIL
DESCRIPTION :	COMPOSITE
SAMPLED ON :	04/14/98 by CLIENT
DATE RECEIVED :	04/15/98
P.O. NO. :	

Analysis Performed	Result	Units	Date Analyzed	Method	Notebook Reference	Analyst
ZHE Extraction	77085		04/17/98	EPA 1311	95-167-47	KAL

For questions regarding this report, please call Customer Services.
cc :

QC 5W NY 10252 NJ 73168 PA 68180 EPA NY 00033

Approved by: _____ *Lab Director*

KEY: ND or U = None Detected < = less than
mg/L = milligrams per liter (equivalent to parts per million)
B = analyte was detected in the method or trip blank
ug/L = micrograms per liter (equivalent to parts per billion)
mg/kg = milligrams per kilogram (equivalent to parts per million)
J = result estimated below the quantitation limit

FLI FRIEND LABORATORY INC

Volatiles

ONE RESEARCH CIRCLE WAVERLY, NY 14892-1532
TELEPHONE (607) 565-3500 FAX (607) 565-4083

DATE Apr 28, 1998

LAB SAMPLE ID : 77085

Golder Associates, Inc.
David Wehn
2221 Niagara Falls Blvd.
PO Box 4069
Niagara Falls NY 14304-4069

SAMPLE SOURCE	TEXTRON 983-9180
ORIGIN	77084
DESCRIPTION	ZHE EXTRACT
SAMPLED ON	04/14/98 by CLIENT
DATE RECEIVED	04/15/98
P.O. NO.	

Analyst : SMB Notebook Reference : 98-035-1520
Method : SW846/8260/5030 Units : MG/L Date Analyzed : 04/24/98

Compounds Detected	Results	
Vinyl Chloride	ND<0.025	0.2
1,1-Dichloroethene	ND<0.025	0.7
Methyl Ethyl Ketone	ND<0.25	200.0
Chloroform	ND<0.025	6.0
Carbon Tetrachloride	ND<0.025	0.5
Benzene	ND<0.025	0.5
1,2-Dichloroethane	ND<0.025	0.5
Trichloroethene	ND<0.025	0.5
Tetrachloroethene	ND<0.025	0.7
Chlorobenzene	ND<0.025	100.0
1,4-Dichlorobenzene	ND<0.025	7.5
Surrogate Recovery (%)		
Dibromofluoromethane	97	
Toluene-d8	98	
Bromofluorobenzene	94	

For questions regarding this report, please call and ask for Customer Services.

CC :

QC NY 10252 NJ 73168 PA 68180 EPA NY 00033

Approved by: Lab Director

KEY: ND or U = None Detected < = less than ug/L = micrograms per liter (equivalent to parts per billion)
mg/L = milligrams per liter (equivalent to parts per million) mg/kg = milligrams per kilogram (equivalent to parts per million)
B = analyte was detected in the method or trip blank J = result estimated below the quantitation limit

APPENDIX G

Air Monitoring Results

GOLDER ASSOCIATES INC.

Air Monitoring During Drilling

Sheet 1 of 1

PROJECT NAME: TEXTRON / EW-3 ENG. SERV. / NY
BORING NUMBER: EW-13
PROJECT NUMBER: 983-9180
AMBIENT TEMPERATURE: 50°F
INSTRUMENT USED AND ID NO.: Mini RAE 00084 / Bacharach 4HT
WIND SPEED: 5-10 mph
CALIBRATION NUMBER:
WIND DIRECTION: SE

DATE	TIME	DEPTH OF AUGER*	INSTRUMENT READING
4/6/98	13:45	2 FT BGS	0.0 ppm / 0% LEL
	13:50	5 FT	0.0 ppm / 0% LEL
	14:02	7.5 FT	0.0 ppm / 0% LEL
	14:05	10 FT	0.0 ppm / 0% LEL
	14:20	12.5 FT	0.0 ppm / 0% LEL
	14:23	14.2 FT	0.0 ppm / 0% LEL
	15:50	15 FT	0.0 ppm / 0% LEL
	16:05	15.5 FT	0.0 ppm / 0% LEL
	16:15	16 FT	0.0 ppm / 0% LEL
	16:22	16.5 FT	0.0 ppm / 0% LEL
	16:30	17 FT	0.0 ppm / 0% LEL
4/8/98	9:25	15 FT	0.0 ppm / 0% LEL
	9:45	18 FT	0.0 ppm / 0% LEL
	10:05	22 FT	0.0 ppm / 0% LEL
	10:20	25 FT	0.0 ppm / 0% LEL
	11:10	26 FT	0.0 ppm / 0% LEL
	11:30	28 FT	0.0 ppm / 0% LEL
	12:10	30 FT	0.0 ppm / 0% LEL
	13:30	34 FT	0.0 ppm / 0% LEL
	14:10	32 FT	0.0 ppm / 0% LEL
	14:30	35 FT	0.0 ppm / 0% LEL

* 12" TRICONE BIT AFTER 14.2 FT BGS
8" TRICONE BIT AFTER 17.2 FT BGS
(OR CORE BARREL)

F/N: AIRMONIT.WK1

Golder Associates Inc.

AIR MONITORING DATA SHEET

Date 5/26/98 Sheet 1 of 1

Job Name TEXTRON / EW-13 ENG. SERV. / NY Job Number 983-9180

Location NIAGARA FALLS, NY

Time In _____ Time Out _____ Weather Sun Temp. 70°F Wind D. SE V 0-5

Instrument Type Sentinel 44T Multi-Gas / Mini RAE PID Serial No. N/A

Calibration Gas 30% LEL / 100 ppm Isobutylene Instrument Reading 27% / 98 ppm Span/Gain/RF Setting 100

and Concentration

* If more than one instrument is used, document calibration procedures and results for each additional instrument in recommendations section below and indicate the instrument used (eg. OVA, 361, OVM, etc.) for each observation.

Time	Station	Instr.*	Reading	Procedure/Observations/Comments
9:20	Vault	44T	0% LEL	Vault Excavation
		PID	0 ppm	
9:35	Vault	44T	0% LEL	
		PID	0 ppm	
9:50	Vault	44T	0% LFL	
		PID	0 ppm	
10:10	Vault	44T	0% LEL	
		PID	0 ppm	
11:00	Vault	44T	0% LEL	
		PID	0 ppm	
13:30	Vault	44T	0% LEL	
		PID	0 ppm	

Recommendations

David Wehn
Printed Name

Signature

Golder Associates Inc.

AIR MONITORING DATA SHEET

Date 6/6/98 Sheet 1 of 1

Job Name TETRON / EW-13 ENG SERV. / NY Job Number 983-9180

Location NIAGARA FALLS, NY

Time In _____ Time Out _____ Weather SUN Temp. 60°F Wind D. NE V 0-15

Instrument Type Sentinel 44T Multi-Gas / Mini RAE PID Serial No. N/A

Calibration Gas and Concentration 30% LEL / 100ppm Isu Instrument Reading 27% / 98ppm Span/Gain/RF Setting 100

* If more than one instrument is used, document calibration procedures and results for each additional instrument in recommendations section below and indicate the instrument used (eg. OVA, 361, OVM, etc.) for each observation.

Time	Station	Instr.*	Reading	Procedure/Observations/Comments
8:30	Vault	44T	0% LEL	20.9 Oz EW-13 Excavation
		PID	0ppm	
13:10	Vault	44T	0% LEL	6/2/98 - EW-8 Vault
		PID	0ppm	~~EW-13 Excavation~~
		44T	0% LEL	EW-13 Excavation
		PID	0ppm	
10:30		44T	0% LEL	EW-13 Excavation 6/3/98
		PID	0ppm	NE WINDS 55°F
14:00		44T	0% LEL	EW-7 Vault
		PID	0ppm	
14:00		44T	0% LEL	EW-8 Vault
		PID	0ppm	

Recommendations

David Wehn
Printed Name

Signature

Golder Associates Inc.

AIR MONITORING DATA SHEET

Date 6/4/98 Sheet 1 of ____

Job Name TETRENE / EW-13 ENG SERV. / NY Job Number 983-9180

Location NIAGARA FALLS, NY

Time In ____ Time Out ____ Weather SUN Temp. 60°F Wind D. E V 0-5

Instrument Type Sentinel 44T Multi-Gas / Mini RAE PID Serial No. N/A

Calibration Gas 30% LEL / 100ppm Isc Instrument Reading 27% / 98ppm Span/Gain/RF Setting 100

and Concentration

* If more than one instrument is used, document calibration procedures and results for each additional instrument in recommendations section below and indicate the instrument used (eg. OVA, 361, OVM, etc.) for each observation.

Time	Station	Instr.*	Reading	Procedure/Observations/Comments
8:10		44T	0% LEL	EW-13 Excavation
		PID	0 ppm	
		44T	0% LEL	EW-8
		PID	0ppm	
		44T	0% LEL	EW-7
		PID	0ppm	

Recommendations

David Wehn
Printed Name

Signature

Golder Associates Inc.

AIR MONITORING DATA SHEET

Date 6/9/98 Sheet 1 of 1

Job Name TEXTRON / EW-13 ENG SERV. / NY Job Number 983-9180

Location NIAGARA FALLS, NY

Time In _____ Time Out _____ Weather SUNNY Temp. 55°C Wind D. SW V 0-5

Instrument Type Sentinel 44T Multi-Gas / Mini RAE PID Serial No. N/A

Calibration Gas 30% LEL / 100ppm Isc Instrument Reading 27% / 98ppm Span/Gain/RF Setting 100

and Concentration

* If more than one instrument is used, document calibration procedures and results for each additional instrument in recommendations section below and indicate the instrument used (eg. OVA, 361, OVM, etc.) for each observation.

Time	Station	Instr.*	Reading	Procedure/Observations/Comments
0755		44T	0% LEL	EW-13 EXCAVATION
		PID	0 ppm	

Recommendations

JONATHAN P. RIZZO
Printed Name

Signature

Golder Associates Inc.

AIR MONITORING DATA SHEET

Date 6/12/98 Sheet 1 of 1

Job Name TETRON / EW-13 ENG SERV. / NY Job Number 983-9180

Location NIAGARA FALLS, NY

Time In _____ Time Out _____ Weather INTERMITTENT RAIN Temp. 70°F Wind D. SW V 5-15 MPH

Instrument Type Sentinel 44T Multi-Gas / Mini RAE PID Serial No. N/A

Calibration Gas 30% LEL / 100 ppm Isc. Instrument Reading 27% / 98 ppm Span/Gain/RF Setting 100

and Concentration

* If more than one instrument is used, document calibration procedures and results for each additional instrument in recommendations section below and indicate the instrument used (eg. OVA, 361, OVM, etc.) for each observation.

Time	Station	Instr.*	Reading	Procedure/Observations/Comments
10:30		44T	0% LEL	EW-13 EXCAV. AT SW
		44T	20.4% O_2	
10:35		44T	0% LEL	EW-07 VAULT
		44T	20.4% O_2	

Recommendations

Jonathan P. Rizzo
Printed Name

Signature

Golder Associates Inc.

AIR MONITORING DATA SHEET

Date 6/15/98 Sheet 1 of 1

Job Name TETRON / EW-13 . ENG SERV. / NY Job Number 983-9180

Location NIAGARA FALLS, NY

Time In _____ Time Out _____ Weather OVERCAST Temp. 65°F Wind D. SW V 0-5 MPH

Instrument Type Sentinel 44T Multi-Gas / Mini RAE PID Serial No. N/A

Calibration Gas 30% LEL / 100ppm Isc Instrument Reading 27% / 98ppm Scan/Gain/RF Setting 100

and Concentration

* If more than one instrument is used, document calibration procedures and results for each additional instrument in recommendations section below and indicate the instrument used (eg. OVA, 361, OVM, etc.) for each observation.

Time	Station	Instr.*	Reading	Procedure/Observations/Comments
08:30		44T	0.0 LEL	EW-13 EXCAVATION
			20.4 O_2	
08:35		44T	0.0 LEL	EW-07 VAULT
		44T	20.4 O_2	

Recommendations

Jonathan P. Rizzo
Printed Name

Signature

Golder Associates Inc.

AIR MONITORING DATA SHEET

Date 6/16/98 Sheet 1 of 1

Job Name TEKTRONIX / EW-13 ENG SERV. / NY Job Number 983-9180

Location NIAGARA FALLS, NY

Time In _____ Time Out _____ Weather PARTLY SUNNY Temp. 65°F Wind D. SW V 5 MPH

Instrument Type Sentinel 44T Multi-Gas / Mini RAE PID Serial No. N/A

Calibration Gas 30% LEL / 100 ppm Isc. Instrument Reading 27% / 98 ppm Span/Gain/RF Setting 100

and Concentration

* If more than one instrument is used, document calibration procedures and results for each additional instrument in recommendations section below and indicate the instrument used (eg. OVA, 361, OVM, etc.) for each observation.

Time	Station	Instr.*	Reading	Procedure/Observations/Comments
08:05		44T	20.4% O_2	EW-13 EXCAVATION
			0.0 LEL	
08:10		44T	20.4% O_2	EW-7 VAULT
			0.0 LEL	
08:15		44T	20.4% O_2	EW-8 VAULT
			0.0 LEL	

Recommendations

JONATHAN P. RIZZO
Printed Name

Signature

Golder Associates Inc.

AIR MONITORING DATA SHEET

Date 6/17/98 Sheet 1 of 1

Job Name TECTRON / EW-13 ENG SERV. / NY Job Number 983-9180

Location NIAGARA FALLS, NY

Time In _____ Time Out _____ Weather ~~65°F~~ PARTLY SUNNY Temp. 65°F Wind D. NW V 0-5 MPH

Instrument Type Sentinel 44T Multi-Gas / Mini RAE PID Serial No. N/A

Calibration Gas 30% LEL / 100ppm Isc Instrument Reading 27% / 98ppm Span/Gain/RF Setting 100

and Concentration

* If more than one instrument is used, document calibration procedures and results for each additional instrument in recommendations section below and indicate the instrument used (eg. OVA, 361, OVM, etc.) for each observation.

Time	Station	Instr.*	Reading	Procedure/Observations/Comments
0800		44T	20.4% O_2	EW-13 EXCAVATION
			0.0 LEL	
0805		44T	20.4% O_2	EW-7 EXCAVATION
			0.0 LEL	
0808		44T	20.4% O_2	EW-8 EXCAVATION
			0.0 LEL	

Recommendations

JONATHAN P. REED
Printed Name

Signature

Golder Associates Inc.

AIR MONITORING DATA SHEET

Date 6/18/98 Sheet 1 of 1

Job Name TEXTRON / EW-13 ENG SERV. / NY Job Number 983-9180

Location NIAGARA FALLS, NY

Time In _____ Time Out _____ Weather PARTLY SUNNY Temp. 68°F Wind D. SW V 05 MPH

Instrument Type Sentinel 44T Multi-Gas / Mini RAE PID Serial No. N/A

Calibration Gas 30% LEL / 100 ppm Isc Instrument Reading 27% / 98 ppm Span/Gain/RF Setting 100

and Concentration

* If more than one instrument is used, document calibration procedures and results for each additional instrument in recommendations section below and indicate the instrument used (eg. OVA, 361, OVM, etc.) for each observation.

Time	Station	Instr.*	Reading	Procedure/Observations/Comments
0805		44T	20.4% O_2	EW-13 EXCAVATION
			0.0 LEL	
0810		44T	20.9% O_2	EW-7 VAULT
			0.0 LEL	
0815		44T	20.7% O_2	EW-8 VAULT
			0.0 LEL	
1410		44T	20.4% O_2	EW-9 VAULT
			0.0 LEL	

Recommendations

JONATHAN P. RIZZO
Printed Name

Signature

Golder Associates Inc.

AIR MONITORING DATA SHEET

Date 6/19/98 Sheet 1 of 1

Job Name TETRON / EW-13 ENG SERV. / NY Job Number 983-9180

Location NIAGARA FALLS, NY

Time In _____ Time Out _____ Weather SUNNY Temp. 75°F Wind D. S V 0-5MPH

Instrument Type Sentinel 44T Multi-Gas / Mini RAE PID Serial No. N/A

Calibration Gas 30% LEL / 100ppm Isc Instrument Reading 27% / 98ppm Span/Gain/RF Setting 100

and Concentration

* If more than one instrument is used, document calibration procedures and results for each additional instrument in recommendations section below and indicate the instrument used (eg. OVA, 361, OVM, etc.) for each observation.

Time	Station	Instr.*	Reading	Procedure/Observations/Comments
0815		44T	20.4% O_2	EW-13 EXCAVATION
			0.0 LEL	
0820		44T	20.4% O_2	EW-7 VAULT
			0.0 LEL	
0825		44T	20.4% O_2	EW-8 - VAULT
			0.0 LEL	

Recommendations

JONATHAN P. RIZZO
Printed Name

Signature

Golder Associates Inc.

AIR MONITORING DATA SHEET

Date 4/23/98 Sheet 1 of 1

Job Name TETRA TECH / EW-13 ENG SERV. / NY Job Number 983-9180

Location NIAGARA FALLS, NY

Time In _____ Time Out _____ Weather Overcast Temp. 80°F Wind D. E V 0-5

Instrument Type Sentinel 44T Multi-Gas / Mini RAE PID Serial No. N/A

Calibration Gas 30% LEL / 100ppm Isc. Instrument Reading 27% / 98ppm Span/Gain/RF Setting 100

and Concentration

* If more than one instrument is used, document calibration procedures and results for each additional instrument in recommendations section below and indicate the instrument used (eg. OVA, 361, OVM, etc.) for each observation.

Time	Station	Instr.*	Reading	Procedure/Observations/Comments
10:10		44T	0% LEL	EW-13 Excavation
		PID	0 ppm	
		44T	0% LEL	EW-7 Vault
		PID	0 ppm	
		44T	0% LEL	EW-8 Vault
		PID	0ppm	

Recommendations

David Wohn
Printed Name

Signature

Golder Associates Inc.

AIR MONITORING DATA SHEET

Date 6/29/98 Sheet 1 of 1

Job Name TETRA TECH / EW-13 ENG SERV. / NY Job Number 983-9180

Location NIAGARA FALLS, NY

Time In _____ Time Out _____ Weather ~~80°~~ P. Sunny Temp. 80°F Wind D. E V 0-5

Instrument Type Sentinel 44T Multi-Gas / Mini RAE PID Serial No. N/A

Calibration Gas 30% LEL / 100ppm Isx Instrument Reading 27% / 85ppm Span/Gain/RF Setting 100

and Concentration

* If more than one instrument is used, document calibration procedures and results for each additional instrument in recommendations section below and indicate the instrument used (eg. OVA, 361, OVM, etc.) for each observation.

Time	Station	Instr.*	Reading	Procedure/Observations/Comments
9:00		44T	0% LEL 20.8% O_2	EW-13 Excavation
		PID	0ppm	
		44T	0% LEL 20.8% O_2	EW-8
		PID	0ppm	
		44T	0% LEL 20.7% O_2	EW-7
		PID	0ppm	

Recommendations

David Wehn
Printed Name

Signature

Golder Associates Inc.

AIR MONITORING DATA SHEET

Date 7/2/98 Sheet 1 of 1

Job Name TEXTRON / EW-13 ENG SERV. / NY Job Number 983-9180

Location NIAGARA FALLS, NY

Time In _____ Time Out _____ Weather Sunny Temp. 70°F Wind D. ___ V 0

Instrument Type Sentinel 44T Multi-Gas / Mini RAE PID Serial No. N/A

Calibration Gas 30% LEL / 100ppm Isc Instrument Reading 27% / 8ppm Span/Gain/RF Setting 100

and Concentration * If more than one instrument is used, document calibration procedures and results for each additional instrument in recommendations section below and indicate the instrument used (eg. OVA, 361, OVM, etc.) for each observation.

Time	Station	Instr.*	Reading	Procedure/Observations/Comments
7:50		44T	0% LEL	EW-8
		44T	20.9% O2	
		PID	0ppm	
		44T	0% LEL	Excavation (EW-13)
		44T	20.9% O2	
		PID	0ppm	
14:00		44T	0% LEL	EW-7
		44T	20.9% O2	
		PID	0 ppm	

Recommendations

David Wehn
Printed Name

Signature

Golder Associates Inc.

AIR MONITORING DATA SHEET

Date 8/3/98 Sheet 1 of 1

Job Name TEXTRON / EW-13 ENG SERV. / NY Job Number 983-9180

Location NIAGARA FALLS, NY

Time In _____ Time Out _____ Weather Sun Temp. 75°F Wind D. E V 0-5

Instrument Type Sentinel 44T Multi-Gas / Mini RAE PID Serial No. N/A

Calibration Gas 30% LEL / 100ppm Isc Instrument Reading 27% / 95ppm Scan/Gain/RF Setting 100

and Concentration

* If more than one instrument is used, document calibration procedures and results for each additional instrument in recommendations section below and indicate the instrument used (eg. OVA, 361, OVM, etc.) for each observation.

Time	Station	Instr.*	Reading	Procedure/Observations/Comments
8:00	EW-7 Vault	44T	0% LEL 20.9% O2	
		PID	0 ppm	
8:00	EW-8 Vault	44T	0% LEL 20.8% O2	
		PID	0 ppm	
13:00	Excavation	44T	0% LEL 20.9% O2	
		PID	0 ppm	

Recommendations

David L Wahn
Printed Name

Dave Wahn
Signature

Golder Associates Inc.

AIR MONITORING DATA SHEET

Date 8/4/98 Sheet 1 of 1

Job Name TETRON / EW-13 ENG SERV. / NY Job Number 983-9180

Location NIAGARA FALLS, NY

Time In _____ Time Out _____ Weather Cloudy Temp. 75°F Wind D. E V 0-5

Instrument Type Sentinel 44T Multi-Gas / Mini RAE PID Serial No. N/A

Calibration Gas and Concentration 30% LEL / 100ppm Isc Instrument Reading 27% / 95ppm Scan/Gain/RF Setting 100

* If more than one instrument is used, document calibration procedures and results for each additional instrument in recommendations section below and indicate the instrument used (eg. OVA, 361, OVM, etc.) for each observation.

Time	Station	Instr.*	Reading	Procedure/Observations/Comments
8:00	EW-7 Vault	44T	0% LEL 20.9 O2	
		PID	0 ppm	
8:00	EW-8 Vault	44T	0% LEL 20.9 O2	
		PID	0ppm	
8:00	Excavation	44T	0% LEL 20.9 O2	
		PID	0 ppm	

Recommendations

David Wehn
Printed Name

Signature

Golder Associates Inc.

AIR MONITORING DATA SHEET

Date 8/5/98 Sheet 1 of 1

Job Name TEXTRON / TEW-13 ENG SERV. / NY Job Number 983-9180

Location NIAGARA FALLS, NY

Time In _____ Time Out _____ Weather Overcast Temp. 80°F Wind D. E V 0-5

Instrument Type Sentinel 44T Multi-Gas / Mini RAE PID Serial No. N/A

Calibration Gas and Concentration 30% LEL / 100ppm Isc Instrument Reading 27% / 98ppm Span/Gain/RF Setting 100

* If more than one instrument is used, document calibration procedures and results for each additional instrument in recommendations section below and indicate the instrument used (eg. OVA, 361, OVM, etc.) for each observation.

Time	Station	Instr.*	Reading	Procedure/Observations/Comments
10:00	EW-7 Vault	44T	0% LEL	20.9% O2
		PID	0 ppm	
	EW-8 Vault	44T	0% LEL	20.9% O2
		PID	0 ppm	
	Excavation	44T	0% LEL	20.9% O2
		PID	0 ppm	

Recommendations

David Weber
Printed Name

Signature

Golder Associates Inc.

AIR MONITORING DATA SHEET

Date 8/6/98 Sheet 1 of 1

Job Name TETRA TECH / EW-13 ENG SERV. / NY Job Number 983-9180

Location NIAGARA FALLS, NY

Time In _____ Time Out _____ Weather Overcast Temp. 80°F Wind D. E V 0-5

Instrument Type Sentinel 44T Multi-Gas / Mini RAE PID Serial No. N/A

Calibration Gas 30% LEL / 100ppm Isobutylene Instrument Reading 27% / 98ppm Span/Gain/RF Setting 100

and Concentration

* If more than one instrument is used, document calibration procedures and results for each additional instrument in recommendations section below and indicate the instrument used (eg. OVA, 361, OVM, etc.) for each observation.

Time	Station	Instr.*	Reading	Procedure/Observations/Comments
8:30	EW-7 Vault	44T	0% LEL 20.9% O2	
		PID	0 ppm	
	EW-8 Vault	44T	0% LEL 20.8% O2	
		PID	0 ppm	
	Excavation	44T	0% LEL 20.9% O2	
		PID	0 ppm	

Recommendations

David Wehn
Printed Name

Signature

Golder Associates Inc.

AIR MONITORING DATA SHEET

Date 8/7/98 Sheet 1 of 1

Job Name TETRA TECH / EW-13 ENG. SERV. / NY Job Number 983-9180

Location NIAGARA FALLS, NY

Time In _____ Time Out _____ Weather Overcast Temp. 85°F Wind D. E V 0-10

Instrument Type Sentinel 44T Multi-Gas / Mini RAE PID Serial No. N/A

Calibration Gas and Concentration 30% LEL / 100ppm Isc Instrument Reading 27% / 98ppm Span/Gain/RF Setting 100

* If more than one instrument is used, document calibration procedures and results for each additional instrument in recommendations section below and indicate the instrument used (eg. OVA, 361, OVM, etc.) for each observation.

Time	Station	Instr.*	Reading	Procedure/Observations/Comments
8:30	EW-7 Vault	44T	0% LEL	20.9% O2
		PID	0 ppm	
	EW-8 Vault	44T	0% LEL	20.9% O2
		PID	0ppm	
	Excavation	44T	0% LEL	20.9 % O2.
		PID	0ppm	

Recommendations

David Wehn
Printed Name

Signature

Golder Associates Inc.

AIR MONITORING DATA SHEET

Date 8/10/98 Sheet 1 of 1

Job Name TEXTRON / EW-13 ENG SERV. / NY Job Number 983-9180

Location NIAGARA FALLS, NY

Time In _____ Time Out _____ Weather _____ Temp. 75°F Wind D. _____ V 0

Instrument Type Sentinel 44T Multi-Gas / Mini RAE PID Serial No. N/A

Calibration Gas and Concentration 30% LEL / 100ppm Isc Instrument Reading 27% / 98ppm Scan/Gain/RF Setting 100

* If more than one instrument is used, document calibration procedures and results for each additional instrument in recommendations section below and indicate the instrument used (eg. OVA, 361, OVM, etc.) for each observation.

Time	Station	Instr.*	Reading	Procedure/Observations/Comments
9:00	EW-7 Vault	44T	0% LEL 20.9% O2	
		PID	0 ppm	
	EW-8 Vault	44T	0% LEL	20.9% O2
		PID	0 ppm	
	EW-8 Vault	44T	0% LEL	20.9% O2
		PID	0 ppm	

Recommendations

David Wohl
Printed Name

Signature

Golder Associates Inc.

AIR MONITORING DATA SHEET

Date 8/11/98 Sheet 1 of 1

Job Name TEXTRON / EW-13 ENG SERV. / NY Job Number 983-9180

Location NIAGARA FALLS, NY

Time In _____ Time Out _____ Weather overcast Temp. 80°F Wind D. E V 0-5

Instrument Type Sentinel 44T Multi-Gas / Mini RAE PID Serial No. N/A

Calibration Gas and Concentration 30% LEL / 100ppm Isc Instrument Reading 27% / 98ppm Span/Gain/RF Setting 100

* If more than one instrument is used, document calibration procedures and results for each additional instrument in recommendations section below and indicate the instrument used (eg. OVA, 361, OVM, etc.) for each observation.

Time	Station	Instr.*	Reading	Procedure/Observations/Comments
7:40	EW-8	44T	8% O2 - 0% LEL	LOW O2
		PID	0 ppm	
				Open vault + air
7:45	EW-8	44T	20.9% O2	← out
7:45	EW-7	44T	20.8% O2	0% LEL.
		PID	0ppm	

Recommendations

Vault EW-8 should be closed + locked when receiving N_2 from EW-7 while line drying.

David Wehn
Printed Name

Signature

Golder Associates Inc.

AIR MONITORING DATA SHEET

Date 8/12/98 Sheet 1 of 1

Job Name TEXTRON / EW-13 ENG SERV. / NY Job Number 983-9180

Location NIAGARA FALLS, NY

Time In _____ Time Out _____ Weather Sun Temp. 75°F Wind D. N V 0-5

Instrument Type Sentinel 44T Multi-Gas / Mini RAE PID Serial No. N/A

Calibration Gas 30% LEL / 100ppm Isc Instrument Reading 27% / 8ppm Span/Gain/RF Setting 100

and Concentration * If more than one instrument is used, document calibration procedures and results for each additional instrument in recommendations section below and indicate the instrument used (eg. OVA, 361, OVM, etc.) for each observation.

Time	Station	Instr.*	Reading	Procedure/Observations/Comments
8:00	EW-7	44T	20.9% O_2 -	0% LEL
		PID	0ppm	
	EW-8	44T	20.9% O_2	0% LEL
		PID	0 ppm	

Recommendations

David Wohn
Printed Name

Signature

Golder Associates Inc.

AIR MONITORING DATA SHEET

Date 8/13/98 Sheet 1 of 1

Job Name TETRON / EW-13 ENG SERV. / NY Job Number 983-9180

Location NIAGARA FALLS, NY

Time In _____ Time Out _____ Weather Sun Temp. 75°F Wind D. N V 0-5

Instrument Type Sentinel 44T Multi-Gas / Mini RAE PID Serial No. N/A

Calibration Gas 30% LEL / 100ppm Isc Instrument Reading 27% / 98ppm Span/Gain/RF Setting 100

and Concentration

* If more than one instrument is used, document calibration procedures and results for each additional instrument in recommendations section below and indicate the instrument used (eg. OVA, 361, OVM, etc.) for each observation.

Time	Station	Instr.*	Reading	Procedure/Observations/Comments
8:00	EW-7	44T	0% LEL	20.9% O2
		PID	0 ppm	
	EW-8	44T	0% LEL	20.9 % O2
		PID	0ppm	

Recommendations

David Wohn
Printed Name

Dave W
Signature

APPENDIX H

Pipe Pressure Testing Certificates

PIPE TEST CERTIFICATE

	Initial Test Status	Interim Test Status	Interim Test Status	Final Test Status	Duration
Date/Time:	6/12/98 1400	6/12/98 1800		6/13/98 1400	24 HRS.
Temperature (Ambient):	70°F	70°F		68°F	
Test Pressure (psig):	30	30		30	

Test Medium: ( ) Water (x) Air ( ) Nitrogen ( ) _____

Test Specification: TEST WITH AIR TO 30 PSI FOR PERIOD of 24 HOURS (PRE - BACKFILL)

DESCRIPTION OF PIPELINE(S) TESTED

Location: 2" POLY PROPYLENE CARRIER LINE BETWEEN EW-07 AND EW-06 INCLUDING EW-13

Line Numbers: N/A

Portion of Line Tested: (x) All, or ( ) _____

Remarks: None

Test Results: Pass ✓ Fail _____

I certify that the above information is correct and that the pipeline described above was prepared and tested in my presence in accordance with the Specification indicated above.

Signed by	[signature]	Maccor	6/12/98
	Contractor's Representative	Company	Date
Test Witnessed by	[signature]	Golder Associates Inc.	6/12/98
	Owner's Representative	Company	Date

F/N: PIPETEST.WK1

PIPE TEST CERTIFICATE

	Initial Test Status	Interim Test Status	Interim Test Status	Final Test Status	Duration
Date/Time:	6/23/98 16:25	17:25		18:25	2 Hrs.
Temperature (Ambient):	75°F	75°F		75°F	
Test Pressure (psig):	5	5		5	

Test Medium: ( ) Water (✓) Air ( ) Nitrogen ( ) _____

Test Specification: Test with air to 5 psi for min. of 2 hours - bubble check for leaks. PRE-Backfill

DESCRIPTION OF PIPELINE(S) TESTED

Location: Annulus of 6" HDPE Containment pipe between EW-7, EW-8, including EW-13.

Line Numbers: N/A

Portion of Line Tested: (✓) All, or ( ) _____

Remarks: None

Test Results: Pass ✓ Fail _____

I certify that the above information is correct and that the pipeline described above was prepared and tested in my presence in accordance with the Specification indicated above.

Signed by	[signature]	Marcor	6/23/98
	Contractor's Representative	Company	Date
Test Witnessed by	[signature]	Golder Associates	6/23/98
	Owner's Representative	Company	Date

F/N: PIPETEST.WK1

PIPE TEST CERTIFICATE

	Initial Test Status	Interim Test Status	Interim Test Status	Final Test Status	Duration
Date/Time:	7-14-97/1500			7-14-97/1700	2 HRS
Temperature (Ambient):	88°F			88°F	
Test Pressure (psig):	75PSI			75PSI	

Test Medium: (X) Water ( ) Air ( ) Nitrogen ( ) _____

Test Specification: PRESSURIZED TO 75 PSI — WATER PUMPED INTO 2" CARRIER PIPE AND PRESSURIZED — FOR 2 HOURS (POST - BACKFILL)

DESCRIPTION OF PIPELINE(S) TESTED

Location: 2" CARRIER PIPE FROM EW-7 TO EW-8 INCLUDING LINE TO EW-13

Line Numbers: EW-13 FROM EW-7 TO EW-8

Portion of Line Tested: (X) All, or ( ) _____

Remarks: _____

Test Results: Pass X Fail _____

I certify that the above information is correct and that the pipeline described above was prepared and tested in my presence in accordance with the Specification indicated above.

Signed by	[signature]	MARCOR	7/11/98
	Contractor's Representative	Company	Date
Test Witnessed by	[signature]	GOLDER ASSOCIATES	7/14/98
	Owner's Representative	Company	Date

F/N: PIPETEST.WK1

PIPE TEST CERTIFICATE

	Initial Test Status	Interim Test Status	Interim Test Status	Final Test Status	Duration
Date/Time:	7/14/98 - 1700				7/15/98
Temperature (Ambient):	88°F				
Test Pressure (psig):	5 PSI			1.5 PSI	24 HRS

Test Medium: ( ) Water (X) Air ( ) Nitrogen ( ) _____

Test Specification: PRESSURIZE TO 5 PSI AIR — 6" CONTAINMENT FOR 24 HOURS - (POST - BACKFILL)

DESCRIPTION OF PIPELINE(S) TESTED

Location: ANNULUS OF 6" HDPE CONTAINMENT PIPE BETWEEN EW-7, EW-8, AND EW-13

Line Numbers: N/A

Portion of Line Tested: (X) All, or ( ) _____

Remarks: None

Test Results: Pass _____ Fail X

I certify that the above information is correct and that the pipeline described above was prepared and tested in my presence in accordance with the Specification indicated above.

Signed by _____ Contractor's Representative — GOLDER ASSOC. INC. Company — 7/15/98 Date

Test Witnessed by _____ Owner's Representative — _____ Company — 7/15/98 Date

F/N: PIPETEST.WK1

PIPE TEST CERTIFICATE

	Initial Test Status	Interim Test Status	Interim Test Status	Final Test Status	Duration
Date/Time:	8/6/98 12:05	14:15	8/7/98 8:52	12:05	24 H
Temperature (Ambient):	80°F	80°F	70°F	70°F	
Test Pressure (psig):	5	5	5	5	

Test Medium: ( ) Water (✓) Air ( ) Nitrogen ( ) _____

Test Specification: Pre-backfill Test (same spec. as post-backfill test)
Test with air to 5 psi for 24 hours.
No allowable drop.

DESCRIPTION OF PIPELINE(S) TESTED

Location: Annulus of 6" HDPE containment pipe between EW-7, EW-8, and EW-13

Line Numbers: N/A

Portion of Line Tested: (✓) All, or ( ) _____

Remarks: Retest of line after repairs due to failing previous post-backfill test.

Test Results: Pass ✓ Fail _____

I certify that the above information is correct and that the pipeline described above was prepared and tested in my presence in accordance with the Specification indicated above.

Signed by	[signature]	Marcor	8/7/98
	Contractor's Representative	Company	Date
Test Witnessed by	[signature]	Golder Assoc.	8/7/98
	Owner's Representative	Company	Date

F/N: PIPETEST.WK1

PIPE TEST CERTIFICATE

	Initial Test Status	Interim Test Status	Interim Test Status	Final Test Status	Duration
Date/Time:	8/8/98 11:00	8/9/98 11:08			24 H
Temperature (Ambient):	75°F	75°-80°F	→		
Test Pressure (psig):	5	5			

Test Medium: ( ) Water (✓) Air ( ) Nitrogen ( ) _____

Test Specification: Post-backfill test
Test with air to 5 psi for 24 hours.
No allowable drop.

DESCRIPTION OF PIPELINE(S) TESTED

Location: Annulus of 6" HDPE containment pipe between EW-7, EW-8, and EW-13.

Line Numbers: N/A

Portion of Line Tested: (✓) All, or ( ) _____

Remarks: Retest of line after repairs due to failing previous post-backfill test.

Test Results: Pass ✓ Fail _____

I certify that the above information is correct and that the pipeline described above was prepared and tested in my presence in accordance with the Specification indicated above.

Signed by	[signature]	Marcor	8/10/98
	Contractor's Representative	Company	Date
Test Witnessed by	[signature]	Golder Assoc.	8/10/98
	Owner's Representative	Company	Date

F/N: PIPETEST.WK1