FILE: CHAUT CO
CHAUT L.F.

LETTER OF TRANSMITTAL

(716) 665-6610

CHAUTAUQUA COUNTY
DEPARTMENT OF PUBLIC WORKS
DIVISION OF TRANSPORTATION
AND ENGINEERING

454 NORTH WORK STREET
FALCONER, NEW YORK 14733

DATE: 10-2-85
JOB NO.:
ATTENTION:
RE: Order on Consnt #84-164 ?

Peter Buechi
What's the issue?

TO: Regional Director Region IX
600 Delaware Ave.
Buffalo, NY 14202

WE ARE SENDING YOU XX Attached ☐ Under Separate Cover via________the following items:

☐ Shop Drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications

XX Copy of Letter ☐ Change Order ☐ ________

COPIES	DATE	NO.	DESCRIPTION
2	9-30-85	2 p.	Letter from Chaut. Co. DPW to NYSDEC

THESE ARE TRANSMITTED as checked below:

☐ For Approval ☐ Approved as submitted ☐ Resubmit________copies for approval

☐ For your use ☐ Approved as noted ☐ Submit________copies for distribution

☐ As requested ☐ Returned for corrections ☐ Return________corrected prints

☐ For review and comment ☐ ________

☐ FOR BIDS DUE________, 19____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS:

COPY TO Div. of Solid & Hazardous Waste
Div. of Environmental Enforcement

SIGNED: Timothy R. Woodbury

IF ENCLOSURES ARE NOT AS NOTED, KINDLY NOTIFY US AT ONCE.

JOHN A. GLENZER
County Executive

GEORGE W. RIEDESEL
Director of Public Works

CHAUTAUQUA COUNTY
DEPARTMENT OF PUBLIC WORKS
454 NORTH WORK STREET
P. O. BOX 38
FALCONER, NEW YORK 14733
(716) 665-6610

September 30, 1985

Mr. Peter J. Buechi
Associate Sanitary Engineer
NYSDEC
600 Delaware Avenue
Buffalo, NY 14202-1073

Re: Dinsbier Rd. Landfill
Order on Consent No. 84-164

Dear Mr. Buechi:

Your letter dated September 27, 1985 is received. This letter is to confirm today's telephone conversation.

You stated that although the New York State Department of Environmental Conservation does not consider the September 4, 1985 submittal to be a complete work plan, the County may address the comments of your September 27 letter within the fifteen (15) day limit specified in Order on Consent No. 84-164.

This office takes exception to the careless wording of your September 27, 1985 letter. Our intent to utilize a consultant to review existing data was and is based on sound Engineering judgement. Data review shall continue to be an important facet of the investigation. It is wrong for you to dictate the chronology of work tasks needed to complete the investigation. We have reviewed the Order on Consent and consider all of our efforts to date in compliance with the intent and the schedule agreed to in the Order.

We will continue to perform the investigation in conformance with the Order on Consent.

In the future we will attempt to develop a working relationship with your office. We are as concerned about the environmental quality of Chautauqua County as your office.

We will not allow minor technicalities and changes-of-events to disrupt our good faith effort to perform the investigation in compliance with the Order on Consent.

Very truly yours,

CHAUTAUQUA COUNTY D.P.W.

George W. Riedesel, P.E

By: Timothy R. Woodbury
Deputy Director D.P.W.
Division of Environment

TRW:car
cc: NYSDEC - Albany
Robert M. Laughlin, County Attorney
Steven M. Johnson, Chaut. Co. Health Dept.
G.S. Sikora, Dunn Geoscience Corp.

JOHN A. GLENZER
County Executive

GEORGE W. RIEDESEL
Director of Public Works

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CHAUTAUQUA COUNTY D.P.W.

George W. Riedesel, P.E

By: Timothy R. Woodbury
Deputy Director D.P.W.
Division of Environment

TRW:car
cc: NYSDEC - Albany
Robert M. Laughlin, County Attorney
Steven M. Johnson, Chaut. Co. Health Dept.
G.S. Sikora, Dunn Geoscience Corp.

File

Chautauqua County Landfill 3/15/88
Site# 907002

Phone call Don Gibbs 665-6610

(1) D.G. has been assigned the Dunsbeir RD. Job -

(2) D.G. has many questions and would like to come here to discuss the job.

(3) Date set - Friday 3/18/88 10:00 A.M. -

DUNN GEOSCIENCE CORPORATION

Solid Waste Projects 1980 — 1985

PROJECT NAME & LOCATION	NATURE OF FIRM'S RESPONSIBILITY	CLIENT'S NAME AND LOCATION	DATE COMPLETED	FIRM'S FEE In Thousands
Cortland County Regional Landfill, Solon, NY	Suitability study involved field interpretation of site geology and hydrology, evaluation of existing literature and report preparation.	Catoh Environmental (for Resource Engineers, Inc.) Savannah, NY	1984	$8
Municipal Landfill Expansion Niskayuna, NY	Part 360 expansion, and evaluation of existing facility for groundwater contamination. Drilling, groundwater sampling and geologic evaluation.	Town of Niskayuna, NY	1984	15
Proposed Landfill Expansion Utica, NY	Part 360 permit, Monitoring wells, water quality sampling, hydrogeologic investigation.	SCA Services (operator for City of Utica, NY)	1984	75
Investigation of Existing Industrial Landfill, Upstate NY	Investigate source of leachate seepage, geophysical survey, delineate contaminant plume, drill wells, groundwater sampling, hydrogeologic evaluation.	Confidential Industrial client	1982	35
Investigation of Existing Industrial Landfill, Saratoga County, NY	Install monitoring wells, evaluate groundwater quality, delineate and determine flow direction of leachate plume.	Knolls Atomic Power Laboratory, West Milton & Niskayuna, NY	1981	30
Existing Landfill Investigation, Rotterdam, NY	Study leachate problem at municipal landfill: install wells, collect & evaluate samples to determine contaminate migration pattern.	Town of Rotterdam, NY	1981	15
Municipal Landfill Study Richfield Springs, NY	360 Permit: drill monitoring wells, sample water quality, determine quality of landfill cover material.	Town of Richfield Springs, NY	1981	5
Establish Quarry Waste Site Belmont, NH	Solid waste landfill for quarry involves surficial geologic and hydrologic study and detailed permitting procedure.	Pike Industries Tilton, NH	1985	5

WORK/QUALITY ASSURANCE PLAN

DINSBIER ROAD LANDFILL
FIELD INVESTIGATION

CHAUTAUQUA COUNTY DEPARTMENT
OF PUBLIC WORKS

AUGUST 30, 1985

1. Project Name: Dinsbier Road Landill Field Investigation

2. Project Requested By: NYState Dept. of Environmental Conservation

3. Date of Request: July 3, 1985 revised August 14, 1985

4. Date of Project Initiation: March 29, 1985

5. Project Officer: George W. Riedesal, P.E.

6. Quality Assurance Officer: Lawrence G. Clare

7. Project Description

A. Objective and Scope Statement: Determine the nature of the wastes and the areal extent and vertical distribution of the waste disposed of at the site; identify any past, current, and/or potential future releases or migration of hazardous waste from the site to other on-Site and off-Site areas; evaluate the On-Site and off-Site impacts of such migration. Background information in regard to the site is included in the section entitled "SITE RECONNAISSANCE" in the attached document entitled "PHASE II WORK PLAN" dated March 29, 1985.

B. Data Usage For reporting to the NYState Department of Environmental Conservation as to the potential of the Site to cause health or safety problems, or ecological problems, or environmental damage.

C. Monitoring Network Design and Rationale: Surface water sampling locations, soil sampling locations, leachate sampling locations, and deep and shallow well locations shall be based on the review of existing data and information; evaluation of remote sensing information; health and safety considerations; results of completed geophysical surveys including terrain conductivity metering, resistivity sounding, and non-explosive seismic spreads; water sample collection and analysis; and air monitoring. The attached Proposal from Dunn Geoscience Corporation dated April 1, 1985, Task II (B) and (D) technical discussions are incorporated herein by reference.

D. Monitoring Parameters and their Frequency of Collection :

SAMPLE LOCATIONS, SAMPLE MATRICES, AND SAMPLE PARAMETERS

Existing Wells and Traditional quarterly Surface Water Sampling Locations

See attached document entitled "Phase II Work Plan" dated March 29, 1985.

The section entitled "Sampling and Analysis" is incorporated herein by reference.

Proposed Wells and Proposed Surface Water Sampling Locations

Heavy metals, cyanide, total organic halogens, EPA priority pollutants

Proposed Sediment Sampling Locations

Heavy metals, cyanide. EPA priority pollutants

Proposed Soil Sampling

The attached Proposal from Dunn Geoscience Corporation dated April 1, 1985,

Task II (C) technical discussion is incorporated herein by reference.

Leachate Sampling

See attached document entitled "Phase II Work Plan" dated March 29, 1985.

The section entitled "Sampling and Analysis" is incorporated herein by reference.

Air Sampling

The attached Proposal from Dunn Geoscience Corporation dated April 1, 1985,

Task I (F) technical discussion is incorporated herein by reference.

TYPE OF SAMPLING

See item 12 of this plan.

SAMPLING FREQUENCY

ONE TIME ONLY.

NOTE: The project officer hereby reserves the right to collect additional samples and and analyze them for parameters of interest based on information which becomes available as work progresses. Quality control shall be maintained in compliance with the intent of this quality assurance plan. All data shall be usable.

E. Parameter Table

Parameter	Number of Samples	Sample Matrix	Analytical Method Reference	Sample Preservation	Holding Time
Tot. Alk.	13	ground, surface	Std. Mtds. 15^{th}	cool @ $4^{o}C$	24hr./14da.
Net Acidity	13	ground, surface		cool @ $4^{o}C$	24hr./14da.
BOD5	14	gr., srf., leach.	Std. Mtds. 15^{th}	cool @ $4^{o}C$	6hr./48hr.
TOC	14	gr., srf., leach.	Std. Mtds. 15^{th}	H2SO4	7da./28da.
COD	13	ground, surface	Std. Mtds. 15^{th}	H2SO4	7da./28da.
Cl	14	gr.,srf.,leach.	Std. Mtds. 15^{th}	cool @ $4^{o}C$	
Color	13	ground, surface	Std. Mtds. 15^{th}	cool @ $4^{o}C$	48hr./48hr.
Hardness	13	ground, surface	Std. Mtds. 15^{th}	cool @ $4^{o}C$	6mo./6mo.
Ammonia	14	gr.,srf.,leach.		H2SO4	7da./7da.
Nitrite	13	ground, surface	Std. Mtds. 15^{th}	cool @ $4^{o}C$	imdt./48hr.
Nitrate	13	ground, surface	Std. Mtds. 15^{th}	H2SO4	48hr./48hr.
Odor	13	ground, surface	Std. Mtds. 15^{th}	cool @ $4^{o}C$	6hr./6hr.
T.D.S.	14	gr.,srf.,leach.	Std. Mtds. 15^{th}	cool @ $4^{o}C$	7da./14da.
SS	14	gr.,srf.,leach.	Std. Mtds. 15^{th}	cool @ $4^{o}C$	7da./14da.
Turbidity	13	ground, surface	Std. Mtds. 15^{th}	cool @ $4^{o}C$	24hr./48hr.
Cr	13+	gr.,srf.,sed.	SOW No. 784	HNO3	6mo./6mo.
Cu	14+	gr.,srf.,lch.,sed.	SOW No. 784	HNO3	6mo./6mo.
Fe	14+	gr.,srf.,lch.,sed.	SOW No. 784	HNO3	6mo.6mo.
Mn	14+	gr.,srf.,lch.,sed.	SOW No. 784	HNO3	6mo./6mo.
Ni	14+	gr.,srf.,lch.,sed.	SOW No. 784	HNO3	6mo./6mo.
K	13+	gr.,srf.,sed.	SOW No. 784	HNO3	6mo./6mo.

Parameter	Number of Samples	Sample Matrix	Analytical Method Reference	Sample Preservation	Holding Time
Na	13+	gr.,srf.,sed.	Std.Mtds15th	HNO3	6mo./6mo.
Zn	14+	gr.,srf.,lch.,sed.	Std.Mtds.15th	HNO3	6mo./6mo.
pH	14	gr.,srf.,lch.	Std.Mtds.15th	cool @ 4°C	imdt./2hr.
Arsenic	1+	gr.,srf.,lch.,sed.	SOW No. 784	HNO3	6mo./6mo.
Borate (Boron)	1	leachate	EPA	—	28da./28da.
Cadmium	14+	gr.,srf.,lch.,sed.	SOW No. 784	HNO3	6mo./6mo.
Cr+6	1	leachate	EPA	cool @ 4°C	24hr./48hr.
Cr+3	1	leachate	EPA	HNO3	6mo./6mo.
CN	14+	gr.,srf.,sed.,lch.	SOWNo.784	NaOH	24hr./14da.
Pb	1+	gr.,srf.,sed.,lch.	SOW No. 784	HNO3	6mo./6mo.
Hg	1+	gr.,srf.,sed.,lch.	SOW No. 784	HNO3	28da./28da.
Silver	1+	gr.,srf.,sed.,lch	SOW No. 784	HNO3	6mo./6mo.
Sulfate	1	leachate	STd.Mtds.15th	cool @ 4°C	28da./28da.
T.K.N.	1	leachate	Std.Mtds.15th	H2SO4	7da./28da.
Sp.Con.	1	leachate	Std.Mtds.15th	cool @ 4°C	28da./28da.
Phenols	1	leachate	Std.mtds15th	coo l @ 4°C	- /28da.
Volatile SS	1	leachate	Std.Mtds.15th	cool @ 4°C	7da./14da.
Tot.Vol.Sol.	1	leachate	Std.Mtds.15th	cool @ 4°C	7da./14da.
Settle.Sol.	1	leachate	Std.Mtds.15th	cool @ 4°C	7da./14da.
Oil&Grease	1	leachate	Std. Mtds.15th	cool @ 4°C	28da./28da.
D.O.	1	leachate	Std.Mtds.15th	no air, glass, cool@4°C	½hr./1hr.
T.O.H.	14+	gr.,srf.,lch.	EPA	no air, glass, cool @ 4°C	—
Antimony	13+	gr.,srf.,sed.	SOW No. 784	HNO3	6mo./6mo.
Cobalt	13+	gr.,srf,sed.	SOW No. 784	HNO3	6mo./6mo.
Thallium	13+	gr.,srf.,sed.	SOW No. 784	HNO3	6mo./6mo.
Tin	13+	gr.,srf.,sed.	SOW No. 784	HNO3	6mo./6mo.
Vanadium	13+	gr.,srf,sed.	SOW No. 784	HNO3	6mo./6mo.

	Parameter	Number of Samples	Sample Matrix	Analytical Method Reference	Sample Preservation	Holding Time
	Aluminum	13+	gr.,srf.,sed.	SOW No. 784	HNO_3	6mo./6mo.
	Barium	13+	gr.,srf.,sed.	SOW No. 784	HNO_3	6mo./6mo.
	Beryllium	13+	gr.,srf.,sed.	SOW No. 784	HNO_3	6mo./6mo.
	Calcium	13+	gr.,srf.,sed.	SOW No. 784	HNO_3	6mo./6mo.
	Magnesium	13+	gr.,srf.,sed.	SOW No. 784	HNO_3	6mo./6mo.
	Selenium	13+	gr.,srf.,sed.	SOW No. 784	HNO_3	6mo./6mo.
Priority Pollutants	Semi-volatile, non-volatile organics	1+	gr.,srf,sed.	SOW No. 784	Brown glass, cool @ 4°C ½gal/sample	7da./14da.
Priority Pollutants	Pesticides	1+	gr.,srf.,sed.	SOW No. 784	Brown glass, cool @ 4°C, ½gal/sample	7da./7da.
Priority Pollutants	Volatile organics	1+	gr.,srf.,sed.	SOW No. 784	Two (2) small, ~~clear~~ glass vials cool @ 4°C	

KEY

gr. = groundwater sample
srf. = surface water sample
lch. = leachate sample
sed. = sediment sample
Std.Mtds.15th = "Standard Methods for the Examination of Water and Wastewater, 15th edition, 1980
SOW No. 784 = "NYS Department of Environmntal Conservation Superfund and Contract laboratory Protocol, January, 1985"

8. Project Fiscal Information (Optional): This information has been intentionally omitted from this work/quality assurance plan.

A. Survey Costs

Salaries	Omit	
Supplies	Omit	
Equipment	Omit	
Mileage	Omit	Omit

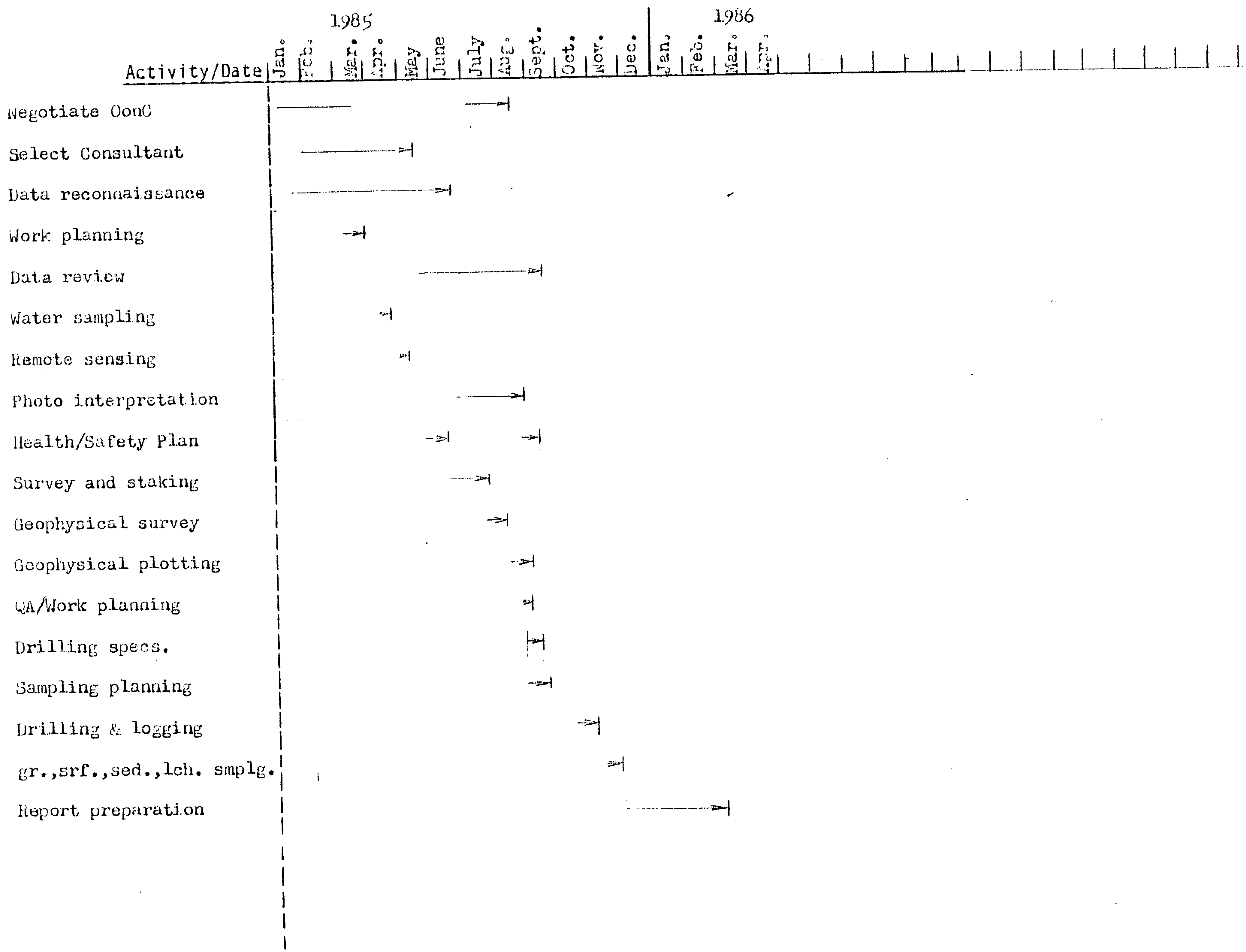
B. Laboratory Services	Omit
C. Administrative Overhead	Omit
D. Consultant Services	Omit
Total Project Cost	Omit

9. Schedule of Tasks and Products

Activity/Date

SEE NEXT PAGE

9. Schedule of Tasks and Products



10. Project Organization and Responsibility

The following is a list of key project personnel and their corresponding responsibilities:

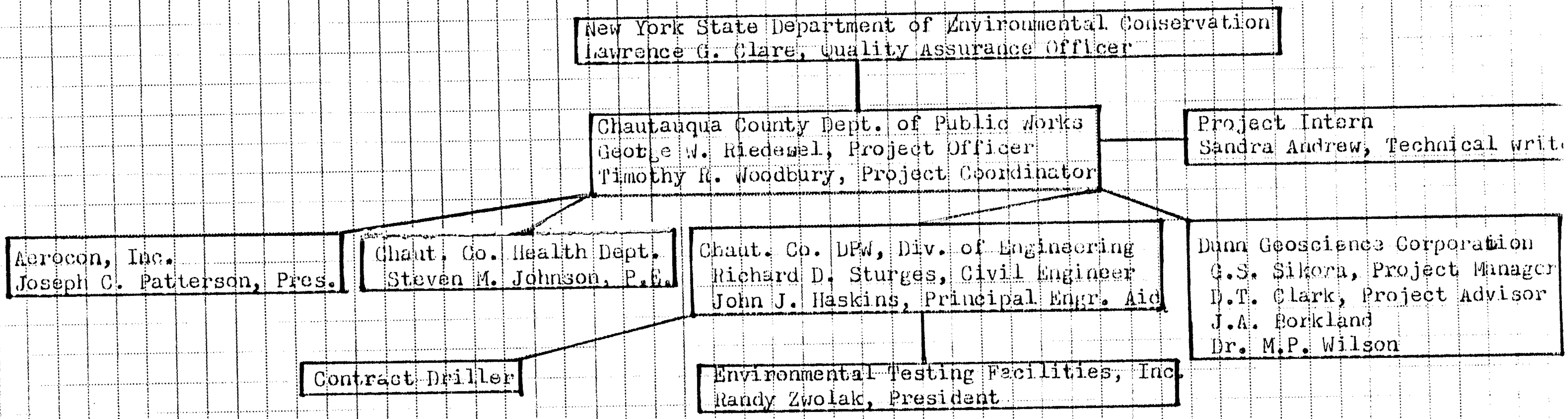
John J. Haskins, Chaut. Co. DPW	- sampling operations 716-665-6610
Randy Zwolak, Env. Testing Fac., Inc.	- sampling QC 716-366-0429
Randy Zwolak, Env. Testing Fac., Inc.	- laboratory analysis 716-366-0429
Randy Zwolak, Env. Testing Fac., Inc.	- laboratory QC 716-366-0429
Jay Borkland, Dunn Geoscience Corp.	- data processing activities 716-884-1500
G.S.Sikora, Dunn Geoscience Corp.	- data processing QC 716-884-1500
D.T.Clark, Dunn Geoscience Corp.	- data quality review 518-783-8102
Timothy R. Woodbury, Chaut. Co. DPW	- performance auditing 716-665-6610
NYSELAP certification (pending)	- systems auditing
Lawrence G. Clare, NYSDEC	- overall QA 716-847-4585
Timothy R. Woodbury, Chaut. Co. DPW	- overall project coordination 716-665-6610

(Note: an organizational chart should be supplied with this plan)

(SEE FOLLOWING PAGE)

PROJECT ORGANIZATION AND RESPONSIBILITY (CON'D)

Organizational Chart



11. Data Quality Requirements and Assessments

Parameter	Detection Limit*	Quantation Limit*	Estimated Accuracy	Accuracy Protocol	Estimated Precision	Precision Protocol
T.Alkalinity	1.0	1.0	95%	std.	±5%	duplicates /10
Hot Acidity	to alk.	to alk.	95%	std.	±5%	duplicates /10
BOD(5 day)	1.0	1.0	95%	known	±5%	duplicates /10
T.O.C.	1.0	1.0	95%	std.	±5%	duplicates /10
C.O.D.	0.2	0.2	95%	known	±5%	duplicates (avg)
Chlorides	0.5	0.5	95%	known	±5%	duplicates (avg)
Color	5 c.u.	5 c.u.	95%	blank	±5%	duplicates /10
Hardness	2.0	2.0	95%	known	±5%	duplicates (avg)
Ammonia-N	0.06	0.06	95%	known	±5%	duplicates /10
Nitrite-N	0.01	0.01	95%	known	±5%	duplicates /10
Nitrate-N	0.02	0.02	95%	known	±5%	duplicates /10
Odor @ 60C	none	none	75%	blank	±25%	duplicates /10
T.D.S.	0.1	0.1	95%	blank	±5%	duplicates /10
T.S.S.	0.1	0.1	95%	blank	±5%	duplicates /10
Turbidity	0.05 FTU	0.05 FTU	95%	blank	±5%	duplicates (avg)
Chromium	0.01	0.01	95%	10% spike	±5%	duplicates /10
Copper	0.05	0.05	95%	10% spike	±5%	duplicates /10
Iron	0.05	0.05	95%	10% spike	±5%	duplicates /10
Manganese	0.01	0.01	95%	10% spike	±5%	duplicates /10
Nickel	0.025	0.025	95%	10% spike	±5%	duplicates /10
Potassium	1.0	1.0	95%	10% spike	±5%	duplicates /10

Parameter	Detection Limit*	Quantation Limit*	Estimated Accuracy	Accuracy Protocol	Estimated Precision	Precision Protocol
Sodium	5	5	95%	10% spike	±5%	duplicates /10
Zinc	0.02	0.02	95%	10% spike	±5%	duplicates /10
pH @ 20C	0.05 su	0.05 su	98%	known	±2%	duplicates /10
Arsenic	0.005	0.005	95%	10% spike	±5%	duplicates /10
Borate(Boron)	0.1	0.1	95%	10 spikes	±5%	duplicates /10
Cadmium	0.001	0.001	95%	10 spikes	±5%	duplicates /10
Chromium+6	0.010	0.010	95%	10% spikes	±5%	duplicates /10
Chromium+3	0.010	0.010	95%	10% spikes	±5%	duplicates /10
Cyanide	0.020	0.020	95%	known	±5%	duplicates /10
Lead	0.001	0.001	95%	10% spikes	±5%	duplicates /10
Mercury	0.0004	0.0004	95%	10% spikes	±5%	duplicates /10
Silver	0.010	0.010	95%	10% spikes	±5%	duplicates /10
Sulfate	3.0	3.0	95%	known	±5%	duplicates /10
T.K.N.	0.05	0.05	95%	known	±5%	duplicates /10
Sp. Con.	1 umho/cm	1 umho/cm	95%	known	±5%	duplicates (avg)
Phenols	0.05	0.05	95%	known	±5%	duplicates /10
Volatile S.S.	0.1	0.1	95%	blanks	±5%	duplicates /10
Tot.Vol.Sol.	0.1	0.1	95%	blanks	±5%	duplicates /10
Settle Sol.	0.1 ml/l	0.1 ml/l	98%	blanks	±2%	duplicates /10
Oil & Grease	1.0	1.0	90%	blanks	±10%	knowns
D.O.	0.1	0.1	95%	known	±5%	duplicates /day
T.O.H.	0.002	0.002	95%	known	±2%	dupilactes /10
Antimony	0.05	0.05	95%	10% spikes	±5%	duplicates /10
Cobalt	0.050	0.050	95%	10% spikes	±5%	duplicates /10
Thallium	0.010	0.010	95%	10% spikes	±5%	duplicates /10
Tin	0.050	0.050	95%	10% spikes	±5%	duplicates /10
Vanadium	0.050	0.050	95%	10% spikes	±5%	duplicates

Parameter	Detection Limit*	Quantation Limit*	Estimated Accuracy	Accuracy Protocol	Estimated Precision	Precision Protocol
Aluminum	0.200	0.200	95%	10% spikes	±5%	duplicates /10
Barium	0.200	0.200	95%	10% spikes	±5%	duplicates /10
Beryllium	0.005	0.005	95%	10% spikes	±5%	duplicates /10
Calcium	5.0	5.0	95%	10% spikes	±5%	duplicates /10
Magnesium	5.0	5.0	95%	10% spikes	±5%	duplicates /10
Selenium	0.005	0.005	95%	10% spikes	±5%	duplicates /10
**Semi-volatile	0.010					
**Non-volatile Organics	0.010					
**Pesticides	0.0001 - 0.001					
**Volatile Organics	0.005 - 0.01					

* all numbers mg/l unless specified differently

** Priority Pollutant Parameters are analysed via "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, U.S. EPA Environmental Monitoring and Support Laboratory, Cincinnati, OH 46258. All criteria for Detection Limits, Accuracy, and Precision listed in the Methods Manual are followed.

Data Representativeness: Data collected and analyzed will be used to confirm or disprove the existence of an alleged significant environmental threat. For sample collection, standard operating procedures developed during quarterly water sampling experience will be supplemented with EPA-approved documentation and chain-of-custody procedures. Sampling locations will be chosen based on existing data, remote sensing analysis, and state-of-the-art geophysical tests and analysis. Data representativeness goals shall be to determine: the nature of the wastes, the areal extent of the wastes, and the vertical distributin of the wastes; and to identify any releases of hazardous wastes to off-site areas.

Data Comparability: Data obtained as aresult of this investigation shall be compared with existing data obtained from the quarterly monitoring program and from other sources. Comparison of water quality at points along known or presumed gradients will help determine extents of environmental threat. Comparison of water quality data from past and current samplings wil help determine possible migration characteristics.

Data Completeness: Data collection shall be extensive as to allow a thorough evaluation of the relative potential of the site to cause health or safety problems, or ecological or environmental damage. Data shall be used in accordance with 40CFR Part 300, Subpart H, Appendix A.

12. Sampling Procedures: 1.Remote Sensing: as described in Fig. 4, "Phase II Work Plan" dated March 29, 1985; 2.Geophysical Survey: as described in Dunn Geoscience Proposal dated April 1, 1985, Task I (D); 3.Air monitoring: as described in Dunn Geoscience Proposal, Task I (F); 4.Borings: as described in Dunn Geoscience Proposal, Task II (C) and (D); 5.Water: as described in Fig. 18, (1) "Phase II Work Plan." NOTE Dedicated bailers shall be purchased for each new boring and for existing wells as required.

13. **Sample Custody Procedures:** As described in Fig. 18 (1) "Phase II Work Plan" dated March 29, 1985 and in accordance with procedures described in "Proposed Sampling and Analytical Methodologies for Addition to Test Methods for Evaluating Solid Solid Waste: Physical/Chemical Methods (SW-846, 2nd Edition)" USEPA, Washington, DC, 1984.

14. Calibration Procedures and Preventive Maintenance: All laboratory equipment used is calibrated immediately prior to use and, depending on the number of samples analyzed, either recalibrated during use or at the end of the set of samples. All chemical solutions and standards are standardized with corresponding knowns. Distilled water blanks are used with each series. In the field, the pH meter is calibrated and maintained in accordance with the manufacturer's directions. Fresh buffers and knowns are obtained from the lab.

15. Documentation, Data Reduction, and Reporting

A. Documentation: Standard Environmental Testing Facilities, Inc. Logs are used for water sampling and kept on file at the lab and at Chaut. Co. DPW offices. Original field sampling notes are kept on file at Chaut. Co. DPW offices. Copies of all sample tags and chain-of-custody forms are kept on file at Chaut. Co. DPW offices. All field sampling is logged in the Monitoring/Sampling Log book at Chaut. Co. DPW offices. The laboratory supplies complete written reports of analyses of each sampling point. Reports are filed.

B. Data Reduction and Reporting: The laboratory and sub-laboratories are responsible for all data reduction and reporting tasks. Data is reduced in accordance with Analytical Methodologies referenced in section 7 (E) of this document.

16. Data Validation: The laboratory and sub-laboratories are responsible for all data validation tasks. Data is validated in accordance with Analytical Methodologies referenced in section 7 (E) and in accordance with limits, accuracies, and precisions required pursuant to section 11 of this document.

17. Performance and Systems Audits: Laboratory certification procedures are pending in New York State. Performance and System Audits will be performed, when procedures are instigated, by the New York State Health Department Environmental Laboratory Accreditation Program (NYSELAP).

18. Corrective Action: In accordance with "NYS Department of Environmental Conservation Superfund and Contract Laboratory Protocol," January, 1985.

19. Reports: Reporting shall be in accordance with New York State Department of Environmental Conservation Order on Consent No. 84-164 and in accordance with 40CFR Part 300, Subpart H, Appendix A.

Rec 9/4/85
Reg 9

DUNN
GEOSCIENCE CORP.

539 FRANKLIN STREET •
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PROPOSAL TO PROVIDE CONSULTING SERVICES
FOR A
PHASE II INVESTIGATION
AT THE DINSBIER ROAD COUNTY LANDFILL
CHAUTAUQUA COUNTY, NEW YORK

Prepared For:

Department of Public Works
Chautauqua County, New York

Submitted By:

DUNN GEOSCIENCE CORPORATION
539 Franklin Street
Buffalo, New York 14202

Dated: April 1, 1985

1.0 PURPOSE AND SCOPE OF SERVICES

The purpose of the proposed investigation is to:

- determine the nature of the wastes which have been disposed.

- determine the spatial distribution of the wastes.

- identify past, current, and/or future potential releases of hazardous and/or industrial wastes to other on or off-site locations.

- evaluate environmental impact.

In order to address the primary objectives of the investigation in an efficient and cost-effective fashion, we propose to perform the project scope in two separate work tasks so that data and information gained during preliminary work can be used to guide the data collection and interpretation of subsequent activity. The tasks, with their respective subtasks are briefly explained below.

TASK I - ENVIRONMENTAL CHARACTERIZATION

A. Review of available data and information.

B. Evaluation of remote sensing information.

C. Health and Safety considerations.

D. Execution of selected geophysical surveys.

E. Water sample collection and analysis.

F. Air monitoring.

TASK II - ADDITIONAL DATA COLLECTION AND INTERPRETATION

A. Development of QA/QC analytical protocols.

B. Drilling of additional soil borings.

C. Collection of subsurface soil samples and chemical analysis.

D. Deep monitoring well installation, completion, and development.

E. Collection of surface and groundwater samples for selective chemical analysis.

F. In-situ permeability testing.

G. Geotechnical laboratory testing.

H. Environmental site assessment.

I. Report preparation and presentation.

2.0 TECHNICAL DISCUSSION

TASK I - ENVIRONMENTAL CHARACTERIZATION

The purpose of the characterization task is to develop background data and information of a general environmental nature in sufficient quantity to guide the development and implementation of the more specific (and generally costlier) tasks related to subsurface drilling, sampling, and chemical analysis.

A. Review of Available Data and Information: This subtask will integrate all currently existing public and private technical information about the Dinsbier Road Site. This information will include the comprehensive historical site report currently being prepared by County personnel. Earlier technical reports, readily available published information, and documents in the Dunn Geoscience and Fredonia State College Geology Department libraries will also be reviewed. This subtask will result in a bank of information which will be used to guide all subsequent project activity.

B. Evaluation of Remote Sensing Information: All existing, readily available aerial photographic information will be collected and reviewed to determine relevant existing and historical environmental information about the site. Depending upon the scale of the photography available, this review may be instrumental in defining factors, such as locations of waste deposition, leachate seeps, as well as the presence of subsurface features which could enhance waste migration, such as bedrock faulting. Although existing black and white, color, and color infrared photography will be acquired and reviewed as available, we anticipate that some large scale photography may not be readily available. Accordingly, we recommend that the County consider the acquisition of sterioscopic color infrared, or alternatively color photography, at a 1:1200 scale in early spring after snowmelt and before the growth of spring vegetation.

C. Health and Safety Considerations: All field work conducted during Task I will be performed under Class D safety conditions, that is, non-hazardous. All field personnel will adhere to sensible safety procedures (e.g., work boots, eye protection, hard hat, gloves, etc.). Equipment will be supplied to appropriate personnel at the site in the event that any conditions necessitate switching to a Class C or B work area, or in the event of any emergency. In the event that this preliminary investigation discovers a contravention of groundwater quality which constitutes a hazard, then a more detailed Health and Safety report will be prepared to be site-specific for work during Task II. This detailed plan will include contingency/emergency plans, decontamination procedures (where necessary), and an evaluation of the level of contamination.

D. Execution of Selected Geophysical Surveys: Geophysical surveys will be conducted at the landfill site to determine and/or confirm boundaries of the municipal and industrial waste disposal areas, to determine the presence of conductive contaminant plumes (if any) and to characterize subsurface stratigraphic and hydrogeologic conditions above the shale/siltstone bedrock. The survey will consist of a series of regularly spaced (100 feet), orthogonal traverses across the landfill and a single traverse outside the inferred perimeter of the landfill. Additional traverses will be made at specific anomalies for further definition. This grid will be used during subsequent tasks of the site investigation. Traverses will be tied into a surveyed 100-foot baseline grid for horizontal control The traverses will consist of electromagnetic measurements made with a Geonics EM-31 terrain conductivity meter (and a deeper penetrating EM-34 in local areas of interest) at an approximate 20 foot station spacing. Field data will be recorded and contoured directly on a plan map of the site to facilitate rapid and cost-effective identification of geophysical anomalies that may be indicative of fill, contaminant plumes, and hydrogeologically significant subsurface variations in soil moisture, texture, and thickness. Representative discrete and patternal anomalies will be correlated with existing subsurface data and further investigated by approximately four (4) resistivity soundings and approximately 1500 feet of signal-enhancement, non-explosive, seismic refraction spreads. These additional geophysical tools will be employed in an attempt to further define the nature and vertical extent of the anomalies and estimate the depth to bedrock between or beyond borehole control points. Interpretation of the geophysical data will lean heavily upon direct subsurface data. The final subsurface model will integrate all available information, including the geophysics, but it is believed that the paramount value of geophysics at this site will be in enhancing the placement of groundwater monitoring wells and in improving drilling safety.

E. <u>Water Sample Collection and Analysis</u>: As a preliminary investigation prior to well placement and ground water monitoring, a review/survey of local waters will be performed by integrating existing water quality information with the collection of additional water samples from existing wells, local streams, and nearby outfalls. To maximize the benefits of such an effort, a series of general water quality parameters will be analyzed for at an appropriate number of sites as directed by the existing data base and existing site conditions. Preliminary chemical parameters selected for analysis include:

- Total Organic Carbon
- Total Organic Halide
- Total Dissolved Solids
- pH
- Specific Conductance
- Phenols
- Sulfate
- Chromium
- Iron
- Chloride
- Manganese
- Ammonia Nitrogen
- Copper
- Sodium
- Nickel

If possible, the sampling sites will include leachate seeps, in an attempt to maximize the positioning of new wells by knowledge of present contaminant distribution. Because this is not a monitoring program, but rather a specific exercise in locating the observation sites, our proposed list is slightly expanded beyond the indicator parameter list used by NYSDEC (solid Waste Management Facility Guidelines, May 1981). This preliminary chemical data will be combined with the geophysical and remote sensing information to guide well-site selection and more comprehensive chemical analysis of subsequent water samples to aid waste characterization.

~~H.~~ F <u>Air Monitoring</u>: Preliminary sampling of air will be performed by a gridded site walk with an ex plosimeter and HNu photoionizer to detect the presence of organic and/or explosive vapors. Readings will be continuous but marked only at 50 foot centers or wherever an elevated level on either meter is registered. Combined with air flow patterns and other weather information, these simple field analysis will be a guide to the placement of further and more elaborate air monitoring systems, if necessary. Because of the nature of the site, the air will be monitored (i.e., samples collected) no more than two (2) feet above grade.

TASK II- ADDITIONAL DATA COLLECTION AND INTERPRETATION

At the completion of Task I activity, all the data acquired will be integrated and synthesized so that further data collection and analysis can be formulated to more specifically address the objectives of the investigation. As the specific scope of Task II is dependent upon the data gathered in Task I, the scope of Task II activity cannot be accurately defined. Nevertheless, outlined below are elements of Task II scope which are expanded to the degree allowed by existing data:

A. Development of QA/QC Analytical Protocols: At the onset of Task II, a quality control program consistant with NYSDEC Analytical Control and Reporting Requirements will be developed which will include the establishment of parameter analytical criteria, preparation and documentation of field sampling protocols, and documentation of laboratory operating procedures. More specifically the QA/QC plan will include documentation regarding analytical methodology, quality assurance objectives, calibration requirements, sampling procedures, sample custody, data reduction/ validation, internal quality control checks, preventive maintenance and corrective action. This quality assurance document will be in accordance with NYSDEC quality assurance publication "Guidance for Preparation of Combined Work Quality Assurance Project Plans for Water Monitoring (OWRS QA-1) USEPA, May, 1983.

B. Additional Soil Borings: The number of additional borings which will have to be drilled to better define subsurface conditions cannot currently be estimated with any degree of confidence. Elements of Task I will be useful in evaluating the number of sites and the locations that these borings should be drilled at. Nevertheless, for planning purposes, a tentative range of five (5) to ten (10) drilling and nested monitoring well installation sites are anticipated. At approximately half or more of the sites, depending upon the degree of water production realized at depth during soil sampling, the installation of monitoring wells completed in the bedrock near its contact with the overlying till is recommended. The reason for drilling to the bedrock is that aside from overlying water-bearing strata in the till, the till/ bedrock contact presently appears to constitute the only other potentially significant subsurface contaminant migration pathway.

C. Collection of Subsurface Soil Samples and Selected Chemical Analyses: During drilling of the soil borings continuous split spoon samples will be collected, logged by a qualified geologist and retained for future reference, from the surface to drilling refusal. The

QA/QC program developed for this task will define tool cleaning and H-Nu protocols during soil sampling. Soil samples collected at a depth of two (2) to four (4) feet below grade, and at depths where visual and/or olfactory observations of contamination are made will be subjected to chemical analysis. The specific chemical parameters chosen for analysis will be determined from data and information collected during Task I and will reflect a select number of specific, mobile, and/or relatively more toxic contaminants which are suspected of being present. Upon completion, shallow two-inch steel cased, sand-packed, and bentonite sealed monitoring wells will be set in the uppermost water-bearing zone as determined during soil boring. After airlift development all the wells will be equipped with secure protective casings.

D. Deep Monitoring Well Installation, Completion and Development: In order to minimize the hydraulic and mechanical potential for intra-well contamination from an overlying strata, we strongly recommend that the deeper wells be installed in the following fashion:

1. Drill to refusal using nominal 3-3/4 inch hollow stem augers to define the subsurface stratigraphy of the site. Withdraw the augers and grout the hole to the surface with a cement/bentonite slurry.
2. Move the drilling site five feet in any direction.
3. Using the mud rotary method, drill nominal twelve-inch hole to a point two feet above the top of the bedrock as determined during auger drilling. Install and pressure grout eight-inch black steel casing.
4. Continue mud rotary drilling in the casing with a nominal eight-inch bit to a point five feet into rock.
5. Install four-inch black steel casing and a five (5) foot section of pipe size stainless steel screen to the bottom of the bore, apply gravel/sand pack in the annulus to a point one foot above the uppermost screen slot after flushing the drilling mud from the well and the annular space.
6. Install a one foot bentonite pellet seal.
7. Pressure grout the remaining annulus to the surface with a cement bentonite slurry.

The well design outlined above, conservatively consistent with NYSDEC concerns regarding cross contamination, will be important in confirming, as accurately as possible, the character and magnitude of ground water contamination in the upper bed; a critical factor in developing site closure plans.

Upon completion, each monitoring well will be developed by airlift methods to purge the well of residual drilling fluids (mud and/or water) and to break down the filter-cake mud along the perimeter of the boring. It is anticipated that two (2) to four (4) hours of air-lift development may be necessary at each well.

E. Collection of Surface and Groundwater Samples for Selected Chemical Analyses: After all monitoring wells have been installed and developed, the wells and all surface water sampling stations will be sampled and chemically analyzed for a select number of specific indicator priority pollutant parameters, as defined by Task I activity.

F. In-situ Permeability Testing: After monitoring well installation, well development and sampling for chemical analysis is complete, each well will be slug tested to determine the in-situ permeability of the soil materials in the immediate vicinity of the bore.

G. Geotechnical Laboratory Testing: During drilling and soil sampling, a representative sample from each specific geologic strata at each location will be retained and subjected to laboratory tests which will determine the physical properties of the soils. The tests which are proposed are for grain size analysis, Atterburg Limits, and moisture content.

H. Environmental Site Assessment: During the course of the Phase II investigation, i.e. during both Tasks I andII, information and data will be developed and synthesized to develop a hazardous ranking score for the site as outlined in NYSDEC guidelines and 40 CFR, Part 300, Subpart H, Appendix A.

I. Report Preparation and Presentation: The Phase II evaluation will culminate in a report which represents and interprets the data from the subtasks discussed above.

This report will include conclusions as to the presence, concentration and probable extent of contamination. The report will also include the documentation supporting the development of the hazardous ranking score of the site and a discussion of a few selected site-closure alternatives and related geotechnical data requirements for their implementation.

3.0 ANTICIPATED LEVEL OF EFFORT AND RELATED COSTS:

Included below, in outline form, by subtask, are estimates of the level of effort necessary to complete the tasks of the Phase II evaluation as outlined above.

Subtask		Level of Effort (man-days) Staff	Senior
1.A.	Data Review	-	1-1/2
1.B.	Remote Sensing Evaluation	2	1
1.C.	Health and Safety Plan Preparation	-	3
1.D.	Geophysical Surveys	16	5
1.E.	Preliminary Water Sample Collection	1	1/2
1.F.	Air Quality Screening	2	1/2
2.A.	QA/QC Program Development	-	3
2.B.,	C., and D. Geologic Logging, Sample Collection and Drilling Supervision	22	4
2.E.	Surface and Ground Water Sample Collection	3	1
2.F.	Permeability Testing	4	1
2.H.	Environmental Site Assessment	3	1
2.I.	Data Processing Interpretation, Report Preparation and Presentation	10	19
Estimated Dunn Geoscience Total Project Effort (man-days)		63	40.5

Estimates of related costs are also outlined below:

A. Equipment Rental:

Equipment Type	Estimated Duration (days)	Per diem charge	Total
EM-31	3	$150	$ 450
EM-34	1	300	300
Seismic	2	100*	1,200
Resistivity	1	100	100
Computer	3	50	150
H-Nu Photoionizer	8	50	400
Explosimeter	8	50	400
Equipment Rental Total			$3,000

* Plus $1000.00 for multichannel.

B. Geotechnical Testing:

Test	Estimated Number	Unit Price	Cost
Moisture Content	24	$ 4.00	$ 96
Grain Size Analysis	24	30.00	720
Atterberg Limits	24	45.00	1,080
Geotechnical Testing Total			$1,896

C. Estimated Drilling Costs:

Arbitrarily based on four (4) nested and four (4) single-well installations (twelve wells).

Type of Charge	Estimated Unit Price	Costs
Drilling, sampling and installation of two-inch shallow wells	$1,200	$ 9,600
Drilling and installation of 4 X 8-inch deep wells	6,150	24,200
Airlift development	48 hrs. @ $45/hr.	2,160
Steam generator rental (decomtamination)	Four days @ $150/day	600
Mobilization (lump sum)		
Mud rotary		2,000
Auger		900
Estimated Total Drilling Costs		$39,900

D. Chemical Analysis: Due to a relatively wide range in the number of number of samples (specifically water samples) which will have to be collected, and an even larger variability in the type of chemical parameters to be analyzed for, due to data base differences and a current uncertainity of the wastes disposed at the landfill, chemical laboratory costs cannot be adequately estimated. However, analytical lab costs for a project of this type and size have historically been on the order of $10,000.

4.0 SCHEDULING

Dunn Geoscience and its subcontractors can initiate Task I work within one (1) week of formal notification by County personnel. It is estimated that the elements of Task I can be completed in four weeks or less, depending upon the scheduling constraints of all personnel working on the project and air photo availability. Upon completion of Task I activities, execution of the Task II scope can begin immediately. It is estimated that Task II, including report preparation, can be completed in less than four (4) months.

5.0 HOURLY BILLING RATES

Included in the list below are the names, professional levels, and billing rates of individuals who could be called upon to participate to various degrees in the Dinsbier Road landfill evaluation.

	Hourly Rate (dollars)
Senior Scientists	
J.P. Behan	$ 60
S.I. Bonvell	52
D.T. Clark (Project Advisor)	75
J.E. Gansfuss	52
G.S. Sikora (Project Manager)	61
Staff Scientists	
J.A. Borkland	36
B. Goins	30
R.T. Hansen	36
J.T. Wink	30
State University of New York at Fredonia Personnel	
Dr. W.M. Barnard	40
Dr. M.P. Wilson	40
Student Aides	9

During the course of this project, senior staff involvement will be limited to advising, managing, some data interpretation and report preparation. Field supervision will be provided almost exclusively by qualified staff-level professionals. Whenever staff personnel require field assistance an effort will be made to utilize selected students from SUNY at Fredonia in an effort to keep project costs down. Furthermore, Dunn Geoscience will make similar efforts to utilize Chautauqua County Department of Public Works personnel, if available, for technical assistance, i.e. surveying of geophysical grid, well locations and elevations.

6.0 CONDITIONS

The County Department of Public Works would be expected to provide a suitable base map of the site with topographic control and provide and maintain sufficient physical and legal access to selected locations on the site for truck-mounted drilling equipment.

Invoicing by Dunn Geoscience will be monthly during the duration of the project. Invoices will be submitted for time, services, and expenses incurred during the invoicing period. Invoices are due upon receipt and payable within 45 days of the invoice date. A service charge of one and one-half percent per month (18 percent annually) will be added to past due invoices.

7.0 PERSONNEL QUALIFICATIONS

Resumé

JAMES P. BEHAN, JR., P.E., Principal Engineer

Education: Union College, BSME 1968
University of Cincinnati, MSCE, 1980

Professional Associations: American Society of Civil Engineers
NYS/National Society of Professional Engineers
Sigma Xi

Experience: Dunn Geoscience Corporation, Latham, NY, 1980 to present
Myrick & Chevalier Engineers, E. Greenbush, NY, 1978-1979
NYS Department of Environmental Conservation, Albany, NY, 1974-1978
NYS Department of Transportation, Albany, NY, 1970-1974
Pratt & Whitney Aircraft, E. Hartford, CT, 1968-1970

Mr. Behan's background and special strengths include hydraulics in relation to surface and ground-water systems, as well as containment facilities such as settling ponds and lagoons. He is also

- o Experienced in geophysical applications to subsurface investigations
- o Responsible for engineering studies regarding land disposal of wastes and design of remedial measures at industrial waste sites
- o Experienced in the design and construction of water supply and treatment facilities, including source development from ground water and surface water
- o Instrumental in establishing the firm's computer center and expanding computer applications.

Special Project Experience: Mr. Behan is an effective project manager in site investigations, directing project work so that it is completed on time and within budget. He is team leader for numerous Dunn Geoscience projects that integrate the work of GeoEngineering and Hydrology Divisions, utilizing his hydraulics background and experience in solving problems of rock and soil slope stability and waste site design.

Resumé

SANDER I. BONVELL
Senior Chemist

Education: State University of New York at Albany, BS in Chemistry, 1972

Professional Associations: American Institute of Chemical Engineers
American Chemical Society

Experience:
1983 to present, Senior Chemist, Dunn Geoscience Corporation
1982-1983, Supervisor, Environmental Division, Bender Hygienic Laboratory
1979-1982, Associate Analytical Chemist, Bender Hygienic Laboratory. Also consultant to New York State Science Service Biological Survey
1973-1977, Research Scientist, Albany Medical College

As an environmental chemist for Dunn Geoscience Mr. Bonvell aids contaminated groundwater investigations through analysis of laboratory results and fate of contaminants in soil and groundwater, and in design consulting for treatment systems. He is also involved in personnel safety at sites known or suspected to contain hazardous materials. Before joining Dunn Geoscience Mr. Bonvell was responsible for operations at a major environmental laboratory including: regulatory agency approval, atomic absorption spectrometry, selective ion electrode analysis, ultra-violet and visible spectroscopy, extensive wet chemistry and colorimetric analysis.

Special Project Experience:

Project Coordinator/Manager:

- Major New York industrial site (shale aggregate production) - design and sampling of chemistry-oriented monitoring program for solid waste and groundwater.
- USEPA Superfund site - PCB soil sampling, field test kit analysis and laboratory confirmation. Statistical analysis of results.
- Air-monitoring survey for complex of NY State offices.

Project coordinator:

- Solvent fuels recycling/re-use facility - soils sampling and groundwater monitoring of contaminated area.
- USEPA Superfund site - surface water sampling program, streams and reservoirs downgradient of organics-contaminated ground water.

Resumé

D. THEODORE CLARK, Senior Hydrogeologist
Certified Professional Geologist # 2646

Education: Ohio State University, BA/Geology, 1968
Graduate Study in Hydrology

Professional Associations: (Representative)
American Institute of Professional Geologists
National Water Well Association, Technical Division
Society of MIning Engineers of AIME
American Water Works Association
American Water Resources Association
Certified Geologist State of Maine

Experience:
Dunn Geoscience Corporation, Latham, NY, 1973 to present
Ranney Water Systems, Columbus, OH, 1970-1973
Fred H. Klaer, Jr., Consulting Hydrologist, Columbus, OH, 1968-1970

Mr. Clark has a comprehensive background in hydrogeologic investigations and in ground-water management. As director of DGC's Ground Water Division, he

- Designs procedure, schedules and staffing
- Directs installation and interpretation of ground-water monitoring programs and observation of testing protocol
- Carries out investigations leading to ground-water pollution control at active and inactive industrial sites
- Provides key expertise and experience to develop ground-water models for contaminant transport and water supply quality
- Evaluates hydrogeologic recommendations of colleagues
- Testifies at court cases involving aquifer quality and quantity.

Special Project Experience: Mr. Clark has been project manager for the large majority of Dunn Geoscience's groundwater-related projects, and has headed numerous RCRA compliance teams. He integrates the work of multi-disciplinary groups in aquifer investigations, and remediation of contaminated sites, using his experience with environmental regulatory compliance and negotiation.

Resumé

JOHN E. GANSFUSS,
Senior Engineering Geophysicist

Education	University of Rochester, BA/Geology - 1973 Purdue University, MS/Engineering Geology - 1977
Professional Associations	Association of Engineering Geologists Geological Society of America National Water Well Association
Experience	Dunn Geoscience Corporation, Latham, New York 1983 to present Sargent & Lundy, Chicago, Illinois 1978 to 1982

Mr. Gansfusss has extensive experience determining the impact of geologic conditions of civil engineering project. He often employs geophysical techniques in field exploration and site evaluations for ground water supply and contamination studies. His background includes the following areas:

- o Assessment of contaminated ground-water using geophysical techniques;
- o Geophysical exploration of archaeological sites;
- o Design and construction supervision of water-supply and monitoring wells, includes preparation of technical specifications.
- o Investigations for site suitability and foundation conditions;
- o Subsurface exploration of landfills and surface impoundments, including evaluation of seepage potential and availability of earth construction materials;
- o Bedrock inspection and mapping for foundations;

Special Project Experience	Background in specialized geophysical techniques necessary to identify buried metal and contaminant plumes, and experience in investigative aspects of engineering geology, qualify Mr. Gansfuss to provide important experience to the project. Mr. Gansfuss has taken a key role in most of Dunn Geoscience's electromagnetic and magnetometer surveys for waste sites and construction sites.

Resumé

GERALD S. SIKORA, Senior Hydrogeologist/Buffalo Office
Certified Professional Geologist No. 4655

Education	University of Toledo, OH, MS/Geology, 1975 State University College, Fredonia, NY BS/Geology, 1971
Professional Associations	American Institute of Professional Geologists American Water Resources Association Geological Society of America National Water Well Association, Technical Div. Water Pollution Control Federation
Experience	Dunn Geoscience Corporation, Buffalo, NY 1982 to Present 1975-1982, Corporate environmental hydrogeologist for chemical company, and senior hydrogeologist for ground water consultant

Mr. Sikora works primarily on assessment of industrial waste sites. In his present work assignments, and prior to joining Dunn Geoscience, his experience includes: proactive and concurrent ground-water quality program development; technical supervision of several major toxic ground-water contamination studies; total development, management, data interpretation and presentation of major ground-water quality evaluation and monitoring programs; development and implementation of assessment protocols for evaluating impact of active and inactive waste disposal facilities.

Special Project Experience	Mr. Sikora has intensive experience as team leader in field investigations into hydrogeologic conditions. He specializes in the evaluation of aquifer properties and the design of pumping wells for ground water removal. He recently evaluated the aquifer characteristics on a major ground water contamination site and used a state-of-the-art analytical model to design the pumping rate necessary for 3 wells to accomplish total withdrawal of contaminants, and eliminate further contaminant migration.

Resumé

MARK J. ZDUNCZYK
Certified Professional Geologist No. 6237

Education:	Ft. Lewis College, CO, BS/Geology, 1971 Graduate Studies, Geology, SUNYA, 1971-72
Professional Associations:	American Institute of Professional Geologists Society of Mining Engineers of the AIME
Experience:	1984 to Present, Manager, Testing Laboratory and Geologist, Industrial Rocks and Minerals Division, Dunn Geoscience Corporation
	1983-84, geologist, Division of Solid Waste, Tennessee Dept. of Public Health
	1979-83, Industrial Sands Specialist, Corporate Geologist, NJ and SE U.S. operations of Jesse S. Morie & Son, Inc., Camden, TN
	1978-79, geologist, Industrial Sands Specialist, Holliston Sand Co., Inc., Holliston, MA
	1974-78, graduate work, High School teacher
	1972-74, geologist, Dunn Geoscience Corporation

As an industrial sands specialist in eastern U.S. since 1978, Mr. Zdunczyk has been responsible for project planning, drilling programs, exploration for new sources, reserve calculations, easements and mineral lesses. Assignments also include project cost accounting, testing laboratory supervision, field geology and environmental regulatory compliance.

Special Project Experience:	Mr. Zdunczyk's experience in field geology makes him a valuable member of investigatory teams for recording and synthesizing geologic data. As director of the Dunn Geoscience Testing Laboratory he is in charge of testing earth materials in accordance with specifications. His background includes design of monitoring wells and evaluation and recommendations for municipal landfills.

Resumé

JAY A. BORKLAND, Staff Scientist

Education:

MA, State University of NY at Buffalo, Geological Sciences - Geophysics concentration, 1984
BS, University of New Hampshire, Geology, 1982

Professional Associations:

Society of Exploration Geophysicists
American Association of Petroleum Geologists
Geological Society of America
Professional Association of Diving Instructors: Certified International Open Water Scuba Diver

Professional Experience:

1984 - present, Dunn Geoscience Corporation, Buffalo, NY - Geologic and geotechnical field work on waste sites; well design and monitoring; effective use of computer in data presentation; environmental regulatory compliance investigations.

1982 - 1984, Graduate/Teaching Assistant; SUNY Buffalo; Dept. of Geological Sciences.

1982 - 1984, Part-time consultant; Technical Systems Research Group, Woodward-Clyde Consultants, US Energy Development Corp.

1/82 - 8/82, Research Assistant at UNH; Acquisition and computer manipulation of off shore magnetic and seismic reflection data aboard U.S.G.S. R/V Neecho; and development and use of FORTRAN/BASIC programs on data from Antarctica and the Himalayas.

Special Project Experience:

Mr. Borkland's experience includes responsible roles in both field and office phases of geotechnical investigations and geophysical studies. He has a strong background in collection and interpretation of subsurface data at municipal and industrial waste sites.

BRENT T. GOINS, Geologist

Education

BS, State University of New York at Cortland, Geology, 1983

Experience

1983 - Present, Dunn Geoscience Corporation

- Mr. Goins has had intensive experience in field techniques and laboratory methods of gathering and presenting geologic and hydrologic data.

- Much of his work is with geophysical surveys (using electromagnetic, seismic refraction, resistivity and magnetometer techniques) and interpretation of geophysical data.

- He also works in Dunn's testing laboratory on soils analysis and aggregate specifications.

Special Project Experience

At numerous waste site investigations Mr. Goins has been a member of geophysical teams, collecting and interpreting preliminary data, following such surveys with drilling supervision, sample collection and water level measurements. He has experience in data presentation in graphic form, such as laboratory testing results from permeameter testing of specific leachates and landfill soils.

Resumé

RUTH T. HANSEN
Geotechnical Engineer

Education:

Rensselaer Polytechnic Institute, MS in Civil Engineering, 1984
University of New Hampshire, BS in Civil Engineering, 1980

Experience:

1984 to present, Geotechnical Engineer, Dunn Geoscience Corporation
1982-1984, Laboratory Technician and Teaching Assistant, Rensselaer Polytechnic Institute
1981-1982, Applications Engineer, New Hampshire Department of Public Works and Highways, Concord, NH

Ms. Hansen's work for Dunn Geoscience is chiefly in the area of solid and hazardous waste sites, although she also participates in field investigations and report preparation for soil mechanics studies, utilizing computer applications as appropriate.
Ms. Hansen's MS thesis concerned the permeability of clay liners at hazardous waste sites, and she has training and experience in geology and hydrology. Her laboratory experience includes teaching soil mechanics laboratory methods, as well as performing soil parameter testing.

Special Project Experience:

- Inspector at leachate collection system installation for chemical landfill.
- Performed slope stability analysis at hazardous waste landfill and lagoon, including sample collection and computer analysis.
- Carried out field testing of containment system system permeability at petroleum terminal.
- Analyzed slope failure using STABL program and proposed remediation for major sand quarry client.

Resumé

JEFFREY T. WINK, Hydrogeologist

Education	BA, State University of New York at Potsdam, Geology/Geophysics, 1983
	University of Wisconsin, Seminar on Water Well Hydraulics, 1985
Professional Associations	National Water Well Association
Experience	1983 - Present, Dunn Geoscience Corporation
	1981 - 1983, Potsdam State University, Teaching and Research Assistant, Geophysics, Geochemistry

Mr. Wink utilizes geophysical methods (electromagnetics, seismic refraction and resistivity) to acquire preliminary subsurface data for water well and landfill assignments as well as for foundation investigation. Other hydrogeologic procedures which he uses rountinely include well design and drilling supervision, water monitoring, core logging, soil sampling, aquifer pump testing, in site permeability tests and fracture trace analysis. Full report production also falls within his responsibility.

Special Project Experience	Mr. Wink recently worked on the following applicable projects: a preliminary site suitability study for a regional landfill; an industrial landfill assessment, combining electromagnetics with groundwater monitoring and soil borings to define toxics; aquifer evaluation at major industrial site to determine environmental relationship of high capacity well, water table, septic systems and wetlands area.

WALTHER M. BARNARD

Residence: 2950 Straight Road, RD#1, Fredonia, NY 14063

Telephone: (716) 672-2027 (Residence)
(716) 673-3293 (Office)

Date and Place of Birth: 30 May 1937 at Hartford, CT

Education:

Trinity College, Hartford, CT, B. S. cum laude (Geology), 1959
Dartmouth College, Hanover, NH, A. M. (Geology), 1961
The Pennsylvania State University, State College, PA, Ph.D. (Mineralogy), 1965

Accreditation:

Professional Chemist, by the American Institute of Chemists, January 1971 (Re-accredited March 1976; certified for 1981-84)

Experience:

State University College, Fredonia, NY
Assistant Professor of Geology, Sept. 1964 - August 1970
Associate Professor of Geology, Sept. 1970 - Sept. 1977
Research Associate, Environmental Resources Center, May 1977 - May 1979
Professor of Geology, October 1977 - present

Courses Taught

GL 108, Weather and Climate
GL 111, Introduction to Earth Sciences
GL 112, Geology and Man (seminars only)
GL 115, Physical Geology (laboratories only)
GL 196, Our Mineral Heritage
GL 215, Mineralogy I or Crystallography
GL 216, or 302, Mineralogy II
GL 491, Seminar in Geology
GL 495 and 496, Directed Study
GL 419 or 519, Geochemistry
GL 520, Aqueous Geochemistry
GL 523, Physical Methods in Determinative Mineralogy

Sabbatical Leaves

Spring semester 1973, at Analytical Methods Research Laboratory, Water Resources Division, U. S. G. S., Federal Center, Denver, Colorado.
Autumn semester 1982, at Chemistry and Geology Discipline, University of Hawaii at Hilo; held appointment of Visiting Colleague.

Participation in Programs, Institutes

National Science Foundation Geology of the Southern Canadian Rockies Field Conference, Summer 1968

Wright State University - Air Force Nuclear Engineering Center Short Course on Neutron Activation Analysis, Summer 1969

National Science Foundation supported Summer Institute in Instrumental Methods of Analysis for College Teachers at Rensselaer Polytechnic Institute, June 21 - August 13, 1971

N. S. F. - U. S. A. E. C. sponsored Short Course on Isotopic Neutron Sources at Oak Ridge, TN, August 16 - September 3, 1971

Hydrology and Water Resources Evaluation Workshop, Ohio University, June 13 - July 1, 1983

Consulting

U. S. Army Corps of Engineers' program for monitoring water quality of selected tributary streams in the Lake Erie drainage basin (1975).

Evaluation of Niagara Mohawk Power Corporation's proposed Lake Erie Generating Station site (1976).

Cellumor Corp., Pittston, PA: mineralogical and chemical analyses (1977).

State of Hawaii Dept. of Planning and Economic Development: geochemical baseline study of soils and ground water (1981-83).

Memberships in Professional Societies (continued active membership since date given):

Life Member, American Association for the Advancement of Science (1967)
Member, American Association of University Professors (1966)
Member, American Chemical Society (1976)
Life Member, American Geophysical Union (1971)
Life Fellow, The American Institute of Chemists (Fellow 1971; Life Fellow, 1977)
Associate Member, American Meteorological Society (1983)
Member, American Society of Agronomy (1977)
Member, American Society for Testing and Materials (1970)
Member, Canadian Society of Soil Science (1978)
Member, Crop Science Society of America (1977)
Fellow, The Explorers Club (1979)
Member, Federation of American Scientists (1976)
Member, Geochemical Society (1959)
Member, The Geochemical Society of Japan (1971)
Fellow, Geological Association of Canada (1970)
Fellow, Geological Society of America (Member, 1967; Fellow, 1979)
Member, International Association for Great Lakes Research (1978)
Member, International Association of Geochemistry and Cosmochemistry (1970)
Member, International Association of Theoretical and Applied Limnology (1973)
Member, International Society of Soil Science (1977)
Life Member, Mineralogical Association of Canada (Member, 1964; Life Member, 1968)

Life Member, Mineralogical Society (London) (Member, 1968, Life Member, 1972)
Life Member, Mineralogical Society of America (Member, 1959; Life Member, 1978)
Member, National Association of Geology Teachers (1966)
Member, National Earth Science Teachers Association (1984)
Member, National Science Teachers Association (1980)
Member, National Water Well Association (1979)
Life Member, New York Academy of Sciences (1968)
Member, Society for Applied Spectroscopy (1968)
Life Member, the Society for Environmental Geochemistry and Health (Member, 1972; First Life Member, 1972)
Member, Society of College Science Teachers (1983)
Life Member, The Society of the Sigma Xi (Member, 1970; Life Member, 1980)
Member, Soil Science Society of America (1977)

Listed in:

American Men of Science, 11th ed., Supplement 4, 1968; American Men and Women of Science, 12th ed., 1971; 13th ed., 1976; 14th ed., 1979, 15th ed., 1982
Who's Who In The East, 15th ed., 1975-76; 16th ed., 1977-78; 17th ed., 1979-80; 18th ed., 1981-82; 19th ed., 1983-84
Dictionary of International Biography, v. 12, 1975-76
Community Leaders and Noteworthy Americans, 1975-76 ed.
Notable Americans of the Bicentennial Era, 1976 ed.; Notable Americans of 1976-77

Research Grants and Fellowships:

Grants-in-aid, Research Foundation of SUNY, Autumn 1964, Autumn 1966, Autumn 1969, Autumn 1972
Research Grant, Research Corporation, Autumn 1965
Summer Research Fellowship, Foundation of the State University College at Fredonia, Summer 1965
Faculty Research Fellowships, Research Foundation of SUNY, Summer 1966, Summer 1970, Summer 1973
Lake Erie Environmental Studies/Environmental Resources Center Research Fellowships, Summers 1972, 1973, 1974, 1975, 1976, 1978
Director, National Science Foundation Undergraduate Research Participation Programs, Summers 1975, 1976, 1977, 1978
Co-Investigator, U. S. Energy and Resources Development Agency Grant, June 1975 - November 1977
Faculty Project Adviser, National Science Foundation Student Originated Studies Programs, Summer 1979 (David M. Taylor, student project director) and Summer 1980 (Timothy J. Bender, student project director)
Faculty participant, Research grant from U. S. Dept. of Energy to Nuclear Science and Technology Facility at State University of New York at Buffalo, Autumn 1980
Associate Investigator, Research grants funded by State of Hawaii Department of Planning and Economic Development, July 1981 - June 1983

Publications:

Papers, reviews, memorials

Barnard, W. M., 1963, Uranium content of syenite-1, in Ingamells, C. O., and Suhr, N. H., 1963, Chemical and spectrochemical analysis of standard silicate samples: Geochimica et Cosmochimica Acta, v. 27, p. 897-910.

Wright, H. D., Barnard, W. M., and Halbig, J. B., 1965, Solid solution in the systems ZnS-ZnSe and PbS-PbSe at 300° C. and above: American Mineralogist, v. 50, p. 1802-1815. Abstract also in Economic Geology, v. 59, p. 1424.

Barnard, W. M., and Christopher, P. A., 1966a, Hydrothermal synthesis of chalcopyrite: Economic Geology, v. 61, p. 897-902.

Barnard, W. M., and Christopher, P. A., 1966b, Further study on the effectiveness of aqueous solutions in the hydrothermal synthesis of chalcopyrite: Economic Geology, v. 61, p. 1287-1290.

Barnard, W. M., 1967, Synthesis of pyrite from chloride-bearing solutions: Economic Geology, v. 62, p. 138-141.

Dingledy, David, and Barnard, W. M., 1967a, The stoichiometry of copper sulfide formed in an introductory laboratory exercise: Journal of Chemical Education, v. 44, p. 242. Also published in Modern Experiments for College Chemistry, Serial Publication of the Advisory Council on College Chemistry, no. 27, p. 2, 1967.

Dingledy, David, and Barnard, W. M., 1967b, The stoichiometry of sulfides: Experiments for the introductory laboratory: Journal of Chemical Education, v. 44, p. 693-694.

Metzger, W. J., and Barnard, W. M., 1968, Transformation of aragonite to calcite under hydrothermal conditions: American Mineralogist, v. 53, p. 295-300.

Connelly, J. J., and Barnard, W. M., 1968, Microwave diffraction - a teaching analogue for x-ray diffraction: Journal of Geological Education, v. 16, p. 95-98.

Barnard, W. M., 1969, Recently published guide books to mineral collecting localities in North America: American Mineralogist, v. 54, p. 1743-1746.

Barnard, W. M., 1970, Memorial of Harold Douglas Wright: American Mineralogist, v. 55, p. 614-619.

Barnard, W. M., 1971, Book review of the Mineralogy of Pennsylvania 1922-1965 by Arthur Montgomery: American Mineralogist, v. 56, p. 364.

Bates, T. F., and Barnard, W. M., 1972, Memorial to Harold Douglas Wright (1921-1969): Geological Society of America, memorial separate; also Geological Society of America, Memorials, v. 1.

Barnard, W. M., and Fishman, M. J., 1973, Evaluation of the use of the heated graphite atomizer for the routine determination of trace metals in water: Atomic Absorption Newsletter, v. 12, p. 118-124; abstract also in Society for Applied Spectroscopy, 15th annual Rocky Mountain Spectroscopy Conference, August 20-21, 1973, Denver, Colorado.

Corbin, D. R., and Barnard, W. M., 1976, Atomic absorption spectrophotometric determination of arsenic and selenium in water by hydride generation: Atomic Absorption Newsletter, v. 15, p. 116-120; abstract also in Society for Applied Spectroscopy, 18th annual Rocky Mountain Spectroscopy Conference Program, August 2-3, 1976, Denver, Colorado.

Mayer, J. R., Barnard, W. M., Metzger, W. J., Storch, T. A., Erlandson, T. A., Luensman, J. R., Nicholson, S. A., and Smith, R. T., Chautauqua Lake - watershed and lake basins, in Bloomfield, J. A., ed., 1978, Lakes of New York State, v. 2., Ecology of the Lakes of Western New York: Academic Press, New York, p. 1-103.

Storch, T. A., Barnard, W. M., and Metzger, W. J., 1978, The relationship between phosphorous loading and phytoplankton standing crops in Chautauqua Lake, New York: International Association of Theoretical and Applied Limnology, Proceedings of XX Congress, Copenhagen, Denmark, v. 20, p. 490-495.

Johnston, S. E., and Barnard, W. M., 1979, Comparative effectiveness of fourteen solutions for extracting arsenic from four western New York soils: Soil Science Society of America Journal, v. 43, p. 305-308.

Fargo, T. R., and Barnard, W. M., 1979, Fluoride in potable waters of Chautauqua County, New York: Health Review, Special Edition Sept. 1979, Chautauqua County (New York) Department of Health, p. vi-28.

Taylor, D. M., and Barnard, W. M., 1980, A National Science Foundation Student-Originated Studies Project: Jour. College Science Teaching, v. 9, p. 269-271.

Bender, T. J., and Barnard, W. M., 1981, Land application of wastewater sludges: A National Science Foundation Student-Originated Studies project: Jour. College Science Teaching, v. 11, p. 108-110.

Barnard, W. M., ed., 1981, Feasibility of Land Application of Sewage Sludges in Chautauqua County, New York: Chautauqua County Department of Planning and Development, Mayville, NY, 146 p.

Barnard, W. M., and Halbig, J. B., 1984a, Total and non-residual concentrations of cobalt, chromium, copper, iron, manganese, nickel and zinc in two soil series on the Island of Hawaii: manuscript submitted to Soil Science Society of America Journal.

______ and ______, ~~1984b~~ in press, Rare earth elements in ~~selected~~ soils from selected areas on the Island of Hawaii: ~~manuscript submitted to~~ Pacific Science.

______ and ______, 1984c, Comparison of results of chemical determinations in Hawaii soils by atomic absorption spectrophotometry, x-ray fluorescence spectrometry, and neutron activation/gamma-ray spectroscopy: manuscript submitted to Soil Science.

Halbig, J. B., Barnard, W. M., Johnston, S. E., Butts, R. A., and Bartlett, S. A., 1984 (in press), A Baseline Study of Soil Geochemistry in Selected Areas on the Island of Hawaii: Monograph, Department of Planning and Economic Development, State of Hawaii, Honolulu, HI.

Halbig, J. B., Barnard, W. M., Abbott, L. L., Bartlett, S. A., and Overfield, R. W., in preparation, A Baseline Study of Ground Water Geochemistry in Selected Areas on the Island of Hawaii: Monograph, Department of Planning and Economic Development, State of Hawaii, Honolulu, HI.

Abstracts and Oral Presentations

Wright, H. D., Hutta, J. J., and Barnard, W. M., 1963, Incorporation of some trace elements by hydrothermally synthesized galena and sphalerite (Abstract): Economic Geology, v. 58, p. 1192-1193; Geological Society of America, Program 1963 Annual Meetings, p. 181A-182A.

Barnard, W. M., 1965, Solubilities of selected chalcophile elements in hydrothermally synthesized -ZnS (Sphalerite) (Abstract): Dissertation Abstracts, v. 26, no. 4.

Barnard, W. M., Pazdersky, G. J., Schneider, H. I., and Lubelski, M. A., 1973, Geochemistry of tributaries of Chautauqua Lake, Chautauqua County, New York (Abstract): Geological Society of America, Abstracts with Programs, Northeastern Section, 8th Annual Meeting, p. 135-136.

Barnard, W. M., Schneider, H. I., and Robinson, S. L., 1974, Relationships of specific conductance to chemical constituents in the Chautauqua Lake watershed, Chautauqua County, New York (Abstract): Geological Society of America, Abstracts with Programs, Northeastern Section, 9th Annual Meeting, p. 4.

Barnard, W. M., Suib, S. L., Leetaru, H. E., and Campbell, M. A., 1975, Relationships among discharge, specific conductance, and chemical constituents in tributaries of Chautauqua Lake, Chautauqua County, New York (Abstract): Geological Society of America, Abstracts with Programs, Northeastern Section, 10th Annual Meeting, p. 24-25.

Barnard, W., Corbin, D. R., Leetaru, H. E., and Suib, S. L., 1976, Comparative geochemistry of six lakes in Chautauqua County, New York (Abstract): Geological Society of America, Abstracts with Programs, Northeastern Section, 11th Annual Meeting and Southeastern Section, 25th Annual Meeting, p. 126-127.

Harriger, T. L., Barnard, W. M., and Corbin, D. R., 1977, Impact on water quality by a coal ash landfill in northcentral Chautauqua County, New York (Abstract): Geological Society of America, Abstracts with Programs, Northeastern Section, 12th Annual Meeting, p. 272.

Harriger, T. L., Barnard, W. M., Corbin, D. R., and Watroba, D. A., 1977, Impact of a coal ash landfill on water quality in northcentral Chautauqua County, New York (Abstract): Energy and Environmental Stress in Aquatic Systems Ecological Symposium, November 2-4, 1977, Savannah River Ecology Laboratory, Abstracts of Papers, p. 23.

Barnard, W. M., Johnston, S. E., Watroba, D. A., and Fendinger, N. J., 1978, Arsenic in water and sediments of northcentral Chautauqua County, New York (Abstract): Geological Society of America, Abstracts with Programs, Northeastern Section, 13th Annual Meeting, p. 31.

Fargo, T. R., and Barnard, W. M., 1980, Fluoride in potable waters of Chautauqua County, New York (Abstract): Geological Society of America, Abstracts with Programs, Northeastern Section, 15th Annual Meeting, p. 34.

In-house Reports

Barnard, Walther, Pazdersky, Gregory, Salerno, Michelle, and Schneider, Harvey, 1972, Geochemical data and studies, in Chautauqua Lake Studies 1972 Report, Lake Erie Environmental Studies Program, State University College, Fredonia, NY, p. 97-113.

Barnard, W. M., Schneider, H. I., and Robinson, S. L., 1973, Geochemistry of tributaries of Chautauqua Lake, Chautauqua County, New York. Part II. Investigation in 1973, in Chautauqua Lake Studies - 1973, Lake Erie Environmental Studies Program, State University College, Fredonia, NY, v. 1A, p. 142-213.

Barnard, W. M., Suib, S. L., Leetaru, H. E., and Campbell, M. A., 1975, Geochemistry of tributaries of Chautauqua Lake, Chautauqua County, New York, Part III. Investigation in 1974, in Chautauqua Lakes Studies 1974 Report, Lake Erie Environmental Studies Program, State University College, Fredonia, NY.

Mayer, J. R., Barnard, W. M., Metzger, W. J., Storch, T. A., Erlandson, T. A., Johnson, R. H., Luensman, J. R., Nicholson, S. A., and Smith, R. T., 1976, Chautauqua Lake Studies 1975, State Univeristy College at Fredonia.

Chautauqua Lake Studies: A Model to Predict the Effect of Phosphorous Loading on Algal Growth in Chautauqua Lake; July 1976, State University College at Fredonia.

Chautauqua Lake, A Report to the Public, volume 1: The State of the Lake; State University College at Fredonia, Jamestown Community College, Chautauqua Lake Association, 1976.

Barnard, W. M., Bender, T. J., and Congdon, T. J., 1979, Heavy metals (Cd, Cu, Pb, Ni, and Zn) in Sewage Sludges of Chautauqua County, New York: Department of Geology and the Environmental Resources Center, State University College, Fredonia, NY.

Master of Science Theses Supervised:

Harriger, Ted L., 1977, Impact of water quality by a coal ash landfill in northcentral Chautauqua County, New York: Dept. of Geology, State University College, Fredonia, New York

Lewis, Richard W., 1977, A characterization and comparison of water quality in the three Cassadaga Lakes, Chautauqua County, New York: Dept. of Geology, State University College, Fredonia, New York

Research Interest and Research in Progress:

Since 1971 Barnard's research interests have shifted away from high temperature geochemistry with emphasis on mineral synthesis to low temperature geochemistry with emphasis (1) in analytical techniques, and (2) on environmental problems, areas which are more compatible with the interests of students and other faculty at SUNY Fredonia and which can be pursued more practically at a four-year college. To this end, he participated in a Summer Institute in Instrumental Methods of Analysis for College Teachers sponsored by the National Science Foundation and Rensselaer Polytechnic Institute (1971) and the National Science Foundation - Atomic Energy Commission Short Course on Isotopic Neutron Sources at Oak Ridge (1971). Subsequently, he became associated with the Lake Erie Environmental Studies Program (now the Environmental Resources Center) at SUNY Fredonia and carried on research relating to the hydrogeochemistry of Chautauqua Lake and its tributaries. He spent his sabbatical leave in the Spring semester 1973 at the Analytical Methods Research Laboratory of the U. S. Geological Survey in Denver, further familiarizing himself with methods of analytical hydrogeochemistry and evaluating the use of the heated graphite atomizer in atomic absorption spectrophotometry for the determination of trace elements in water, the results of which were presented orally to the 15th Annual Rocky Mountain Spectroscopy Conference (1973) and subsequently published in Atomic Absorption Newsletter (Barnard and Fishman, 1973). Another paper dealing with geochemical analytical technique which followed the same path of oral presentation (at the 19th Annual Rocky Mountain Spectroscopy Conference, 1976) and subsequent publication in Atomic Absorption Newsletter (Corbin and Barnard, 1976) involved determination of arsenic and selenium in water (Corbin, a former SUNY Fredonia chemistry undergraduate, worked under Barnard's supervision).

Additionally, Barnard has been actively involved in research projects dealing with the environmental impact of coal ash refuse (1975-77), water quality of selected tributary streams in the Lake Erie drainage basin (1975), hydrogeochemistry of the major lakes of Chautauqua County (1975-76), comparative effectiveness of solutions for extracting arsenic from soil (1978), fluoride concentrations in drinking water of Chautauqua County (1979), heavy metals in sludges from Chautauqua County's sewage treatment plants (1979-80), and geochemistry of soils and ground water on the Island of Hawaii (1981-83).

Barnard has directed four National Science Foundation Undergraduate Research Participation programs (summers of 1975, 1976, 1977, 1978), and served as faculty adviser to two National Science Foundation Student-Originated Studies programs (summers of 1979 and 1980).

MICHAEL P. WILSON

BIOGRAPHICAL DATA

PERSONAL Michael P. Wilson S.S.No. 105-42-6051
Born May 28,1949 Utica, New York
Interested in outdoor activities, travel, art, plays, concerts; like to paint in oils, go camping and hiking, fishing.

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716-673-3293 direct

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Dunkirk, N.Y. 14048

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(answering system to record)

PROFESSIONAL INTERESTS

Earth surface history, processes, materials, development and exploration.

TEACHING

Courses with number of times taught in parentheses: applied geophysics(2), site analysis(2), environmental earth science(3), earth science field methods(11), soil science (3), introductory geology (9), natural hazards(5), urban geology (6), geomorphology(graduate,3; undergrad,1) field camp (3), hydrology (1).

EXPERIENCE

Assistant Professor (1984-), State University of New York at Fredonia.

Assistant Professor (1980-1983), Texas A&M University.
Assoc. in Centers for Engin. Geosci. and Remote Sensing.

Lecturer (1976-1980), University of North Carolina-Charlotte.

Consultant (1979-1980), specializing in site evaluation (volatile acid storage in subsurface; golf course; land-fill).

Several part-time engineering-geology assignments (1974-1976). (soil and core logging, lab testing, field testing, for foundations).

Teaching Associate, Spring 1976, Syracuse University.

Graduate Teaching Teaching Assistantships (1971-1976), SUNY College at Fredonia and Syracuse University: intro., geomorph., and air photo labs. Undergraduate Assistantships (1967-1971), SUNY Fredonia: Chemistry Dept. research assist.; Geology Dept. map and photo curator, thin section maker.

EDUCATION

Ph.D. (1981), Syracuse University (major: geology; minor: geotechnical engineering): Dissertation: "Catastrophic

Discharge of Lake Warren in the Batavia-Genesee Region."
Qualifying exams passed in computer science and statistics.

M.S. (1974), SUNY College at Fredonia (major: geology); Thesis: "Gravity Studies in the Vicinity of Walnut Creek, Southwestern New York" (ground water exploration and Pleistocene geology). Qualifying exam in foreign language waived due to two years undergraduate work in German.

A.B. (1971), SUNY College at Fredonia (major: Secondary Education- Earth Science); recipient of New York State Regents Scholarship.

CERTIFICATION

New York State Permanent Teaching Certificate for Earth Science and General Science in grades 7-12.

Full Member, Association of Engineering Geologists.

PUBLICATIONS

Papers:

Fahnestock, R.K., Crowley, D.J., Wilson, M.P., and and Schneider, H.I., 1973, Ice volcanoes of the Lake Erie shore near Dunkirk, New York, USA: Journal of Glaciology, v.12, pp.93-99.

Wilson, M.P., 1983, Erosion of Banks Along Piedmont Urban Streams: North Carolina Water Resources Research Institute, Report No.189, 32pp.

Wilson, M.P., Peterson, D.N., and Ostrye, T.F., 1983, Gravity Exploration of a buried valley in the Appalachian Plateau: Ground Water, Vol. 21, No.5, p.589-596.

Abstracts: (speaker denoted with *)

Fahnestock, R.K., Crowley, D.J., Wilson, M.P.* and Schneider, H.I., 1972, Lake Erie ice cones: Geol. Soc. America,Abstacts with Programs, Northeastern Section Mtg.

Peterson, D.N.*, and Wilson. M.P., 1972, Geophysical investigation of the ancestral Walnut Creek Valley: Geol. Soc. America, Abstracts with Programs, North-eastern Section Mtg.

Wilson, M.P.*,1980, Field methods for college fresh-men & sophomores: Geol. Soc. America, Abstracts with Programs, Southeastern Section Mtg.

Wilson, M.P.*, and Muller, E.H., 1981, Catastrophic discharge of Lake Warren east of Batavia, N.Y: Geol. Soc. America, Abstracts with Programs, National Mtg.

Wilson, M.P.*, and Archer,J.A., 1983, Hydrogeological evaluation of Green Gulch fan, using surface geophysics, northern Big Bend National Park, Texas: Geol. Soc. America, Abstracts with Programs, South Central Section Mtg.

Nunnally, N.R., and Wilson,M.P.*, 1983, Channel design for urban areas: Geol. Soc. America, Abstracts with Programs, South Central Section Mtg.

Wilson, M.P.*, 1983, Alluvial fans of the Northern Chisos Mountains, Big Bend National Park, Texas: Geol. Soc. America, Abstracts with Programs, National Mtg.

PAPERS UNDER REVISION

Wilson, M.P., and Muller, E.H., Episodic Discharge of Lake Warren east of Batavia, New York: Geological Soc. America.

PAPERS IN PREPARATION

Wilson, M.P., Moore,G., and Cross, B.D., Locating a low-temperature thermal well for Gambusia gagei: Ground Water.

Cross, B.D., and Wilson, M.P., Remote sensing exploration for hydrology, north-central Big Bend Park, Texas, Journal Remote Sensing.

Wilson, M.P., Archer, J.A., Monti, J. and Abbott, C.L., Hydro-geophysics of north-central Big Bend Park, Texas, Assoc. Eng. Geol. Bull.

REPORTS

Muller, E.H., Young, R.A., Rhodes, D.D., Willette, P., Wilson, M.P., and Fakundiny, R., 1981, Surficial Geology of the Genesee Valley. New York State Geological Survey, Open File No. 2102.056, 174 pp, eleven major maps.

GRANTS

M.S. Thesis supported by Environmental Studies program at SUNY Fredonia, including two field assistants, summer 1971, and one assistant, summer 1972.

Dissertation: Support for field work during half of summers of 1975 and 1976 from New York State Geological Survey. Field transportation part of summer of 1978 from Soil Conservation Service. Remote sensing mission paid for by New York Geological Survey.

Correspondence with eighteen petroleum, mining and exploration companies netted geophysics teaching materials valued at $1,000.

N.C. Water Resources Research Institute grant to study Piedmont stream-bank erosion and mechanical failures in Charlotte, Winston-Salem and Raleigh. $12,000; 1979-80. Graduate and undergraduate assistants.

N.C. Water Resources Research Institute grant for Piedmont ground water exploration technology development; $11,000; returned upon leaving UNCC.

Responsible for gift to UNCC; two new seismographs valued at $4500 (1980).

Texas A&M University grant for field checking of map interpretations; glacial geology, Park Range, Colorado; $470; 1981.

National Park Service grant for ground water evaluation in Big Bend National Park. Mel Scroeder of TAMU Geoloy Dept. is Co-PI. Grad and undergrad. assistants. $31,400 for 1980-81. $34,000 for 1981-82. $36,300 for 1982-83.

Donation of $250 from Mr. Richard Smith, land developer and mayor of the City of Bryan, Texas, toward research on urban streams. Additionally, Mr. Smith gave access to land for study and agreed to renovate stream as per study findings and then allow monitoring of results.

National Park Service contract to sample for isotopic studies of water and secure age-dates; 1982-83; $1500.

National Park Service contract to site a low-temperature thermal well for endangered fish Gambusia gagei; 1983; $4000.

SUNY at Fredonia, Faculty Development Grants: two grants in 1984 totaling $800 for short courses in ground water monitoring and computer modeling.

OFFICES

President of N.C. Chapter of Amer. Soc. Photogrammetry in 1979; Exec.- Vice-President in 1978.

Secretary-Treasurer of N.C. section of Assoc. Engineering Geologists (1978-1980).

Secretary of Texas section of Assoc. Engin. Geologists (1982-83).

Member of Editorial Board, Assoc. Engin. Geologists (1981-).

Member, State Registration Committee, National Water Well Association (1983-).

MISCELLANEOUS EXAMPLES OF ACTIVITIES:

Testified before the North Carolina Sediment Control commission regarding urban stream erosion.
Interviewed by Channel 36 TV News (Charlotte, N.C.) in 1978 and Channel 9 TV News in 1980 about earthquakes.
Member of Greenway Site Selection Committee for Mecklenburg County, N.C., initial expenditure $4,000,000.
Taught in NSF high school, urban environmental-studies program.

Presented at N.C. Water Resources Research Institute Storm Water Management Workshop.
Talk to NC-Amer. Soc. Photogammetry about remote sensing exploration for ground water.
Texas A&M Geology Club Advisor.
Academic Advising (approx. 20 students per year at UNCC, 50 at TAMU, and 15 at Fredonia)
Developed film collections and other teaching aids at UNCC and TAMU (values over $15 K)
For the past few years an average of 12 weeks/year has been spent on field activities. (1981 - 83)
Organized two symposia and a field trip for S.Central GSA Spring 1983 and chaired student paper awards.
Part of review panel concerning Levant, N.Y. gas well(?) leakage.

ACADEMIC COURSE WORK

GEOLOGY

General Geology
Physical Geology
Mineralogy I & II
Petrology
Geochemistry
Clay Mineral Identification
Historical Geology
Paleontology
Advanced Stratigraphy
Sedimentology
Physical Sedimentology
Hydrodynamics of Sediment Transport
Geomorphology
Advanced Geomorphology
Geomorphology Seminar
Glacial Geology
Glacial Geomorphology
Structural Geology
Advanced Structural Geology
Readings in Appalachian Geology
Field Study in Iceland
Field Goelogy
Advanced Geophysics-Field
Advanced Geophysics-Solid Earth
Geophysics Seminar
Petroleum Geology
Lunar Geology
Geological Statistics-Multivariate
Exploration Statistics

RELATED MATH, SCIENCE, ENGINEERING

Calculus I&II
Univariate Statistics
Computer Programming
Chemistry I&II
Physics I&II
General Biology
Zoology
Meteorology
Astronomy
Advanced Limnology
Snow Hydrology
Water Resources Engineering
Technology of Concrete
Soil Mechanics I&II
Advanced Soil Mechanics and Foundation Design I&II
Rock Engineering
Remote Sensing

ENGINEERING GEOLOGY ASSIGNMENTS
1974-1976:

Date	Employer	Job	Material	Assignment
May, 1976	F. Kulhawy	building foundation	gray mudstone	rock core logging (RQD, I.D., etc), test sample preparation
Feb, 1976	F. Kulhawy	building foundation	cherty limestone	rock core logging (RQD, I.D., etc), test sample preparation
Sept, 1975	F. Kulhawy	bell tower	glacial till, black shale	soil and rock logging, test sample preparation
July, 1975	F. Kulhawy	coal power plant	shales	rock logs and test specimen preparation
June, 1975	Parratt-Wolff, Inc., East Syracuse, NY	housing subdivision	lake sediments (clay, silt, sand)	test pit description, soil sampling, field density, moisture
June, 1974	F. Kulhawy	foundation	deeply weathered Schist (Algeria)	Atterberg Limits, Unconfined Compression, Consolidation
May, 1974	F. Kulhawy	building foundation	red SS and SH	rock logs, test sample preparation

Consulting - 1979-80:

Estimated soil temperature for an underground volatile-acid storage tank.

Gave advice on site problems at Huntersville landfill, North Carolina.

Preliminary site study of Monroe golf course addition; Monroe, N.C.

8.0 RELEVANT COMPANY EXPERIENCE

DUNN GEOSCIENCE CORPORATION

Solid Waste Projects 1980 — 1985

PROJECT NAME & LOCATION	NATURE OF FIRM'S RESPONSIBILITY	CLIENT'S NAME AND LOCATION	DATE COMPLETED	FIRM'S FEE In Thousands
Assess Municipal Landfill Kingston, NY	Delineate groundwater and surface water contamination. Drilling, monitoring, testing.	City of Kingston, NY	1985	$50
Assess Municipal Landfill Clifton Park, NY	Delineate groundwater and surface water contamination.	Town of Clifton Park, NY	1985	14
Evaluate Landfill Expansion Broome County, NY	Hydrogeologic study regarding expansion of privately-operated municipal landfill.	Landstrom Gravel Co., Broome County, NY	1985	35
Hydrogeologic Study of Regional Landfill, Fulton County, NY	Bedrock mapping, flow analysis, soil & water testing; appearances at public meetings. Regional landfill designed to accept tanning wastes from local industries.	SCS Engineers, Covington, KY	1985	100
Hydrogeologic Assessment of 33 New York State Landfills (Statewide)	Compliance with RCRA-mandated landfill study, including site hydrogeology and inventory of 33 groundwater parameters.	New York State Dept. of Environmental Conservation, Albany, NY	1980	200
Industrial Landfill Design and Construction Supervision Ancram, NY	Design and permitting of tobacco/paper-products waste disposal facility, with leachate collection & connection to existing treatment plant for high BOD leachate; and construction supervision.	Kimberly Clark Ancram, NY	1984	15
Industrial Landfill Design Cohoes, NY	Design and permitting of a shale fines disposal facility to handle waste from lightweight aggregate kilns fired by spent-solvent fuel.	Norlite Corporation Cohoes, NY	1984	35
Industrial Landfill Design Ravena, NY	Design and permitting of cement kiln dust landfill at above-ground site, located in low-permeability clay.	Atlantic Cement Ravena, NY	1982	35

DUNN GEOSCIENCE CORPORATION

Solid Waste Projects 1980 — 1985

PROJECT NAME & LOCATION	NATURE OF FIRM'S RESPONSIBILITY	CLIENT'S NAME AND LOCATION	DATE COMPLETED	FIRM'S FEE In Thousands
Hydrogeologic Review of Municipal Landfill	Investigate suspected groundwater contamination and effects of landfill closure.	Swatara Township, Dauphin County, PA	1985	$3.5
Comprehensive Groundwater Study, Hopewell, York,Co., PA	Track off-site contamination from regional landfill: involves geophysics, testing, monitoring, groundwater modeling, regulatory agency negotiations, expert testimony and ongoing investigation.	York County Solid Waste Refuse Authority, York County, PA	1983 Ongoing	100 est.
Disposal Site Potential	Evaluation of abandoned quarry for use as fly ash disposal site.	Domino Salvage Co. Conshohocken, PA	1982	8
Landfill Design and Permitting, Cascade, WV	Design and permitting of coal refuse disposal facility, including provisions for acid run-off and sedimentation pond.	Preston Co. Coal & Coke Masontown, WV	1983	35
Hydrogeologic Review Derry, PA & vicinity	Evaluate performance of 21 area landfills which were permitted to conduct GW manipulation for treatment and control of leachate.	Twp. of Derry, PA (Dauphin Co.)	1983	8
Feasibility Study Norristown, PA	Identify potential sites for demolition waste disposal.	New Concept Transportation Co., Norristown, PA	1983	3.2
Feasibility Study Saucon Valley, PA	Identify potential sites for demo waste disposal; Permit modules.	JACA Corporation Harrisburg, PA	1983	1.2
Groundwater Modeling	Collect data and create groundwater model to assist in evaluating landfill contamination problem.	Buchart Horn York, PA	1984	7
Geophysical Study	Seismic refraction study at municipal landfill.	Beaver Construction Co. Norristown, PA	1980	3.2

COUNTY OF CHAUTAUQUA

TOWN OF CHAUTAUQUA

DINSBIER RD. LANDFILL

PHASE II WORK PLAN

RECORD SEARCH / DATA COMPILATION
SITE RECONNAISSANCE
GEOPHYSICAL SURVEY
TEST BORINGS AND OBSERVATION WELLS
SAMPLING AND ANALYSIS
FINAL PHASE II REPORT

CHAUTAUQUA COUNTY
DEPARTMENT OF PUBLIC WORKS

GEORGE W. RIEDESEL, P.E. DIRECTOR
MARCH 29, 1985

RECORD SEARCH / DATA COMPILATION

DEPARTMENT OF PUBLIC WORKS IS PERFORMING A THOROUGH SEARCH OF RECORDS REGARDING THE SITE. THE ON-GOING RECORD SEARCH CAN BE CONSIDERED FROM:

(A) A HISTORICAL PERSPECTIVE
(B) A TECHNICAL PERSPECTIVE

A. THE GOALS OF THE HISTORICAL PERSPECTIVE RECORD SEARCH ARE ATTACHED TO THIS WORK PLAN. COUNTY RECORDS HAVE BEEN REVIEWED AND NAMES OF INDIVIDUALS WHICH WORKED AT THE SITE HAVE BEEN COMPILED. IN-PERSON AND TELEPHONE INTERVIEWS WITH FORMER KEY PERSONNEL ASSOCIATED WITH THE SITE HAVE BEEN LOGGED. THE HISTORICAL PERSPECTIVE COMPREHENSIVE REPORT WILL BE AVAILABLE FOR USE AS A TOOL BY THE COUNTY'S CONSULTANT AS WELL AS BY DPW TECHNICAL PERSONNEL. THE REPORT WILL ALSO BE A PART OF THE ENTIRE PHASE II REPORT. SEE FIG.1

B. THE TECHNICAL PERSPECTIVE RECORD SEARCH IS BEING CONDUCTED SIMULTANEOUSLY WITH THE HISTORICAL PERSPECTIVE RECORD SEARCH. COMMUNICATION BETWEEN THE HISTORICAL PERSPECTIVE RECORD SEARCHER AND THE TECHNICAL PERSPECTIVE RECORD SEARCHER IS HELPFUL IN TARGETING AREAS OF RESEARCH. THE TECHNICAL PERSPECTIVE RECORD SEARCH HAS BROUGHT ABOUT A RAFT OF INFORMATION ABOUT THE SITE AND A PORTION OF THE INFORMATION COMPILED AS OF THIS WRITING IS ATTACHED TO THIS WORK PLAN. SEE FIGS. 2 AND 3

THE COUNTY OF CHAUTAUQUA HAS CLEAR TITLE TO THE SITE. THE TITLE SEARCH IS ON FILE AT THE CHAUTAUQUA COUNTY DEPARTMENT OF LAW. A BOUNDARY SURVEY OF THE SITE IS NOT INCLUDED IN THE WORK PLAN. SEVERAL HORIZONTAL DATA BASES HAVE BEEN USED AT THE SITE. ALL DATA BASES WILL BE TIED TOGETHER TO AVOID CONFUSION AND THIS WORK WILL BE DONE BY THE DPW. VERTICAL DATUM AT THE LANDFILL HAS BEEN CONSISTENT SINCE 1975 AND, ALTHOUGH THE USGS MONUMENT AT THE INTERSECTION OF DINSBIER ROAD AND NEW YORK STATE ROUTE 430 WAS OBLITERATED, THE ASSUMED DATUM AT THE SITE IS VERY CLOSE TO USGS DATUM. DPW SEES NO NEED TO ADJUST

WORK PLAN ----- RECORD SEARCH

HISTORICAL PERSPECTIVE

WRITE A COMPREHENSIVE REPORT REGARDING THE CHAUTAUQUA SANITARY LANDFILL LOCATED ON DINSBIER ROAD, TOWN OF CHAUTAUQUA, CHAUTAUQUA COUNTY, NEW YORK.

INCLUDE:

1. HISTORY OF THE SITE

   A. OWNERSHIP
   B. MANAGEMENT PERSONNEL
   C. ACTIVITIES

      I - NOMINAL
      II - UNUSUAL, SPECIAL

2. WASTES DISPOSED OF AT THE SITE

3. WASTES STORED AT THE SITE AND REMOVED

   A. LOCATION OF WASTE AFTER LEAVING SITE

4. EQUIPMENT USED AT THE SITE

5. LABORERS USED AT THE SITE

6. ENGINEERING SERVICES USED AT THE SITE

7. POLITICAL DECISIONS REGARDING THE SITE

8. PUBLIC RELATIONS REGARDING THE SITE

9. NYS DEC INSPECTIONS, OPINIONS REGARDING SITE

10. DESCRIPTION OF TESTING, MONITORING, OR REMEDIAL ACTIONS AT THE SITE

INCLUDE REFERENCES AND FOOTNOTES FOR ALL FACTUAL INFORMATION INCLUDED IN THE REPORT.

IF INFORMATION IS OBTAINED VERBALLY FROM INDIVIDUALS, OBTAIN WRITTEN CONFIRMATION AND SIGNATURE.

FIG. 1

DINSBIER RD. MISC. REPORTS

PROPOSED INVESTIGATION TO DETERMINE LEACHATE MIGRATION FROM INDUSTRIAL WASTES AT THE CHAUTAUQUA LANDFILL

PENN ENVIRONMENTAL CONSULTANTS, INC. JULY 1977

INVESTIGATION TO DETERMINE LEACHATE MIGRATION FROM INDUSTRIAL WASTES AT THE CHAUTAUQUA LANDFILL

PENN ENVIRONMENTAL CONSULTANTS, INC. OCTOBER 1977

DESIGN MODIFICATION FOR AN EXISTING INDUSTRIAL WASTE DISPOSAL TRENCH

PENN ENVIRONMENTAL CONSULTANTS, INC. JANUARY 1978

OPERATIONAL PLAN FOR THE CHAUTAUQUA LANDFILL

PENN ENVIRONMENTAL CONSULTANTS, INC. JULY 1978

PROPOSED PLAN FOR DISPOSAL OF SELECTED BARRELS CONTAINING INDUSTRIAL WASTE AT THE CHAUTAUQUA LANDFILL

PENN ENVIRONMENTAL CONSULTANTS, INC. SEPTEMBER 1979

DESIGN REPORT CHAUTAUQUA LANDFILL EXTENSION

PENN ENVIRONMENTAL CONSULTANTS, INC. DECEMBER 1979

PROPOSED PLAN FOR DISPOSAL OF BULK SLUDGES AND SELECTED BARRELS AT THE CHAUTAUQUA LANDFILL

PENN ENVIRONMENTAL CONSULTANTS, INC. MARCH 1980

SUPPLEMENTAL GEOLOGIC REPORT FOR PROPOSED PLAN FOR DISPOSAL OF BULK SLUDGES AND SELECTED BARRELS AT THE CHAUTAUQUA LANDFILL

PENN ENVIRONMENTAL CONSULTANTS, INC. MAY 1980

FIG. 2

PROPOSED PLAN FOR CLOSURE OF INDUSTRIAL WASTE DISPOSAL TRENCHES

PENN ENVIRONMENTAL CONSULTANTS, INC. DECEMBER 1980

CLOSURE AND GROUNDWATER MONITORING PLAN FOR THE CHAUTAUQUA LANDFILL

NUS CORPORATION JANUARY 1983

DINSBIER F 'D LANDFILL

FIG. 3

Topography map, September 1983, Penciled x-section lines A, B, C, D,		DEH	1/85
A Line Profile B Line Profile		DEH	1/85
C Line Profile		DEH	1/85
D Line Profile		DEH	1/85
Ground Profile/Leachate Blow-out Profile		TRW	10/83
Topography Map September 1983 original-mylar			9/83
Chaut. Landfill 8-12-83 Survey Leachate Areas/Erosion Ditches		DMD	9/83
Closure Plan - Side Grading/Erosion Control Plan & Detail	DWG #6117-05-C1	PEC	1/83
Closure Plan - Groundwater Monitoring Plan	DWG #6117-05-C2	PEC	1/83
Closure Plan - Sections A-A, B-B, and C-C	DWG #6117-05-C3	PEC	1/83
Closure Plan - Details	DWG #6117-05-C4	PEC	1/83
Closure Plan - Geologic Cross-section-North-South	DWG #6117-05-C5	PEC	1/83
Closure Plan - Piezometric Surfaces	DWG #6117-05C6	PEC	1/83
Closure Plan - Test Boring Logs (from 1980) No. 914, 916, 917	DWG #6117-05-C7	PEC	1/83
Topography Map - Final Elevs. after Closure Mylar		DPJ	3/82
Topography Map - Final Elevs. after Closure Plotting/Working copy		DPJ	3/82
Topographic Map Working Copy		DPW	ca. 3/82
Survey Control Points & Elevation Points Working DWG		DPW	81-82
South Property Line Surveyed 4/1/81 Mylar		DPW	4/81
Sludge Trenches Working Drawing		DPW	12/80
Topography Map of Industrial Waste Area 1 Mylar, 1 Print		DPW	12/80
Industrial Waste Disposal Facility, Plan View, Operational State	DWG #337-6-07	PEC	rev. 3/80
Industrial Waste Disposal Facility, Plan View, Initial Trench Area Closure	DWG #337-C-08	PEC	rev. 3/80
Industrial Waste Disposal Facility Details & Cross-sections	DWG #337-C-09	PEC	rev. 3/80
Industrial Waste Disposal Facility Plan View Closure Stage	DWG #337-C-10	PEC	rev. 3/80
Prop. Industrial Waste Disposal Trenches Monitoring wells/section locs.	DWG #337-02-R1	PEC	3/80
Prop. Industrial Waste Disposal Trenches Test Boring Log No. 904	DWG #337-02-R2	PEC	5/80
Prop. Industrial Waste Disposal Trenches Test Boring Log No. 907	DWG #337-02-R3	PEC	5/80
Prop. Industrial Waste Disposal Trenches Test Boring Log No. 911	DWG #337-02-R4	PEC	5/80

DINSBIER ROAD LANDFILL - CONTINUED

PROP. INDUSTRIAL WASTE DISPOSAL TRENCHES TEST BORING LOGS NO. 912 & 913	DWG #337-02-R5	PEC	5/80
PROP. INDUSTRIAL WASTE DISPOSAL TRENCHES GEOLOGIC SECTIONS "AA" & "BB"	DWG #337-02-R6	PEC	5/80
SANITARY LANDFILL EXPANSION SITE PREPARATION PLAN (AREA 1)	DWG #337-03-C1	PEC	12/79
SANITARY LANDFILL EXPANSION SITE PREPARATION PLAN (AREA 2)	DWG #337-03-C2	PEC	12/79
SANITARY LANDFILL EXPANSION SITE PREPARATION PLAN (AREA 3)	DWG #337-03-C3	PEC	12/79
SANITARY LANDFILL EXPANSION SITE PREPARATION PLAN (AREA 4)	DWG #337-03-C4	PEC	12/79
SANITARY LANDFILL EXPANSION SITE PREPARATION PLAN (AREA 5)	DWG #337-03-C5	PEC	12/79
SANITARY LANDFILL EXPANSION SITE PREPARATION PLAN (AREA 6)	DWG #337-03-C6	PEC	12/79
SANITARY LANDFILL EXPANSION SITE PREPARATION PLAN (AREA 7)	DWG #337-03-C7	PEC	12/79
SANITARY LANDFILL EXPANSION FINAL PLAN (AREA 8)	DWG #337-03-C8	PEC	12/79
SANITARY LANDFILL EXPANSION FINAL PLAN (AREA 9)	DWG #337-03-C9	PEC	12/79
SANITARY LANDFILL EXPANSION FINAL PLAN (AREA 10)	DWG #337-03-C10	PEC	12/79
SANITARY LANDFILL EXPANSION DETAILS SECTION	DWG #337-03-C11	PEC	12/79
INDUSTRIAL WASTE DISPOSAL FACILITY PLAN VIEW	DWG #337-C-07	PEC	8/79
INDUSTRIAL WASTE DISPOSAL FACILITY PLAN VIEW	DWG #337-C-08	PEC	8/79
INDUSTRIAL WASTE DISPOSAL FACILITY DETAILS & CROSS SECTIONS	DWG #337-C-09	PEC	8/79
PRELIMINARY INDUSTRIAL WASTE FACILITY LAYOUT	DWG #337-0	PEC	7/79
PLAN VIEW OF LANDFILL AND FIRST LIFT	DWG #337-C-05	PEC	3/79
PLAN VIEW OF LANDFILL & FIRST LIFT/LEACHATE COLLECTION & RELATED STRUCTURES	#337-C-05A	PEC	9/78
PLAN VIEW OF LANDFILL & FIRST LIFT	DWG #337-C-05	PEC	7/78
LOCATION OF FIRST, SECOND, & THIRD LIFTS	DWG #337-C-06	PEC	7/78
PROPOSED FINAL CONTOUR MAP/MONITORING WELLS, CUT-OFF TRENCH	#337-C-02	PEC	7/78
CROSS SECTIONS THROUGH WASTE TRENCHES	DWG #337-C-04	PEC	6/78
LAYOUT OF INDUSTRIAL WASTE TRENCHES	DWG #337-C-03	PEC	6/27/78
INTERIM GRADING PLAN & PROFILE OF FINAL COVER/PROP. MONITORING WELLS	#337-C-01	PEC	6/78
SANITARY LANDFILL TOWN OF CHAUTAUQUA, DINSBIER ROAD		DPW	5/78
MAP OF SANITARY LANDFILL, CHAUTAUQUA DINSBIER ROAD - PRINT W/FREEHAND ADDITIONS		DPW	CA. SPR/78
PROP. FINAL CONTOUR MAP	#337-6-02	PEC	2/2/78

DINSBIER ROAD LANDFILL - Continued

Interim Grading Plan & Profile of Final Cover	PEC	2/78
X-Sections 0+00, 0-50, 0-100 Trenches	DPW	ca. 1/78
X-Sections 0+60, 0+50, 0+36 Trenches	DPW	ca. 1/78
X-Sections 1+50, 1+00, 0+76 Trenches	DPW	ca. 1/78
X-Sections 1+72, 1+78, 2+00, 2+04, 2+40 Trenches	DPW	ca. 1/78
X-Sections 3+00, 3+50 Trenches	DPW	ca. 1/78
X-Sections B, C, D Trenches	DPW	ca. 1/78
X-Sections D+50, E, E+50 Trenches	DPW	ca. 1/78
X-Sections F-Line Trenches	DPW	ca. 1/78
Map of Sanitary Landfill Chautauqua Dinsbier Road (pencil)	DPW	1/78
X-Sections C, D, E Landfill pencil, x-rec paper	DPW	ca. 1/78
X-Sections F, G, H Landfill pencil, x-rec paper	DPW	ca. 1/78
X-Section I Landfill pencil, x-rec paper	DPW	ca. 1/78
X-Section 0-50 Landfill pencil, x-rec paper	DPW	ca. 1/78
X-Sections 0+00, H00 Landfill pencil, x-rec paper	DPW	ca. 1/78
X-Sections 2+00, 3+00 Landfill pencil, x-rec paper	DPW	ca. 1/78
X-Sections 6+00, 7+00 Landfill pencil, x-rec paper	DPW	ca. 1/78
X-Sections -100, -200, -300 Landfill pencil, x-rec paper	DPW	ca. 1/78
X-Sections 4+00, 5+00 Landfill pencil, x-rec paper	DPW	ca. 1/78
X-Sections 0+00, 1+00 Landfill print, addtl design	DPW	ca. 1/78
X-Sections 4+00 Landfill print, addtl design	DPW	ca. 1/78
X-Sections D & E Landfill print, addtl design	DPW	ca. 1/78
X-Sections F, G, H Landfill print, addtl design	DPW	ca. 1/78
X-Sections I Landfill print	DPW	ca. 1/78
Sanitary Landfill Industrial Waste Town of Chaut. (pencil)	DPW	12/77
Sanitary Landfill Industrial Waste, Town of Chaut., Dinsbier Road (Mylar)	DPW	ca.12/77
Sanitary Landfill Industrial Waste, Town of Chaut., Dinsbier Road (Prints)	DPW	ca.12/77
Map of Sanitary Landfill, Town of Chaut., Dinsbier Road	DPW	1/76

DINSBIER ROAD LANDFILL - CONTINUED

MAP OF SANITARY LANDFILL, TOWN OF CHAUTAUQUA - DINSBIER ROAD/TRENCH EXCAVATION PLAN	DPW	1/76
SANITARY LANDFILL TOWN OF CHAUTAUQUA - DINSBIER ROAD/FINAL GRADES	DPW	12/30/75
CHAUTAUQUA CO. SOLID WASTE MANAGEMENT INTERIM DISPOSAL PLAN BASE MAP DINSBIER ROAD 1OF2	DPW	12/05/75
CHAUTAUQUA CO. SOLID WASTE MANAGEMENT INTERIM DISPOSAL PLAN BASE MAP DINSBIER ROAD 2OF2	DPW	12/05/75
DINSBIER ROAD BASE MAP WORK SHEET	DPW	CA.12/05/75
CHAUTAUQUA CO. SOLID WASTE MANAGEMENT INTERIM DISPOSAL PLAN BASE MAP DINSBIER ROAD	DPW	12/05/75
CHAUTAUQUA CO. SOLID WASTE MANAGEMENT INTERIM DISPOSAL PLAN BASE MAP DINSBIER ROAD	DPW	12/05/75
CHAUTAUQUA INTERIM SANITARY LANDFILL SITE PLAN	H&E	7/73

THE DATUM THE SMALL AMOUNT TO MAKE IT CONSISTENT WITH USGS DATUM BECAUSE TO DO SO WOULD ADD UNNECESSARY CONFUSION. SEVERAL LOCAL BENCHMARKS ARE AVAILABLE. LOGS OF ALL EXISTING GROUNDWATER MONITORING WELLS HAVE BEEN FOUND. WATER QUALITY DATA REPORTS HAVE BEEN COMPILED. WATER TABLE DATA HAS BEEN COMPILED. A PRELIMINARY REMEDIAL ACTION OUTLINE HAS BEEN FORMULATED. A TOPOGRAPHIC MAP DRAWN FROM AERIAL PHOTOGRAMMETRIC DATA OBTAINED WHEN THE SITE WAS ACTIVE HAS BEEN RECEIVED BY DPW. ALL OF THIS INFORMATION WILL BE REVIEWED AND USED TO ASSESS THE EXTENT OF FURTHER WORK NECESSARY IN THE PHASE II INVESTIGATION.

SITE RECONNAISSANCE

The site is part of property shown on Chautauqua County, Town of Chautauqua tax map Sections 19 and 20. Tax records in Mayville have been studied and the names of all owners of property shown on those tax map sections have been compiled. A survey of water wells used by nearby property owners will be conducted as part of this site reconnaissance work. Specifications for color-infrared aerial photography have been written, and a copy of the specifications has been included as part of this work plan. Requests for proposals from several aerial photography companies have been requested. The site will be photographed as soon as possible. March and April are the best months for color-infrared photography. Patterns of certain stresses will be visible from these photographs. Our consultant will assist in photo-interpretation. See Fig. 4

DPW is aware of the general condition of the site. Leachate breakouts were mapped in August, 1983. DPW monitors several existing monitoring wells quarterly. DPW has completed a topographic map of the site dated September, 1983. A copy is included as part of this work plan. Key project personnel are familiar with the site. See Fig. 5

The County Fire Coordinator will be contacted and a procedure for notification of the Mayville Fire Department and Rescue Units as well as the Chautauqua County Hazardous Materials Response Team will be developed. The nearest hospital is Westfield Memorial Hospital in Westfield. The County with its consultant will review existing water quality data along with existing water quality monitoring techniques and safety equipment to determine whether further safety precautions are warranted. The Historical Perspective Record Search Report will be studied to determine the degree-of-safety required for any proposed drilling and/or further sampling.

DINSBIER ROAD SANITARY LANDFILL

COLOR-INFRARED AERIAL PHOTOGRAPHY SPECIFICATIONS

SECTION I FINISHED PRODUCT

1.1 Scale of finished product shall be 1:1200

1.2 Finished product shall be capable of being viewed stereoscopically.

1.2.1 Forward overlap of photos shall be 60%.

1.2.2 Sidelap shall be 15%.

1.3 Contractor shall supply the Chautauqua County Department of Public Works with positive transparencies for light-table viewing.

SECTION II FILM

2.1 Film shall be Kodak Aerochrome infrared film, Type 2443.

2.2 Film shall be fresh.

2.3 Film shall be stored prior to and after exposure in strict accordance with Kodak, the film manufacture's requirements and recommendations.

2.4 Film shall be processed promptly.

2.5 Film shall be processed in strict accordance with Kodak's requirements and recommendations.

2.6 Film shall be packaged carefully and in such a manner that the film cannot bend, become scratched or be otherwise damaged during any shipment.

SECTION III FIELD AND AIR CONDITIONS

3.1 Recommended camera settings are:

3.1.1 ASA = 100

3.1.2 Speed = 1/500 sec

3.1.3 f - stop = 8

Contractor shall report the camera settings actually used to the Chautauqua County Department of Public Works.

3.2 Atmospheric conditions shall be such that no cloud shadows are photographed. Recommended exposure period shall be mid-day, between the hours of 10:00 AM to 2:00 PM. Contractor shall report atmospheric conditions and actual exposure period and exposure date to Chautauqua County Department of Public Works.

3.3 Yellow (minus-blue) filter must be used. Filter shall be wratten 12 or 15.

3.4 Camera shall have a focal length f = 6".

FIG. 4

A GASEOUS SMELL IS CURRENTLY EVIDENT AT CERTAIN PORTIONS OF THE SITE. WITH DPW PROVIDING HORIZONTAL CONTROL MAPPING SERVICES, AN AIR SURVEY WILL BE CONDUCTED FOR SAFETY PURPOSES. DATA COLLECTED FROM THE AIR SURVEY WILL ALSO BE USED FOR HAZARD RANKING SYSTEM PURPOSES. DATE, TIME, AND LOCATION OF SAMPLING WILL BE RECORDED. APPROXIMATE WIND DIRECTION, WIND SPEED, TEMPERATURE AND SAMPLER'S NAME WILL ALSO BE RECORDED. SAMPLES WILL BE TAKEN BOTH UPWIND AND DOWNWIND. METHODS OF AIR SAMPLING WILL INCLUDE EITHER AN HNU PHOTOIONIZER OR AN MSA EXPLOSIMETER DETECTOR.

GEOPHYSICAL SURVEY

Since the correlation of geophysical data with well logs or test boring data is generally more reliable than either type of information used by itself, a careful definition of the problem and determination of the objectives and determination or the best type of information to solve the problem should be made before geophysical work is done.[1] Part of the work plan is the review of existing well logs and test boring data. After review of this material, a determination of the objectives of any proposed geophysical survey will be made and the type of information needed will be targeted.

DPW's consultant has capabilities to obtain information using the following types of equipment:

a. Radar
b. Electromagnetics
c. Resistivity
d. Seismic
e. Metal detector
f. Magnetometer

1. Fetter, C.W., Jr., Applied Hydrogeology pp 412-413, Bell & Howell Co., Columbus, Ohio, 1980.

TEST BORINGS AND OBSERVATION WELLS

ATTACHED TO THIS SECTION ARE COPIES OF THE BORING LOGS OF THE WELLS WHICH DPW CURRENTLY MONITORS QUARTERLY. PRIOR TO ANY FURTHER DRILLING, DPW AND ITS CONSULTANT WILL THOROUGHLY REVIEW THE EXISTING BORING LOGS ALONG WITH THE PIEZOMETRIC (WATER TABLE) DATA GENERATED FROM THE QUARTERLY MONITORING PROGRAM. EXISTING DATA WILL ALSO BE USED TO PERFORM ANY SLUG TEST CALCULATIONS POSSIBLE. ANY SUCH SLUG TEST CALCULATIONS WILL BE FOOTNOTED WITH A STATEMENT THAT WATER PURGED FROM THE WELLS WAS DUMPED OUT ON THE GROUND AT THE WELL LOCATIONS. SEE FIGS. 6-14

DPW WILL TIE THE GROUND ELEVATIONS AND THE TOP OF CASING ELEVATIONS OF ALL EXISTING MONITORING WELLS/TEST BORINGS INTO THE VERTICAL DATUM FOR THE SITE. ANY NEW WELLS WILL BE TIED IN TO THE SAME DATUM.

SEVERAL EXISTING MONITORING WELLS ARE ONE AND ONE HALF ($1\frac{1}{2}$) INCHES IN DIAMETER AND DO NOT SUPPLY ENOUGH WATER FOR COMPREHENSIVE WATER QUALITY MONITORING. SOME OF THESE WELLS ARE NESTED, THAT IS TWO WELLS ARE IN THE SAME HORIZONTAL LOCATION BUT SCREENED AT DIFFERENCE ELEVATIONS. ALTHOUGH INADEQUATE FOR WATER QUALITY MONITORING, THE WELLS MAY GENERATE VERY GOOD PIEZOMETRIC DATA. DPW AND ITS CONSULTANT WILL EVALUATE THE STATUS OF SUCH PIEZOMETERS. IF PIEZOMETERS ARE LOCATED AT KEY LOCATIONS FOR GROUNDWATER MONITORING, THEN NEW 4" DIAMETER WELLS WILL BE INSTALLED IN CLOSE PROXIMITY TO PIEZOMETERS.

EXISTING MONITORING WELLS WILL BE FITTED WITH LOCKING CAPS. ANY NEW WELLS WILL BE CASED WITH STEEL AND FITTED WITH A LOCKING CAP.

MOST EXISTING WELLS ARE COMPLETED IN THE GLACIAL TILL OVERLYING THE BEDROCK. GENERALLY, SITE GEOLOGY CONSISTS OF A "BROWN TILL" WHICH IS WEATHERED AND RELATIVELY PERMEABLE, A "GRAY TILL" WHICH IS RELATIVELY DENSE AND RELATIVELY IMPERMEABLE, A FRACTURED SHALE UPPER BEDROCK, AND A CONSOLIDATED SHALE LOWER BEDROCK. THE DPW AND ITS CONSULTANT WILL

TABLE 2-1

MONITORING WELL DATA

Well	Approximate Surface Elevation*	Water Level**	Bedrock Elevation	Monitored Zone
→ 1A	1546	1537	1520	brown till - gray till contact
→ 1B	1546	1531	1520	near base of gray till
→ 2	1548	1545	1520	brown till
→ 3A	1548	dry	1528	brown till
→ 3B	1548	1534	1528	gray till
---904	1514	1493	1484	gray till - bedrock contact
---907	1509	1504	1480	brown till - gray till contact
---911	1508	1487	1456	sand lense in gray till
---912	1508	1506	NE	brown till - gray till contact
---913	1507	1504	1470	gray till - bedrock contact
→ 914	1574	1572	NE	base of brown till
X 916	1519	1516	NE	gray till
X 917	1481	1479	NE	brown till - gray till contact
→ 918	1582	1555[1]	1517	base of gray till
→ 918A	1582	1567	1517	base of brown till
→ 919	1550	1535	1526	base of brown till
→ 920	1490	1481	1474	gray till - bedrock contact
P1	1508	1504	NE	brown till - gray till contact

NE denotes "not encountered" in boring

*All elevations are based on topographic map of the site. Wells were not surveyed for elevations.

**Levels taken in July 1982.

[1]Measured on October 26, 1982.

→ INDICATES WELL MONITORED REGULARLY, WELL LOGS AVAILABLE

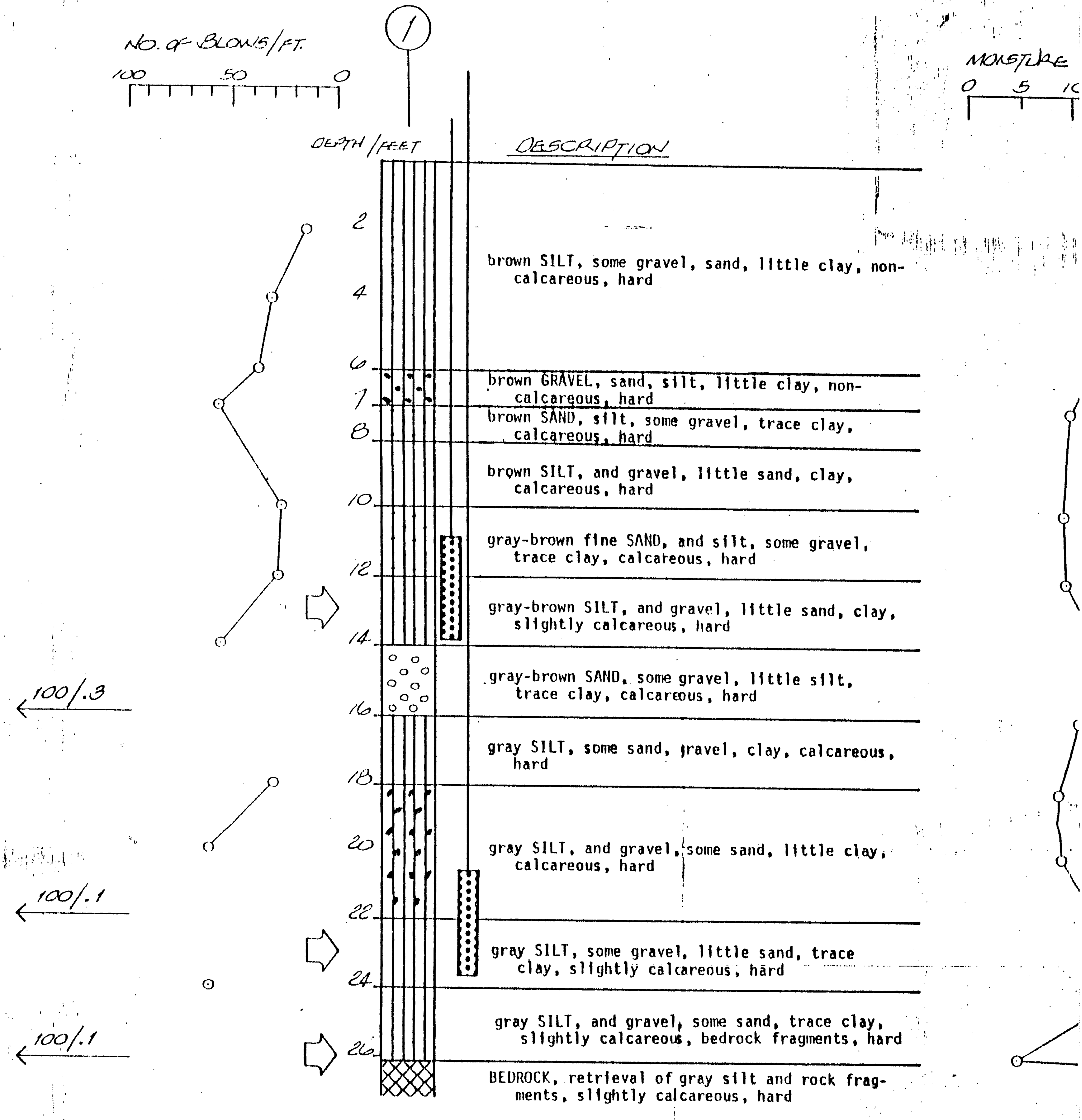
X INDICATES WELL LOG AVAILABLE FROM PEC "CLOSURE PLANS" DATED 1/83

--- INDICATES WELL LOG AVAILABLE FROM PEC "PROP. INDUSTRIAL WASTE DISPOSAL TRENCHES" PLANS DATED 5/80

FIG. 6

FROM
CHAUTAUQUA SANITARY LANDFILL
CLOSURE PLAN
"GROUNDWATER MONITORING PLAN"
PEC 1/83
DWG. # 6117-05-C2

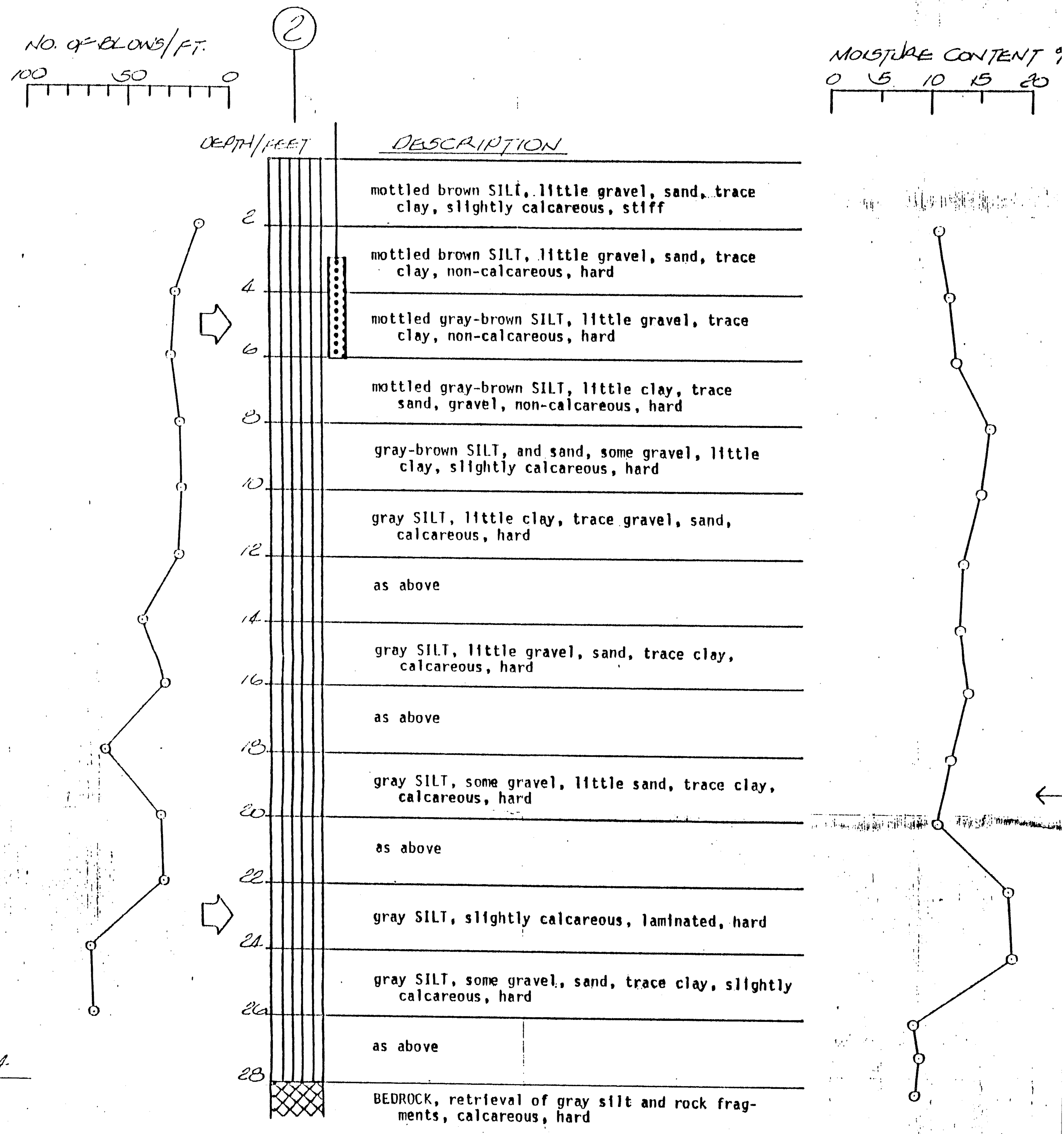
TRW 3/7/85



Portion of PEC DWG Dated 9-12-77
"TEST BORING LOGS, MONITORING WELLS, AND LEACHED SOIL SAMPLE LOCATIONS
CHAUTAUQUA LANDFILL
CHAUTAUQUA COUNTY, NEW YORK"

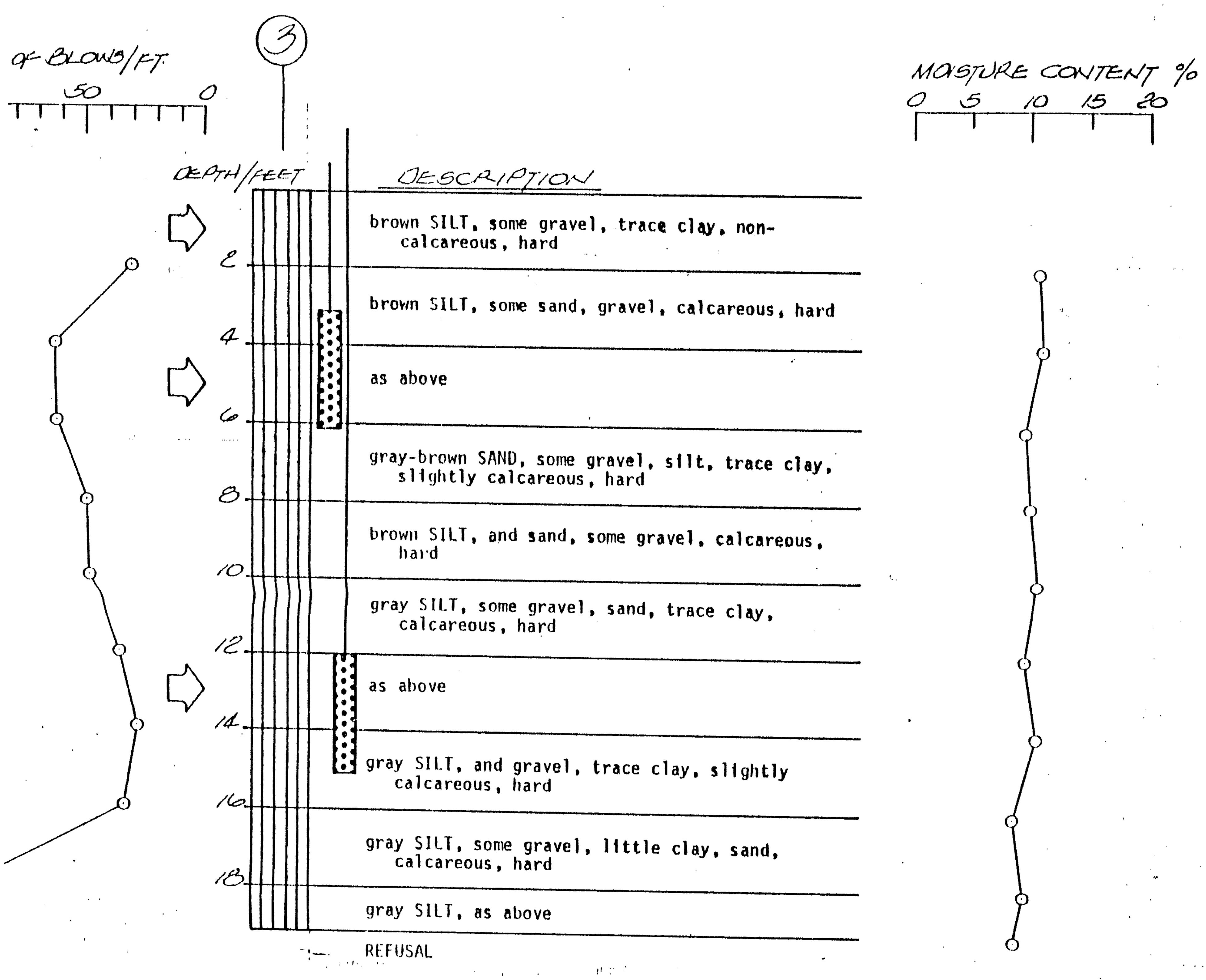
FIG. 7

TEST BORING LOGS



Portion of PEC DWG. # DATED 9-12-77
"TEST BORING LOGS, MONITORING WELLS, AND LEACHATE SOIL SAMPLE LOCATIONS
CHAUTAUQUA LANDFILL
CHAUTAUQUA COUNTY, NEW YORK"

FIG. 8



Portion of PEC Dwg. Dated 9-12-77
"Test Boring Logs, Monitoring Wells, and Leached Soil Sample Locations
Chautauqua Landfill
Chautauqua County, New York"

FIG. 9

TEST BORING NO. 914

...ATIONS	INTERVAL	DEPTH/FEET	DESCRIPTION	BL... 0 20 40
5' monitoring interval 9.0' to 14.0'		0	Dark brown SILT, trace clay, trace fragments, organic matter, very soft, damp to moist, topsoil.	* W
			Brown SILT, little gravel, little sand, trace clay, mottled, soft, damp to moist, TILL.	
			Same as above, some gravel, damp.	
		5	Same as above, some sand, trace gravel, very soft, moist.	
			Brown SILT, little gravel, little sand, trace clay, damp, TILL.	
			Brown SILT and GRAVEL, little sand, trace clay, hard. TILL.	
		10	Brown SILT, some gravel, trace sand, trace clay, hard, TILL.	
			Same as above, little gravel, rock fragment encountered (refusal).	
			Augered.	
		15	Gray SILT, little gravel, trace sand, trace clay, hard, TILL.	
		16		

*W means driven by weight

PORTION OF PEC DWG NO. 6117-05-C7
"CHAUTAUQUA COUNTY, NEW YORK
CHAUTAUQUA LANDFILL
TEST BORING LOGS NOS. 914, 916 & 917
(DRILLED IN 1980)"

FIG. 10

TEST BORING NO. 916

...TIONS	INTERVAL	DEPTH/FEET	DESCRIPTION	BL... 0 20 40
		0	Dark brown SILT, trace clay, trace fragments, very soft, damp to moist, topsoil.	
			Brown fine SAND, little gravel, trace silt, mottled, soft, TILL.	

PEC

TEST BORING Nº 918

BY KG DATE 8-2-82
CHK'D DBT DATE 8-27-82
DATE

PROJECT NAME CHAUTAUQUA COUNTY LANDFILL PROJECT Nº 6117-02
LOCATION MAYVILLE, NEW YORK COORDINATES
GEOLOGIST / ENGINEER DEBORA B. THOMPSON DRILLING CONTRACTOR EMPIRE DRILLING
DRILL CME 55 DRILLING METHOD AUGER DRILLER JOE JENSEN
SURFACE ELEVATION STICK UP ELEVATION
DRILLING DATE 7-8-82 SCALE: 1" = 10' VERTICAL

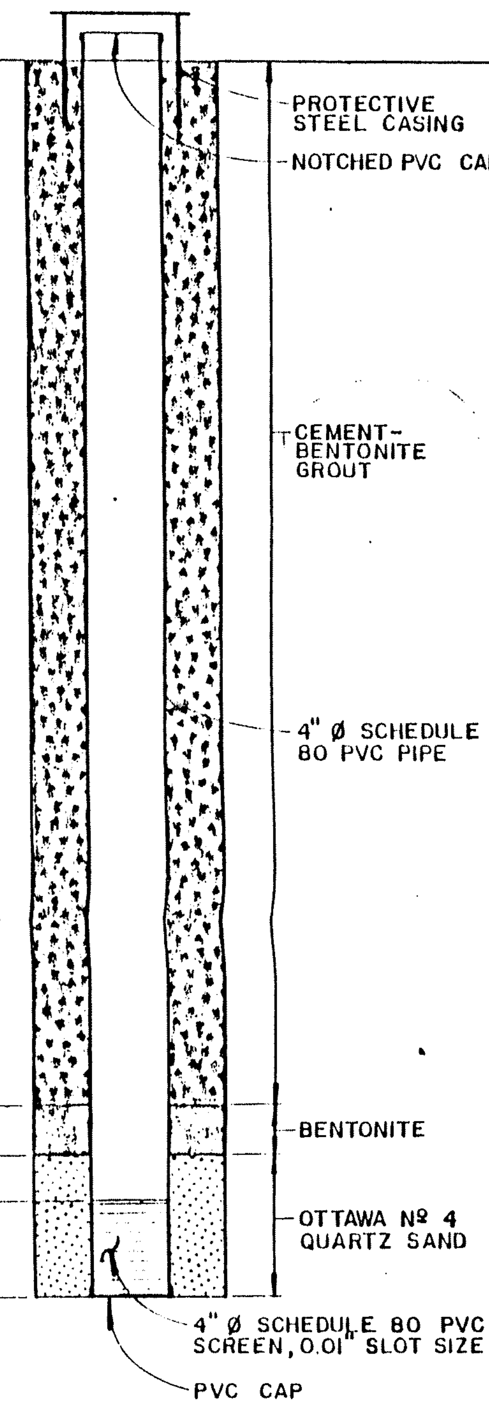
LITHOLOGY

SURFACE

- AUGERED
- mottled SILT and very fine SAND, some subangular-to subrounded, fine-to-coarse gravel, soft
- very dark-reddish-brown SILT and GRAVEL, some very fine sand
- AUGERED
- light-yellowish-brown SILT with some subangular-to-subrounded gravel, calcareous
- medium-to-light-brown, fine-to-medium GRAVEL and fine SAND; calcareous
- medium-brown, very fine-grained SAND and SILT; abundant subangular-to-rounded gravel; calcareous
- AUGERED
- medium-gray SILT with abundant very find sand; some subangular-to-subrounded, fine-to-coarse gravel and small cobbles, calcareous
- AUGERED
- medium-gray SILT, sandy; some sub-rounded-to-rounded, medium gravel; calcareous
- AUGERED
- medium-brownish gray CLAY, silty; some fine-to-medium, subrounded gravel, trace very fine sand, calcareous
- AUGERED
- medium-brownish-gray SILT and CLAY; abundant subrounded-to-subangular fine-to-medium gravel; occasional coarse gravel; calcareous
- AUGERED
- medium-gray SILT and very fine-grained SAND: abundant coarse sand and very fine-to-medium, rounded-to-subrounded gravel; occasional cobbles; calcareous
- AUGERED
- medium-dark-gray, sandy SILT, coarsening downward to silty, very fine SAND: fine-to-coarse, subangular-to-subrounded gravel throughout; calcareous
- AUGERED
- medium-brownish-gray SILT and very fine-to-coarse, subangular-to-subrounded sand; trace gravel; calcareous
- AUGERED
- medium-gray SILT and coarse SAND; some fine-to-coarse gravel; graded, calcareous
- medium-greenish-gray SILT; some very fine, subangular-to-subrounded, medium gravel; calcareous
- AUGERED
- medium-gray SILT; abundant very fine-to-coarse, subrounded gravel; calcareous
- AUGERED
- medium-gray and grayish-brown SILT; abundant subangular, coarse sand and subrounded, fine-to-medium gravel, some very fine sand; calcareous, stiff
- AUGERED
- SHALE, dark-gray, silty, slighty micaceous
- AUGERED
- SHALE

DEPTH, FEET	RUN, FEET	RECOVERY, %	RQD, %	STATIC WATER LEVEL, FEET	BLOW COUNTS /.5 FOOT
5.5 / 6.5 / 7.0	1.5	47			6/8/8
10.5 / 10.95 / 11.4 / 12.0	1.5	87			21/17/12
15.5 / 17.0	1.5	70			12/13/20
18.0 / 19.5	1.5	70			13/15/16
20.5 / 22.0	1.5	70			9/16/20
25.5 / 27.0	1.5	77			20/28/20
30.5 / 32.0	1.5	73			21/18/29
35.5 / 37.0	1.5	43			40/37/34
40.5 / 42.0	1.5				23/24/51
45.5 / 47.0	1.5	80			21/33/26
49.9 / 51.4	1.5	80			23/31/45
54.5 / 56.0	1.5	93			20/30/32
59.8 / 61.3	1.5	90		62.9	27/36/40
65.5					100/0'

WELL CONSTRUCTION DETAILS (NOT TO HORIZONTAL SCALE)



DEPTH, FEET: 55.5, 58.0, 60.5, 65.5

BORING-CASING DIAMETER, INCHES: 10" Ø HOLLOW-STEM AUGER AND SPLIT-SPOON SAMPLER

FIG. 11

TEST BORING Nº 918A

BY KG DATE 8-3-82
CHK'D DBT DATE 8-27-82
DATE

PROJECT NAME CHAUTAUQUA COUNTY LANDFILL PROJECT Nº 6117-02
LOCATION MAYVILLE, NEW YORK COORDINATES
GEOLOGIST/ENGINEER DEBORA B. THOMPSON DRILLING CONTRACTOR EMPIRE DRILLING
DRILL CME 55 DRILLING METHOD AUGER DRILLER JOE JENSEN
SURFACE ELEVATION STICK UP ELEVATION
DRILLING DATE 7-7-82 SCALE: 1" = 5' VERTICAL

LITHOLOGY	DEPTH, FEET	RUN, FEET	RECOVERY, %	R Q D, %	STATIC WATER LEVEL, FEET	BORING-CASING DIAMETER, INCHES	DEPTH, FEET	REMARKS
SURFACE								
AUGERED						6" ø AUGER		LITHOLOGY TAKEN FROM BORING 918
mottled SILT and very fine SAND; some subangular-to subrounded, fine-to-coarse gravel, soft	5.5						7.5	
very dark-reddish-brown SILT and GRAVEL, some very fine sand	6.5							
AUGERED	7.0						10.0	
light-yellowish-brown SILT with some subangular-to-subrounded gravel, calcareous	10.5							
medium-to-light-borwn, fine-to-medium GRAVEL and fine SAND; calcareous	10.95							
medium-brown, very fine-grained SAND and SILT; abundant subangular-to-rounded gravel, calcareous	11.4 / 12.0				14.7		13.0	
AUGERED	15.5							
medium-gray SILT with abundant very fine sand; some subangular-to-subrounded, fine-to-coarse gravel and small cobbles, calcareous	17.0							
AUGERED	18.0						18.0	

WELL CONSTRUCTION DETAILS (NOT TO HORIZONTAL SCALE)

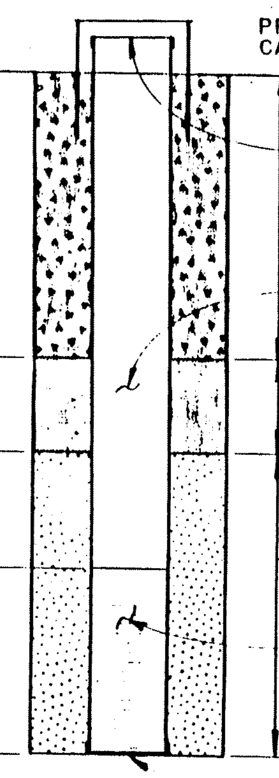


FIG. 12

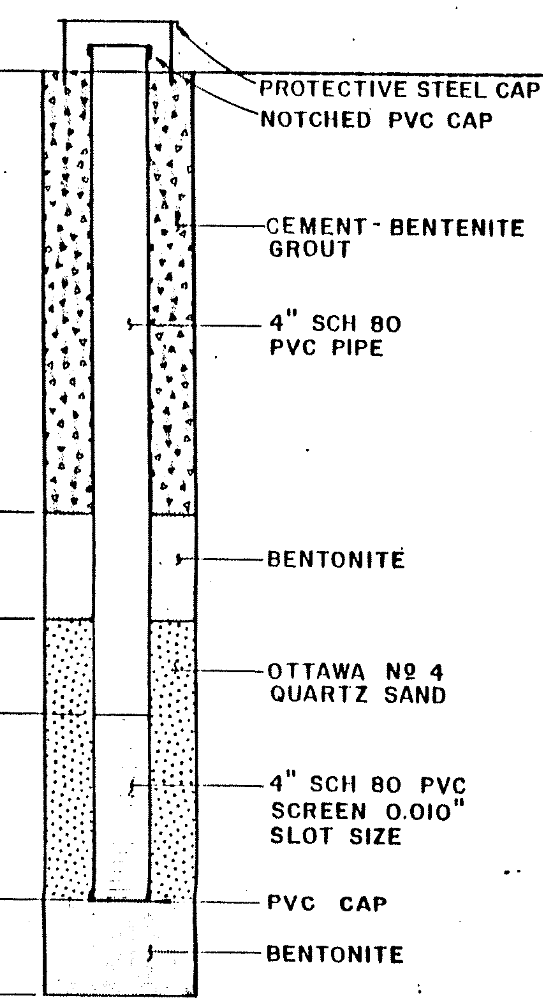
TEST BORING Nº 919

BY RJD DATE 8-20-82
CHK'D DBT DATE 8-27-82
DATE

PROJECT NAME CHAUTAUQUA COUNTY LANDFILL PROJECT Nº 6117-02
LOCATION MAYVILLE, NEW YORK COORDINATES
GEOLOGIST / ENGINEER PAULINE STEINBACHER DRILLING CONTRACTOR EMPIRE DRILLING
DRILL CME 55 DRILLING METHOD AUGER DRILLER JOE JENSEN
SURFACE ELEVATION STICK UP ELEVATION
DRILLING DATE 7-9-82 SCALE: 1" = 5' VERTICAL

LITHOLOGY (SURFACE)	DEPTH, FEET	RUN, FEET	RECOVERY, %	R Q D, %	STATIC WATER LEVEL, FEET	BLOW COUNTS /.5 FOOT	DEPTH, FEET
AUGERED							
mottled; very fine SAND, silty; trace fine-to-coarse, angular gravel	5.5 / 7.0	1.5	83			12/8/8	
AUGERED							
medium-brown SILT and very fine-to-fine, angular-to-subrounded GRAVEL, trace fine-to-medium sand; calcareous	10.5 / 12.0	1.5	87			9/8/7	11.6
AUGERED							14.4
medium-brown SILT, angular SAND, and subangular-to-subrounded GRAVEL, trace clay; calcareous	15.5 / 17.0	1.5	80		15.1	7/7/8	16.9
AUGERED							
medium-brown, angular SAND and GRAVEL, moderately sorted, calcareous	20.5 / 20.85	1.5	80			7/17/20	
medium-brown, very fine, silty SAND and angular-to-subangular, fine GRAVEL; calcareous	20.85 / 21.7						21.9
violet-gray, very fine SAND; trace medium, subrounded gravel; calcareous	21.7 / 22.0						
AUGERED	22.0 / 22.7						
medium-gray SILT and CLAY; some fine, subangular-to-subrounded gravel and very fine sand; calcareous	22.7 / 23.75	1.8	72			10/14/17	
medium-brown, medium-grained, angular SAND; some silt, medium-gray silt nodules, calcareous; no recovery	23.75 / 24.5					100/0.0'	24.5
NO RECOVERY - BEDROCK							

WELL CONSTRUCTION DETAILS (NOT TO HORIZONTAL SCALE)



BORING-CASING DIAMETER INCHES: 10" HOLLOW-STEM AUGER AND SPLIT-SPOON SAMPLER

FIG. 13

TEST BORING Nº 920

BY KG DATE 8-2-82
CHK'D DBT DATE 8-27-82
DATE -

PROJECT NAME CHAUTAUQUA COUNTY LANDFILL PROJECT Nº 6117-02
LOCATION MAYVILLE, NEW YORK COORDINATES
GEOLOGIST/ENGINEER DEBORA B. THOMPSON DRILLING CONTRACTOR EMPIRE DRILLING
DRILL CME 55 DRILLING METHOD AUGER DRILLER JOE JENSEN
SURFACE ELEVATION STICK UP ELEVATION
DRILLING DATE 7-6-82 SCALE: 1" = 5' VERTICAL

LITHOLOGY (SURFACE)	PROFILE	DEPTH, FEET	RUN, FEET	RECOVERY, %	RQD %	STATIC WATER LEVEL, FEET	BLOW COUNTS /.5 FOOT	DEPTH, FEET	BORING-CASING DIAMETER, INCHES
AUGERED									
sanitary REFUSE and soil, soft		5.0 – 6.5	1.5	27			3/3/5		
AUGERED						8.7			10" Ø HOLLOW-STEM AUGER AND SPLIT SPOON SAMPLER
sanitary REFUSE and medium-gray soil		10.0 – 11.05	1.5	40			2/6/11	10.0	
medium-brownish-gray SAND, SILT, and GRAVEL		11.05 – 11.5							
AUGERED		11.5 – 12.6						12.5	
medium-greenish-brown SILT and very fine SAND; some fine-to-coarse gravel; iron-stained, calcareous		12.6 – 13.7	1.5	80			41/28/31	13.5	
medium-dark-brownish-gray SILT and SAND; some subrounded gravel, trace cobbles; calcareous		13.7 – 14.1							
AUGERED		14.1 – 15.0							
medium-grayish-brown SILT, abundant subangular gravel, some very fine sand; occasional iron-staining, calcareous		15.0 – 16.1	1.45	47			60/100 100/.45'		
SILTSTONE, medium-greenish-gray, sandy		16.1 – 16.45							
AUGERED		16.45 – 18.5						18.5	

WELL CONSTRUCTION DETAILS (NOT TO HORIZONTAL SCALE)

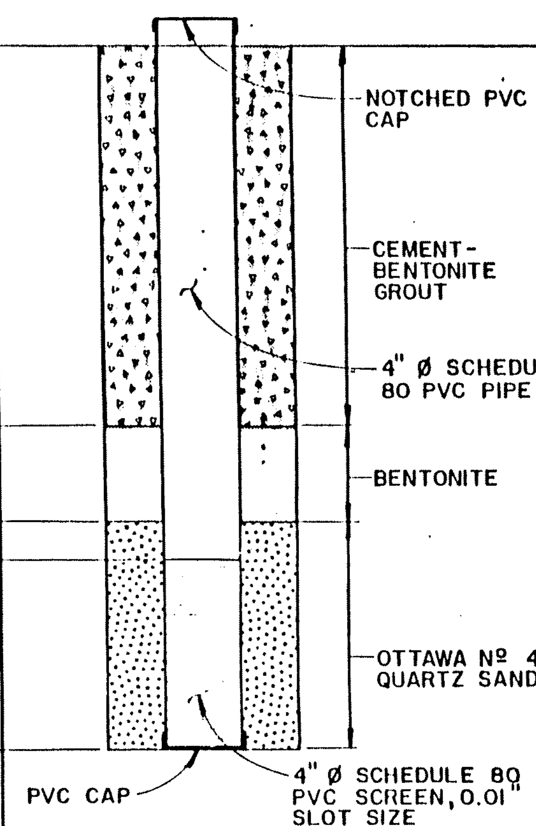


FIG. 14

ESTABLISH THE AQUIFER OR AQUIFERS OF INTEREST AND CONDUCT FURTHER SUB-SURFACE INVESTIGATIONS AND MONITORING WELL INSTALLATIONS FOR COLLECTING INFORMATION FOR APPLICATION OF THE HAZARD RANKING SYSTEM.

CONTINUOUS SPLIT-SPOON SAMPLES WILL BE OBTAINED FROM HOLLOW-STEMMED AUGERS DURING ANY DRILLING OPERATIONS. BEFORE BEING INTRODUCED INTO THE HOLE, THE SPLIT-SPOON SAMPLER WILL BE CLEANED AS FOLLOWS:

A. CLEAN OFF ALL FOREIGN MATERIAL
B. WASH W/DETERGENT
C. RINSE W/WATER
D. ACETONE WASH
E. HEXANE WASH

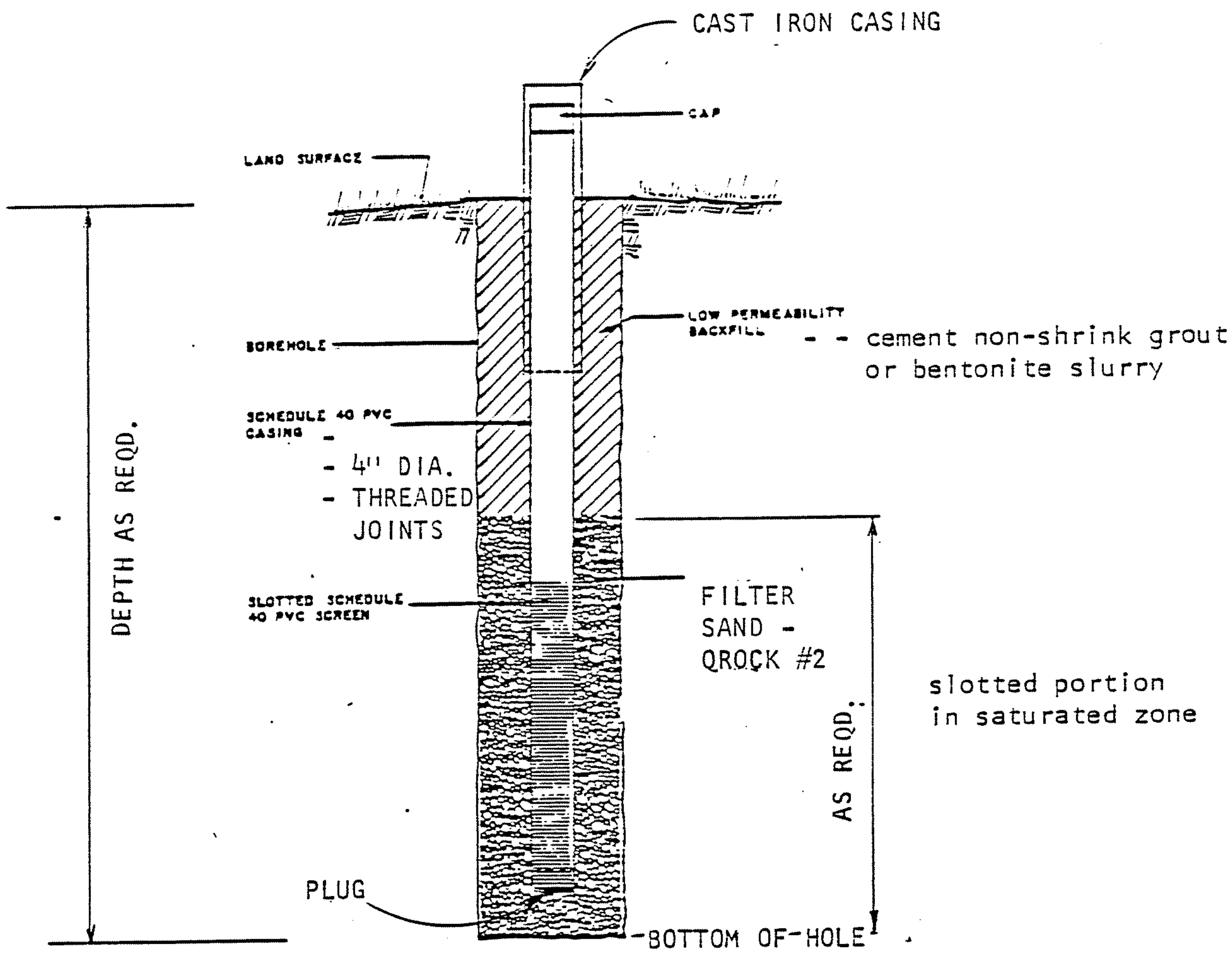
IF WARRANTED, HNU DETECTION OF GASES ADMITTED AT SAMPLING TIME WILL BE PERFORMED. IN-FIELD GEOLOGICAL IDENTIFICATION OF SAMPLES WILL BE PERFORMED BY THE DRILLING CONTRACTOR. GROUNDWATER ELEVATIONS WILL BE OBTAINED. ALL WELL DEVELOPMENT WASTE MATERIAL WILL BE DISPOSED OF ON-SITE.

WELL DEVELOPMENT PLANS FOR WELLS TO BE SCREENED IN UNCONSOLIDATED SEDIMENTS AND FOR WELLS TO BE COMPLETED IN BEDROCK ARE ATTACHED TO THIS WORK PLAN. FURTHER STUDY OF THE TECHNICAL PERSPECTIVE RECORD RESEARCH MATERIAL IS REQUIRED PRIOR TO MAKING A DECISION ABOUT WELL LOCATIONS AND SCREENING DEPTHS. SEE FIGS. 15 AND 16

PROPOSED TEST BORING/MONITORING WELL

DINSBIER RD. LANDFILL

CHAUTAUQUA COUNTY DPW



MONITORING WELL SCREENED OVER A SINGLE VERTICAL INTERVAL

NOTES

1. DRILLING TECHNIQUE SHALL BE VIA FLIGHT AUGER

2. A DRILLING REPORT SUBSEQUENT TO WELL INSTALLATION SHALL BE SUBMITTED AND SHALL CONTAIN THE FOLLOWING INFORMATION:

   a. VISUAL DESCRIPTION OF SOILS AT VARIOUS DEPTHS,
   b. MOISTURE CONTENT OF SOILS VS. DEPTH,
   c. STANDARD INFORMATION, DRILLER'S LOG (DATE, TIME, WEATHER, ETC.).

3. DRILLER SHALL ALSO SUBMIT CLEARLY IDENTIFIED SHELBY TUBE OR SPLIT-SPOON SAMPLES OF THE VARIOUS SOILS ENCOUNTERED WITH DEPTH. FOR ANALYSIS BY OWNER.

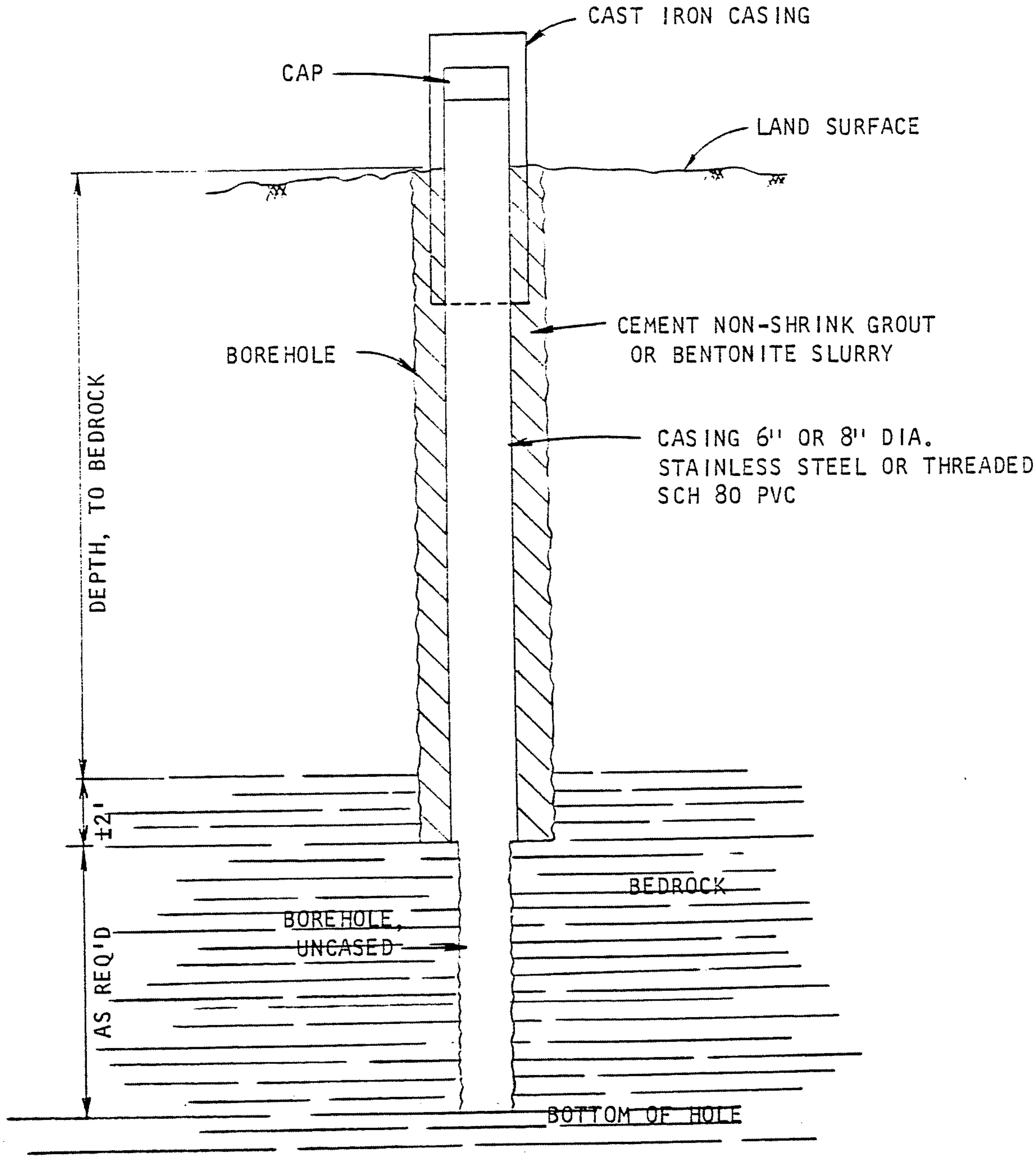
FIG. 15

TRW 2/25/85
rev. 3/28/85

PROPOSED TEST BORING/MONITORING WELL

DINSBIER RD. LANDFILL

CHAUTAUQUA COUNTY DPW



TRW 3/28/85

FIG. 16

SAMPLING AND ANALYSIS

All sampling and analysis will be conducted in accordance with New York State Department of Environmental Conservation superfund and contract laboratory protocol.

A mix of laboratories shall be used for chemical analysis. Some parameters of analysis require initiation of the processes of analysis within certain time limits. Analysis for such parameters will be by Environmental Testing Facilities, Inc.. Environmental Testing Facilities Inc. will act as the Key Laboratory for the project and will prepare all sample bottles, chain-of-custody forms, and route all samples to the appropriate laboratory for analysis. DPW, its consultant, and Environmental Testing Facilities, Inc. will work together to prepare and follow through on combined work/quality assurance project plans for water monitoring in accordance with guidelines dated May 27, 1983 by the Office of Water Regulations and Standards, U. S. EPA, Washington, D.C.

Two DPW bailers are available for sampling existing wells as well as any new Phase II wells. The sampling technique is critical to the data quality generated from this Phase II study. The DPW bailers are constructed of PVC pipe, PVC check valves, stainless steel bolt, and nylon rope. Parts of these bailers are held together with the following materials:

<u>Glue</u>: Tetrahydrofuran
Cyclohexanone
Methyl Ethyl Ketone

<u>Fiberglass Patching with Resin and Hardner</u>:
Fiberglass cloth
Methyl Ethyl Ketone Peroxide
Polyester Resin

SAMPLING AND ANALYSIS - CONTINUED

DPW PROPOSES TO USE THESE BAILERS FOR THE PHASE II STUDY AND FOR ANY QUARTERLY, SEMI-ANNUAL, OR YEARLY MONITORING TO BE PROPOSED AS A RESULT OF THE PHASE II INVESTIGATION.

SAMPLING EQUIPMENT WILL BE CLEANED PRIOR TO USE VIA THE FOLLOWING METHOD:

1. DETERGENT WASH, SCRUB
2. RINSE WITH POTABLE WATER
3. DETERGENT WASH, SCRUB
4. RINSE WITH POTABLE WATER
5. RINSE WITH DISTILLED WATER
6. NITRIC OR CHROMIC ACID RINSE
7. POUR OUT ACID ON LIMESTONE SLAG
8. POTABLE RINSE
9. DISTILLED WATER RINSE

pH OF ALL SAMPLES SHALL BE MEASURED IN-THE-FIELD BY THE DPW WITH EQUIPMENT CALIBRATED BY ENVIRONMENTAL TESTING FACILITIES, INC..
IN ADDITION TO THE NORMAL PARAMETERS OF ANALYSIS USED FOR THE EXISTING MONITORING PROGRAM AT THE DINSBIER ROAD LANDFILL[1], THE FOLLOWING ADDITIONAL PARAMETERS WILL BE ANALYZED FOR THE FIRST QUARTER 1985.

TOTAL ORGANIC HALOGENS
ANTIMONY
CADMIUM
COBALT
THALLIM
TIN
VANADIUM

PRIORITY POLLUTANT SURVEY - WELL CLG 918 ONLY.

1 SEE FIGS. 17 AND 18

Element	Contract Required Detection Level[1,2] (ug/L)	Traditional Dinsbier Rd. monitoring parameter	parameter missing from prop. ETF, Inc. AOS
Aluminum	200		
Antimony	60		✓
Arsenic	10		
Barium	200		
Beryllium	5		✓
Cadmium	5		
Calcium	5000		✓
Chromium	10	✓	
Cobalt	50		✓
Copper	25	✓	
Iron	100	✓	
Lead	5		
Magnesium	5000		
Manganese	15	✓	
Mercury	0.2		
Nickel	40	✓	
Potassium	5000	✓	
Selenium	5		
Silver	10		
Sodium	5000	✓	
Thallium	10		✓
Tin	40		✓
Vanadium	50		✓
Zinc	20	✓	
Cyanide	10		

TRW 3/15/85

FIG. 17

QUARTERLY MONITORING PROCEDURE DINSBIER RD. LANDFILL

1. BY CHAUTAUQUA COUNTY DEPARTMENT OF PUBLIC WORKS

MEASURE WELL WATER DEPTHS ON ARRIVAL, RECORD DATE AND TIME

PURGE 4" WELLS W/BAILER FABRICATED BY DPW

ALLOW RECOVERY OF WELLS

PICK-UP SAMPLE BOTTLES

MEASURE WELL WATER DEPTHS AFTER RECOVERY, RECORD DATE AND TIME

GRAB SAMPLES, FILL SAMPLE BOTTLES

A. W/BAILER (BAILER RINSED W/DISTILLED WATER BETWEEN SAMPLES)
B. W/JACK-RABBIT PUMP (1½" WELLS)
C. AT SURFACE WATER MONITORING POINTS

MEASURE pH IN THE FIELD

DELIVER SAMPLE BOTTLES TO LAB (SAME DAY)

2. BY ENVIRONMENTAL TESTING FACILITIES, INC.

CALIBRATION OF pH METER

PREPARATION OF SAMPLE BOTTLES

CHEMICAL ANALYSIS AND REPORTING FOR THE FOLLOWING: ALKALINITY, HOT ACIDITY, BOD_5, TOC, COD, CL, COLOR, HARDNESS, NH_3N, NO_2N, ODOR, TDS, SS, TURBIDITY, CR, CU, FE, MN, NI, K, NA, ZN.

3. BY CHAUTAUQUA COUNTY DEPARTMENT OF PUBLIC WORKS

COPY REPORTS

SEND COPIES TO NYSDEC AND CHAUTAUQUA COUNTY DEPARTMENT OF HEALTH UNDER COVER LETTER-REPORT.

FIG. 18

THE DATA GENERATED SHALL BE USED TO DETERMINE THE EXTENT OF FURTHER ANALYSIS REQUIRED AND WILL ASSIST IN LOCATIONS AND MONITORING REQUIREMENTS OF ANY NEW PHASE II WELLS.

ONE (1) LEACHATE SAMPLE WILL BE OBTAINED AND A PRIORITY POLLUTANT SURVEY WILL BE CONDUCTED ON THAT SAMPLE. THE FOLLOWING ADDITIONAL PARAMETERS OF ANALYSIS WILL BE RUN ON THE LEACHATE SAMPLE:

AMMONIA	SILVER	CHLORIDES
ARSENIC	SULFATE	CYANIDE
BORATE (BORON)	ZINC	TOTAL ORGANIC CARBON
CADMIUM	BOD 5	TOTAL ORGANIC HALOGENS
HEXAVALENT CHROMIUM	TKN	COPPER
TRIVALENT CHROMIUM	SS	LEAD
COPPER	SPECIFIC CONDUCTIVITY	NICKEL
CYANIDE	PHENOLS	AMMONIA-NITROGEN
IRON	VOLATILE SS	DISOLVED OXYGEN
LEAD	TOTAL SOLIDS	
MANGANESE	TOTAL VOLATILE SOLIDS	
MERCURY	SETTLEABLE SOLIDS	
NICKEL	OIL AND GREASE	

THESE PARAMETERS ARE IDENTICAL TO THOSE RUN ON ELLERY SANITARY LANDFILL LEACHATE AND WILL BE USED TO HELP DETERMINE THE TREATABILITY OF THE DINSBIER ROAD LEACHATE. LEACHATE SAMPLING TECHNIQUES WILL BE BASED ON "PROPOSED SAMPLING AND ANALYTICAL METHODOLOGIES FOR ADDITION TO TEST METHODS FOR EVALUATING SOLID WASTE: PHYSICAL/CHEMICAL METHODS," USEPA, WASHINGTON, D.C., 1984.

FINAL PHASE II REPORT

DPW AND ITS CONSULTANT WILL PREPARE A FINAL REPORT IN CONFORMANCE WITH THE FORMAT ATTACHED TO THIS WORK PLAN. CONTAMINATION ASSESSMENT IS A PART OF THIS SECTION. THE HAZARD RANKING SYSTEM WILL BE APPLIED IN ACCORDANCE WITH APPENDIX A OF 40 CFR SECTION 300 "UNCONTROLLED HAZARDOUS WASTE SITE RANKING SYSTEM; A USERS MANUAL."

F. REPORT FORMAT

1. TITLE PAGE

A. NAME OF PROJECT

B. SITE NAME

C. LOCATION

D. NYSDEC SITE NO.

E. OWNER NAME/ADDRESS

F. CONSULTANT'S NAME

G. DATE SUBMITTED

2. TABLE OF CONTENTS

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- DEPTH OF BEDROCK
- SOIL PERMEABILITIES
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- UNIQUE GEOLOGICAL CHARACTERISTICS
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  - HOW POPULATION AFFECTED
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5. UPDATED EPA FORM 2070-13 "POTENTIAL HAZARDOUS WASTE SITE, SITE INSPECTION FORM"

8. APPENDIX

ALL RAW DATA

DUNN
GEOSCIENCE CORP.

539 FRANKLIN STREET •
BUFFALO, NEW YORK 14202
(716) 884-1500

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OCT 30 1985
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Received 10/31
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with Chaut Co.

October 29, 1985

Mr. Timothy R. Woodbury, Deputy Director
D.P.W. - Division of Environment
Chautauqua County Department of Public Works
454 North Work Street, P.O. Box 38
Falconer, NY 14733

Re: Dinsbier Road Landfill - Order on Consent No. 84-164

Dear Mr. Woodbury:

Pursuant to our telephone conversation during the week of October 9, enclosed please find the two documents which you requested. One document, which can be appended to the Chautauqua County Work/Quality Assurance Plan of August 30, 1985, addresses comments from New York State Department of Environmental Conservation correspondence dated July 11 and September 27 regarding the Work/Quality Assurance Plan which merit additional explanation and/or description by Dunn Geoscience. The other document is a detailed Health and Safety Plan which can be submitted as an addendum to the Work Plan.

Please note that during the preparation of our proposal for the Phase II Investigation at the Dinsbier Road Site we were not aware of any technical data assessment which may have been required as a part of the investigation, as such was not called for in the generic Phase II Work Plan used for proposal formulation. Accordingly, our proposal contained no provisions for such an assessment. Nevertheless, the data and information which was provided to us has been reviewed, accepted as being of professional quality and integrated with our proposed plan of investigation to formulate a drilling/sampling plan which cost effectively gathers subsurface information over greater areas of the landfill not sampled previously.

If there are any further questions regarding any aspect of the enclosed, please do not hesitate to contact us.

Very truly yours,

DUNN GEOSCIENCE CORPORATION

Gerald A. Sikora

Gerald S. Sikora
Manager, Buffalo Office

GSS:dmb

Enclosures

COMMENTS AND DESCRIPTIONS REGARDING

SELECTED ELEMENTS OF PROJECT SCOPE

Phase II Investigation

Dinsbier Road Landfill - Town of Chautauqua, NY

1. Air Sampling: MSA explosimeter and HNU photoionizer readings of air quality both, upwind and downwind, will be taken prior to initiating work at a selected site on the landfill. These instruments will also be used to document releases of organic vapors, gases, and methane whenever suspected. The date, time, location, vapor/gas levels, appropriate wind direction/speed, and temperature will also be recorded. During the drilling activity the HNU photoionizer and explosimeter will be used frequently to monitor ambient vapor/gas levels around the drilling site, in the hollow stem of the auger, and the split spoon soil samples. The levels monitored will be used to establish the level of safety protocol to be used at each site.

2. Drilling Equipment Decontamination: Due to the fact that soil and water samples will be collected at various locations across the site for chemical analysis, decontamination of drilling rig equipment between each location will be necessary. In such a case, all sampling equipment (split spoon assembly) will be cleaned as follows:

   - Removal of residual oils, grit, rust, and soil with a stiff wire brush;
   - detergent wash;

- rinse with water;
- rinse with hexane;
- rinse with acetone;
- rinse with deionized water;
- collection, storage, and eventual secure disposal of all rinse fluids.

In the event visual or olfactory observations of contamination, including elevated HNU photoionizer readings are made by field personnel, more stringent decontamination procedures will be instituted. The procedures will include the cleaning of all parts of the drilling rig which may have come in contact with the contaminated soils between each drilling location and before leaving the site. This cleaning will be conducted as follows:

- Removal of residual oils, grit, rust, and soil with a stiff wire brush;
- cleaning of the appropriate sections of the drilling rig with a high pressure steam/water generator, or as a minimum, soap and water.

3. Well-Casing: Threaded flush-joint PVC casing and screen is considered a good alternative to the black steel casing and stainless steel screen currently proposed.

4. Soil Sampling of Drummed Storage Area: Composite soil samples will be collected in the former drummed storage area and retained for chemical analysis. These samples will be collected

from various representative areas as outlined below.

4.1 The entire area will be scanned on a rectangular grid with 50 foot centers using an HNU photoinizer while holding the tip of the probe approximately six inches above the surface of the soil. Potential "hot spots" arising from volatile organics which may have been inadvertently spilled during earlier operations that register on the HNU will be documented, staked and mapped. Probing will continue and be repeated at such apparent hot spots to determine whether the elevated reading was random or real. Probing will be repeated a third time and a fourth time, if necessary. Only areas recording positive hits three out of four times (minimum) will be regarded as valid hits and will be subsequently sampled.

4.2 In the event that no hot spots are found or an insufficient number are found to accurately define the site, suspicious, non-vegetated areas and surface drainage paths will be sampled.

4.3 In the event that there are still insufficient sampling points, additional points will be chosen at random to provide a total of 10 to 15 soil samples.

Chatauqua County Landfill

Town of Chautauqua
New York

Health and Safety Plan

Dunn Geoscience Corporation
Latham, New York

October, 1985

Table of Contents

Appendices

I. Respirator Fit Tests

II. Care and Cleaning of Respirators

III. SCBA Checkout Procedures

IV. Procedure for Contacting the Hazardous Materials Response Team in Case of Emergency

V. Interim Standard Operating Safety Procedures, EPA Emergency Response Division.

1.0 INTRODUCTION

Dunn Geoscience Corporation (DGC) policy provides all DGC employees with a safe and healthy work environment. In accordance with this policy, the Health and Safety Plan was prepared to address the specific health and safety needs of the Chautauqua County Landfill (CCL) site. The Plan presents information and procedures for employees investigating a municipal sanitary landfill site with the possibility of discovering uncontrolled hazardous substances. Information on potential health, safety and environmental hazards will be discussed in conjunction with health and safety protective measures. The safety plan will include assignment of responsibility, personnel protective requirements, work practices and emergency response procedures. All health and safety procedures were prepared with the consideration to potentially affected communities and the prevention of adverse exposures to toxic contaminants.

All personnel involved with the CCL site will be required to familiarize themselves and abide by the Health and Safety Plan. Since every health and safety hazard encountered at such a site cannot be anticipated, it is imperative that personnel are equipped and trained to promptly respond to unexpected hazards. Enforcement and adherence to the Health and Safety Plan will help prevent the loss of life, injury or health hazard to the field investigators and the public.

Prior to work at the site, all known contaminated materials, if any, present on the site will be removed. The site may still contain unknown organic and inorganic hazardous substances in soil and surficial deposits, groundwater and surface-water samples and buried drums.

Work on the CCL site will proceed under Class D working conditions. Given the historical perspective of this site, especially during the years before hazardous waste manifesting was strictly enforced, it is not unreasonable to expect that hazardous materials may be encountered. Therefore, strict adherence to organic vapor analysis and visual observations for the detection of sludges, especially during soil boring, will be followed. In the event that site conditions merit switching to Level C safety, such personnel protection will immediately take place. Level C protective equipment will be available at all times for all personnel actively involved on the site. In the event that any isolated areas, or the entire site, remain consistently at Level C working conditions, then Level B personnel protection equipment will be made available to all workers on the site.

In the event that isolated areas, or the entire site, become Level C or B safety work areas, then zones of contamination (exclusion area), contamination reduction and support will be established in accordance with the <u>Interim Standard Operating Safety Procedures</u> (1981) designated by the EPA Emergency Response Division. The text of this document is included as Appendix V to the Health and Safety Plan.

2.0 RESPONSIBILITIES OF SAFETY PERSONNEL

2.1 Designation of Responsibilities

The responsibility for implementing the Plan is delegated to a number of persons working on the field investigation of the CCL site. The Project Manager recommends policy on all safety matters including work practices, training, and corrective action and provides the necessary resources to conduct the program safely.

The Safety Officer has overall responsibility for developing safety procedures and training programs, maintaining a high level of safety awareness, ensuring compliance with applicable federal and state health and safety regulations, determining appropriate protection, including selection of protective equipment, maintenance schedules, and monitoring protocols, and maintaining close communication with the on-site safety coordinator and team members.

The Project Manager will designate the On-Site Coordinator (OSC) for the CCL site. The OSC is responsible for establishing overall operating standards, manning the command post and communication network, and coordinating all safety and technical activities occurring at the site. The OSC will seek guidance from the Safety Officer for all health and safety matters. The OSC or Safety Officer is responsible for conducting training and briefing sessions prior to work on the site. The OSC will coordinate operations with local police and fire departments and medical emergency facilities.

The field investigation team will have one of its members designated the safety coordinator. This person will have specific responsibility for maintaining a high level of safety awareness among team members, ensuring equipment availability and proper maintenance, enforcement of clothing and protective equipment use requirements, communicating with team members on pertinent safety matters, recommending to the OSC and Safety Officer improved safety measures, and initiating immediate corrective actions in the event of an emergency or development of an unsafe condition.

The field team coordinator will assign a member of the team to remain outside of any restrictive zone to monitor the air supplies of the team (if required), observe the team's activities for extraneous hazards, notify the field team and OSC if a problem arises and assist in the decontamination of the field team and equipment, if necessary.

Field team personnel are subjected to heat, cold, stress, exhaustion and potential hazards. The field team coordinator must be an astute observer to any signs or symptoms that may affect the safety of the field team. The field team coordinator has the power to substitute team personnel, order work breaks or halt operations to ensure the safety of the team.

The key element in the responsibility for health and safety is, of course, the individual field team members. Not only must they be familiar with and conform to the safety protocols prescribed in the plan, but their experience and observations will provide valuable inputs to improving overall safety. It would be impossible to draw up contigency plans for every conceivable event and in these cases, experience is invaluable.

2.2 Emergency Procedures

2.2.1 Notification of Authorities

In the event of a medical or other emergency, the On-Site Coordinator or Safety Coordinator will notify the appropriate authority. The list of phone numbers will be posted prominently at the site command post and is presented here as Appendix IV. A local map outlining all major routes to hospitals or other emergency medical facilities will also be available at the command post.

2.2.2 Evacuation Plan

The most likely incidents for which evacuation will be required are:

- a sudden release of hazardous gases/vapors during drilling;
- a drilling rig accident resulting in a physical injury to one or more persons; and,
- flashing of the borehole during drilling which subsequently results in a fire.

Emergency procedures established to deal with these incidents include escape routes, signals for evacuating work parties, emergency communications, and procedures for fire.

1. Escape Routes

Flags will be positioned near the drilling rigs and at various other locations to indicate wind direction. In the event of a sudden release or fire, all personnel will move away from the location of the incident in an upwind direction and then to the site exit point at the command trailer. Personnel downwind of the incident will first move to the perimeter of the site and then upwind to the command trailer. Scott air packs with a 5-minute supply of air will be kept on the drilling rigs for use during escape in the event of a sudden release.

2. Signal for Evacuation

In the event of a sudden release or fire requiring the immediate evacuation of personnel, the signal for evacuation will be three quick blasts on an air horn. Both the geologist monitoring the borehole and the drill rig operator will have two air horns in their possession. These air horns will be kept in a conspicuously visible location for quick access by other personnel as well.

3. Other Signals

Emergency hand signals to be used by personnel wearing air-purifying respirators are the following:

A.	Hand gripping throat:	Can't breathe
B.	Grip partners wrist or place both hands around wrist:	Leave area immediately, no debate!
C.	Hands on top of head:	Need assistance
D.	Thumbs up:	Ok, I'm alright, I understand
E.	Thumbs down:	No, negative

4. Emergency Communications

A telephone or citizens band radio will be installed at the command post to provide a quick means for completing emergency communications. The name, telephone number, and location of each pertinent local agency (e.g. police, medical facility, ambulance, fire department, etc.) will be conspicuously posted. (See Appendix 4).

5. Fire

The drill rig operator will be responsible for having a fire extinguisher available at the drill rig. It will further be the operator's responsibility to practice fire prevention measures such as periodically cleaning the rig to keep it free of accumulated oil/grease or other combustible materials. However, in the event of a drill rig fire or any other fire which cannot be controlled with available fire extinguishers, the local fire department will be summoned.

2.3 Recordkeeping

2.3.1 Personnel Exposure

A site log with a required sign-in, sign-out procedure will document the time spent by each team member on the site. This information will be supplemented by periodic air monitoring using a portable HNU Photoionization unit to measure total nonmethane hydrocarbon levels in the air, as well as the combustible gas indicator, especially so during soil boring and well installation.

2.3.2 Protective Equipment

A checklist will track all protective equipment on site, as well as any and all protective equipment brought into the field each day. Any equipment malfunction must be noted on the checklist and repaired before reuse. Other routine maintenance checks will be scheduled and recorded on a regular basis to ensure that protective equipment is effective at all times.

3.0 TRAINING PROGRAM

Prior to any site activities, the field investigation team participates in training programs developed by the Safety Officer. At a minimum, the training will cover:

- emergency and routine communications;
- first aid: recognition of conditions requiring emergency or medical care and simple steps to take until help arrives;
- rescue operations;
- decontamination procedures;
- special chemical and physical hazards and potential health effects;
- personnel protective equipment use, maintenance, fit, and limitations;
- site evacuation;
- sample identification, packaging, storage, transport: chain of custody procedures;
- laboratory procedures;
- fire fighting; and,
- hands-on training in simulated sites.

DGC personnel and all Subcontractors assigned to a field investigation team will undergo the safety indoctrination program to:

- o Ensure that regard for the health and safety of fellow employees, the public, and the environment is maximum.

- o To comply with all laws, rules, and regulations to safeguard the health and safety of all employees, the public, and the environment.

- o Increase the ability of employees to react responsibly and to handle emergency situations in a safe manner under normal conditions and when physiological and psychological stresses occur.

- o To educate the field investigation team of potential hazards at sample sites, adverse effects, and the importance of safety and industrial hygiene practices.

All new employees will be required to participate in a training program. Training programs will routinely be offered throughout the duration of the project to refresh employees health and safety awareness. Field investigation team members are expected to be familiar with this plan and any safety directive issued during the course of the project.

The following general field safety techniques will be discussed in the training session.

- o Availability of safety and health consulting services (medical, industrial hygiene) and when and how to use them.

- o Site topography

  - Site surveillance/observation/plan development
  - Restricted zone, if necessary
  - Contamination reduction zone, if necessary
  - Clean zone

- o Vehicles (cars, trucks, drill rigs)
  - Inspection
  - Operation
  - Mandatory rules, regulations, and orientation
  - Decontamination
- o Hazardous Materials in the Field
  - Hazards
  - Storage
  - Transportation (DOT requirements for common sample preservatives)
- o Use of Field Equipment and Supplies
  - Work tools
  - Testing equipment
  - Sampling equipment
- o Work Practices and Limitations
  - Awareness of fellow employees
  - Prohibited work practices
  - Fatigue
  - Hours of work
  - Stress

The following areas of personal protection will be discussed:

- o Respiratory Protection
  - Selection
  - Fit
  - Donning and use
- o Personal Protective Clothing
  - Clothing (gloves, aprons, coveralls, etc.)
  - Eye protection
  - Foot protection
  - Head protection

- o Limitations of Clothing and Equipment
- o Decontamination of Clothing and Equipment
- o Disposal of Contaminated Clothing and Equipment

The following actions will be discussed in the event of an emergency:

- o Availability of Emergency Services
  - Poison control center
  - Hospital and ambulance services
  - Local fire and police departments
- o How to obtain emergency treatment in the field
- o How and when to file an incident report of an accident

The following standing orders will be in force for all field investigation teams:

- o No member of the field investigation team may enter the site without signing in at the base facility beforehand.
- o No smoking, eating, drinking or chewing gum will be allowed at the site.
- o No open fires are permitted at the site.
- o Where applicable, no person may enter contamination reduction or restrictive zones of the site without proper safety equipment or unaccompanied or without the knowledge of the OSC.
- o Avoid contact with potentially contaminated substances. Do not walk through puddles, pools, or mud; kneel or sit on the ground or lean against equipment, drums, or the ground; and avoid passing through all designated "hot areas."

4.0 PERSONNEL PROTECTION

SUMMARY

In many situations the potential hazard may be unknown and certain precautionary measures must be taken by the response personnel. In any case, appropriate protective clothing must be worn to provide maximum protection to the response personnel.

4.1 Criteria for Establishing Levels of Personnel Protection

The need to have personnel enter a hazardous incident area must first be made by the On-Scene Coordinator. Some on-site operations will necessitate personnel to enter the site and define the existence of a potential hazard. The level of protection will be based on the best available information prior to the initial entry. Subsequent analytical measurements -- HNU -- changes the original level of protection selection.

4.2 Levels of Personnel Protection

4.2.1 Level A

The highest level for respiratory, skin, and eye contact when:

- HNU readings between 500 to 1,000 ppm;
- Combustible gas analyzer reading above 20%;
- Oxygen analyzer reading below 19.5%;
- Highly toxic materials are present.

4.2.2 Level B

The minimum level worn at initial entry when potential hazard is unknown or when:

- o HNU readings between 5 to 500 ppm;
- o Combustible gas analyzer readings above 20%;
- o Oxygen analyzer readings below 19.5%;
- o Skin exposure should be avoided.

Only personnel that have been trained in response procedures will respond to hazardous incidents classified as Level B or C. Under no circumstances will personnel respond to hazardous substance incidents classified as Level A or higher. The U.S. EPA and U.S. Coast Guard will respond to Level A hazardous incidents.

4.2.3 Level C

- o HNU readings between 0 to 05 ppm;
- o Combustible gas analyzer readings below 20%;
- o Oxygen analyzer readings equal to or greater than 19.5%;
- o Skin exposure danger unlikely.

4.2.4 Level D

- o HNU readings are 0;
- o Combustible gas analyzer readings are 0;
- o Normal oxygen concentration indicated by the oxygen analyzer above 19.5%.

4.3 Selection of Protective Clothing

All field investigation team members will be provided with all the necessary protective clothing to prevent body contact with dusts, vapors, or liquids. The selection of protective clothing is based on the nature of the hazard, i.e., the physical, chemical, and toxic properties and levels of hazardous substances. Background information on the CCL site has been used to characterize potential hazards at the site. To reduce personal stress the lowest level of personal protection is selected which maintains the health and safety of personnel. The "level of hazard" may be changed during the field investigation if ambient monitoring or analysis results of sampling detects a change in level or constituents at the sample site.

The degree of the hazard and the following factors must be considered in choosing appropriate protective clothing:

- meteorological conditions
- topography
- type of work to be performed
- required length of shift
- disposable versus reusable clothing
- set-up of decontamination station

Each type of protective clothing has its limitations. Thus, special attention is afforded to the physical characteristics of the clothing material and the environment to which they are exposed. Elastomer materials have varying degrees of resistance to chemical permeation, whereas, non-elastomer materials offer no protection from chemical permeation. After examining the strength, flexibility, thermal limits, chemical resistance and permeability, cleanability, lifetime, and cost, the most compatible protective clothing for the sample site is chosen. If incompatibilities exist, multiple layers of different protective clothing can be worn. The following selection of protective clothing has been chosen for the CCL site:

Gloves will be selected on the basis of their resistance to a broad spectrum of chemical substances. Neoprene is generally the material of choice for work with unknown chemical hazards. Other factors will include fit and gripping properties. Inner gloves will be disposable. Viton gloves have been shown to be exceptionally resistant to PCBs. These will be worn when handling samples suspected to contain PCBs. Nitrile and neoprene gloves will also be available at all times for sample handling.

Disposable Outer Clothing such as the one-piece Tyvek^{R} suits will be worn by on-site personnel working in dry areas. In general, the waterproof reusable outwear is preferred because of its greater durability and protectiveness.

Leather Shoes and Boots must be worn for all on-site work. Rubber boots must be worn at all times on the site. Handlers and samplers are required to wear sturdy, fitted boots. Other personnel wear overshoes with antislip soles, 10 to 15 inches high.

Hardhats are required headgear on site at all times with or without face-shields.

Eye protection will be required on site at all times. Contact lenses will be permitted on site only under Class D conditions. For on-site personnel, full face respirators offer maximum eye protection and where needed, prescription lenses will be ordered to fit inside the masks. If full face respirators are not worn on site, chemical splash goggles, with safety glasses as needed, are worn. Goggles will be selected to offer maximum protection, comfortable fit and antifogging properties.

Ear protection is required around activities creating excessive noise.

All protective clothing must be examined prior to donning to check for any defects, tears, or noticeable contamination.

4.4 Selection of Respiratory Protection

The selection of respiratory protection requires the recognition and evaluation of known hazards, potential risks, and the types of operations to be performed at a site. Other considerations in the selection of respiratory protection are:

- the location of any hazardous area in relation to the nearest area with acceptable respirable air;
- the period of time requiring respiratory protection--length of work shifts;
- the physical characteristics and functional capabilities and limitations of the different types of respirators; and,
- the physical condition and facial characteristics of individual employees.

When a hazard is unknown, the selection of respiratory protection is based on the worst possible ambient conditions and warrants the use of maximum protection.

There are two basic types of respirators:

- o air-purifying respirators
- o atmosphere-supplying respirators

Air-purifying, full-face respirators with the combination type organic vapor cartridge will be worn when necessary. Air-purifying respirators can only be worn in atmospheres with at least 19.5 percent oxygen. Air-purifying respirators will not be used if the gases or vapors exceed their respective threshold limit values (TLVs) by a factor of 5 and should not be worn unless the hazard has warning properties, such as odor or irritation, to warn the wearer that the respirator has failed.

Users of air-purifying respirators must consider the cartridge duration. Twin cartridges may have useable lives as short as 15 minutes. Manufacturer's specifications rate the duration for some concentrations of gases and vapors and using this information and the results from preliminary site investigation, the Safety Officer will determine the frequency of recommended cartridge replacement.

Fit is most important in air-purifying respirator selection and use. The mask must completely seal against leaks in order to provide the rated degree of protection.

Atmosphere-supplying respirators operate independently of contaminated air and are either self-contained or use an air-line for air supply. Atmosphere-supplying respirators are used when the hazard is unknown, the concentrations of contaminants are too high for air-purifying systems, or are determined to be immediately dangerous to life and health.

Proper training on the fit, use, and maintenance of respiratory equipment will be an integral part of each field investigation. All respiratory protective devices will be cleaned and disinfected after each use. Records of training and fit testing will be maintained by the Safety Officer. Persons who are unable to obtain a good respirator fit will not be allowed to enter atmospheres requiring respirators.

In summary, respiratory protection is divided into two general types: air purifying and air supplying (SCBA). Only a full face covering device will be permitted for respiratory protection when responding to hazardous incidents.

4.4.1 <u>Full Face Purifying Respirator</u>

- o Hazardous vapor concentration equal to or less than 5 ppm;
- o Oxygen level equal to or greater than 19.5%;
- o Cartridge type must correspond to contaminate in atmosphere;
- o Respirator must fit properly - Appendix I;
- o Respirator must be kept clean - Appendix II.

4.4.2 Self Contained Breathing Apparatus (SCBA), Positive Pressure Type

SCBA offers much greater protection than the air purifying type respirator for concentrations over 5 ppm, i.e., purer sources of air, predictable time of usage.

- o Hazardous vapor concentration from 5 to 500 ppm (above 500 ppm additional protective equipment required; see levels of personnel protection).
- o Oxygen deficient atmosphere less than 19.5%.
- o Face piece must fit - Appendix I.
- o Apparatus must be kept clean - Appendix II.
- o Prior to use check out Appendix III.
- o Entry into a hazardous atmosphere, the air cylinder must be filled to at least 100% capacity. This should allow no less than 30 minutes of breathing air.

4.5 Personnel Protective Equipment Required for Each Level

4.5.1 Level A

- o Self Contained Breathing Apparatus (SCBA), Positive Pressure Type
- o Totally encapsulated suit
- o Gloves - inner-chemical resistant

- Gloves - outer-chemical resistant

- Boots - chemical resistant, steel toe and shank.

OPTIONAL ITEMS

- Hard hat

- Underwear - long-john type

- Disposal protective gloves and boots (worn over encapsulated suit)

- Two-way radio - only in nonexplosive atmosphere.

4.5.2 Level B

- Self Contained Breathing Apparatus (SCBA), Positive Pressure Type

- One piece chemical resistant suit with hood

- Gloves - inner-chemical resistant

- Gloves - outer-chemical resistant

- Boots - chemical resistant, steel tow and shank.

OPTIONAL ITEMS

- Hard hat

- Coveralls - under splash suit

- Disposal protective boots and gloves (worn over chemical resistant gloves and boots).

4.5.3 Level C

- Full face, air purifying respirator

- Gloves - inner-chemical resistant

- Gloves - outer-chemical resistant

- Boots - chemical resistant, steel toe and shank.

OPTIONAL ITEMS

- Hard hat

- Coveralls - under splash suit

- Disposal protective boots and gloves (worn over chemical resistant gloves and boots)

- Two-way radio - only in nonexplosive atmosphere.

4.5.4 Level D

- Hard hat

- Safety glasses

- Gloves - chemical resistant
- Coveralls
- Boots - chemical resistant.

5.0 FIELD INVESTIGATIONS AND ATMOSPHERIC MONITORING

An initial site investigation will be conducted prior to any on-site activities at the site. The initial investigation is a walk through the area to detect any observable conditions which may present a hazard to field investigation teams. The investigative team consists just of a few scientists (to minimize the number of people potentially exposed to hazardous conditions) and a backup team in constant visual contact. The field equipment for taking measurements can easily be handled by a team of two.

The investigative team will observe the topography of the site, measure prevailing wind directions and speeds, note any observable drums (whether labels are present) or open pits, damaged vegetation, fish kill, animal kill, and monitor the oxygen content, combustible gases, and organic vapors and inorganic vapors of the atmosphere. The following site survey instruments will be used:

5.1 Combustible Gas Indicator

Combustible gas indicators are used to determine the potential for combustion or explosion in the atmosphere. The unit measures the range below the lower explosive limit of combustible gases.

The lower explosive limit (LEL) of a combustible gas is the minimum percent concentration that will combust when ignited in the atmosphere. The upper explosive limit (UEL) is the maximum concentration of gas in the atmosphere that will combust. Above the UEL, there is insufficient oxygen to support combustion, so no explosion or combustion is possible. Caution must be taken when leaving an area above the UEL since the outer limits may be at the ideal UEL or LEL to produce combusion or an explosion.

If a concentration between the LEL and the UEL occurs, then the meter needle will deflect beyond the 1.0 (100%) level. This indicates that the ambient atmosphere is immediately combustible or explosive. When the gas concentration is above the UEL, the meter needle will rise above the 1.0 (100%) mark and then return to zero. This indicates an uncombustible rich atmosphere.

5.1.1 Combustible Indicator - Interference Factors

- o The unit is intended for use only in normal atmosphere, not ones that are oxygen enriched.
- o Leaded gasoline vapors and sulfur compounds will foul the detection filament.
- o There is no differentiation between petroleum vapors and combustible gases unless a charcoal filter is employed.

The manufacturer's instruction manual is the best guide for calibration and general operation procedures.

5.2 Atmospheric Oxygen Indicator

Portable oxygen indicators are invaluable when responding to hazardous materials, spills, or waste sites. Depressions in the land, unventilated rooms or areas may not contain enough oxygen to support life. Normal respiration can occur above oxygen concentrations of 19.5%. The indicator scales are available for selected oxygen concentrations, i.e., 0 - 25%, 0 - 100%, etc.

5.2.1 Factors Which Must Be Considered When Using The Oxygen Indicator

- Operation temperature range.
- Presence of interfering gases (oxidants).
- Presence of carbon dioxide (CO_2) in concentrations greater than 1%.
- Caution should be taken when a reading of less then 19.5% is reached.

The manufacturer's instruction manual is the best guide for calibration and general operation procedures.

5.3 Organic and Inorganic Vapor Detection by HNU

The HNU Photoionization Analyzer is a portable instrument used to measure a variety of organic and inorganic vapors concentration.

The advantage of this instrument is: portability, wide range of operation, rapid response, and ease of operation.

The sample constituents are ionized, producing an instrument response; the ionization potential (IP) is supplied by the instrument lamp (9.5 eV, 10.2 eV, 11.7 eV). A 9.5 eV lamp should be used for chemical species that have a very low IP. The 11.7 eV lamp will ionize the greatest number of chemicals that will ensure the widest detection of chemicals. Typically, the 10.2 eV lamp is most frequently used because of the lamp's stability, and its intermediate range. Because the instrument cannot differentiate the ionized gas constituents, the instrument response is a measure of total ionizable species present in the sample.

5.3.1 Interference Factors

These factors include:

- o explosive atmosphere will be avoided
- o moisture decreasing its sensitivity
- o wind lowering its readings
- o gasoline coating the lamp and lens and interfering with its sensitivity.

Table 1 presents a summary of hazard evaluation procedures for use of these monitoring instruments and proper response to various levels of hazards.

TABLE 1. HAZARD EVALUATION PROCEDURES

Monitoring Instruments	Hazard	Level	Action
Oxygen Meter	Oxygen Deficiency	<19.5%	Complete inspection with SCBA with continuous monitoring. NOTE: Explosimeter readings are not valid in atmosphere with <19.5% oxygen.
		19.5%	Complete inspection.
		>25.0%	Combustible levels; evacuate site immediately.
Explosimeter	Explosive Atmosphere	<10% LEL	Complete on-site inspection.
		10% LEL	Continue on-site inspection with careful monitoring.
		>20% LEL (confined space)	Explosion hazard and immediately dangerous to life and health; evacuate immediately.
		>40% LEL (unconfined space)	Explosion hazard and immediately dangerous to life and health; evacuate immediately.
HNU Photoionizer	Organic and inorganic vapors and gases	(1) Species Dependent	Consult standard reference manuals for concentration/hazard evaluation.
		(2) Total Response Mode	Consult EPA standard operating procedures.

APPENDIX I

Respirator Fit Tests

APPENDIX I

Respiratory Fit Tests

I. INTRODUCTION

A. All users or potential users of demand type respiratory protection devices shall be fit tested to nsure proper facepiece to face seal of the respirator.

B. The fit test shall be accomplished by use of one of the tests aerosols listed below by application of the most desirable method feasible.

C. Users will be tested with a selection of brands of masks and allowed to choose the most comfortable from those that fit satisfactorily.

TEST AEROSOL	METHOD OF TESTING
a. Iso amyl-acetate	1. Field Test - Swab or brush 3. Field Test - Plastic Bag Enclosure
b. Irritant Smoke (Ventilation (Smoke Tube))	2. Field Test - Around Seal 4. Field Test - Plastis Bag Enclosure

II. METHODS

A. Method No. 1

1. Facepieces equipped with organic vapor cartridges will be used for this test.

2. The test shall be performed in an area where no noticeable air movement is observed.

3. A tissue, cloth or brush is saturated with iso amyl-acetate.

4. Prior to testing, the test subject will be exposed to a very light concentration of the iso amyl-acetate to assure that he/she can detect the odor.

5. The test subject will don the respirator and a visual inspection of the facepiece to face seal made by the tester. An obvious leak in the facepiece to face seal shall be reason to abort the test and record that mask as unsatisfactory. Expression of discomfort created by the mask shall also be reason to abort the test.

6. The saturated material will be moved slowly around the entire sealing surface of the respirator worn by the test subject. The saturated material should be no closer than 3" nor farther than 6" from the sealing surface. The test shall be performed first with the test subject sedentary, then with the subject performing head and face movements (i.e., talking, moving head side to side and up and down). Leakage at any time shall be cause to terminate the test.

Any indication of detection of the odor by the test subject, during fitting, indicates a failure of that respirator. If leakage is detected, the subject shall be removed from the test atmosphere and the facepiece to face seal visually inspected for obvious leakage. If any doubt about the condition of the respirator or the cartridges exists, another like respirator shall be tested to assure the leakage was due to facepiece to face seal.

B. Method No. 2

1. Respirators equipped with high-efficiency filters will be used for this test.

2. The test shall be performed in an area where no noticeable air movement is observed.

3. Both ends are broken on an MSA ventilation smoke tube. One end is inserted into the tube connected to the positive pressure end of a two-way respirator bulb and the other end covered by a 1-2" length of tygon, surgical or rubber tubing. The test aerosol is generated by squeezing the aspirator bulb.

4. The test subject will don the respirator and a visual inspection of the facepiece to face seal made by the tester. An obvious leak in the facepiece to face seal shall be reason to abort the test and record that mask as unsatisfactory. Expression of discomfort created by the mask shall also be reason to abort the test.

5. The smoke will be generated and directed around the entire sealing surface of the mask. The tube will be held no closer than 3" nor farther than 6" from the sealing surface. The test subject will be instructed to breathe shallowly during initial test around surface and normally therefafter if no leakage is detected. If a half-mask is being tested, the subject shall be instructed to close his eyes for the duration of the test. The test shall be performed first with the test subject sedentary, then with the subject performing head and face movements (i.e., talking, moving side to side and up and down). Leakage at any time shall be cause to terminate the test.

6. Any indication of detection of the smoke by the test subject, during fitting, indicates a failure of that respirator. If leakage is detected, the subject shall be removed from the test atmosphere and the facepiece to face seal visually inspected for obvious leakage. If any doubt about the condition of the respirator or the filter exists, another like respirator shall be tested to assure the leakage was due to facepiece to face seal.

C. Method No. 3

1. Facepieces equipped with organic vapor cartridges will be used for this test.

2. A tissue or cloth is saturated with iso amyl-acetate and suspended in the inside top of a plastic garbage bag or hood.

3. Prior to testing, the test subject will be exposed to a very light concentration of the iso amyl acetate to assure that he can detect the odor.

4. The test subject will don the respirator and a visual inspection of the facepiece to face seal made by the tester. An obvious leak in the facepiece to face seal shall be reason to abort the test and record that mask as unsatisfactory. Expression of discomfort created by the mask shall also be reason to abort the test.

5. The test subject shall be instructed to enter the bag or hood and breathe normally during a short (30-60 seconds) sedentary period. If no leakage is detected during the sedentary period, the subject shall be instructed to perform various exercises simulating, as near as possible, work conditions (i.e., talking, running in place, head movements, bending over, etc.) Leakage at any time shall be cause to terminate the test.

6. Any indication of detection of the odor by the test subject, during fitting, indicates a failure of that respirator. If leakage is detected, the subject shall be removed from the test atmosphere and the facepiece to face seal visually inspected for obvious leakage. If any doubt about the condition of the respirator or the cartridges exist, another like respirator shall be tested to assure the leakage was due to facepiece to face seal.

D. Method No. 4

1. Respirators equipped with high-efficiency filters will be used for this test.

2. Both ends are broken on an MSA ventilation smoke tube. One end is inserted into the tube connected to the positive pressure end of a two-way respirator bulb and the other end covered by a 1-2" length of tygon, surgical or rubber tubing. The test aerosol is generated by squeezing the aspirator bulb.

3. The test subject will don the respirator and a visual inspection of the facepiece to face seal made by the tester. An obvious leak in the facepiece to face seal shall be reason to abort the test and record that mask as unsatisfactory. Expression of discomfort created by the mask shall also be reason to abort the test.

4. The smoke will be generated into the input of the harvard hood or a hole punched in the top of the plastic bag enclosed until a concentration can be detected throughout the bag or hood visually.

5. The test subject shall be instructed to enter the bag or hood and breathe shallowly during a short (30-60 seconds) sedentary period. If a half-mask is being tested, the subject shall be instructed to close his eyes prior to entry and keep them closed until he exits. If no leakage is detected during the sedentary period, the subject shall be instructed to perform various exercises, simulating, as near as possible, work conditions (i.e., talking, running in place, head movements, bending over, etc.) while breathing normally. Leakage at any time shall be cause to terminate the test.

6. Any indication of detection of the smoke by the test subject, during fitting, indicates a failure of that respirator. If leakage is detected, the subject shall be removed from the test atmosphere and the facepiece to face seal visually inspected for obvious leakage. If any doubt about the condition of the respirator or the filter exists, another like respirator shall be tested to assure the leakage was due to facepiece to face seal.

APPENDIX II

Care and Cleaning of Respirators

APPENDIX II

CARE AND CLEANING OF RESPIRATORS

I. GENERAL REQUIREMENTS

A program for the maintenance and cleaning of respirators should be provided for any organization which uses them on a routine basis. The extent of the program is adjusted for the number, types and activity of usage of respirators, including the working conditions and hazards involved.

In general, this care and service includes the following basic services.

A. Inspection for defects (including a leak check)
B. Cleaning and disinfecting
C. Repair
D. Storage

The purpose of a respirator program is to assure that all repirators are properly maintained up to its original effectiveness. These devices are never to be modified or altered in any way or the protection factor may be voided.

It is usual practice to train one person in an organization to inspect, clean, repair and store respirators and to be responsible for their upkeep.

II. INSPECTION

Respirators must be inspected routinely after each use. A respirator that is not routinely used but kept ready for emergency use should be inspected monthly to assure its readiness for satisfactory working operation.

The inspection of air purifying respirators should include a thorough check of all connections for gaskets and "O" rings and for proper tightness. Check the condition of the facepiece and all facepiece parts, connecting air tube and head bands. Rubber or elastomer parts should be inspected for pliability and signs of deterioration.

A record should be maintained for each respirator inspected. The date of inspection, the inspector's initials and any unusual conditions or findings must be entered into the inspection record.

III. CLEANING AND DISINFECTION

Respirators should be collected at some central location within an organization. Employees required to wear respirators should be briefed on the respirator program and assured that he will always be receiving a clean and sanitized respirator. Such assurances can have a morally benefitting effect. Cleaning and disinfecting respirators should be performed as follows:

A. Remove all cartridges, canisters or filters and all gaskets or seals that are not affixed to their seats.

B. Remove elastic headbands.

C. Remove exhalation cover.

D. Remove speaking diaphragm or speaking diaphragm-exhalation valve assembly.

E. Remove inhalation valves.

F. Wash facepiece and breathing tube in cleaner and sanitizer solution mixed in warm water. Optimum results are obtained in water at 120 to 140 F temperature. Parts removed may be washed separately from the facemask, as necessary. A hand brush is used to facilitate the removal of soiled material on the respirator.

G. The respirator is removed from the wash water and rinsed completely in clean warm water.

H. The facepiece and components are then air dried in some designated clean area.

I. The facepieces, valves and seats may be hand wiped with a damp lint-free cloth to remove any soap or other foreign materials not removed by washing.

NOTE: Most respirator manufacturers distribute their own cleaner-sanitizer solutions on the market. These cleaners are dry mixtures of a bactericidal agent and a mild powdered detergent packaged in a one ounce packet for individual unit cleaning and in larger bulk packages for greater quantity usage.

IV. REPAIRS

A. Disassemble and hand clean the pressure demand and exhalation valve assembly. (SCBA) exercise care to avoid damage to the rubber diaphragm.

B. All faulty or questionable parts or assemblies must be replaced. Parts which are deteriorated or distorted must be replaced only with parts specifically designed for the particular respirator.

C. The entire respirator is reassembled and given a final visual inspection of the completed assembly.

D. Insert new filters, cartridges or canisters, as required, assuring that gaskets or seals are in place and made seal-tight.

E. Clean and fogproof lens on full face pieces.

F. Install lens cover.

G. Place each mask in a plastic bag or container for sealing.

NOTE: Repairs or replacement should be performed only by an experienced person with tools and replacement parts for each respirator on hand. No attempt should ever be made to replace components or to make adjustments, or repairs beyond the manufacturer's recommendations. All types of self-contained breathing apparatus high pressure side components including the regulator and reducing or admission valves must be repaired only by a trained technician or shall be sent to an authorized facility for repairs.

V. STORAGE

Upon inspection, cleaning and performing of all necessary repairs, the respirators should be stored to protect them against dust, air moisture or suspended chemicals in the plant or building environment. They must also be protected against hot and cold temperatures and direct sunlight.

Clean respirators should be drawn from storage for each use. Each unit can be individually sealed in a plastic bag and placed in a separate storage box properly marked and tagged for ready use.

Respirators should not be stored in clothes lockers, bench drawers or tool boxes. They may be placed in wall compartments at work stations or in a designated work area for emergency use furnished for that purpose. They may be sorted in the original carton or carrying case for mobile use.

Respirators should be stored and packed with the facepiecs and exhalation valve lying in a normal position in order not to be damaged or impared by an abnormally positioned elastomer setting.

Follow the manufacturers recommended instructions for the proper storage of respirators. These instructions are always furnished with new respirators or affixed to the lid of the carrying case.

APPENDIX III

SCBA Checkout Procedures

APPENDIX III

SCBA CHECKOUT PROCEDURES

I. INTRODUCTION

Before self-contained breathing apparatus can be used, it must be properly inspected. Thorough inspection will help prevent malfunction of the SCBA during use. To help ensure proper inspection, the following checklists are provided. The first is written for those SCBA units which have no mode select lever such as the MSA 401. Scott airpaks and Survivair units have mode select levers and so an appropriate checklist for inspection is provided. Also note that both checklists indicate that certain inspection steps are required monthly rather than prior to each use.

Although the checklists appear long and complicated, familiarity with the SCBA will make inspections easier.

II. CHECKLIST FOR INSPECTION OF PRESSURE DEMAND SELF-CONTAINED BREATHING APPARATUS WITHOUT MODE SELECT LEVER:

Prior to beginning inspection:

1. Check to assure that high pressure hose connector is tight on cylinder fitting.

2. Bypass valve closed.

3. Mainline valve closed.

4. No cover or obstruction on regulator outlet.

   A. Back Pack & Harness Assembly

      1. Straps

         a. Visually inspect for complete set.

         b. Visually inspect for frayed or damaged straps that may break during use.

      2. Buckles

         a. Visually inspect for mating ends.

         b. Check locking function.

      3. Backplate & Cylinder Lock

         a. Visually inspect backplate for cracks and for missing rivets or screws.

         b. Visually inspect cylinder hold down strap and physically check strap tightener and lock to assure that it is fully engaged.

B. Cylinder & Cylinder Valve Assembly

1. Cylinder

a. Physically check cylinder to assure that it is tightly fastened to back plate.

(M) b. Check Hydrostatic Test Date to assure it is current.

(M) c. Visually inspect cylinder for large dents or gouges in metal.

2. Head & Valve Assembly

(M) a. Visually inspect cylinder valve lock for presence.

(M) b. Visually inspect cylinder gauge for condition of face, needle, and lens.

c. Open cylinder valve and listen or feel for leakage around packing. (If leakage is noted, do not use until repaired.) Note function of valve lock.

C. Regulator & High Pressure Hose

1. High Pressure Hose & Connector

a. Listen or feel for leakage in hose or at hose to cylinder connector. (Bubble in outer hose covering may be caused by seepage of air through hose when stored under pressure. This does not necessarily mean a faulty hose.

2. Regulatory & Low Pressure Alarm

a. Cover outlet of regulator with palm of hand. Open mainline valve and read regulator gauge (must read at least 1800 PSI and not more than rated cylinder pressure).

b. Close cylinder valve and slowly move hand from regulator outlet to allow slow flow of air. Gauge should begin to show immediate loss of pressure as air flows. Low pressure alarm should sound between 650 and 550 PSI. Remove hand completely from outlet and close mainline valve.

c. Place mouth onto or over regulator outlet and blow. A positive pressure should be created and maintained for 5-10 seconds without any loss of air. Next suck a slight negative on regulator and hold for 5-10 seconds. Vacuum should remain constant. This tests for integrity of the diaphragm. Any loss of pressure or vacuum during this test indicates a leak in the apparatus.

d. Open cylinder valve.

e. Place hand over regulator outlet and open mainline valve. Remove hand from outlet and replace in rapid movement. Repeat twice. Air should escape when hand is removed each time, indicating a positive pressure in chamber. Close mainline valve and remove hand from outlet.

f. Ascertain that no obstruction is in or over the regulator outlet. Open and close bypass valve momentarily to assure flow of air through by pass system.

D. Facepiece & Corrugated Breathing Tube

1. Facepiece

a. Visually inspect head harness for damaged serrations and deteriorated rubber. Visually inspect rubber facepiece body for signs of deterioration or extreme distortion.

b. Visually inspect lens for proper seal in rubber facepiece, retaining clamp properly in place, and cracks or large scratches.

c. Visually inspect exhalation valve for visible deterioration or foreign materials build-up.

2. Breathing Tube & Connector

a. Stretch breathing tube and visually inspect for deterioration and holes.

b. Visually inspect connector to assure good condition of threads and for presence and proper condition of "O" ring or rubber gasket seal.

NOTE: Final test of facepiece would involve a negative pressure test for overall seal and check of exhalation valve. If monthly inspection, mask may now be placed against face and following tests performed. If preparing for use, don backpack, then don facepiece and use following procedure.

3. Negative Pressure Test on Facepiece

a. With facepiece held tightly to face or facepiece properly donned, stretch breathing tube to open corrugations and place thumb or hand over end of connector. Inhale. Negative pressure should be created inside mask, causing it to pull tightly to face. This negative pressure should be maintained for 5-10 seconds. If negative pressure leaks down, the facepiece assembly is not adequate and should not be worn.

E. Storage of Units

a. Cylinder refilled as necessary and unit cleaned and inspected.

b. Cylinder valve closed.

c. High pressure hose connector tight on cylinder.

d. Pressure bled off of high pressure hose and regulator.

e. Bypass valve closed.

f. Mainline valve closed.

g. All straps completely loosened and laid straight.

h. Facepiece properly stored to protect against dust, sunlight, heater, extreme cold, excessive moisture, and damaging chemicals.

Items marked (M) would be done only on monthly inspection.

NOTE: Any discrepancy found should be cause to set unit aside until repair can be done by certified repair person.

III. CHECKLIST FOR INSPECTION OF DEMAND, OPEN CIRCUIT SELF-CONTAINED BREATHING APPARATUS OR PRESSURE DEMAND, OPEN CIRCUIT SELF-CONTAINED BREATHING APPARTUS WITH MODE SELECT LEVER.

Prior to beginning inspection:

1. Check to assure that high pressure hose connector is tight on cylinder fitting.

2. Bypass valve closed.

3. Mainline valve open and locked (when lock present).

4. Select lever (if present) on demand mode.

5. No cover or obstruction on regulator outlet.

A. Back Pack & Harness Assembly

1. Straps

a. Visually inspect for complete set.

b. Visually inspect for frayed or damaged straps that may break during use.

2. Buckles

a. Visually inspect for mating ends.

b. Check locking function.

3. Back Plate & Cylinder Lock

a. Visually inspect backplate for cracks and for missing rivets or screws.

b. Visually inspect cylinder hold down strap and physically check strap tightner and lock to assure that it is fully engaged.

B. Cylinder & Cylinder Valve Assembly

1. Cylinder

a. Physically check cylinder to assure that it is tightly fastened to back plate.

(M) b. Check Hydrostatic Test Date to assure it is current.

(M) c. Visually inspect cylinder for large dents or gouges in metal.

2. Head & Valve Assembly

(M) a. Visually inspect cylinder valve lock for presence.

(M) b. Visually inspect cylinder gauge for condition of face, needle, and lens.

c. Open cylinder valve and listen or feel for leakage around packing. (If leakage is noted, do not use until repaired.) Note function of valve lock.

C. Regulator & High Pressure Hose

1. High Pressure Hose & Connector

a. Listen or feel for leakage in hose or at hose to cylinder connector. (Bubble in outer hose covering may be caused by seepage of air through hose when stored under pressure. This does not necessarily mean a faulty hose.)

2. Regulator & Low Pressure Alarm

a. Read pressure on regulator gauge (must read at least 1800 PSI and not more than rated cylinder pressure).

b. Close cylinder valve. Ascertain that no obstruction is in or over regulator outlet. Position regulator to observe regulator gauge. Slowly open bypass valve. Air should flow from outlet, and gauge pressure should begin to decrease immediately. Alarm should sound at pressure reading between 650 and 550 PSI. (This assures function of bypass valve and low pressure alarm.) After pressure is completely released, close bypass valve.

c. Place mouth onto or over regulator outlet and blow. A positive pressure should be created and maintained for 5-10 seconds without any loss of air. Next, suck a slight negative on regulator and hold for 5-10 seconds. Vacuum should remain constant. This tests the integrity of the diaphragm. Any loss of pressure or vacuum during this test indicates a leak in the apparatus.

d. Open cylinder valve.

e. Suck on regulator outlet. Air should be delivered with very slight effort.

f. On units with select lever, place hand over regulator outlet. Select pressure demand mode. Remove and replace hand over outlet in rapid movement. Repeat twice more. Air should escape when hand is removed each time, indicating a positive pressure in chamber. Select demand mode on select lever and remove hand from outlet.

At this point, there should be no air leaking from any part on the pressurized unit.

D. Facepiece & Corrugatred Breathing Tube

1. Facepiece

a. Visually inspect head harness for damaged serrations and deteriorated rubber. Visually inspect rubber facepiece body for signs of deterioration or extreme distortion.

b. Visually inspect lens for proper seal in rubber facepiece, retaining clamp properly in place, and cracks or large scratches.

c. Visually inspect exhalation valve for visible deterioration or foreign materials build-up.

2. Breathing Tube & Connector

a. Stretch breathing tube and visually inspect for deterioration and holes.

b. Visually inspect connector to assure good condition of threads and for presence and proper condition of "O" ring or rubber gasket seal.

NOTE: Final test of facepiece would involve a negative pressure test for overall seal and check of exhalation valve. If monthly inspection, mask may now be placed against face and following tests performed. If preparing for use, don backpack, then don facepiece and use following procedure.

3. Negative Pressure Test on Facepiece

a. With facepiece held tightly to face or facepiece properly donned, stretch breathing tube to open corrugations and place thumb or hand over end of connector. Inhale. Negative pressure should be created inside mask, causing it to pull tightly to face. This negative pressure should be maintained for 5-10 seconds. If negative pressure leaks down, the facepiece assembly is not adequate and should not be worn.

NOTE: On Scott Pressure-Pak II and IIA facepiece units only, place connector end of the breathing tube approximately 1/4 - 1/2 inch from palm of hand and exhale. If you note any air returning through tube, the mask should not be used.

E. Storage of Units

a. Cylinder refilled as necessary and unit cleaned and inspected.

b. Cylinder closed.

c. High pressure hose connector tight on cylinder.

d. Pressure bled off of high pressure hose and regulator.

e. Bypass valve closed.

f. Mainline valve open (When mainline valve lock present, it should be engaged.)

g. Select lever, if present, on demand mode.

h. All straps completely loosened and laid straight.

i. Facepiece properly stored to protect against dust, sunlight, heat, extreme cold, excessive moisture, and damaging chemicals.

Items marked (M) would be done only on monthly inspection.

NOTE: Any discrepancy found should be cause to set unit aside until repair can be done by certified repair person.

REFERENCE MATERIALS

1. Pocket Guide to Chemical Hazards, National Institute for Occupational Safety and Health, U. S. Department of Health and Human Services

2. Hazardous Materials, 1980 Emergency Response Guidebook, U. S. Department of Transportation

3. TIV's for Chemical Substances in Workroom Air, Publications Office, ACGIH, 6500 Glenway Avenue, Building D-5, Cincinnati, Ohio 45211

4. 1979 Registry to Toxic Effects of Chemical Substances, NIOSH U. S. Department of Health and Human Services, Vol. 1 & 2

5. Hazardous Materials Incidents Response Operations Training Manual, U. S. Environmental Protection Agency, National Training and Operations, Technology Center, Cincinnati, OH 45268

6. Field Manual for Ground Water Sampling, Water Resources Section, DNREC, Dover, DE 19901

7. Bill Jahns Memorandum, Hazardous Waste Committee Meeting of July 29, 1981

8. HNU Systems, Inc., 30 Ossipee Road, Newton, MA 92164

9. MSA Company Catalog, Pittsburg,PA 19208

10. RCRA Personnel Training Guidance Manual, U. S. Environmental Protection Agency, Washington, D. C.

11. Samplers and Sampling Procedures for Hazardous Waste Streams, Municipal Environmental Research Laboratory, Office of Research & Development, U. S. Environmental Protection Agency, Cincinnati, Ohio 45268

12. Interim Standard Operating Safety Procedures, Emergency Response Division, EPA Headquarters, Washington, D. C.

APPENDIX IV

Procedure for Contacting the Hazardous Materials Response Team in Case of Emergency

APPENDIX IV

DINSBIER ROAD SANITARY LAND FILL

PROCEDURE FOR CONTACTING THE HAZARDOUS MATERIALS RESPONSE TEAM IN CASE OF EMERGENCY

1. Dial the Sheriff's Department

   Phone 664-3100--Toll Free

   or

   753-2131--Direct

2. Provide Sheriff with the following information:

   A. Location of Incident

   B. Nature of Incident (e.g. Leachate Tanker ....)

3. Advise the Sheriff to dispatch local fire department

4. Advise the Sheriff to notify the Hazardous Materials Response Team.

TELEPHONE NUMBER LIST (Area Code 716 Unless Noted)

CHAUTAUQUA COUNTY DEPARTMENT OF PUBLIC WORKS

Falconer Office Engineering	665-6610 or 665-6611
George W. Riedesel (Home)	326-4787
Timothy Woodbury (Home)	672-8426

NEW YORK STATE DEPT. OF ENVIRONMENTAL CONSERVATION

Mr. Robert Mitrey (Buffalo)	847-4585
Mr. David Manfrici (Albany)	518-457-3254

STATE POLICE - Barracks, Rt. 60 - Fredonia	679-1521
- Falconer	665-3113
- Westfield	326-3031

CHAUTAUQUA COUNTY DEPARTMENT OF SANITATION

Ellery Sanitary Landfill	985-4785
Maurice Sisson (Home)	569-4127
Tom Barber (Home)	962-8463

HOSPITALS

Westfield Memorial Hospital	326-4921
Jamestown General Hospital	484-1161
WCA Hospital, Jamestown	487-0141
Poison Control Center, Jamestown	484-8648

MAYVILLE FIRE HALL	753-2322

APPENDIX V

Interim Standard Operating Safety Procedures

APPENDIX V

INTERIM STANDARD OPERATING SAFETY PROCEDURES

APRIL, 1981

Emergency Response Division
EPA Headquarters, Washington, D.C.

STANDARD OPERATING SAFETY PROCEDURES

I. INTRODUCTION

The purpose of this document is to provide recommendations for selected safety procedures. Although every endeavor on or off-site involves some degree of consideration for worker protection and safety, the purpose of this document is to provide criteria for standard operating procedures primarily related to site control and entry. THe omission of other safety procedures does not imply their lack of importance.

The following phases are addressed in this document:

1. Site Entry: General Measures

2. Site Entry: Initial Survey & Reconnaissance

3. Site Entry: Personnel Protection

4. Site Control: Site Work Areas

5. Site Control: Decontamination

II. STANDARDIZED OPERATING PROCEDURES

A major consideration in all response activities is the health and safety of the personnel. Not only must a variety of technical tasks be conducted, in a timely fashion, but they must be accomplished in a manner to protect the worker. In addition to having appropriate equipment and training, safety-oriented standard operating procedures provide another means of reducing the possibility of harm.

For procedures to be effective:

1. Written instructions should be prepared in advance of anticipated use. The careful deliberation and thought needed to develop safe, practical procedures is difficult enough without the added pressure and stress created by the urgency of an emergency

2. Procedures must be based on the best available knowledge, operational principles, and technical guidance

3. Initial procedures should be field tested, reviewed, and revised, when necessary, by competent safety professionals

4. Procedures should be understandable, practically feasible and applicable, without sacrificing the quality of safety

5. All personnel involved in site activities should be provided with and briefed on operating procedures

6. Response personnel should receive thorough and periodic training in operating procedures

III. RESPONSE ACTIVITIES

Response activites associated with each specific incident are unique; however, there are criteria, principles, and operations common to all incidents. An incident must be evaluated to determine its hazard or potential hazard. Since a variety of environmental samples and measurements are needed to determine the extent-of-contamination, personnel may need to go on-site to collect information. Workers involved need to be protected against the potential hazards. Efforts such as containment, cleanup, and disposal activities to prevent or reduce potentially harmful substances from migrating from the site, require response personnel to be appropriately protected.

Standard operating procedures are needed for all phases of the operations and each phase should include health and safety options. These safety procedures are independent of the type of incident, but are adapted or modified to meet the incident-specific requirements.

1. SITE ENTRY - GENERAL MEASURES

I. INTRODUCTION

To prevent injuries and acute and chronic health effects, the following safe work practices are to be followed when dealing with situations of known or unknown toxic hazards and/or relying on portable field monitoring equipment. These practices establish a pattern of general precautionary measures for reducing the risks associated with response operations.

II. SAFETY PRACTICES

A. Personal Hygiene

1. Eating, drinking, chewing gum or tobacco, taking medication, and smoking is prohibited in the contaminated or potentially contaminated area or where the possibility for the transfer of contamination exists.

2. Upon leaving contaminated or suspected contaminated areas, the hands and face must be thoroughly washed. After decontamination procedures, a thorough shower and washing of the body must occur.

3. Avoid contact with potentially contaminated substances. Do not walk through puddles, pools, mud, etc. Avoid, whenever possible, kneeling on the ground, leaning or sitting on drums, equipment, or ground. Do not place monitoring equipment on potentially contaminated surfaces (i.e., drum, ground, etc.).

4. No beard or facial hair which interferes with a satisfactory qualitative respirator fit test may be worn.

B. Personnel Protection

1. Be familiar with and knowledgeable about standard operating safety procedures.

2. Be familiar, knowledgeable, and adhere to all instructions in the site safety plan.

3. Identify and arrange for emergency medical assistance. The location, telephone number, and transportation capabilities of the nearest emergency medical facilities should be known. For particularly hazardous operations, on-site medical assistance should be available and/or the nearest medical facility alerted.

4. Consider fatigue, heat stress, and other environmental factors influencing efficacy of personnel.

5. Wear appropriate or designated, approved respiratory protective devices and protective clothing.

C. Operations

1. In emergencies, oral and/or semaphore safety protocols must be established by the team, followed as soon as practical by written site safety plans. These should be developed, reviewed, and made available to personnel for all phases of operation.

2. All personnel going on-site should be thoroughly briefed on the anticipated hazards, equipment requirements, safety practices, emergency procedures, and communication methods.

3. Initial entry team entrance and exit routes should be planned, and emergency escape routes delineated.

4. Unfamiliar operations should be rehearsed prior to implementation.

5. Personnel on-site must use the "buddy" system (pairs). Buddies should pre-arrange hand signals or other means of emergency signals for communication in case of lack of radios or radio breakdown. At a minimum, use of self-contained breathing apparatus and fully-encapsulating suits require a third person, suitably equipped, as a safety man backup. Communications between these three members must be maintained at all times.

6. Visual contact must be maintained between "pairs" on-site with the team members remaining in close proximity in order to assist each other in case of emergencies.

7. Wind indicators visible to all on-site personnel should be provided to indicate possible routes for upwind escape.

8. The number of personnel and equipment in the contaminated area should be minimized consistent with site operations as directed by the On-Scene Coordinator (OSC).

9. Establish appropriate work areas for support, contamination, reduction, and exclusion.

10. Establish appropriate decontamination procedures for leaving the site.

III. EDUCATION & TRAINING

All personnel involved in incident response operations must receive training in general safety practices and procedures and equipment use.

Safety education must be continually incorporated into all site activities so that safety awareness becomes a part of the thought process of all personnel. To accomplish this, safety training must be provided to all incident response personnel commensurate with the activities they will perform as a responder. Not only must they be provided with initial safety training, but periodic, repetitive re-training is necessary.

IV. STRESS

A. Both physiological and psychological stress can effect the functioning of response personnel, and under certain conditions, be a significant contributing factor to accidents and harm to workers. To reduce the potential for these stresses or anxieties:

1. Workers must be periodically determined by medical authorities to be physically, and if possible, psychologically fit to perform the functions of their job

2. Continual practice and training must be provided in using personnel protection equipment, especially the self-contained breathing apparatus and fully encapsulating suit, and in safety procedures

3. A thorough and complete safety program to protect the worker and assure their confidence in the program must be established

B. Adverse climate conditions - heat and cold - are important considerations in planning and conducting site operations. The effects of ambient temperature can cause physical discomfort, loss of efficiency, personal injury, and increased accident probability. In particular, heat stress, due to protective clothing decreasing body ventilation, is an important factor. One or more of the following recommendations will help reduce heat stress. Their applicability is dependent on evaluating the conditions particular to a specific incident

1. Provide plenty of liquids to replace loss of body fluids. Employees should replace water and salts lost from sweating. Use either at 0.1% salt water solution, more heavily salted foods, or commercial mixes such as Gatorade. The commercial mixes may be preferable for employees on low sodium diets

2. Establish a work schedule that will provide sufficient rest periods for cooling down. This may require shifts of workers when wearing encapsulating suits and SCBA

3. Cooling devices may be worn under suits. These increase, however, the amount of weight that must be carried

4. Portable showers and hosing down of suits may be utilized

C. Heat Stress

Heat stress symptoms should be observed for all levels of protection, but especially in Levels A and B. For example, Army personnel wearing the military M3 toxicological suit (a two-piece butyl rubber suit) are required to follow these guidlines:

Ambient Temperature	Maximum Wearing Time (Hours)
Above 90 degress F	1/4 hour
85-90 degrees F	1/2 hour
80-85 degrees F	1 hour
70-80 degrees F	1 1/2 hour
60-70 degrees F	2 hours
50-60 degrees F	3 hours
30-50 degrees F	5 hours
Below 30 degrees F	8 hours

A method for measuring the effectiveness of employees rest-recovery regime is by monitoring the heart rate. Use the Brouha guideline: The pulse rate is counted for the last 30 seconds of the first minute of a three minute period; the last 30 seconds of the second minute; and the last 30 seconds of the third minute. The count obtained should then be doubled. If the recovery pulse rate during the last 30 second of the first minute is maintained at 110 beats per minute or below and deceleration between the first, second, and third minute is at least 10 beats per minute, no increasing strain occurs as the work day progresses.

D. Response personnel should be trained to recognize the symptoms of and provide first aid for heat exhaustion, heat prostration, and heat stroke.

E. Field personnel must observe each other for any toxic exposure effects. Indications of adverse effects include:

1. Changes in complexion, skin discoloration
2. Changes in coordination
3. Changes in demeanor
4. Excessive salivation, pupillary response
5. Changes in speech pattern

F. Field personnel will inform each other of non-visual effects of toxic exposure such as:

1. headaches
2. dizziness
3. blurred vision
4. cramps
5. irritation of eyes, skin, or respiratory tract

2. SITE ENTRY - INITIAL SURVEY & RECONNAISSANCE

I. INTRODUCTION

Initial site entry should be preceded by the collection of as much information as possible concerning the type(s) and degree of hazard which may exist.

Based upon a preliminary evaluation of available information, an assessment of the hazards to be expected is made to determine the protection needed by personnel initially going on-site.

II. OBJECTIVE OF INITIAL SITE ENTRY TEAM

The initial site entry team's primary objective is to collect information about the site in order to assess the toxic environment and other immediate health hazards which may affect personnel subsequently entering the site, and concomitantly to provide additional information for determining required corrective actions to mitigate the incident.

III. INITIAL INFORMATION COLLECTION

A. Organic Vapors

With the use of either a photoionizer (HNU systems, etc.)* and/or an organic vapor analyzer (Century OVA System, etc.)* operating in the total readout mode, sufficient data should be collected to delineate or screen the site for concentrations of organic vapor material. Gross measurements can then be related to both levels of protection and exclusion area zones.

If the type(s) of substances involved in the incident are known, specific measurements with appropriate survey instruments should be made. Higher than background readings on the photoionizer or organic vapor analyzer may also indicate the presence of combustible gases and be prime areas for explosivity measurements. See Appendix III, "Characteristics of the Portable Photoionizer and Organic Vapor Analyzer".

B. Inorganic Vapors

The entry team's collection of total inorganic vapor concentration is extremely limited by available field monitoring equipment. Presently the photoionizer has limited detection capability and the organic vapor analyzer does not detect inorganic

*Use of brand names does not imply endorsement by USEPA.

vapors. See Apendix III for Photoionizer/organic vapor analyzer characteristics. Colorimetric tubes and handpumps would be useful, as would be other instruments for specific substance measurements.

C. Radiation

Although radiation monitoring is not necessary for all response activities, it should be incorporated in the initial survey where applicable (i.e., break or leaking of unknown wastes from an impoundment, transportation incident involving unknown materials/wastes, etc.).

Normal gamma radiation background is approximately 0.01 to 0.02 milliroentgen per hour (mR/hr) on a gamma survey instrument. Radiation exposure levels should not be more than 2-3 times background levels and at no time should exposure be 10 mR/hr or above without the advice of a health physicist. EPA's Office of Air, Noise, and Radiation has radiation specialists in each Region as well as a staff at Headquarters, Montgomery, Alabama and Las Vegas, Nevada.

Absence of instrument readings above background may be misinterpreted as the complete absence of radioactivity. Radioactive materials emitting low energy gamma radiation, alpha or beta radiation may be present, but for a number of reasons will not cause a response on the instrument. Unless airborne, these radioactive materials should present minimal hazard to initial on-site personnel, but more thorough surveys should be conducted as site operations continue in order to completely determine the presence or absence of radioactive material.

D. Visual Observations

While on-site, the initial entry team(s) should make visual observation which may be useful in an evaluation of the site hazards i.e., fish kill, animal kill, land features, dead insects, damaged vegetation, wind direction, labeling on packages or drums, general conditions, etc.

IV. ADDITIONAL INFORMATION COLLECTION

For subsequent entry wearing appropriate personal protective equipment, the following surveys should be made to further assist in selecting personal protection equipment and determining any additional hazardous conditions which may exist.

A. Oxygen Deficiency

At least 19.5% oxygen at sea level must be present in the ambient air without using air-supplied equipment. Oxygen deficiency measurements are of particular importance for work in enclosed spaces, low-lying areas or in the vicinity of accidents that have produced heavier-than-air vapors which could displace the ambient atmospheres. Oxygen deficient areas are also prime locations for taking further organic vapor measurements, since air has been displaced by other substances.

B. Airborne Toxic Materials

A more thorough survey is needed on-site to qualitate and quantify airborne toxic vapors. This information determines the subsequent level of protection needed by all workers on-site.

If specific known or suspected harmful materials (hygrogen sulfide, hydrogen cyanide, etc.) are present, the entry teams should monitor with appropriate instruments for these specific agents, in addition to an overall air monitoring program.

C. Combustible Gases

The presence or absence of combustible vapors or gases should be determined. If explosivity readings greater than 10% of the lower explosive limit (LEL) are detected, a very careful investigation and mapping of the area must be made. Readings approaching or greater than 50% LEL are cause for immediate withdrawal of personnel from on-site. Before the resumption of any on-site activities, project personnel in consultation with personnel skilled in fire or explosion hazards, must develop refined plans for additional operations. The presence of combustible gases also indicates that vapors are present. These vapors may present toxicity hazards.

V. CONSIDERATIONS

A. The surveys made by the initial site entry team are for preliminary hazard evaluation only. These should be followed up by more comprehensive investigations as activity at the site progresses. Continual monitoring and hazard evaluation programs should be established for the duration of site operations to indicate changes in the on- or off-site environment caused by activities at the site.

B. The order of priority for acquiring information about an incident is dependent on many factors which may or may not be known. Consequently, priorities for the types of measurements needed should be established on a case-by-case basis by those in charge of the response.

3. SITE ENTRY - PERSONNEL PROTECTION

I. INTRODUCTION

It is important that personnel protective equipment and safety requirements be appropriate to protect against the potential or known hazards at an incident. Protective equipment should be selected based on the type(s), concentration(s), possibilities, and routes of personnel exposure from substances at a site. In situations where the type of materials and possibilities of contact are unknown or the hazards are not clearly identifiable, a more subjective determination must be made of the personnel protective equipment required for initial safety.

The appropriate level of protection shall be determined prior to the initial entry on-site based on best available information. Subsequent information may suggest changes in the original level selected.

A. Levels of Protection

Level A

Level A protection should be worn when the highest available level of respiratory, skin, and eye contact protection is needed. While Level A provides the maximum available protection, it does not protect against all possible airborne or splash hazards. For example, suit material may be rapidly permeable to certain chemicals in high air concentrations or heavy splashes.

Level B

Level B protection should be selected when the highest level of respiratory protection is needed, but exposure to the small unprotected areas of the body (i.e., neck and back of head) is unlikely, or where concentrations are known to be within acceptable exposure standards.

Level B protection is the minimum level recommended on initial entries until the hazards have been further identified and defined by monitoring, sampling, and other reliable methods of analysis, and personnel protection equipment corresponding with those findings is utilized.

Level C

Level C protection should be selected when the type(s) and concentration(s) of respirable material in known, has adequate warning properties, or is reasonably assumed to be not greater than the protection factors associated with air-purifying respirators; and exposure to the few unprotected areas of the body (i.e., neck and back of head) is unlikely to cause harm. Continous monitoring of site and/or individuals should be established.

Level D

Level D is the basic work uniform and should be worn for all site operations. Level D protection should only be selected when sites are positively identified as having no toxic hazards.

B. Equipment & Selection Criteria

Level A

1. Personal Protection Equipment

- Positive Pressure SCBA (MSHA/NIOSH approved) Operated in the positive pressure mode

  Totally Encapsulating Suit (boots & gloves attached)

- Gloves - Inner (tight fitting & chemical-resistant)
- Boots - Chemical-protective, steel toe and shank. Depending on suit boot construction; worn over suit boot
- Gloves - Outer, chemical-resistant. Depending on suit construction worn over suit gloves. May be replaced with tight-fitting, chemical-resistant gloves worn inside suit gloves
- Underwear - Cotton, long-john type*
- Hard Hat* (under suit)
- Disposable protective suit, gloves, and boots. (Worn under or over encapsulating suit)*
- Coveralls* (under suit)
- 2-way Radio Communications

2. Criteria for Use

   A. When the type(s) and concentration(s) of toxic substances are known and require the highest level of combined protection to the respiratory tract, skin, and eyes. These conditions would be:

*Optional

1. Atmospheres which are "immediately dangerous to life and health" (IDHL)

   a. IDHL's can be found in the NIOSH/OSHA's "Pocket Guide to Chemical Hazards" and/or other references

2. Known atmospheres or potential situations that would effect the skin or eyes, or could be absorbed into the body through these surfaces in toxic quantities

   a. Potential situations are those where vapors may be generated or splashing occur through site activities

   b. Standard reference books should be consulted to obtain concentrations hazardous to skin, eyes, or mucous membranes

3. Oxygen deficient atmospheres with above conditions

B. At sites where the type(s) and/or potential concentration(s) of toxic substances are unknown

   1. Unless circumstances strongly indicate otherwise, the site should be presumed to present hazards to the respiratory system, skin, and eyes. Level A protection would provide the highest level of protection for the initial entry team

      a. Such circumstances might be:

         1. Environmental measurements contiguous to the site

         2. Reliable, accurate historical data

         3. Open, unconfined areas

         4. Minimal probability of vapor's presence or splashing with cutaneous effecting substances

   2. Enclosed areas such as buildings, railroad cars, ships holds, etc.

C. Total vapor readings indicate 500 ppm to 1,000 ppm on instruments such as the photoionizer or organic vapor analyzer

<u>Level B</u>

1. Personal Protective Equipment

   - Positive Pressure SCBA (MSHA/NIOSH approved), operated in the positive pressure mode

- Hooded, two-piece chemical-resistant suit
- Gloves - Outer, chemical-protective
- Gloves - Inner, tight-fitting, chemical-resistant
- Boots - Outer (chemical-protective, heavy rubber disposables)
- Boots - Inner (chemical-protective, steel toe and shank)
- 2-way Radio communications
- Hard Hat*
- Face Shield*

2. Criteria for Use

A. When the type(s) and concentration(s) of hazardous substances are known and require the highest degree of respiratory protection; but a lower level of skin protection

1. Atmospheres which are "immediately dangerous to life and health" (IDLH). Type(s) and concentration(s) of vapors in air do not present a hazard to the small, unprotected areas of the body

2. Atmospheres with concentrations of known substances greater than protection factors associated with full-face, air-purifying respirators with appropriate cartridges

3. Atmospheres with less than 19.5% oxygen

B. A determination is made that potential exposure to the body parts not protected by a fully encapsulating suit (primarily neck, ears, etc.) is highly unlikely

1. Known absence of cutaneous or percutaneous hazards

2. Activities performed preclude splashing of individuals

C. Total vapor levels range from 5 ppm - 500 ppm on instruments such as the photoionizer or organic vapor analyzer and does not contain suspect high levels of toxic substances affecting skin or eyes

*Optional

D. Level B protection is recommended as the lowest level of protection for initial entries until the hazards have been further identified and defined by monitoring, sampling, and other reliable methods of analysis, and personnel protection equipment commensurate with these findings utilized

LEVEL C

1. Personal Protective Equipment

   - Full-face, air-purifying respirator (MSHA/NIOSH approved)
   - Chemical-resistant clothing
   - Overalls & long-sleeved jacket or coveralls; hooded 2-piece chemical splash suit (when applicable - hooded disposable coveralls)*
   - Gloves - Outer (chemical-protective)
   - Gloves - Inner (tight-fitting, chemical-resistant type)
   - Cloth Coveralls - Fire resistant (inside chemical-protective clothing)*
   - Escape mask
   - Hard Hat* (face shield, optional)
   - Boots - Outer (chemical-protective heavy rubber throw-aways)
   - Boots - Inner (chemical-protective, steel toe & shank)
   - 2-way Radio communications

2. Criteria for Use

   A. Site known to contain potential hazards not to exceed:

      1. Air concentrations of material not requiring a protection factor greater than that afforded by a full-face mask (normally considered to be 100). Material must have warning properties

      2. Body exposure to unprotected areas (face, neck, etc.) non-existent or less than any amount that will cause harm

*Optional

3. Well-documented, reliable history of site and patterns of prior entry

4. No evidence of acute or chronic effects to exposed personnel

B. Total vapor reading between 0 ppm and 5 ppm above background on instruments such as the photoionizer and portable GC

C. Continuous air or personnel monitoring should occur while wearing Level C protection

LEVEL D

1. Personal Protective Equipment

- Coveralls - Fire resistant
- Boots/Shoes - Safety or chemical-resistant steel-toed boots.
- Boots - Outer (chemical-protective heavy rubber throw-away)
- Escape Mask
- Safety Glasses or Safety Goggles
- Hard Hat* (face shield optional)
- Gloves*

2. Criteria for Use

a. No indication of airborne health hazards present

b. No gross indications above background on the photoionizer and/or organic vapor analyzer

c. Continuous air or personnel monitoring should occur while wearing Level D protection

II. CRITERIA FOR ESTABLISHING LEVELS OF PROTECTION IN UNKNOWN ENVIRONMENTS

In responding to an incident where the type(s) and concentration(s) in the ambient atmosphere of substances injurious to human health are unknown, a determination must first be made if it is necessary

*Optional

to have personnel enter the site (close proximity to the potential source of exposure). A requirement for on-site operations, necessitates personnel to initially enter the site to characterize and define the hazardous environment that potentially exists.

The lack of knowledge concerning the toxic atmosphere that could be encountered precludes the use of a decision logic for selecting respiratory protection equipment based on evaluating concentrations of known toxicants against safety factors associated with various types of personal protective equipment. Until qualitative and quantitative information is available for assessing the ambient atmosphere at a site, levels of protection based on gross measurements from portable instruments for organic vapor analysis (photoionizer, organic vapor analyzer etc.) may have to be used.

If carcinogens or other highly toxic materials are suspected to be present, levels of protection should be determined on a case-by-case basis and not solely dependent on the following criteria.

ZONE A - TOTAL VAPOR READINGS: 500 ppm TO 1000 ppm

DEFINITION

That section of the site which has the highest inhalation exposure potential and/or contains suspected high probability of skin contact with cutaneous or percutaneous effecting chemicals.

PROTECTION LEVEL

Since the area requires maximum respiratory, skin, and eye protection, this area requires Level A personal protection equipment.

MONITORING CRITERIA

Note wind direction and atmospheric conditions before taking environmental background readings. The zone's total vapor concentrations at breathing levels vary above background from 500 ppm to 1000 ppm.

The entry team should not routinely enter an area containing total vapor concentrations over 1000 ppm. Although the protective equipment required for this area is sufficient to go into environments with total vapor concentrations greater than 1000 ppm, the entry team should evaluate the need for further entry on a case-by-case basis.

ZONE B - TOTAL VAPOR READINGS: 5 ppm to 500 ppm

DEFINITION

That section of the site which has the next highest respiratory hazard and does not have a high probability of skin contact with cutaneous or percutaneous chemicals.

PROTECTION LEVEL

Since the area requires maximum respiratory protection and the next lower level of skin and eye protection, this area requires Level B personal protection.

MONITORING CRITERIA

Note wind direction and atmospheric condition before taking environmental background readings. The zone's total vapor concentrations at breathing levels vary above background from 5 ppm to 500 ppm.

Level B is for those areas where the potential exposure to the small unprotected areas of the body is not likely to be harmful upon skin contact.

ZONE C - TOTAL VAPOR READINGS: BACKGROUND TO 5 ppm

DEFINITION

That section of the site where exposure potential is assumed relatively unlikely, however, low levels of respiratory exposure are possible.

PROTECTION LEVEL

Since the exposure potential, concentration, and/or route(s) of contamination are assumed not to be greater than the protection factor associated with a full-face air-purifying respirator, this area requires Level C personal protection.

MONITORING CRITERIA

Note wind direction and atmospheric condition before taking environmental background readings. The zone's total vapor concentrations at breathing levels vary above background to 5 ppm.

III. ADDITIONAL CRITERIA FOR ESTABLISHING PROTECTIVE EQUIPMENT

In addition to the criteria previously discussed for selecting the levels of protection (A-D), the following criteria are also helpful in determining appropriate levels of protection:

A. The chemicals listed in Appendix I were taken from OHM-TADS and are known to have adverse effects on the skin ranging from irritation to absorption, and require Level 1 or Level 2 protection depending on the specific chemical and exposure concentration potential. Additional information is available from OHM-TADS on the chemicals listed in Appendix I

B. Chemicals listed in Appendix II were taken from OHM-TADS and are known to have percutaneous properties and Level 1 protection should be worn in areas with relatively high potential for direct skin contact with these materials. Level 2 protection may be worn, but it is dependent upon exposure concentration potential, wind direction and speed, temperature, duration of exposure, and specific chemical properties, etc.

C. Level C protection calls for the use of an air-purifying respirator, as well as skin protection. The following criteria should be considered in making the decision to use air- purifying respirators:

1. Atmospheric conditions - temperatures, stability, etc.

2. Wind direction and velocity

3. Whether conditions have been identified sufficiently to permit air-purifying respirators (MSHA/NIOSH approved)

    a. Oxygen levels are sufficient to support air-purifying respirators

    b. Canisters or cartridges used are MESA/NIOSH approved for all identified and/or suspected chemicals present

    c. Total release exposure potential is known

    d. Airborne materials have adequate warning properties

    e. Individual has been fit-tested for the air-purifying respirator used

    f. The respirator used is a full-face mask

4. Entry tasks of individuals have been identified to assure direct exposure does not occur (eg. drum sampling.)

5. Individual is knowledgeable of the site entry/safety plan and carries an emergency escape pack

6. Continuous monitoring program should be established to maintain knowledge about the type and concentration of substances in the ambient air

IV. IMPORTANT CONSIDERATIONS

A. General

The protection of health and safety of personnel is an important consideration in all site operations. Selecting the appropriate personnel protection equipment to be worn is one of the first requirements in reducing the potential for adverse health effects.

When the material(s), airborne concentration(s), inhalation characteristic(s), cutaneous characteristic(s), toxicity, and health effects are known, determining the appropriate personnel protection equipment is less difficult. In general, after determining whether the substances concentration in the ambient air is a respiratory and/or a cutaneous hazard, it is compared with the protection factor associated with respiratory protection equipment and protective clothing. Appropriate equipment is selected to reduce the concentrations to acceptable levels.

Determining adequate protection when type and concentration of vapors are unknown, if present at all, is more difficult. In Sections I, II, & IV guidance is given for selecting levels of protection based on gross survey readings. However, the applicability of the best level of protection must be determined on a case-by-case basis utilizing the guidance contained within and the professional judgement of those in charge.

It should also be recognized that physical stress incurred by wearing personal protective equipment decreases the efficiency and effectiveness of the user. Although the stress to the wearer must be considered in planning work routines, the selection of the level of protection must be based only on the protection of the wearer from hostile environment.

SITE CONTROL: FIELD OPERATIONS WORK AREA

I. INTRODUCTION

An incident generally invloves the escape of normally controlled substances into the environment via air, water, or land surfaces and response activities involve control actions to prevent, minimize, and remove these discharges. As used here, however, site control is preventing or reducing the transport of hazardous substances (contaminants) from the site by workers and equipment involved in site operations.

Site control involves two major activities: 1) physical arrangements and control of the site work areas; and 2) methods for the removal of contaminants from people and equipment - decontamination procedures - which are discussed in SITE CONTROL: DECONTAMINATION.

II. CONTROL AT THE SITE

Control of contaminants is needed to reduce the possibility of transfer from the site of contaminants, which may be present on personnel and equipment needed for various on-site operations. This can be accomplished in a number of ways including:

1) Physical barriers to exclude unnecessary personnel
2) Checkpoints with limited access to the site, or areas within the site
3) Minimizing personnel and equipment on-site consistent with effective operations
4) Establishment of containment zones
5) Decontamination procedures
6) Conducting operations in a manner to reduce possibility of contamination

A. FIELD OPERATIONS WORK AREAS

One method of reducing the potential for transfer of contamination off-site is to delineate zones or work areas based upon expected contamination. Within these zones prescribed operations would occur utilizing appropriate personnel protective equipment. Movement between areas would be controlled at checkpoints. Three contiguous zones are recommemded:

1. Exclusion area (contaminated)
2. Contamination reduction area
3. Support area (non-contaminated)

B. EXCLUSION AREA

The exclusion zone is the inner most area of three concentric rings and is considered contaminated, dirty or "hot". Within this area prescribed levels of protection must be worn by any entering personnel. An entry checkpoint must be established at the periphery of the exclusion area to control the flow of personnel and equipment between contiguous zones and to ascertain that the procedures established to enter and exit the zones are followed. The exclusion area boundary would be established initially based on the presence of the actual wastes or spilled materials and placed as close as possible to drums, tanks, ponds, liquid run-off, or other physical indicators of hazardous substances. Subsequent to operations the boundary may be readjusted based on observation and/or measurements. The boundary should be physically secure and posted, or well- defined by geographical boundaries.

The exclusion area could be further divided into zones with different levels of protection for each zone. Based upon environmental measurements or expected on-site work practices, locations within the exclusion area would be defined concomitantly with the level of protection required for that area. This procedure would allow for more flexibility in operation, decontamination procedures, resources needed and other advantages. Guidelines for designationg levels of protection are found in the section entitled SITE ENTRY- PERSONNEL PROTECTION

C. SUPPORT AREA

The support area is the outermost of three rings and is considered a non-contaminated or clean area. It contains the command post for field operations and other elements necessary to support site activities. Normal street clothes are the appropriate apparel within this zone.

D. CONTAMINATION REDUCTION AREA

Between the exclusion area and the support area is the contamination reduction area. The purpose of this zone is to provide an area to prevent or reduce the transfer of contaminants which may have been picked up by personnel or equipment returning from the exclusion area. All decontamination activities occur in this area.

The boundary between the support area and the contamination reduction area is the contamination control line. This boundary separates the possibly contaminated area from the clean zone. Entry into the contamination reduction zone from the clean area should be through an access control point. Personnel entering at this station would be wearing the prescribed personal protective equipment for working in the contamination reduction area. Exiting the contamination reduction area to the clean area requires the removal of any suspected or known contaminated personnel protection equipment and compliance with

4. Proximity to Site - Relatively easy access to the site is needed

IV. ZONE DIMENSIONS

The radius of the zones or distances between hazardous waste site, hot line, contamination control line, and command post (Figure 1) are approximate distances only. Considerable judgement is needed to assure safe working distances for each zone balanced against practical work considerations. Physical and topographical barriers may constrain ideal locations. Field/laboratory measurements combined with meteorological conditions and air depression calculations would assist in establishing the control zone distances. Long term operations would involve contamination tests for determining the transfer of material and dictate readjustment of zones.

decontamination procedures.

At the boundary between the contamination reduction area and the exclusion area is the hot line and access control station. Entrance into the exclusion area requires the wearing of the prescribed personal protection equipment (which may be different than the equipment requirements for working in the reduction area.) At a point close to the hot line, a personnel and/or equipment decontamination station is established for those exiting the exclusion area. Another decontamination station is needed closer to the contamination control line for those working only in the contamination reduction area.

III. OTHER CONSIDERATIONS

A. Modifications

The use of a three-zone system of area designation, access control points, and exacting decontamination procedures provides reasonable assurance against the translocation of a contaminating substance. This control system is based on a "worst case" situation and requires a large number of personnel and an abundance of equipment and material to operate. Less stringent site control and decontamination procedures or adaptations of the procedures described may be utilized based upon more accurate information on the types of contaminants involved and the contaminating hazards they present. This information can be obtained through air monitoring, instrument survey, wipe tests for possible personnel or equipment contamination, and technical data concerning the characteristics and behavior of the material present. Predicated upon having more reliable data about encountered conditions, site control requirements should be modified for the specific situation.

B. Location of Field Command Post

The location of the Field Command Post, and other support necessities in the support area (clean zone) are dependent on a number of factors including:

1. Wind direction - Preferably the Command Post should be located upwind of the site exclusion area. However, wind directions shift and other conditions may be such that the ideal location based on wind direction does not exist

2. Accessibility - The terrain, woods, topography and space, may limit availability of Command Post sites

3. Roads - Adequate roads or unavailability thereof

SITE CONTROL: DECONTAMINATION

I. INTRODUCTION

As part of the system to prevent or reduce the physical transfer of contaminants by people or equipment from on-site to off-site areas, procedures must be instituted for decontaminating anything leaving the exclusion area and contamination reduction area. These procedures include the decontamination of protective equipment and also the correct method of removing personnel protective equipment to avoid transfer of contaminants from the clothing to the body. Unless otherwise demonstrated, everything leaving the exclusion area should be considered contaminated and appropriate methods established for decontamination or disposal.

II. DECONTAMINATION

In general, decontamination at the site consists of:

1) Washing or a series of washings using a detergent/water solution
2) Rinsing or a series of rinses using copious amounts of water
or
3) If the contaminating substance is known, rinsing with a solution which will react with the substance and alter its chemical composition, form or solubility. In Section IV is a sample procedure and physical layout for personnel decontamination is given. This example is a general procedure assuming the contaminating substance(s) is unknown and illustrates a possible "worst-case" situation. The procedure would be modified if the type of contaminating substance and its hazard potential was known or if the amount of contamination was minimal

CONTAMINATED MATERIAL

The decontamination process uses water and rinse solutions for washing down personnel and equipment. The spent solution, brushes, sponges, containers, stands, etc., used in the decontamination process must, until shown otherwise, be considered contaminated and, therefore, must be properly disposed of.

Personnel equipment that has been worn into the exclusion area and subsequently decontaminated upon leaving the area, may need to be used in subsequent operations; therefore, it should be stored for air drying in the support zone.

The decontamination of equipment, material and personnel used or working in the contamination reduction area may be somewhat less complex than "hot-line" procedures. Exact procedures would depend on the probability of these items being cross-contaminated.

In extreme situations, complete decontamination of personnel protective equipment, instruments, and small items may have to be done in a controlled laboratory situation.

Determining the presence or absence of unknown contaminating substance(s) and the identification and quantification of the substance(s) is a difficult task. To verify the initial decontamination procedures and/or the effectiveness of these procedures, contamination-decontamination testing is necessary.

III. SAMPLE LAYOUT - PERSONNEL DECONTAMINATION PROCEDURES

A. Organization of the Personnel Decon Station (PDS)

Once the Hot Line section of the Exclusion Area Boundary has been established, the PDS is set up.

1. <u>Layout of the PDS</u>

The layout of the PDS is shown in Figure 1 and is as follows:

STATION A - A plastic ground sheet on which field equipment is dropped by returning members of the work party.

STATION B - A wash tub filled with decon solution A
- A second wash tub filled with rinse solution
- A third wash tub filled with decon solution B
- A fourth wash tub filled with rinse solution
- Each wash tub should be equipped with a large sponge and brush

STATION C - A bench or stool with disposable seat covers for personnel to sit on during removal of booties
- A ten (10) gallon pail with plastic liner where disposable boot covers are discarded

STATION D - Two ten (10) gallon buckets filled with decon solution A and B respectively

STATION E - A ten (10) gallon bucket filled with rinse solution

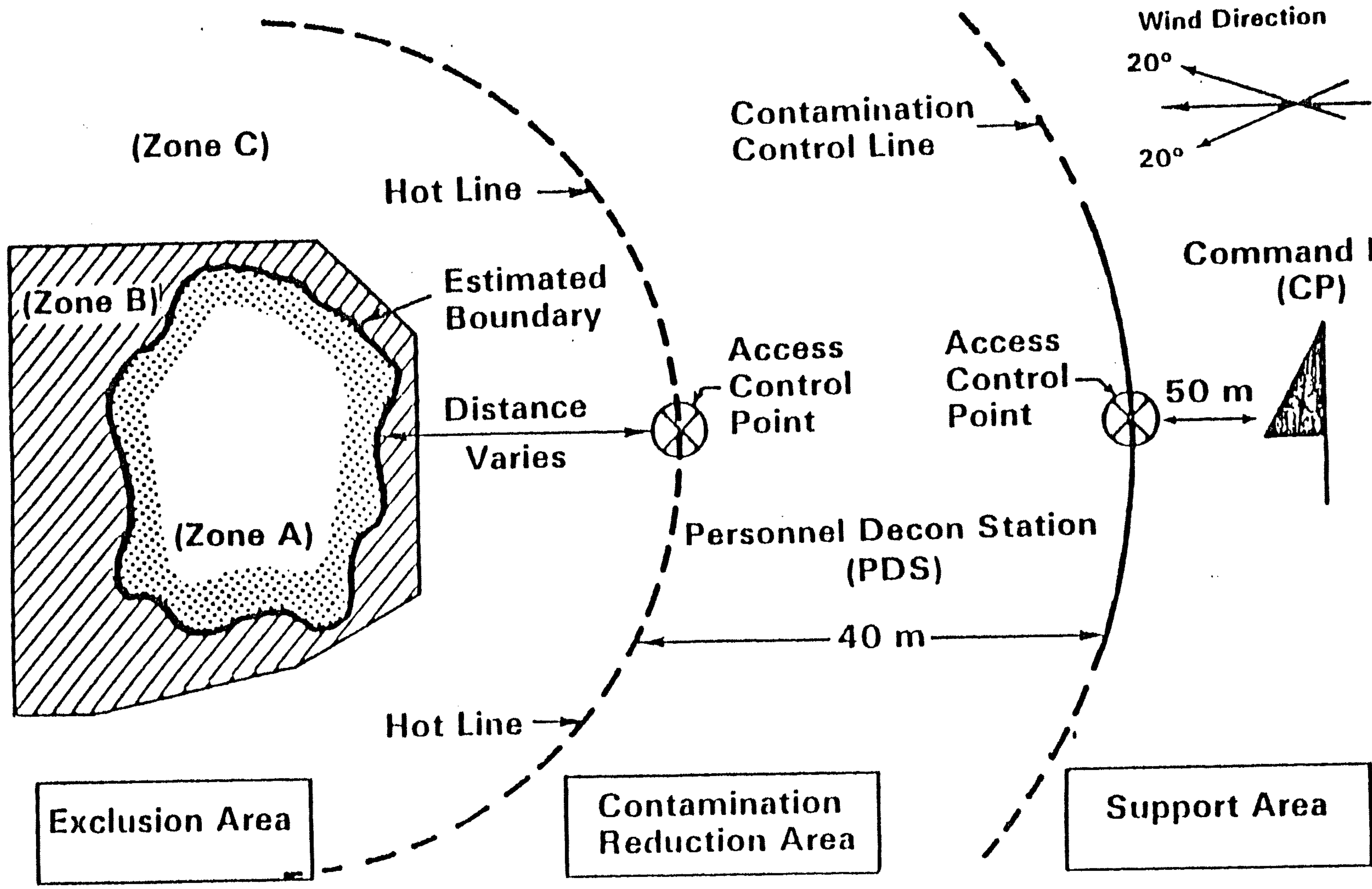
STATION F - A 32 gallon trash can with plastic liner (container for rubber items)

STATION G - 30 meters upwind from Station F
- A plastic ground sheet for SCBA drop

STATION H - A bench or stool for personnel
- A 32 gallon trash can with plastic liner (container for cloth items)

STATION I - A field shower set-up

STATION J - A redressing and first aid station. This station defines the boundary between the Contamination Control Area and The Clean Area



NOTE: Zone dimensions are for illustration purposes only.
Zone dimensions will vary on a case-per-case basis.

Figure 1. Site work areas.

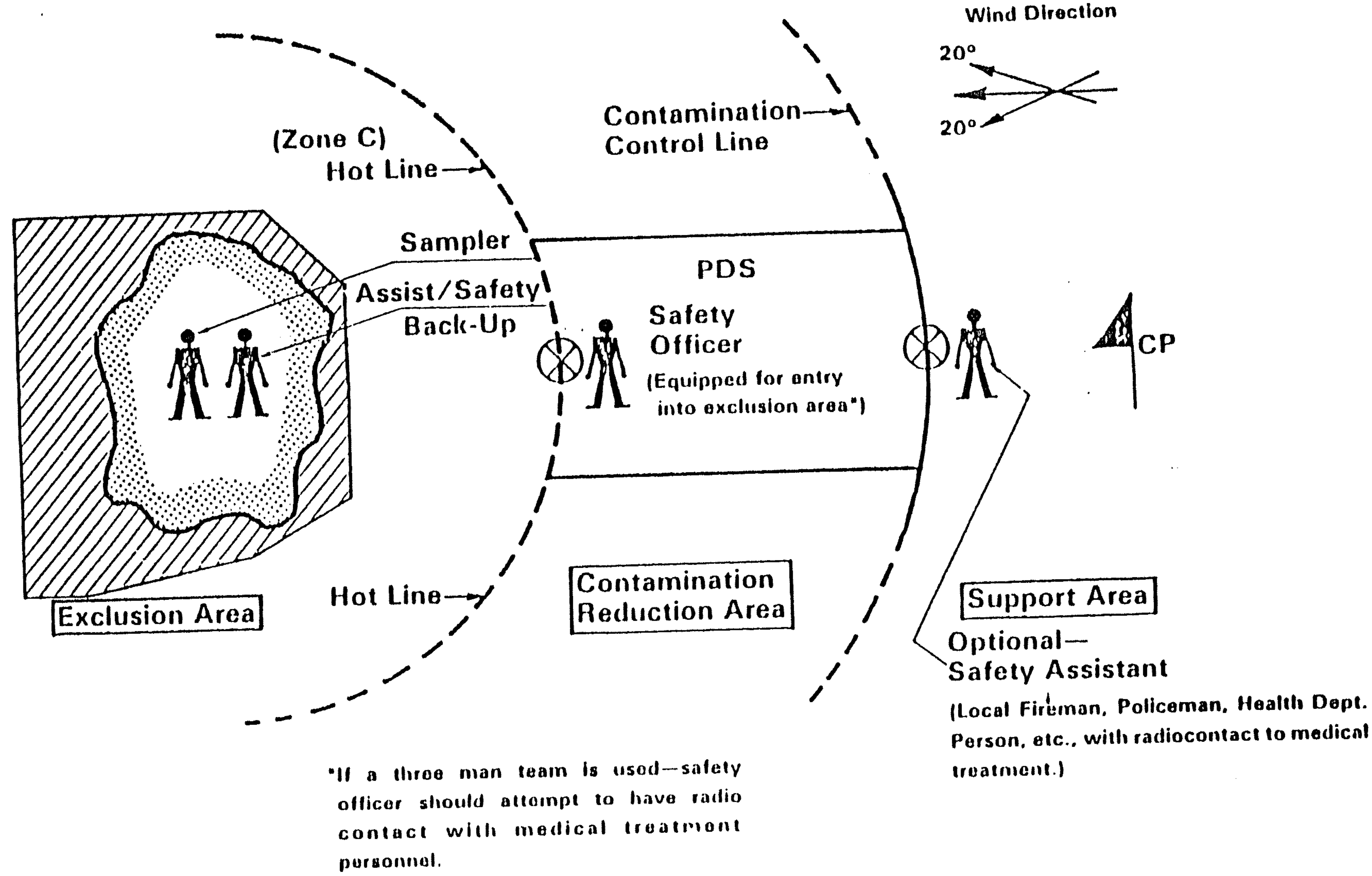


Figure 2. Organization/location of entry team members.
(Three/Four Man Team)

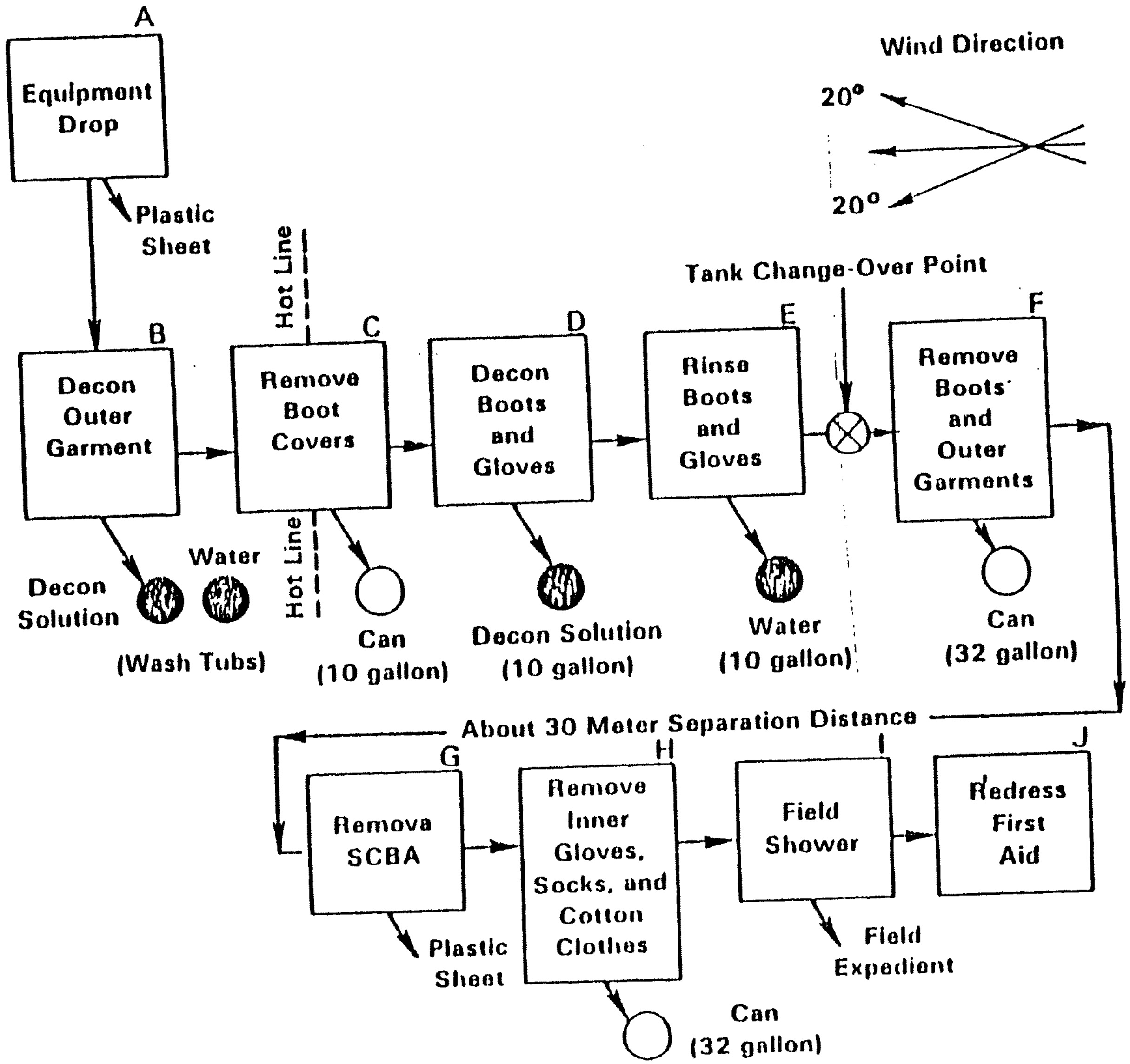


Figure 3. Maximum layout of personnel decontamination station. (Levels A & B Protection)

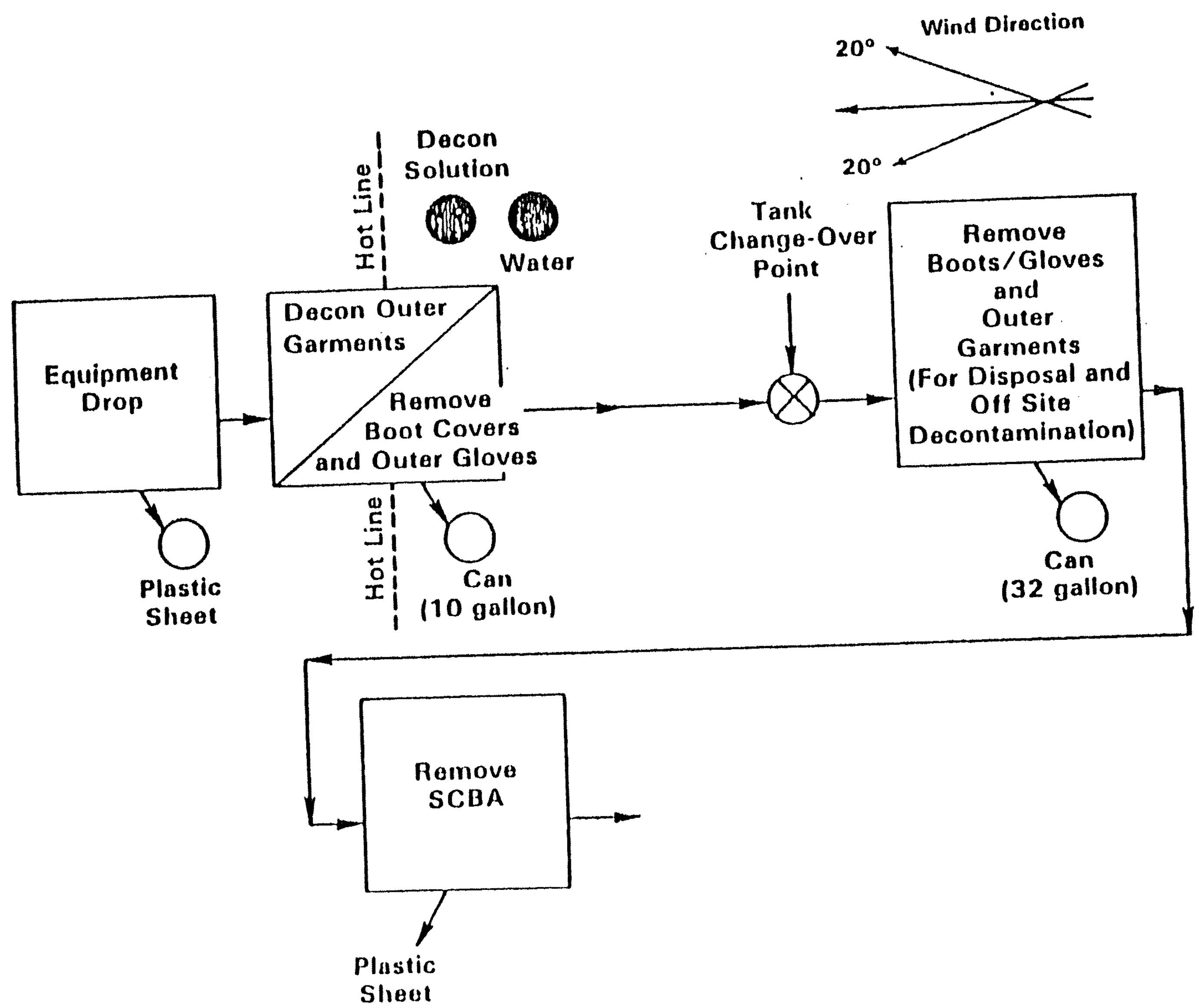


Figure 4. Minimum layout of the PDS.

(Level A, B & C Protection)

2. Decon and Rinse Solutions

a. The decon solutions should be solutions of water and chemical compounds designed to react with and neutralize the specific contaminants on the site. The temperature and contact time should also be considered to insure complete neutralization. However, the contaminants on a particular site will not be known in a majority of cases and it will be necessary to use a decon solution that is effective for a variety of contaminants. Two of these general decon solutions are listed below:

Decon Solution A - A solution containing 5% Sodium Carbonate (Na_2CO_3) and 5% Trisodium Phosphate (Na_3PO_4). Mix four (4) pounds of commercial grade Na_2CO_3 plus four (4) pounds commercial grade Na_3PO_4 with each ten (10) gallons of water. These chemicals are available at most hardware stores.

Decon Solution B - A solution containing 10% Calcium Hypochlorite $Ca(ClO)_2$. Mix eight (8) pounds of $CA(ClO)_2$ with each ten (10) gallons of water. Calcium Hypochlorite (HTH) is available at most hardware or pool supply stores.

b. The rinse soultions used in decon should have the ability to not only physically remove the decon solution but to also neutralize excess decon solution.

A general purpose rinse solution, used for both decon solutions listed above consists of a five (5) percent solution of Trisodium Phosphate. Mix four (4) pounds of Na_3PO_4 with each ten (10) gallons of water.

IV. OTHER CONSIDERATIONS

The decontamination procedure, as illustrated, is based upon wearing a self-contained breathing apparatus and fully encapsulating suit. A detailed decontamination process is required. Less extensive procedures for decontamination can be subsequently or initially established when the type and degree of contamination becomes known through analysis or the potential for transfer is judged to be minimal.

Less extensive procedures generally involve only one or two washdowns and fewer percautionary measures in doffing equipment. These procedures would not involve additional decontamination of removed protective clothing.

Additional problems are presented with SCBA worn over chemical-protective clothing and with monitoring instruments. This type of equipment is difficult to decontaminate. Therefore, whenever possible it should be packaged or wrapped in material that will protect it from contamination, but does not interfere with its operation.

In extreme situations when there may be a question of the efficacy of decontamination to known or strongly suspect substances of a highly toxic nature protective clothing may have to be discarded after use.

Since it is virtually impossible to prevent the transfer of contaminants, if present, on protective clothing to the wearer, the mainline of defense is the thorough decontamination of the clothing. When done effectively, the amount of substance remaining on the suit is greatly reduced and the possibility of suit-to-wearer- transfer is proportionately reduced.

Consideration must also be given to the protective equipment worn by those personnel operating the decontamination line. In most cases, chemical-protective clothing, boots, and gloves should suffice. Unless it is suspectd and/or confirmed that personnel needing decontamination are highly contaminated, air-purifying respirators with suitable cartridges should be worn.