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CUMMINGS
RITER
CONSULTANTS, INC.

PRE-FINAL REMEDIAL DESIGN
KENTUCKY AVENUE WELLFIELD SITE
OPERABLE UNIT NO. 3

PREPARED FOR:

CBS CORPORATION
11 STANWIX STREET
PITTSBURGH, PA 15222

PROJECT NO. 98245.10/03
JANUARY 31, 2000

339 Haymaker Road • Parkway Building • Suite 201 • Monroeville, PA 15146
(412) 373-5240 • FAX (412) 373-5242 • E-Mail: crc@nb.net

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KENTUCKY AVENUE WELLFIELD SITE
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1.0 INTRODUCTION

This document has been prepared on behalf of CBS Corporation (CBS) in accordance with the requirements of a Consent Decree, Civil Action No. 97-CV-6555T, between CBS and the U.S. Environmental Protection Agency (USEPA), entered March 2, 1998 (the "Consent Decree"). This document presents the pre-final remedial design (RD), at 90-percent completion, for source control at the former Westinghouse Electric Corporation (Westinghouse) plant site in Horseheads, New York (Figure 1). This activity comprises a portion of the remedial design and remedial action (RD/RA) for Operable Unit No. 3 at the Kentucky Avenue Wellfield site in accordance with the applicable Record of Decision (ROD)[1]. This pre-final RD deals specifically with Disposal Area F and the Former Runoff Basin Area at the Westinghouse plant site. The locations of these areas are shown on Figure 2. The third remedial action component specified in the ROD addresses impacted sediments in the Industrial Drainageway located south of the Westinghouse plant site. Because of differences in timing of the work, RA in the drainageway will be the subject of a supplemental design.

This first section provides an overview of the pre-final RD, addressing the following:

- Project background;
- Design report organization and content;
- Proposed RA implementation strategy; and
- Anticipated remedial construction schedule.

[1] U.S. Environmental Protection Agency, Region II, September 30, 1996, *Record of Decision, Kentucky Avenue Wellfield, Operable Unit 3, Horseheads, Chemung County, New York.*

CUMMINGS RITER

In this and subsequent sections, this pre-final RD presents all of the design and supporting information identified in the Statement of Work (SOW) attached to the Consent Decree.

2.0 PROJECT BACKGROUND

The following paragraphs briefly summarize the site and pertinent background information. More-detailed descriptions are provided in the remedial investigation and feasibility study (RI/FS) prepared for Operable Unit No. 3.[2]

2.1 SITE DESCRIPTION

The areas addressed in this pre-final RD are defined by USEPA as part of the Kentucky Avenue Wellfield site, which is located in the Village of Horseheads and the Town of Horseheads in the central portion of Chemung County, New York. The Kentucky Avenue Wellfield, which consists of one production well (the Kentucky Avenue Well) and three test wells for water level determinations, is located about one mile south of the former Westinghouse plant site. The Kentucky Avenue Wellfield is part of the public water supply system owned and operated by the Elmira Water Board (EWB). After trichloroethylene (TCE) was discovered in the Kentucky Avenue Well in May 1980, this production well was closed. In September 1983, USEPA placed the Kentucky Avenue Wellfield site on the National Priorities List for remediation under the Comprehensive Environmental Response, Compensation, and Liability Act. USEPA has separated response actions at the Kentucky Avenue Wellfield site into operable units as follows:

- Operable Unit No. 1, defined by a 1986 ROD and a 1990 Explanation of Significant Differences, included the following components: an investigation to identify all residences using private wells; installation and sampling of monitoring wells upgradient from the Sullivan Street Wellfield;[3] design and construction of an air stripper at the Sullivan Street Wellfield; and a supplemental RI/FS;

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[2] Philip Environmental Services Corporation, September 1996, "Final Remedial Investigation Report, Kentucky Avenue Wellfield Site, Operable Unit No. 3," Horseheads, New York.

[3] The Sullivan Street Wellfield, also owned and operated by EWB, is located approximately three miles south (downstream) of the Kentucky Avenue Wellfield in the Newtown Creek valley. The Sullivan Street Wellfield, like the Kentucky Avenue Wellfield, draws water from the glacial outwash aquifer known as the Newtown Creek Aquifer, and USEPA addressed both wellfields as part of the "Kentucky Avenue Wellfield" Superfund site.

- Operable Unit No. 2, defined in a 1990 ROD, called for recovery and treatment of affected groundwater and restoration of the Kentucky Avenue Well as a water supply well; and

- Operable Unit No. 3, which was specified in the 1996 ROD, is aimed at identifying and remediating sources of groundwater contamination at the former Westinghouse plant site that may have affected the Kentucky Avenue Well.

2.2 SUMMARY OF OPERABLE UNIT NO. 3 REMEDY

With respect to source control at the former Westinghouse plant site, the 1996 ROD specifies the following objectives for RA:

- Prevent potential direct contact with impacted soils that could result in unacceptable human health risk; and

- Eliminate the potential sources of TCE leaching into groundwater.

From the evaluation of remedial alternatives, USEPA selected the following remedial actions for Disposal Area F and the Former Runoff Basin Area:

- Removal and off-site disposal of soils and waste from Disposal Area F where these soils present a potentially unacceptable health risk from direct contact or contribute TCE to groundwater; and

- Soil vapor extraction and air sparging (SVE/AS) treatment of soils in the Former Runoff Basin Area to eliminate the leaching of TCE from these soils to groundwater.

RD activities conducted to date have focused on these two components of remediation.

2.3 STATUS OF RD/RA

The first step of RD/RA involved preparation of the Remedial Design Work Plan (RD Work Plan). That plan was prepared on behalf of CBS by Cummings/Riter Consultants, Inc. (Cummings/Riter), with the assistance of IT Corporation (IT).[4] Following approval

[4] Cummings/Riter Consultants, Inc., March 26, 1999. *Remedial Design Work Plan, Kentucky Avenue Wellfield Site, Operable Unit No. 3.*

of the RD Work Plan, CBS and its consultants conducted the specified pre-design investigations, which updated and expanded the technical basis for remediation from the information presented in the RI and other studies and upon which the ROD was based. The results of the pre-design investigations are summarized in the "Remedial Design Interim Data Submittal" prepared by Cummings/Riter and IT and submitted to USEPA on September 2, 1999.

Because the expected remedial work in Disposal Area F and the Former Runoff Basin Area is straightforward, and in an effort to expedite the RD/RA process, CBS and USEPA agreed to forego preparation of a preliminary (30-percent) RD and proceed directly with the pre-final (90-percent) RD. Upon USEPA review and approval of the pre-final RD, CBS and its consultants will prepare the final RD and the remedial action work plan (RAWP). Remedial action will be initiated upon USEPA approval of the final RD and RAWP.

3.0 DESIGN REPORT ORGANIZATION

This pre-final RD presents the design information identified in the SOW attached to the Consent Decree. The organization and content of this report and the design it presents have been tailored to address the specific needs for remediation at Disposal Area F and the Former Runoff Basin Area in a thorough, but efficient, manner. By this presentation, the goal is to streamline the design preparation and review process, thereby accelerating the project schedule and controlling costs.

Included as an appendix to this Overview are the following:

- Disposal Area F design report;
- Former Runoff Basin Area design report;
- Construction quality assurance project plan (CQAPP);
- Sampling, analysis, and monitoring plan (SAMP);
- Health and Safety/Contingency Plan (HSCP); and
- SVE/AS remedial system operations plan.

The design reports for Disposal Area F and the Former Runoff Basin Area include the following:

- Design criteria and basis of design, including design assumptions, supporting calculations, and permitting plan; and

- Design drawings, including engineering and construction drawings and process flow diagrams (where applicable).

The work required for remedial construction is straightforward and, as discussed below, CBS intends to complete RD/RA using a hands-on, turnkey approach. For these reasons, the required engineering specifications are minimal. The Division 1 Specifications (General Requirements)[5] will be addressed in the RAWP and other project plans. Pertinent technical specifications (i.e., Division 2 et seq.) are provided on the engineering drawings and in lists of materials, where appropriate.

[5] Engineering specification divisions and contents are those provided by the Construction Specifications Institute master format.

The CQAPP addresses both the soil removal activities at Disposal Area F and the SVE/AS system installation at the Former Runoff Basin. The SAMP describes methods to be employed in all air, water, and soil sampling associated with remedial construction, including confirmatory soil sampling, SVE/AS system start-up, and SVE/AS system operation. The SAMP incorporates the Quality Assurance Project Plan.

This HSCP addresses construction monitoring activities and specifies the remedial contractor requirements for establishing safe working conditions and procedures at the site during RA activities and includes provisions for a community air monitoring program.

The SVE/AS remedial system operations plan describes operation and maintenance of the SVE/AS, including operational procedures, personnel requirements, reporting, and troubleshooting.

4.0 RA IMPLEMENTATION STRATEGY

CBS will manage and coordinate remedial construction activity and operation and maintenance of the SVE/AS system. CBS will be active in both the overall and day-to-day management of remedial activities and serve as the primary intermediary between the USEPA and the other organizations involved in the project.

Cummings/Riter will fill the role of Construction Manager with full-time on-site representation during remedial construction. The primary responsibilities of the Construction Manager will be to observe, coordinate, and document the work performed by the contractors for conformance with the requirements of the Consent Decree, RD, and RAWP.

CBS plans to retain, through negotiation or a competitive bidding process, a qualified remedial action contractor to perform soil excavation, backfilling, and related work at Disposal Area F. CBS plans to separately (directly) subcontract off-site transportation and disposal services. The Construction Manager will be responsible for surveying, confirmatory soil sampling and analysis, perimeter air monitoring, construction quality assurance testing, project documentation, and other similar services.

IT will be the prime contractor to CBS for installation, start-up, operation, and maintenance of the SVE/AS system at the Former Runoff Basin Area. For this work, IT plans to subcontract with equipment vendors and an electrical contractor for assistance in installation. IT will be responsible, with oversight by the Construction Manager, for construction quality control testing, system performance testing, documentation, confirmatory soil sampling and analysis, air monitoring, and all other aspects of system installation, start-up, operation, and maintenance.

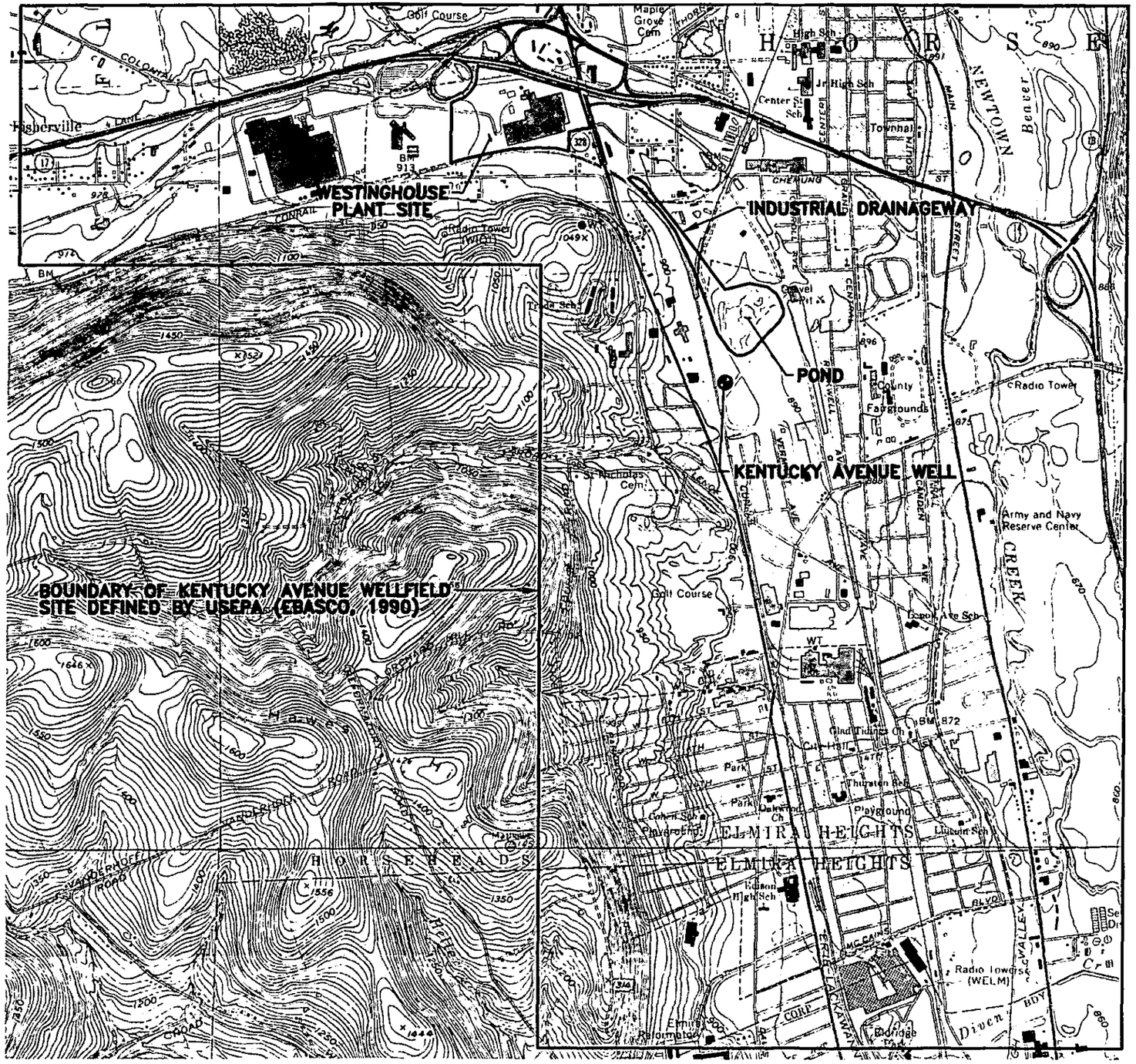
Through this hands-on, turnkey contracting strategy, CBS can streamline RD and the contractor procurement process. This approach shortens project schedules and works to control costs. CBS will identify and present the qualifications of subcontractors to USEPA, as required by the Consent Decree, prior to awarding (or approving) subcontracts.

5.0 RA IMPLEMENTATION SCHEDULE

Figure 3 provides the currently estimated schedule for completing RD and implementing RA for Disposal Area F and the Former Runoff Basin Area. RA begins with the award of contracts, related to work in both Disposal Area F and the Former Runoff Basin, immediately following USEPA approval of the RAWP. The equipment needed for SVE/AS installation will then be procured. Field work at Disposal Area F and the Former Runoff Basin will proceed concurrently following SVE/AS equipment procurement. Performing the field work in these two areas simultaneously provides field supervision and quality assurance efficiencies, improves safety coordination, and simplifies USEPA oversight.

FIGURES

DRAWING NUMBER 98245B28



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QUADRANGLE LOCATION

REFRENCE:
MODIFIED FROM U.S GEOLOGICAL SURVEY HORSEHEADS, NEW YORK, AND ELIMIRA, NEW YORK–PENNSYLVANIA, QUADRANGLES, PHOTOREVISED 1978.

FIGURE 1

SITE LOCATION MAP

KENTUCKY AVENUE WELLFIELD SITE – OU3
HORSEHEADS, NEW YORK

PREPARED FOR
CBS CORPORATION
PITTSBURGH, PENNSYLVANIA

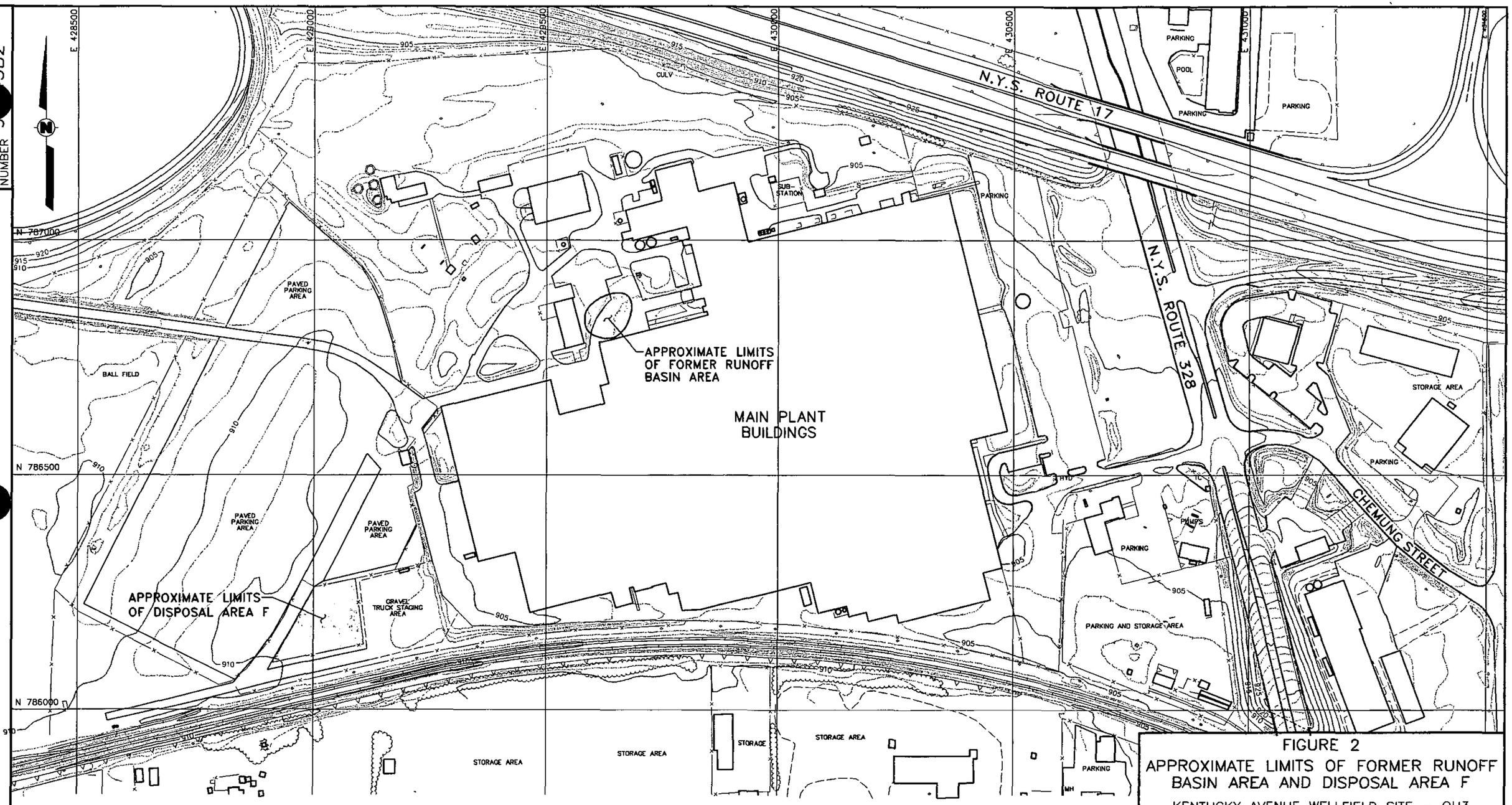
CUMMINGS RITER CONSULTANTS, INC.

DRAWING NUMBER 98245B28

DRAWN BY: T.E. McKee	DATE: 1-28-00
CHECKED BY:	DATE:
APPROVED BY:	DATE:

PLOT SCALE: 1

DRAWING NUMBER 98245B2



SCALE

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REFERENCE:

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PLOT SCALE:

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FIGURE 2

APPROXIMATE LIMITS OF FORMER RUNOFF BASIN AREA AND DISPOSAL AREA F

KENTUCKY AVENUE WELLFIELD SITE - OU3
HORSEHEADS, NEW YORK

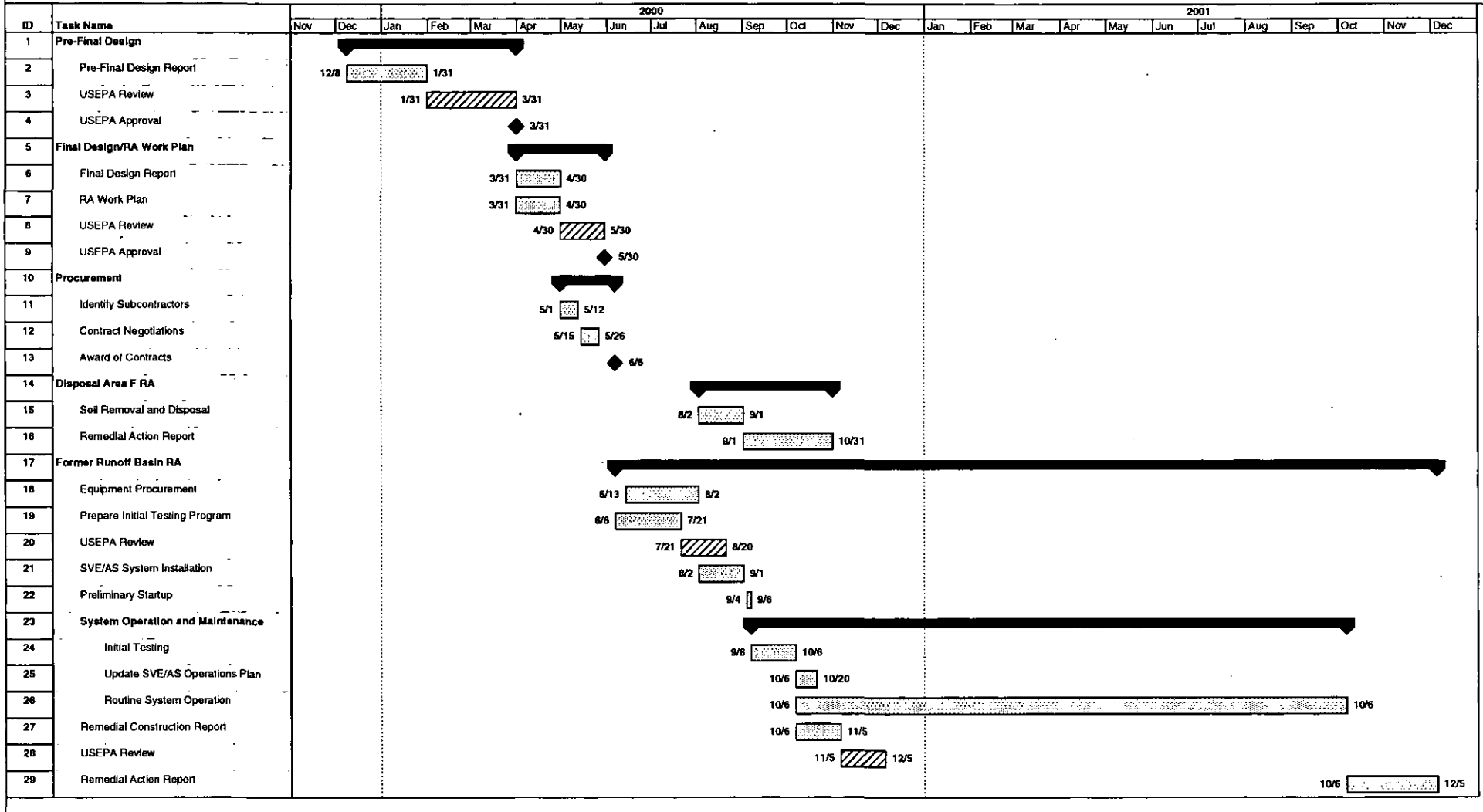
PREPARED FOR
CBS CORPORATION
PITTSBURGH, PENNSYLVANIA

CUMMINGS RITER CONSULTANTS, INC.

DRAWING NUMBER 98245B2

REVISION	DATE	DESCRIPTION

DRAWN BY: T.E. McKee DATE: 3-3-98
CHECKED BY: B. Smith DATE: 10-20-98
APPROVED BY: B. Smith DATE: 10-20-98



Project: Disposal Area F and Former Runoff Basin RA
Site: Kentucky Ave. Wellfield Site - OU3
Date: Mon 1/31/00

Task | USEPA Review | Progress | Milestone | Summary

wcs\245\Prelinal Design.MPP

FIGURE 3 - RA SCHEDULE - DISPOSAL AREA F AND FORMER RUNOFF BASIN

CUMMINGS RITER CONSULTANTS, INC.

PRE-FINAL DESIGN REPORT
DISPOSAL AREA F SOIL REMEDIATION
KENTUCKY AVENUE WELLFIELD SITE
OPERABLE UNIT NO. 3

PREPARED FOR:

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1	TITLE SHEET
2	SURFACE SOIL (0-2 FEET) EXCAVATION PLAN
3	SUBSURFACE SOIL EXCAVATION PLAN
4	CONSTRUCTION DETAILS – SHEET 1 OF 2
5	CONSTRUCTION DETAILS – SHEET 2 OF 2

PRE-FINAL DESIGN REPORT
DISPOSAL AREA F SOIL REMEDIATION
KENTUCKY AVENUE WELLFIELD SITE
OPERABLE UNIT NO. 3

1.0 INTRODUCTION

CBS Corporation, Inc. (CBS) retained Cummings/Riter Consultants, Inc. (Cummings/Riter) to design the remedial action (RA) for Disposal Area F soil at the former Westinghouse Electric Corporation plant site in Horseheads, New York (Drawing No. 1). This work is part of Operable Unit No. 3 for the Kentucky Avenue Wellfield Superfund site. This Pre-Final Design Report for Disposal Area F Soil Remediation was prepared in accordance with the Remedial Design (RD) Work Plan (Cummings/Riter, March 26, 1999), and the Statement of Work appended to the Consent Decree between CBS and the U.S. Environmental Protection Agency (USEPA). The Consent Decree identifies the requirements for design and implementation of the selected remedy set forth in the Record of Decision (ROD) for Operable Unit No. 3 (USEPA, September 30, 1996).

As specified in the RD Work Plan, this report provides the design criteria and basis of design, specifications, plans, and drawings to be used for contractor procurement and remedial construction for the excavation and off-site disposal of Disposal Area F soils. This report contains the calculations and assumptions used in the design, and the schedule for implementation of the RA.

2.0 BASIS OF DESIGN

The design for the Disposal Area F soil RA is based on the results of the pre-design investigation, as summarized in the Remedial Design Interim Data Submittal (Cummings/Riter, September 2, 1999). Surface and subsurface soils exceeding the performance standards set forth in the ROD were delineated by systematic grid sampling and laboratory sample analysis.

2.1 PERFORMANCE STANDARDS

As stated in the ROD, the Remedial Action Objectives (RAO) or performance standards for the constituents of concern in Disposal Area F surface soil (i.e., less than two feet deep) are as follows:

- Arsenic - 12.0 milligrams per kilogram (mg/kg),
- Trichloroethene (TCE) - 800 micrograms per kilogram (µg/kg),
- Benzo(a)anthracene - 7,800 µg/kg,
- Benzo(a)pyrene - 780 µg/kg,
- Benzo(a)fluoranthene - 7,800 µg/kg, and
- Indeno(1,2,3-cd)pyrene - 7,800 µg/kg.

The RAO for subsurface soils is a TCE concentration of 800 µg/kg.

2.2 SOIL DELINEATION

The soil samples exceeding performance standards were used to delineate the surface and subsurface soils to be excavated. More specifically, the initial limits of soils to be excavated were taken as the midpoint between samples exceeding performance standards and the nearest sample meeting performance standards. The initial limits of surface soils to be excavated were established based on laboratory analyses of samples for all the parameters of interest and are shown on Drawing No. 2. The initial limits of subsurface soils to be excavated were determined based on TCE concentrations and are shown on Drawing No. 3. The total volume of surface and subsurface soil exceeding performance standards is estimated at 1,800 cubic yards (CY), of which 455 CY exceed the performance standard for TCE. For ease of field location, polygons have been drawn around the surface and subsurface soil areas to be excavated, with coordinates of the

corners of each polygon listed in a table on the respective figure. The polygons will be located and staked by survey prior to remedial construction mobilization. Post-excavation verification samples will be collected to demonstrate the effective removal of impacted soils.

2.3 ATTAINMENT DEMONSTRATION

Post-excavation soil samples will be collected from both the excavation sidewalls and bottom for laboratory analysis to verify attainment of the performance standards. Surface soil excavation sidewall samples will be analyzed for each of the surface soil parameters of interest identified in the ROD. Subsurface sidewall and bottom samples will be analyzed for TCE. Sidewall samples will be collected at mid-height from zero to six inches in the direction of the sidewall (i.e., lateral direction). Bottom samples will be collected from a depth of zero to six inches at the base of the excavation.

Sidewall sample collection frequency will be based on linear feet of sidewall. A frequency of 1 sample for every 40 linear feet of sidewall is proposed. Bottom samples will be systematically collected at the grid nodes of an orthogonal grid with a grid spacing of 10 feet.

Additional excavation will be performed if a post-excavation verification sample fails the applicable performance standard(s). If a post-excavation bottom sample exceeds the respective performance standard for TCE, a minimum of six additional inches of soil will be removed from the (100 square foot) grid area represented by the failed sample, and a new sample will be collected. The corners of the area to be re-excavated will be taken as the midpoints between the sample exceeding the performance standard and the four adjacent samples. For every additional two-foot depth increment that the excavation is lowered, sidewall samples will be collected. If a post-excavation sidewall sample fails to meet the performance standard(s), the midpoints between the failed sample and the nearest passing sample will be marked, and the excavation will be expanded laterally for another 10 feet in the direction of the failed sample. Upon completion of the additional excavation, the new sidewall will be sampled at the frequency of one sample per 40 linear feet.

3.0 DESIGN COMPONENTS

3.1 PREMOBILIZATION ACTIVITIES

The design documents will be used to procure a qualified remediation contractor. Qualifications of the selected contractor will include experience in hazardous waste excavation and load out, decontamination procedures, and health and safety training in accordance with U.S. Department of Labor, Occupational Safety and Health Administration (OSHA) regulations under 29 Code of Federal Regulations (CFR) 1910.120.

Prior to mobilization of the remedial action contractor, CBS will identify and select disposal facilities for both hazardous and non-hazardous material. Soil samples will be collected and analyzed for waste characterization, as required by the candidate disposal facilities. Soil exceeding the performance standard for TCE will be classified for disposal purposes as a listed hazardous waste in accordance with 40 CFR Part 261, (waste code F001). Soil exceeding performance standards for the remaining constituents of interest will be disposed of as non-hazardous waste in accordance with applicable USEPA and state regulations, provided that such materials do not exhibit characteristics of a hazardous waste. Chemical Waste Management in Model City, New York is the likely candidate facility for hazardous waste disposal. High Acres landfill in East Rochester, New York is the likely candidate disposal facility for non-hazardous waste. Prior to any off-site shipment of more than 10 cubic yards of waste material from the site to an out-of-state facility, written notification will be provided to the appropriate state environmental official in the receiving facility's state and to the USEPA Project Coordinator.

The contractor will be required to prepare a health and safety/contingency plan (HSCP) prior to mobilization. The HSCP will be reviewed by CBS. The HSCP will include provisions for dust and organic vapor monitoring of the work zone to determine personal protective equipment requirements for on-site workers and perimeter air monitoring to protect public safety.

3.2 SITE SECURITY

RA activities associated with Disposal Area F will be conducted within the confines of the chain-link perimeter fence that encompasses the plant grounds. Access to the fenced area is controlled by plant security personnel. RA personnel will be assigned contractor security badges that will be displayed while on site. Signs will be posted at the perimeter of Disposal Area F identifying the area as part of the Kentucky Avenue Wellfield site where remedial construction activities are being performed. Signs will be installed prior to implementation of remedial construction activities. Cooperation of plant management is anticipated with regard to communicating security, access control, and general plant emergency and contingency procedures to affected personnel.

Disposal Area F is partially fenced with high-visibility construction fencing. The remaining unfenced boundary will be marked with caution tape during RA field activities to warn unauthorized personnel against entry. If the excavation expands beyond the existing fence boundaries, the fence will be removed and the caution tape extended, as needed. Removed chain-linked fence will be replaced following restoration.

3.3 SOIL EXCAVATION

While direct loading of excavated material is the preferred operating method, soil may be temporarily staged for subsequent load out depending on the availability and scheduling of long-haul trucks. Soil that is temporarily staged will be stockpiled within Disposal Area F on adjacent areas designated for excavation to help control migration of impacted soil. If staged soils are to be left for more than 24 hours where precipitation runoff could potentially cause migration of stockpiled soils, the stockpiles will be covered with plastic sheeting.

Trucks will be staged on plastic sheeting during loading. The plastic sheeting and trucks will be broom swept to remove any soil spilled during loading prior to truck departure.

3.4 AIR MONITORING

As part of the HSCP, a perimeter air monitoring program will be conducted, including dust monitoring and organic vapor monitoring. The

perimeter air monitoring plan will include contingencies (i.e., soil wetting) should airborne levels of particulates or volatile organic vapor concentrations exceed action levels.

3.5 CONSTRUCTION STAGING/SETUP AREA

A proposed construction staging/setup area has been designated on Drawing No. 2. The setup area will be used for temporary sanitation facilities, truck staging, and storage of any necessary construction-related materials (i.e., approved backfill, plastic sheeting, geotextile, fuel, etc.). If fuel is to be stored on site, a temporary secondary containment structure will be employed to contain potential leaks or spills.

3.6 EROSION AND SEDIMENTATION CONTROL

The topography of Disposal Area F is nearly level (see Drawing No. 2). The area disturbed by remediation activities will be lowered in elevation due to excavation, thereby containing precipitation and runon. Upon restoration of the disturbed area to original grades and elevations, the area will be seeded with a permanent grass seed mix and mulched. A silt fence detail has been provided on Drawing No. 4 as a contingency, should the potential for erosion and sedimentation be identified.

3.7 EXCAVATION DEWATERING

Precipitation falling in the open excavation may necessitate dewatering. Standing water in the excavation will be pumped into portable tanks and transported to the groundwater treatment system for Operable Unit 2 for treatment.

3.8 DECONTAMINATION

Equipment decontamination will be required following the excavation of impacted material and prior to handling and placement of soil backfill. The contractor will be required to provide temporary decontamination facilities for construction equipment decontamination. The structure will be placed in the area designated on Drawing No. 2, subject to field change by the remedial action contractor. A detail of the decontamination pad is shown on Drawing No. 4. Containerized decontamination liquids will be transported to the on-site groundwater treatment system for treatment and disposal.

3.9 BACKFILL CLASSIFICATION

Following the excavation of soil exceeding the performance standards, the excavation will be restored to approximate original elevations and grades with suitable backfill as shown on Drawing No. 4. Backfill to within six inches of final grade will consist of natural soils classified according to American Society for Testing of Materials (ASTM) D 2487 as any of the following: GW, GM, SM, SW, SP, GC, SC, ML, and CL. Unacceptable backfill materials include soils classified in ASTM D 2487 as MH, CH, OH, and OL; materials having a maximum particle size larger than eight inches; materials containing debris, roots, brush, sod, organic or frozen materials; and materials containing otherwise objectionable materials.

Material placed for the topmost six inches of backfill will be suitable topsoil, defined as selectively excavated natural, friable soil that is capable of producing crops, grass, or other vegetation. Topsoil will be reasonably free from underlying subsoil, clay lumps, objectionable weeds, litter, brush, or other material that may be harmful to plant growth or be a hindrance to grading, planting, or maintenance operations. Topsoil will not contain more than 5 percent by volume of particles larger than one inch in any dimension. Topsoil will contain between 2 and 20 percent organic matter as determined by loss on ignition in accordance with ASTM D 2974, and will have a pH of between 6 and 7.5. One sample for agronomic testing will be tested from each borrow source. If the pH or organic content are not within the acceptable limits, the remedial construction contractor will be required to add soil amendments to achieve the specified requirements.

The contractor will be required to sample proposed backfill material for laboratory analytical testing. One representative grab sample will be collected from each source of fill and analyzed for full Target Compound List/Target Analyte List (TCL/TAL) parameters. TCL/TAL results will be compared to recommended cleanup objectives presented in the New York State Department of Environmental Conservation *Technical and Administrative Guidance Memorandum on Determination of Soil Cleanup Objectives and Cleanup Levels*. Only soils that meet these standards will be acceptable as fill. One soil sample will be required for each source of off-site borrow. In this context, a "source" refers to a specific borrow pit stratum or location. Gravel or other granular materials with insufficient fine particles for laboratory analysis will not be sampled.

3.10 BACKFILL PLACEMENT AND COMPACTION

With the exception of topsoil, backfill will be placed in loose lifts not to exceed 18 inches in thickness and compacted. Backfill will be tracked in during placement, but not compacted to a specific criterion. Each lift of suitable fill will be compacted with a minimum of four passes of appropriate spreading equipment. Topsoil will be compacted with a minimum of one pass of appropriate spreading equipment.

3.11 SEEDING AND MULCHING

Following restoration of the excavation area to original elevations and grades, the topsoil seedbed will be prepared with the necessary soil amendments, and raked to loosen the surface and remove stones. The disturbed area will be fertilized, seeded, and mulched per the *New York Guidelines for Urban Erosion and Sediment Control, Standard and Specifications for Critical Area Seedings*, as follows:

SEED	RATE (POUNDS/1,000 SQUARE FEET)
Fertilizer 5-10-10, or equivalent	14
Empire birdsfoot trefoil or common white clover, and	 0.20
Tall fescue and	0.45
Redtop or Ryegrass	0.05 0.10
Mulch, small grain straw, secured with wood cellulose (hydroseed application) or mulch netting (manual application)	90

3.12 SURVEYING

A metes-and-bounds survey will be completed for Disposal Area F and the Former Drainage Basin Area as needed for deed notification.

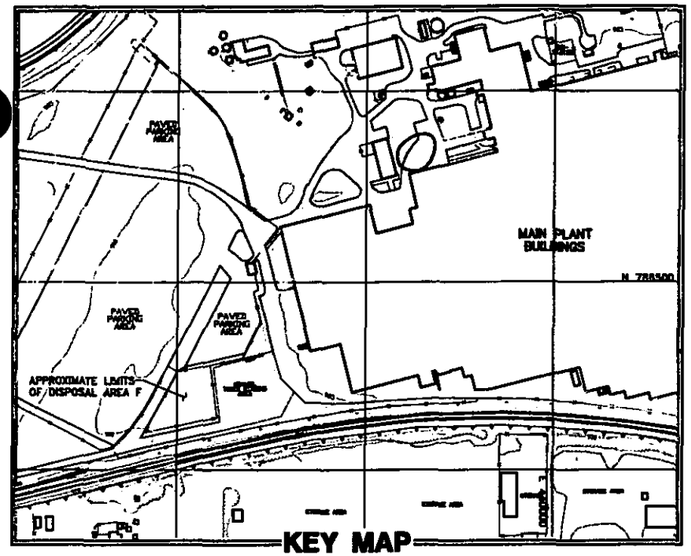
4.0 SCHEDULE

The schedule for RA implementation of Disposal Area F is as follows:

TASK/DELIVERABLE	PLANNED COMPLETION DATE
Final Design Report	May 2000
Contracting	June 2000
Field Construction	September 2000
Remedial Construction Report	October 2000

DRAWINGS

AUTOCAD FILE NUMBER 99245T1



KEY MAP
SCALE 1" = 300'

LIST OF DRAWINGS

SHEET NUMBER	DRAWING TITLE	AUTOCAD FILE NUMBER
1	TITLE SHEET	99245T1
2	SURFACE SOIL (0-2 FEET) EXCAVATION PLAN	98245B18
3	SUBSURFACE SOIL EXCAVATION PLAN	98245B22
4	CONSTRUCTION DETAILS (SHEET 1 OF 2)	98245B23
5	CONSTRUCTION DETAILS (SHEET 2 OF 2)	98245B25

PRE-FINAL DESIGN
DISPOSAL AREA F SOIL EXCAVATION

KENTUCKY AVENUE WELLFIELD SITE
OPERABLE UNIT #3
HORSEHEADS, NY

PREPARED FOR

CBS CORPORATION
PITTSBURGH, PENNSYLVANIA

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED

CUMMINGS RITER CONSULTANTS, INC.
CORPORATE HEADQUARTERS
330 Haymaker Road
Parkway Building, Suite 201
Monroeville, PA 15146
(412) 373-5240
Fax: (412) 373-5242

TITLE SHEET

KENTUCKY AVENUE WELLFIELD SITE - OU3
HORSEHEADS, NEW YORK

PREPARED FOR
CBS CORPORATION
PITTSBURGH, PENNSYLVANIA

AUTOCAD FILE NUMBER 98245T1

DRAWN BY:	T.N. Fitzroy	DATE: 1-20-99	DRAWING NUMBER
CHECKED BY:		DATE:	1
APPROVED BY:		DATE:	

PLOT SCALE: 1=1

DRAWING NUMBER 98245B21

SOIL AREA EXCAVATION COORDINATES		
POINT	NORTHING	EASTING
A	786116.06	428918.22
B	786269.65	429001.80
C	786285.52	429076.26
D	786285.93	429091.15
E	786271.60	429107.80
F	786221.25	429090.69
G	786209.91	429060.23
H	786164.02	429038.54
I	786135.14	429069.52
J	786118.59	429006.66
K	786099.56	428989.48
L	786092.34	428958.50
M	786106.26	428953.85
N	786215.60	429002.33
O	786237.91	429016.04
P	786250.15	429023.73
Q	786275.20	429053.00
R	786258.46	429092.46
S	786220.53	429056.41
T	786201.06	429036.27

LEGEND:

- EXISTING FENCE
- EDGE OF ASPHALT PAVEMENT
- EXISTING MONITORING WELL LOCATION
- CROSS-SECTION (DRAWING NO. WHERE SECTION LINE IS SHOWN / DRAWING NO. WHERE SECTION IS SHOWN)
- INITIAL EXCAVATION LIMITS OF SOIL EXCEEDING RAO FOR PAHs AND ARSENIC. EXCAVATION DEPTH IS TWO FEET.
- INITIAL EXCAVATION LIMITS OF SOIL EXCEEDING RAO FOR TCE. EXCAVATION DEPTH IS TWO FEET.
- AREA FOR TCE POST-EXCAVATION BOTTOM SAMPLE COLLECTION.

SCALE
0 40 80 FEET

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED

CUMMINGS RITER CONSULTANTS, INC.
CORPORATE HEADQUARTERS
339 Haymaker Road
Parkway Building, Suite 201
Monroeville, PA 15146
(412) 373-6240
Fax: (412) 373-5242

SURFACE SOIL (0-2 FEET) EXCAVATION PLAN

KENTUCKY AVENUE WELLFIELD SITE - OU3
HORSEHEADS, NEW YORK

PREPARED FOR
CBS CORPORATION
PITTSBURGH, PENNSYLVANIA

AUTOCAD FILE NUMBER 98245B21

DRAWN BY:	T.E. McKee	DATE: 8-31-99	DRAWING NUMBER 2
CHECKED BY:		DATE:	
APPROVED BY:		DATE:	

PLOT SCALE: 1=1'

98245b21.dwg 1-26-00 1:24:30 pm EST

DRAWING NUMBER 98245B22

PLOT SCALE: 1=1

E 428800 E 429000 E 429200

N 786200 N 786000

910.3 911.8 909.3 910.0 909.8 909.5 909.7 909.8 909.5 908.8

PAVED PARKING AREA

PAVED PARKING AREA

910

MW-14D
N 786,099.10
E 428,889.70
GROUND ELEV.: 909.68
TOP OF CASING: 912.51

MW-14S
N 786,081.44
E 428,885.82
GROUND ELEV.: 910.97
TOP OF CASING: 913.48

MW-14R
N 786,087.84
E 428,904.57
GROUND ELEV.: 910.73
TOP OF CASING: 913.14

U V W X Y Z

APPROXIMATE DECONTAMINATION AREA

CONSTRUCTION STAGING/SETUP AREA

PAVED ROADWAY

APPROXIMATE PROPERTY LINE

RAILROAD TRACKS

RETAINING WALL

910 915

SOIL AREA EXCAVATION COORDINATES		
POINT	NORTHING	EASTING
U	786236.04	429024.89
V	786249.17	429025.68
W	786273.32	429054.86
X	786278.83	429087.72
Y	786259.14	429090.35
Z	786222.92	429055.91

LEGEND:

- EXISTING FENCE
- EDGE OF ASPHALT PAVEMENT
- EXISTING MONITORING WELL LOCATION
- CROSS-SECTION (3/4): DRAWING NO. WHERE SECTION LINE IS SHOWN; DRAWING NO. WHERE SECTION IS SHOWN
- INITIAL EXCAVATION LIMITS OF SOIL EXCEEDING RAO FOR TCE.
- AREA FOR TCE POST-EXCAVATION BOTTOM SAMPLE COLLECTION.

SCALE
0 40 80 FEET

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED

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CORPORATE HEADQUARTERS
339 Haymaker Road
Parkway Building, Suite 201
Monroeville, PA 15146
(412) 373-6240
Fax: (412) 373-6242

SUBSURFACE SOIL EXCAVATION PLAN

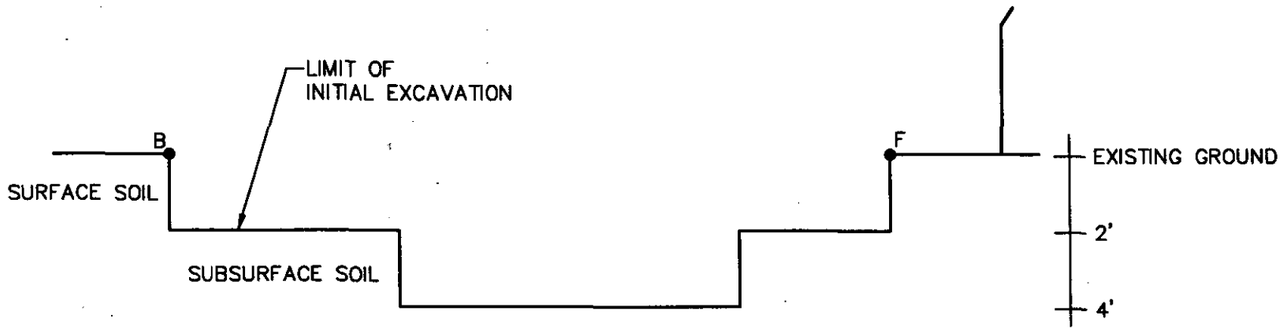
KENTUCKY AVENUE WELLFIELD SITE - OU3
HORSEHEADS, NEW YORK

PREPARED FOR
CBS CORPORATION
PITTSBURGH, PENNSYLVANIA

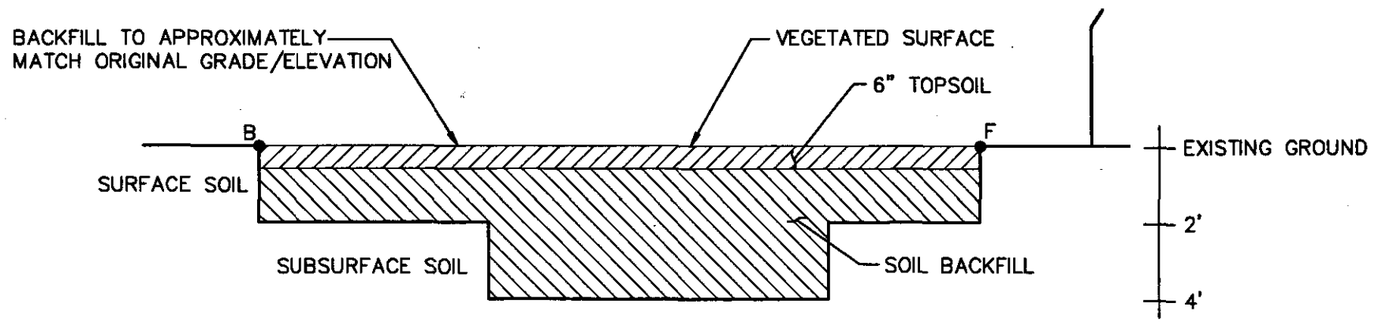
AUTOCAD FILE NUMBER 98245B22

DRAWN BY:	T.N. Fitzroy	DATE: 1-25-00	DRAWING NUMBER
CHECKED BY:		DATE:	3
APPROVED BY:		DATE:	

DRAWING NUMBER 98245B23



TYPICAL EXCAVATION CROSS SECTION 1 OF 2



TYPICAL EXCAVATION CROSS SECTION 2 OF 2

NOTES:

1. THE FINAL LIMITS OF EXCAVATION FOR IMPACTED SOIL SHALL BE DETERMINED BASED ON POST-EXCAVATION SAMPLE RESULTS.

2. BACKFILL SHALL CONSIST OF NATURAL SOILS CLASSIFIED ACCORDING TO ASTM D 2487 AS ANY OF THE FOLLOWING: GW, GM, SM, SW, SP, GC, SC, ML, AND CL. UNACCEPTABLE BACKFILL MATERIALS INCLUDE SOILS CLASSIFIED BY ASTM D 2487 AS MH, CH, OH, AND OL; MATERIALS HAVING A MAXIMUM PARTICLE SIZE LARGER THAN 8 INCHES; MATERIALS CONTAINING DEBRIS, ROOTS, BRUSH, SOD, ORGANIC OR FROZEN MATERIALS; AND MATERIALS CONTAINING OTHERWISE OBJECTIONABLE MATERIALS. BACKFILL SHALL BE PLACED IN LOOSE LIFTS NOT TO EXCEED 18 INCHES IN THICKNESS AND COMPACTED. EACH LIFT SHALL BE COMPACTED AT A MOISTURE CONTENT WITHIN 5 PERCENT OF OPTIMUM MOISTURE AS DEFINED BY ASTM D 698. SUITABLE BACKFILL SHALL BE COMPACTED BY TRACKING IN PLACE A MINIMUM OF 4 PASSES BY USING EARTHMOVING EQUIPMENT.

3. TOPSOIL SHALL BE SELECTIVELY EXCAVATED NATURAL, FRIABLE SOIL THAT IS CAPABLE OF PRODUCING CROPS, GRASS, OR OTHER VEGETATION. TOPSOIL SHALL BE REASONABLY FREE FROM UNDERLYING SUBSOIL, CLAY LUMPS, OBJECTIONABLE WEEDS, LITTER, BRUSH, OR OTHER MATERIAL THAT MAY BE HARMFUL TO PLANT GROWTH OR BE A HINDRANCE TO GRADING, PLANTING, OR MAINTENANCE OPERATIONS. TOPSOIL SHALL HAVE A MAXIMUM PARTICLE SIZE OF 1.5 INCHES AND A MINIMUM OF 95% PASSING THE ONE INCH SIEVE AS DETERMINED BY ASTM D 422. TOPSOIL SHALL CONTAIN BETWEEN 2 AND 20 PERCENT ORGANIC MATTER AS DETERMINED BY ASTM D 2974, AND SHALL HAVE A PH OF BETWEEN 6 AND 7.5. IF THE PH OR ORGANIC CONTENT IS NOT WITHIN THE ACCEPTABLE LIMITS, THE REMEDIAL CONSTRUCTION CONTRACTOR SHALL BE REQUIRED TO ADD SOIL AMENDMENTS TO ACHIEVE THE SPECIFIED REQUIREMENTS.

4. THE CONTRACTOR SHALL SAMPLE PROPOSED BACKFILL AND TOPSOIL MATERIAL FOR LABORATORY ANALYTICAL TESTING AND ANALYZE FOR FULL TARGET COMPOUND LIST/TARGET ANALYTE LIST (TCL/TAL) PARAMETERS. TCL/TAL RESULTS WILL BE COMPARED TO RECOMMENDED CLEANUP OBJECTIVES PRESENTED IN THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC) TECHNICAL AND ADMINISTRATIVE GUIDANCE MEMORANDUM (TAGM) ON DETERMINATION OF SOIL CLEANUP OBJECTIVES AND CLEANUP LEVELS. ONLY SOILS THAT MEET NYSDEC TAGM STANDARDS SHALL BE ACCEPTABLE FOR USE.

5. FOLLOWING RESTORATION OF THE EXCAVATION AREA TO ORIGINAL ELEVATIONS AND GRADES, THE TOPSOIL SEEDBED WILL BE PREPARED WITH THE NECESSARY SOIL AMENDMENTS, AND RAKED TO LOOSEN THE SURFACE AND REMOVE STONES. THE DISTURBED AREA WILL BE FERTILIZED, SEEDED, AND MULCHED PER THE NEW YORK GUIDELINES FOR URBAN EROSION AND SEDIMENT CONTROL, STANDARD AND SPECIFICATIONS FOR CRITICAL AREA SEEDINGS, AS FOLLOWS:

SEED	RATE (LBS./1,000 SQUARE FEET)
FERTILIZER 5-10-10, OR EQUIVALENT	14
EMPIRE BIRDSFOOT TREFOIL OR COMMON WHITE CLOVER, AND	0.20
TALL FESCUE AND	0.45
REDTOP OR RYEGRASS	0.05 0.10
MULCH, SMALL GRAIN STRAW, SECURED WITH WOOD CELLULOSE (HYDROSEED APPLICATION) OR MULCH NETTING (MANUAL APPLICATION)	90

6. DEPTHS OF EXCAVATION AND AS-BUILT ELEVATIONS SHALL BE ACCEPTABLE IF SURVEYED LOCATIONS AND ELEVATIONS ARE WITHIN 0.1 FOOT.

HORIZONTAL SCALE
0 20 40 FEET

VERTICAL SCALE
0 4 8 FEET

PLOT SCALE: 1=1

REVISIONS

REV.	DESCRIPTION	DATE	APPROVED

CUMMINGS RITER CONSULTANTS, INC.
CORPORATE HEADQUARTERS
339 Haymaker Road
Parkway Building, Suite 201
Monroeville, PA 15146
(412) 373-5240
Fax: (412) 373-5242

CONSTRUCTION DETAILS SHEET 1 OF 2

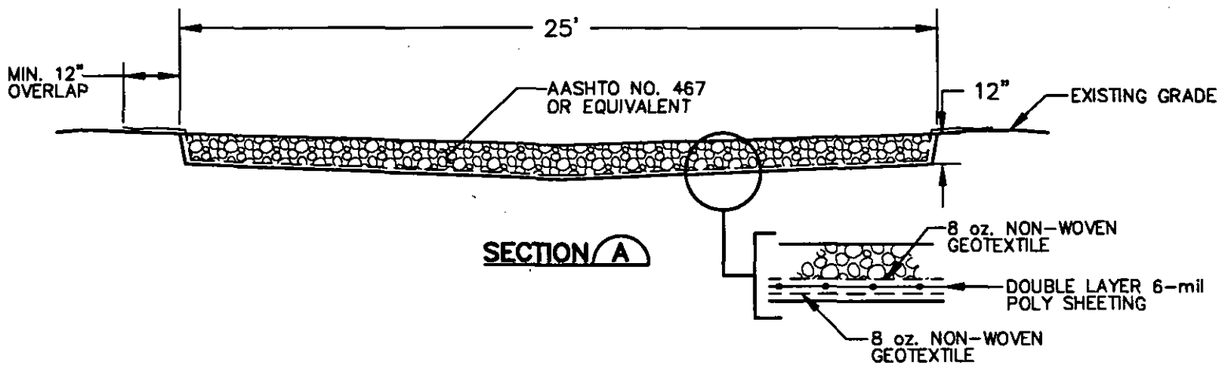
KENTUCKY AVENUE WELLFIELD SITE - OU3
HORSEHEADS, NEW YORK

PREPARED FOR
CBS CORPORATION
PITTSBURGH, PENNSYLVANIA

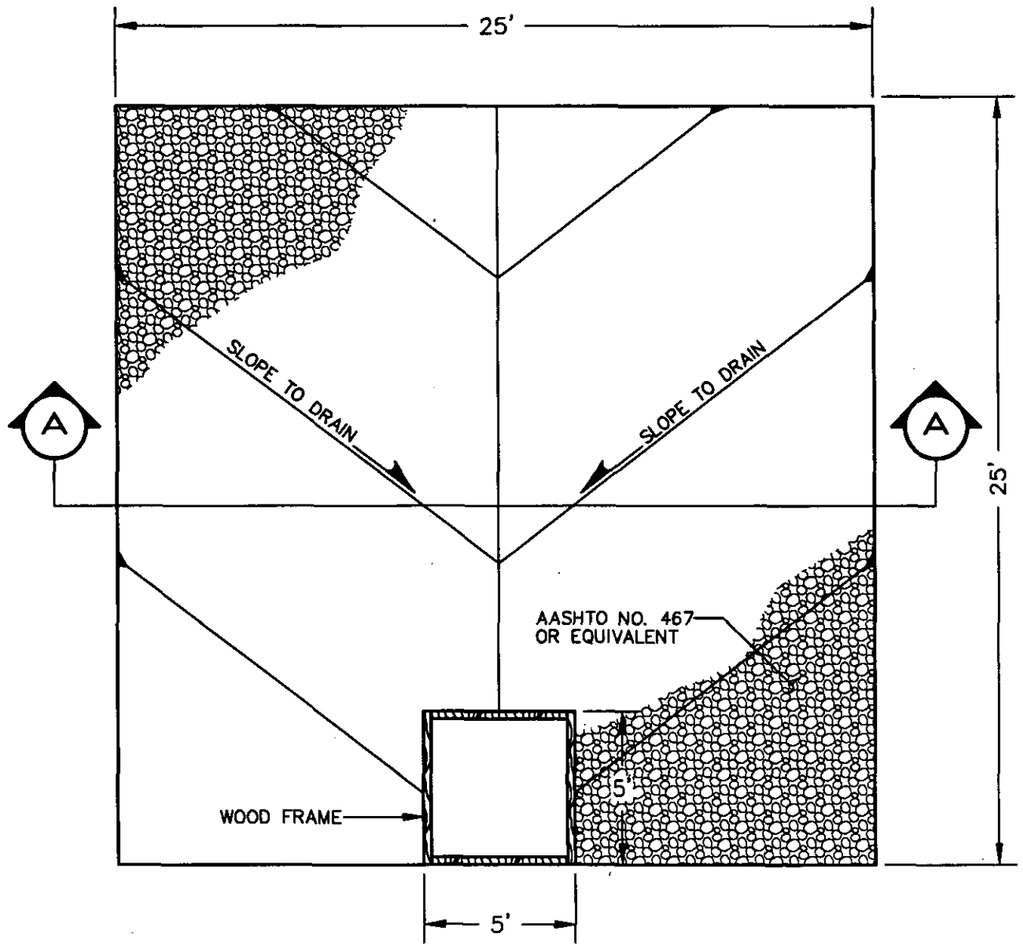
AUTOCAD FILE NUMBER 98245B23

DRAWN BY:	T.N. Fitzroy	DATE: 1-25-00	DRAWING NUMBER
CHECKED BY:		DATE:	4
APPROVED BY:		DATE:	

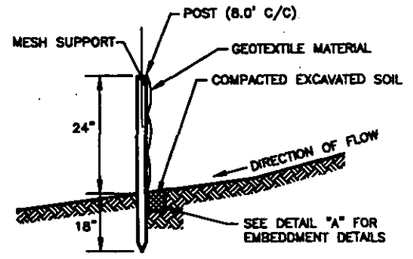
DRAWING NUMBER 98245B24



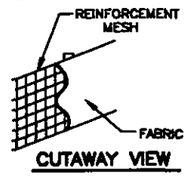
SECTION A



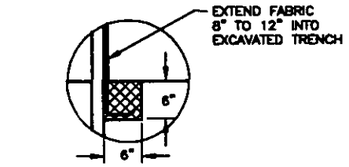
DECONTAMINATION PAD
PLAN VIEW
(NTS)



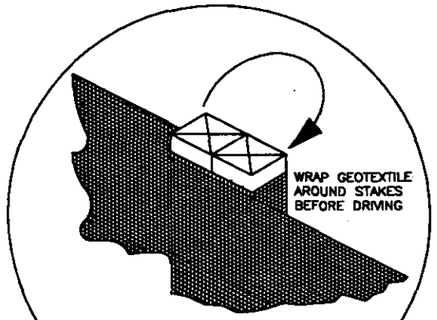
ELEVATION



CUTAWAY VIEW



DETAIL A
ANCHORING SILT FENCE



DETAIL B
JOINING SECTIONS OF SILT FENCE

DETAIL 2
SILT FENCE
(NTS)

SPECIFIC NOTES:

1. POST SHALL BE 2" X 2" WOOD STAKES PLACED A MAXIMUM OF 8.0' CENTER TO CENTER.
2. GEOTEXTILE MATERIAL SHALL BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES.
3. WHEN TWO SECTIONS OF GEOTEXTILE MATERIAL ADJOIN EACH OTHER, THE GEOTEXTILE SHALL BE WRAPPED AROUND THE TWO STAKES AND THE STAKES SHALL BE DRIVEN INTO THE GROUND AS ONE UNIT.
4. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.
5. INSPECTION SHALL BE FREQUENT AND REPAIR OR REPLACEMENT SHALL BE MADE WHEN ACCUMULATIONS REACH 1/2 THE ABOVE GROUND HEIGHT OF SILT FENCING, OR AS REQUIRED BY THE CONSTRUCTION MANAGER.
6. MESH SHALL BE INDUSTRIAL POLYPROPYLENE OR STEEL MESH WITH MAXIMUM 6" OPENING=1" MINIMUM 14 GAUGE.
7. SILT FENCING SHALL BE INSTALLED PARALLEL TO EXISTING CONTOURS OR CONSTRUCTED LEVEL ALIGNMENTS. ENDS OF FENCING MUST BE EXTENDED 8.0 FEET, TRAVELING UPSLOPE AT 45 DEGREES TO THE ALIGNMENT OF THE MAIN FENCING SECTION.

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED

CUMMINGS RITER CONSULTANTS, INC.
CORPORATE HEADQUARTERS
339 Haymaker Road
Parkway Building, Suite 201
Monroeville, PA 15146
(412) 373-5240
Fax: (412) 373-5242

CONSTRUCTION DETAILS
SHEET 2 OF 2

KENTUCKY AVENUE WELLFIELD SITE - OU3
HORSEHEADS, NEW YORK

PREPARED FOR
CBS CORPORATION
PITTSBURGH, PENNSYLVANIA

AUTOCAD FILE NUMBER 98245B24

DRAWN BY:	T.E. McKee	DATE: 1-25-00	DRAWING NUMBER
CHECKED BY:		DATE:	5
APPROVED BY:		DATE:	

PLOT SCALE: 1=1

IT Corporation
Kennedy Business Park 2
431-F Hayden Station Road
Windsor, CT 06095-1313
Tel. 860.688.1151
Fax. 860.688.8239
A Member of The IT Group

PRE-FINAL DESIGN FOR PROPOSED AIR SPARGE AND SOIL VAPOR EXTRACTION SYSTEM

FORMER RUNOFF BASIN
KENTUCKY AVENUE WELLFIELD SITE
OPERABLE UNIT NO. 3
HORSEHEADS, NEW YORK

January 26, 2000

Prepared for:

CBS Corporation
373 Westinghouse Building
11 Stanwix Street
Pittsburgh, Pennsylvania 15222-1384

IT Corporation
Written/Submitted by:

Sean W. Lorden

Sean W. Lorden
Staff Engineer

IT Corporation
Reviewed/Approved by:

Anne E. Proctor

Anne E. Proctor, PE
Project Engineer

IT Corporation
Reviewed/Approved by:

Jonathan D. Ann /For

Nicholas A. Hastings, RPG, LEP
Senior Hydrogeologist

CONTENTS

DRAWINGS

APPENDICES

1.0 INTRODUCTION

IT Corporation (IT) was retained by CBS Corporation (CBS) to design an air sparge (AS) and soil vapor extraction (SVE) system for the Former Runoff Basin area at the former Westinghouse Electric Corporation plant site in Horseheads, New York (**Drawing Y1**). This report has been prepared to meet requirements of the Remedial Design (RD) Work Plan, prepared on behalf of CBS by Cummings Riter Consultants, Inc. (February 1999), for a Pre-Final Design Report. This work is part of the remedial design and remedial action for the Kentucky Avenue Wellfield Site, Operable Unit No. 3.

As specified in the RD Work Plan, the Pre-Final Design Report includes specifications, plans, and drawings to be used for remedial action implementation. This report presents the calculations and assumptions on which the design is based (**Section 2.0**), the proposed design (**Section 3.0**), permitting plan (**Section 4.0**), and the remedial construction schedule (**Section 5.0**).

2.0 BASIS OF DESIGN

The design of the proposed AS/SVE system is based on the results discussed in the "Air Sparging and Soil Vapor Extraction Pilot Test Report" (IT, August 1999). That report summarized the results of pilot tests conducted in the area shown in **Drawing Y1** by IT in June 1999 and by Philip Environmental Services Corporation in 1995. Calculations and conclusions from the report are presented in **Section 2.1**. Additional design calculations are discussed in **Section 2.2**.

2.1 Summary of Pilot Test Conclusions

- Based on pilot test results, it appears that an effective remedial strategy can be created for the Former Runoff Basin using the remedial technology of AS/SVE. Some data suggest the presence of anisotropic flow and layering of soils. The remediation system will be designed with flexibility and attention to such potential heterogeneity.

- A desired removal efficiency of 99% was selected for reduction of adsorbed and dissolved trichloroethene (TCE). This removal efficiency should be sufficient to reduce historically measured TCE concentrations in soil from a high of 79,000 micrograms per kilogram (µg/kg) reported for a soil sample collected from boring FRB-158 (Philip Environmental, February 1996) to below the remedial standard of 800 µg/kg, which is protective of groundwater.

- SVE appears capable of reducing adsorbed TCE concentrations by 99% with an effective interwell radius of influence of up to 50 feet and within a period of one year. These estimates are based on a proposed air flow rate of 172 standard cubic feet per minute (scfm) per well at a wellhead vacuum of approximately 15 inches of water column (in. w.c.). Modeling of the proposed SVE system by IT using Vent-ROI® suggests that the effective radius for a site SVE well is relatively robust with respect to such design parameters as wellhead vacuum and depth to water.

- Air sparging demonstrated a potential capacity to remove TCE from groundwater at the site within a radius of approximately 15 to 40 feet. Based on experience with similar systems and the possibility of anisotropic flow, IT recommends a sparge radius of influence of 15 feet.

- Parameters measured at each monitoring point during pilot testing appeared to be influenced immediately by sparging, even at the lowest flow rate. Therefore, a low flow rate per well (2 scfm) will be used for full-scale system design at a pressure of at least 5.5 pounds per square inch gauge (psig).

- Based on the measured vapor-phase TCE concentration of 3,700 micrograms per cubic meter ($\mu g/m^3$) measured by IT during SVE pilot testing, the initial mass recovery rate, M, per SVE well was calculated as follows:

  $M = 172 ft^3/min \times 3{,}700 \mu g/m^3 \times m^3/35.3147 ft^3 \times kg/10^9 \mu g \times 2.2046 lb/kg \times 1440 min/day =$ **0.06 lb TCE/day**.

- Based on the maximum measured vapor-phase TCE concentration during SVE/AS pilot testing by IT (7,000 $\mu g/m^3$), the initial mass recovery rate, M, per pair of SVE and AS wells was calculated as follows:

  $M = 172 ft^3/min \times 7{,}000 \mu g/m^3 \times m^3/35.3147 ft^3 \times kg/10^9 \mu g \times 2.2046 lb/kg \times 1440 min/day =$ **0.11 lb TCE/day**.

- Assuming that the increase in vapor-phase TCE from 3,700 to 7,000 ug/m^3 resulted from the activation of air sparging, the contribution to the total initial mass removal rate from the air sparge well is the difference between 0.11 and 0.06 lb TCE/day, or **0.05 lb TCE/day**.

The full-scale system as shown in **Drawing Y2** includes three SVE wells (i.e., SVE-1, SVE-2, and SVE-3). The proposed operating plan calls for two of these wells, typically SVE-2 and SVE-3, to be active at one time, with the third well, typically SVE-1, to remain off-line. Once the mass recovery rate has decreased significantly with SVE-2 and SVE-3 in service, one of these two wells will be taken off-line, and SVE-1 will be operated. Various combinations of these three SVE wells will be employed until all combinations yield uniformly low mass removal rates.

Based on the calculations shown above, and on the proposed operating plan, the full-scale system would be expected to recover TCE at an initial rate of approximately **0.72 lb/day** (0.06 lb/day x 2 SVE wells plus 0.05 lb/day x 12 AS wells). This estimate assumes uniform adsorbed and dissolved TCE concentrations equal to those encountered in the vicinity of the pilot test wells and distributed throughout the area to be remediated. The actual initial recovery rates will be verified upon full-scale system start up. These rates typically decrease under dynamic conditions following system activation.

2.2 Additional Basis of Design Calculations

The following additional calculations were completed as part of the development of this Pre-Final Design Report:

- Revised SVE effective radius of influence modeling,
- SVE to AS flow ratios,
- Preliminary emissions compliance calculations,
- Carbon consumption rate, and
- Full-scale system headloss calculations.

IT re-evaluated the SVE effective radius of influence using Vent-ROI® for the planned SVE well construction. Specifically, trenching requirements dictated a depth to top of screen of 3.5 feet below grade, rather than 2.5 feet as originally modeled in the pilot test report. As indicated in the revised Vent-ROI® modeling results (**Appendix A**), changing the depth to top of screen did not change the design radius from 50 feet.

The two SVE wells, each operating at 172 scfm, will provide a total air extraction rate of 344 scfm. The 12 AS wells will inject air into the subsurface at a rate of 2 scfm per point, for a total air injection rate of 24 scfm. Accordingly, the ratio of air withdrawn to air injected is 14.3. The SVE wells are placed and designed to effectively control and collect the air injected through the sparge points.

Emissions compliance calculations were completed for the proposed full-scale SVE system to determine whether offgas treatment would be required to maintain emissions below the New York State Department of Environmental Conservation (NYSDEC) Annual Guideline Concentration (AGC) or Short-term Guideline Concentration (SGC) for TCE. Preliminary calculations were conducted using a spreadsheet developed by IT (**Appendix B**), which is a simplified version of the NYSDEC compliance modeling software. As indicated in the calculations, an effluent loading rate of 0.72 lb TCE/day (263 lb TCE/year) from a stack 20 feet above grade would result in an Actual Annual Impact Concentration of 2.18 ug/m^3, which exceeds the AGC of 0.45 ug/m^3. However, the SGC would not be exceeded. Using the very conservative assumptions presented in this calculation (e.g., initial mass removal rate maintained throughout one year), offgas treatment would be necessary to assure that the AGC for TCE is not exceeded. Granular activated carbon (GAC) was selected for vapor treatment.

The required size for the GAC units was determined by estimating a carbon usage rate. It was assumed that the loading rate would be constant at 0.72 lb TCE/day, and that the adsorptive capacity of the carbon would be approximately 5% by mass. Therefore the carbon usage rate was determined to be 14.4 lb GAC/day. Assuming that the shortest allowable time between GAC changeouts would be 90 days, a total of 1,296 pounds of GAC would be required. To be conservative, this estimate was rounded up to 1,600 pounds. Per standard engineering practice, two GAC units in series were specified, in this case each containing 800 pounds of carbon. Larger, standard sizes of GAC units may be considered depending on pricing and availability.

Headloss calculations for the full-scale system were estimated based on the proposed trenching and remediation compound layouts (**Drawings Y3 and Y4**). SVE flow rates were assumed to be 172 scfm in individual SVE leg piping and 344 scfm in the SVE manifold and discharge piping, assuming two SVE wells operating fully open. The maximum estimated vacuum headloss between an SVE wellhead and the SVE blower system inlet, not including appurtenances such as a filter or a moisture trap, was estimated at approximately 5 in. w.c. Pressure headloss between the blower outlet and the discharge stack was estimated as approximately 26 in. w.c., including the headloss contributions of each proposed GAC unit. The air sparge flow rate was assumed to be 2 scfm per sparge well. At this flow rate, pressure headloss between the sparge compressor and the sparge wellhead was determined to be negligible.

3.0 SYSTEM INSTALLATION

3.1 General Process Description

The remedial system layout shown in **Drawing Y2** is designed to provide coverage of the identified impacted soil areas within the Former Runoff Basin. This layout provides aggressive treatment in the area of boring FRB-158, where the maximum TCE levels were detected in soils.

The SVE portion of the proposed remedial system will require the installation of two SVE wells, SVE-2 and SVE-3, located as shown in **Drawing Y2**. The spacing between these two wells was selected to maximize recovery of TCE vapor from soil and sparged vapors while minimizing competition for air between the wells. Existing well SVE-1 will also be connected to the SVE system to be operated in place of SVE-2 if a closer spacing between the operating SVE points is desired to maximize TCE removal and to provide operational flexibility. The two new SVE wells will be installed as shown in **Drawing Y5**. Care will be taken to insure that a sufficient amount of screen lies above the water table.

The air sparge portion of the system will require installation of eleven new sparge wells. One of the existing sparge wells, AS-1D, will also be incorporated into the system. This sparge point was selected over the shallower sparge point, AS-1S, because a deeper sparge point would affect a thicker portion of the saturated zone. The locations of the new air sparge points were selected to remediate known areas of impacted groundwater and to inhibit further migration of contaminants beyond these areas. In their "Report of Soil Vapor Extraction Pilot Studies" (1995), Philip Environmental suggested incorporating remedial coverage in the vicinity of soil boring FRB-163, approximately 20 feet southwest of TMP-2S/D. Because a maximum concentration of 150 ug/kg TCE was detected in shallow (2-foot) soil samples from this boring (compared with a remedial standard of 800 ug/kg), SVE will be effective in addressing the TCE, and expansion of the AS system in this area is unnecessary.

New sparge wells will be installed as shown in **Drawing Y5**. Care will be taken not to install the sparge points below a confining layer by conducting continuous split-spoon sampling during drilling.

The sparge and SVE wells will be connected via individual subgrade conveyance piping to the remediation compound. The subgrade conveyance piping will be installed and connected to the remediation compound as shown in **Drawings Y3, Y4,** and **Y5**. Trenching will be constructed as shown in **Drawing Y5**. The planned remediation compound will consist of a wooden enclosure containing the remediation equipment and the controls required for operation, monitoring and adjustment of the system (**Drawings Y4** and **Y6**). The equipment compound will be located approximately as shown in **Drawing Y3** unless a more suitable location is determined and approved by the site owner and operator. The air sparge and SVE wells will be manifolded separately inside the shed and connected to a compressor and a blower, respectively. Typically, blowers and compressors are ordered skid-mounted complete with appurtenances.

To prevent potential migration of sparged vapors, the AS compressor will be interlocked with the SVE blower such that the compressor will shut down in the event of blower failure or low flow, as indicated in the general process schematic (**Drawing P2**). The air sparge compressor and SVE blower will also shut

down should the water level in the moisture separator reach a high-level alarm. In either case, IT will be notified by means of a programmable logic controller (PLC) equipped with a modem.

Additionally, the PLC will include a timer to operate the AS compressor intermittently to minimize channeling that can occur from the compressed air opening and maintaining paths in saturated soil. When the AS system is off, the channels collapse and when the AS system turns back on, new channels open achieving greater remedial efficiency.

An updated equipment list is attached as **Appendix C** of this report. A System Operations Plan providing guidance for system activation and monitoring is attached as Section 7 of the Pre-Final Remedial Design Report for the site.

3.2 Hazardous Area Classification

Because TCE is not combustible or flammable, the installation will be electrically unclassified.

3.3 Residual Waste Management Plan

Wastes will be generated during the installation, operation, and maintenance of the proposed AS/SVE system. Waste streams identified for the remedial action include used personal protection equipment (PPE), spent GAC, decontamination liquids, well sampling purge water, and water from the moisture separator. Wastes will be classified and managed in accordance with NYSDEC waste regulations, including 6 NYCRR Parts 360 and 370-376. Any solid waste determined to be hazardous will be transported in accordance with U.S. Department of Transportation (DOT) 49 CFR 172 regulations. Separate 55-gallon drums will be provided at the site to properly containerize the PPE and liquids. Spent GAC will be removed from the site by a licensed RCRA hazardous waste vendor and regenerated or disposed in accordance with applicable local, state, and federal regulations. Liquid wastes will be transported to the on-site groundwater treatment plant for treatment and discharge.

4.0 PERMITTING PLAN

As indicated in the pilot test and preliminary design report by IT (August 1999), the following permits or approvals may be required for remediation system installation:

- Town Building Permit,
- Town Zoning Board Approval,
- Town Electrical Permit, and
- Plumbing Permit (if required by town).

All of these are standard contractor permits. Specific requirements for these permits will be addressed in the Remedial Action Work Plan.

- Town Building Permit,
- Town Zoning Board Approval,
- Town Electrical Permit, and
- Plumbing Permit (if required by town).

All of these are standard contractor permits. Specific requirements for these permits will be addressed in the Remedial Action Work Plan.

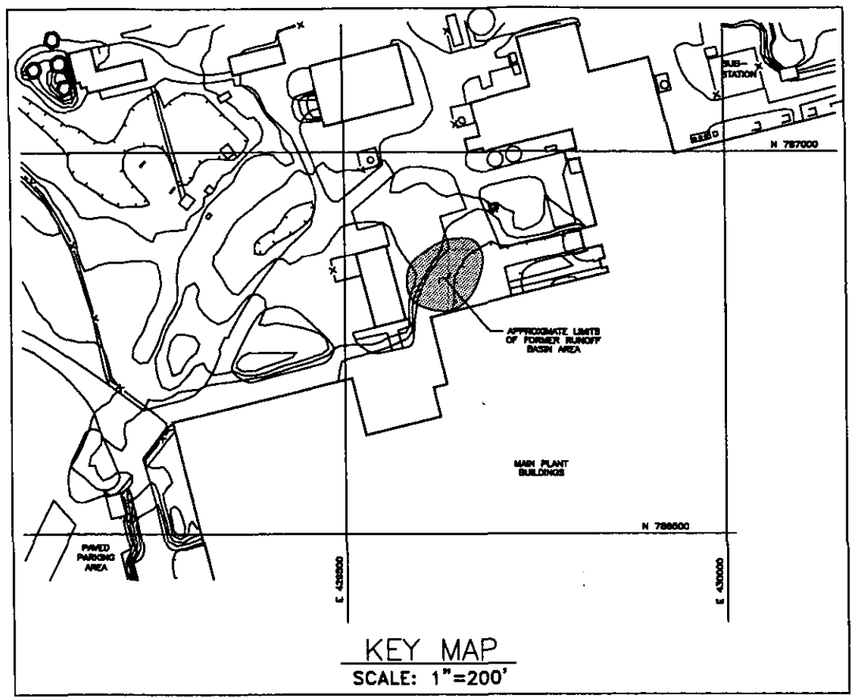
On the basis of 6 NYCRR Part 201-3.3, air discharge permitting for the AS/SVE system is not required in New York State. According to Part 201-3.3, air strippers and soil vents required under the provisions of an Order of Consent or Stipulation Agreement, or in operation at a Superfund Site, are categorized as "trivial activities" and do not need to be included in a Title V facility permit application. However, Part 201-3.3 specifies that the owner or operator of an emission source listed as trivial may be required to certify that the source operates within specific emission criteria. For this reason, offgas treatment has been specified. In addition, system performance data will be recorded as outlined in the System Operations Plan. Records will be maintained in accordance with regulatory requirements and made available to USEPA and NYSDEC representatives upon request. No specific local air discharge permitting requirements have been identified for Chemung County.

5.0 SCHEDULE

The following schedule is proposed for the major remaining tasks to be completed by IT associated with the AS/SVE system in the former runoff basin. Additional items such as system inspections will be scheduled with USEPA as appropriate.

Tasks/Deliverables	Planned Completion Dates
Final Design Report	May 2000
Procurement	June 2000
AS/SVE System Installation	September 2000
Initial Testing Program	October 2000
Remedial Construction Report	November 2000

DRAWINGS



KEY MAP
SCALE: 1"=200'

INDEX OF DRAWINGS

IT DRAWING NUMBER	SHEET REFERENCE NUMBER	DESCRIPTION
B0666CVR	CVR	TITLE SHEET
B0666E1	E1	SINGLE-LINE ELECTRICAL DIAGRAM
B0666P1	P1	PROPOSED PIPING & INSTRUMENTATION DIAGRAM LEGEND
B0666P2-A	P2	PROPOSED PIPING & INSTRUMENTATION DIAGRAM
B0666Y1-A	Y1	PILOT TEST LAYOUT MAP
B0666Y2-A	Y2	PROPOSED REMEDIATION SYSTEM LAYOUT - RADIUS OF INFLUENCE
B0666Y3-A	Y3	PROPOSED REMEDIATION SYSTEM TRENCHING LAYOUT
B0666Y4-A	Y4	PROPOSED REMEDIATION COMPOUND LAYOUT
B0666Y5-A	Y5	CONSTRUCTION DETAILS
B0666Y6	Y6	PROPOSED REMEDIATION SYSTEM SHED DETAILS

PRE-FINAL DESIGN FOR PROPOSED AIR SPARGE AND SOIL VAPOR EXTRACTION SYSTEM FOR FORMER RUNOFF BASIN

FORMER WESTINGHOUSE FACILITY OPERABLE UNIT #3 HORSEHEADS, NY

PREPARED FOR

CBS CORPORATION PITTSBURGH, PA

Revisions			
Symbol	Descriptions	Date	Approved

IT CORPORATION

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FORMER WESTINGHOUSE FACILITY
OPERABLE UNIT #3
HORSEHEADS, NY

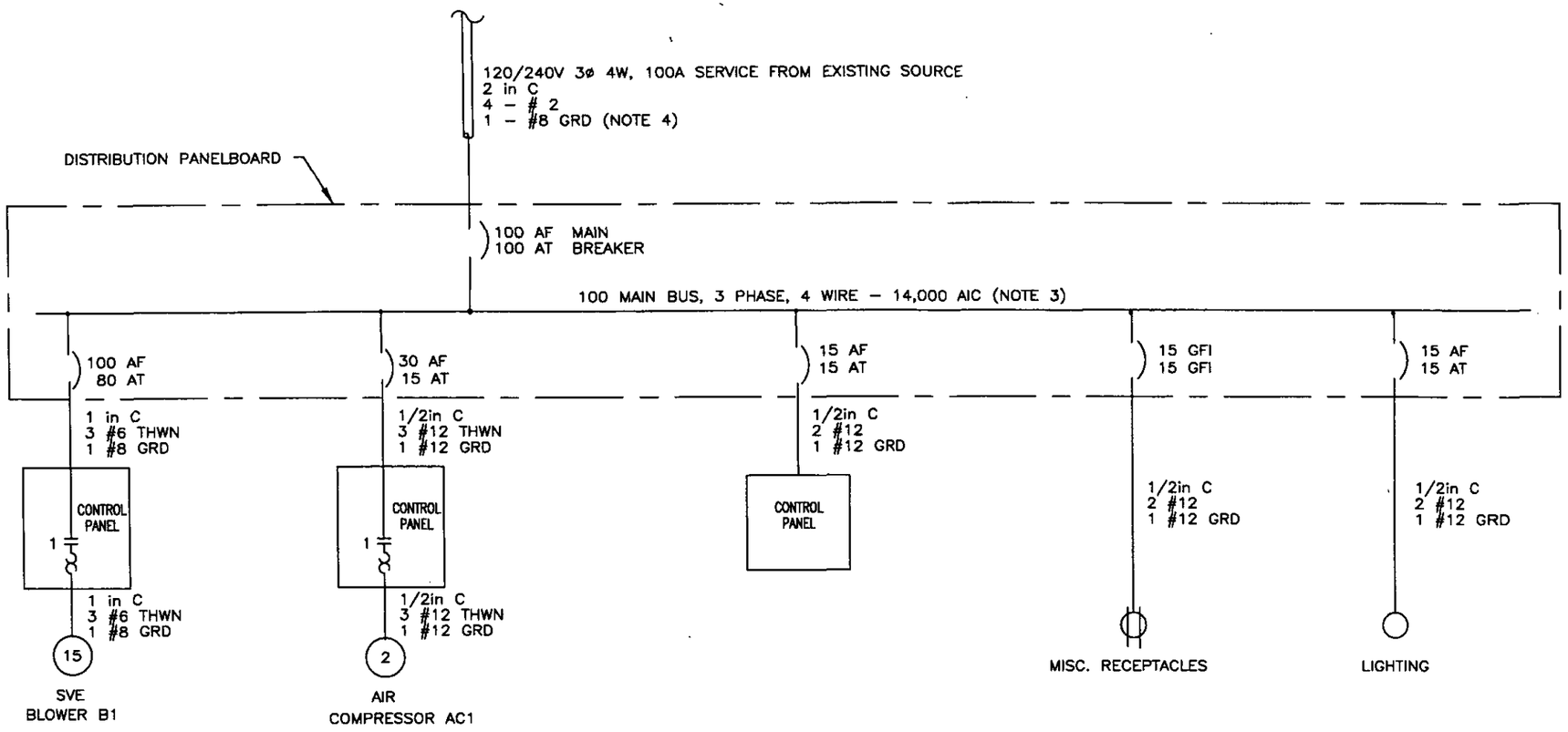
Designed by: SWL	TITLE SHEET		
Drawn by: LJA			
Checked by: AEP			
Reviewed by:	Scale: AS SHOWN	Sheet reference number:	Spec No.
Approved by:	Date: 1/4/00		Contract No.
	Drawing Number 0666CVR	CVR	Cover Sheet

DRAWING NUMBER B0666CVR | OFFICE WIN | X-REF --- | IMAGE ---

VERIFY SCALE 0 1"

DATE: 1/4/00
TIME: 10:12 AM
FORMAT REVISION 2/28/99

DRAWING NUMBER B0666E1
OFFICE WIN
X-REF ---
IMAGE ---



SINGLE–LINE DIAGRAM

(SEE NOTES 1 THROUGH 7)

LEGEND

- CIRCUIT BREAKER, 100 AMPERE FRAME, 60 AMPERE TRIP
- SIZE 00 MOTOR STARTER
- THERMAL OVERLOAD
- 1/3 HORSEPOWER MOTOR
- MCP — MOTOR CIRCUIT PROTECTOR
- FUSE (SIZE BY PANEL VENDOR)

NOTES:

1) CONTROL ENCLOSURES SHALL CONTAIN CONTACTORS 120V, CONTROL POWER XFORMER, (3) OVERLOAD RELAYS, AS WELL AS RELAYS, SWITCHES AND LIGHTS TO ACCOMPLISH THE INTERLOCKING AS SHOWN ON THE P&ID.
2) ALL EQUIPMENT IS TO BE INSTALLED IN A NON HAZARDOUS ENVIRONMENT.
3) MINIMUM SHORT CIRCUIT CAPACITY FOR ALL ELECTRICAL EQUIPMENT SHALL BE 14,000 AMPS SYMMETRICAL.
4) ALL ELECTRICAL EQUIPMENT SHALL BE GROUNDED PER NEC REQUIREMENTS.
5) SEALING FITTINGS SHALL BE INSTALLED PER NEC REQUIREMENTS.
6) ALL CONDUIT SHALL BE RIGID GALVANIZED STEEL, 1/2 in MINIMUM SIZE.
7) ALL WIRE SHALL BE "THWN" OR "XHHW" INSULATED COPPER, RATED 600V. @ 90 C. MINIMUM SIZE FOR POWER WIRING TO BE #12 AWG.

PANELBOARD SCHEDULE

100 A. DISTRIBUTION PANELBOARD, 240/120V., 3 PHASE, 4 WIRE, 14 KAIC MINIMUM, SURFACE MOUNT, NEMA 3R

LOAD SERVED	LOAD (AMPS) A	B	C	BKR. TRIP	WIRE SIZE	CKT. NO.	PHASE A B C	CKT. NO.	WIRE SIZE	BKR. TRIP	LOAD (AMPS) A	B	C	LOAD SERVED
SVE BLOWER B-1	42			50	6	1		2	12	15	6.8			AIR COMPRESSOR, AC1
		42		50	6	3		4	12	15		6.8		
			42	50	6	5		6	12	15			6.8	
LIGHTING	10			15	12	7	GFI	8	12	15		2.5		MISC. RECEPTACLES
SPARE		0		15	12	9		10	12	20		0		SPARE
SPARE			0	15	12	11		12	12	20			0	SPARE
TOTAL	52	42	42								6.8	9.3	6.8	TOTAL

TOTAL CONNECTED AMPS A: 58.8 B: 51.3 C: 48.8

PANEL SCHEDULE

— — WIRED BY PANEL VENDOR

——— WIRED BY CONTRACTOR

VERIFY SCALE 1"

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Designed by: SWL	SINGLE–LINE ELECTRICAL DIAGRAM		
Drawn by: LJA			
Checked by: AEP			
Reviewed by:	Scale: AS SHOWN	Sheet reference number: E1	Spec No.
Approved by:	Date: 1/4/00		Contract No.
	Drawing Number 0666E1		Sheet 1 of 1

DATE: 1/4/00
TIME: 10:12 AM
FORMAT REVISION 2/26/99

IMAGE | X-REF | OFFICE | DRAWING NUMBER
--- | --- | WIN | B066

VALVE AND PIPING SYMBOLS

- GLOBE VALVE
- GATE VALVE
- BUTTERFLY VALVE
- CHECK VALVE
- PLUG VALVE
- 3-WAY VALVE
- ANGLE VALVE
- RELIEF OR SAFETY VALVE
- DIAPHRAGM VALVE
- BALL VALVE
- GLOBE VALVE
- KNIFE GATE VALVE
- FLEXIBLE HOSE
- BASKET TYPE STRAINER
- Y-TYPE STRAINER
- DUPLEX STRAINER
- SLEEVE COUPLING (SC)
- FLOOR DRAIN
- EQUIPMENT DRAIN
- CLEANOUT (CO)
- REMOVABLE PLUG
- REMOVABLE CAP
- BF — BLIND FLANGE
- EXHAUST TO ATMOSPHERE (INSIDE)
- EXHAUST TO ATMOSPHERE (OUTSIDE)
- REDUCER
- UNION
- QUICK DISCONNECT COUPLING
- GAUGE SEAL
- DAMPER
- BPH — BACKFLOW PREVENTER
- NO — NORMALLY OPEN
- NC — NORMALLY CLOSED
- SP — SAMPLE PORT
- SELF-CONTAINED PRESSURE REGULATING VALVE W/RELIEF

GENERAL INSTRUMENT SYMBOLS

ONE VARIABLE | TWO VARIABLES

- LOCALLY MOUNTED
- PANEL MOUNTED
- REAR-OF-PANEL MOUNTED
- I — INTERLOCK
- P — PURGE

EQUIPMENT SYMBOLS

- SUBMERSIBLE PUMP
- PUMP
- PNEUMATIC DIAPHRAGM PUMP
- BLOWER
- AIR COMPRESSOR

VALVE OPERATOR SYMBOLS

- DIAPHRAGM WITH POSITIONER
- HANDWHEEL OR LEVER
- CHAINWHEEL
- S — SOLENOID
- M — MOTOR, ELECTRIC
- DIAPHRAGM

PRIMARY ELEMENT SYMBOLS – FLOW

- ORIFICE PLATE
- PITOT TUBE
- AVERAGING PITOT TUBE
- VENTURI OR FLOW TUBE
- TOTALIZING FLOWMETER
- FLUME
- WEIR
- TURBINE OR PROPELLOR TYPE METER
- MAGNETIC FLOW METER
- ROTAMETER

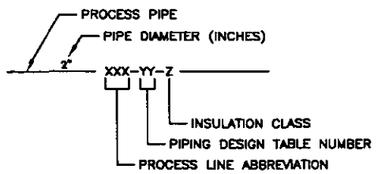
LINE SYMBOLS

- PROCESS PIPES OR CHANNELS
- CONNECTION TO PROCESS, MECHANICAL LINK OR INSTRUMENT SUPPLY
- PNEUMATIC SIGNAL
- ELECTRIC SIGNAL
- CAPILLARY TUBING (FILLED SYSTEM)
- HYDRAULIC SIGNAL
- ELECTROMAGNETIC OR SONIC SIGNAL NO WIRING OR TUBING

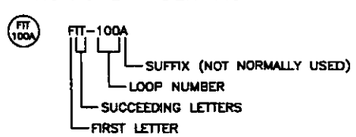
INSTRUMENT IDENTIFICATION TABLE

	FIRST LETTER		SUCCEEDING LETTERS		
	MEASURED OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYSIS		ALARM		
B	BURNER FLAME				
C	CONDUCTIVITY			CONTROL	
D	DENSITY (SP. GR.)	DIFFERENTIAL			
E	VOLTAGE		PRIMARY ELEMENT		
F	FLOW RATE	RATIO			
G	GAUGING (DIMENSIONAL)		GLASS		
H	HAND (MANUAL)				HIGH
I	CURRENT		INDICATE		
J	POWER	SCAN			
K	TIME OR SCHEDULE			CONTROL STATION	
L	LEVEL		LIGHT (PILOT)		LOW
M	MOISTURE OR HUMIDITY				MIDDLE
N					
O			ORIFICE		
P	PRESSURE OR VACUUM		POINT (TEST)		
Q	QUANT. OR EVENT	INTEGRATE			
R	RADIOACTIVITY		RECORD OR PRINT		
S	SPEED OR FREQ.	SAFETY		SWITCH	
T	TEMPERATURE			TRANSMIT	
U	MULTIVARIABLE		MULTIFUNCTION		
V	VISCOSITY			VALVE OR DAMPER	
W	WEIGHT OR FORCE		WELL		
X	UNCLASSIFIED		UNCLASSIFIED		
Y				RELAY OR COMPUTE	
Z	POSITION			DRIVE, ACTUATE	

PROCESS PIPING IDENTIFICATION



INSTRUMENT IDENTIFICATION



FUNCTION ABBREVIATIONS

DO	DISSOLVED OXYGEN
FC	FAIL CLOSED
FI	FAIL INDETERMINATE
FL	FAIL LOCKED
FO	FAIL OPEN
HOA	HAND-OFF-AUTOMATIC
I/I	CURRENT-TO-CURRENT
I/P	CURRENT-TO-PNEUMATIC
LEL	LOWER EXPLOSIVE LIMIT
LR	LOCAL-REMOTE
OC	OPEN-CLOSE
OO	ON-OFF (MAINTAINED)
ORP	OXIDATION REDUCTION POTENTIAL
OSC	OPEN-STOP-CLOSE (MOMENTARY)
SS	START-STOP (MOMENTARY)
>	HIGH SELECT
<	LOW SELECT
√	SQUARE ROOT
Σ	ADD OR TOTALIZE

PROCESS LINE ABBREVIATIONS

AIR	AIR, ATMOSPHERIC PRESSURE
BW	BACKWASH
CA	COMPRESSED AIR
CGW	CONTAMINATED GROUNDWATER
D	DRAIN
EFF	EFFLUENT
EXH	EXHAUST
GW	GROUNDWATER
NPW	NON-POTABLE WATER
P	PRODUCT
PW	POTABLE WATER
S	SANITARY
SL	SLUDGE
SP	SAMPLE PORT
SS	STORM SEWER
TF	TOTAL FLUIDS
V	VENT
VAP	VAPOR

PIPING MATERIAL IDENTIFICATION

CPVC	CHLORINATED POLYVINYL CHLORIDE
CSP	CARBON STEEL PIPE
COP	COPPER
CMP	CORRUGATED METAL PIPE
CIP	CAST IRON PIPE
DIP	DUCTILE IRON PIPE
GAL	GALVANIZED STEEL PIPE
PE	POLYETHYLENE PIPE
PP	POLYPROPYLENE PIPE
PVC	POLYVINYL CHLORIDE PIPE
RCP	REINFORCED CONCRETE PIPE
RUB	RUBBER HOSE
SS	STAINLESS STEEL PIPE
VCP	VITRIFIED CLAY PIPE

Revisions

Symbol	Descriptions	Date	Approved

IT CORPORATION

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HORSEHEADS, NY

Designed by: SWL	PROPOSED PIPING & INSTRUMENTATION DIAGRAM LEGEND		
Drawn by: LJA			
Checked by: AEP			
Reviewed by:	Scale: AS SHOWN	Sheet reference number: P1	Spec No.
Approved by:	Date: 1/4/00		Contract No.
	Drawing Number 0666P1		Sheet 2 of 9

VERIFY SCALE 0 — 1"

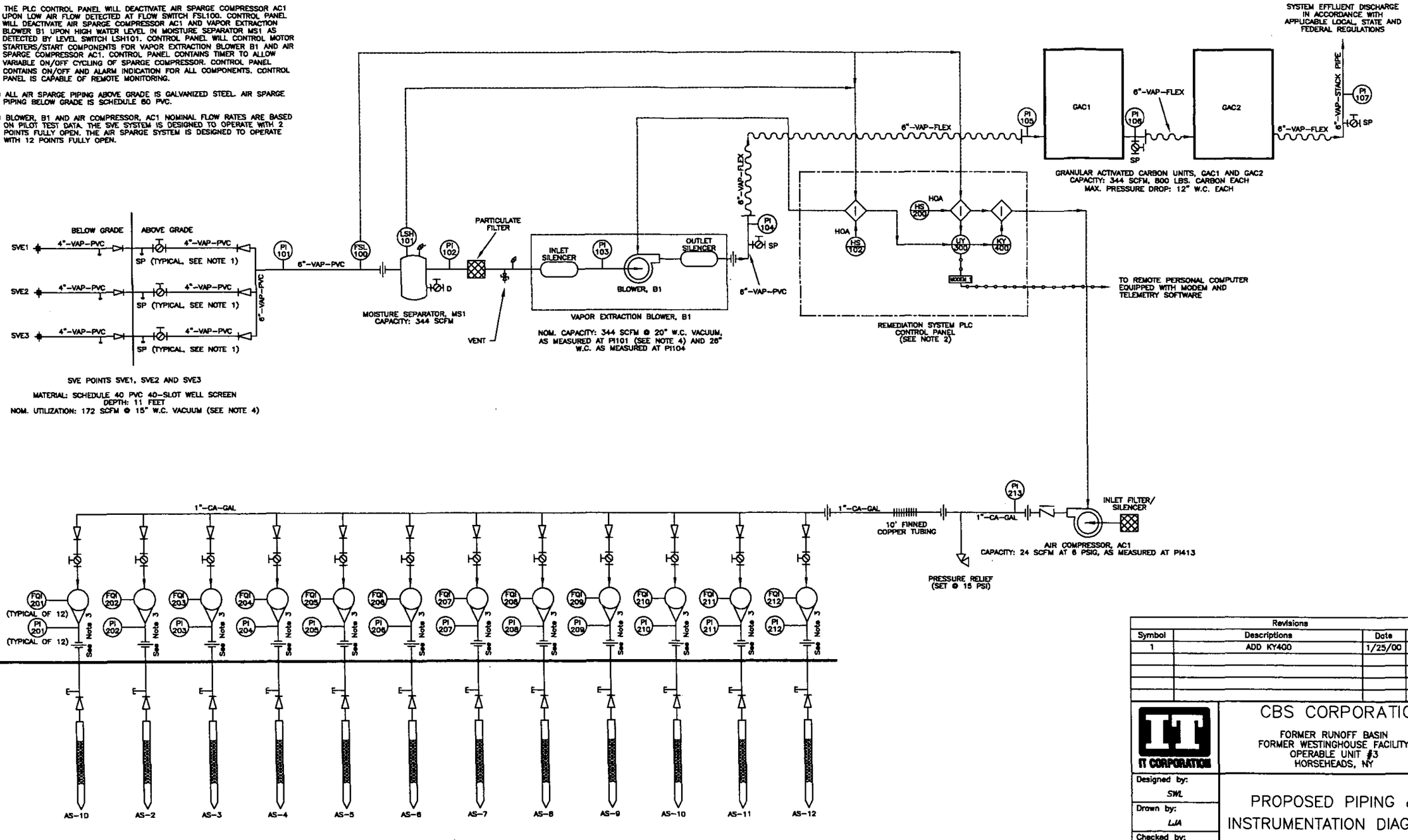
DATE: 1/4/00
TIME: 10:12 AM
FORMAT REVISION 2_____99

NOTES:
1) SAMPLE PORTS ARE INSTALLED TO ALLOW VAPOR MEASUREMENTS USING A PID, VACUUM MEASUREMENTS USING A MAGNEHELIC GAUGE, AND AIR FLOW MEASUREMENTS USING A PORTABLE THERMAL ANEMOMETER.

2) THE PLC CONTROL PANEL WILL DEACTIVATE AIR SPARGE COMPRESSOR AC1 UPON LOW AIR FLOW DETECTED AT FLOW SWITCH FSL100. CONTROL PANEL WILL DEACTIVATE AIR SPARGE COMPRESSOR AC1 AND VAPOR EXTRACTION BLOWER B1 UPON HIGH WATER LEVEL IN MOISTURE SEPARATOR MS1 AS DETECTED BY LEVEL SWITCH LSH101. CONTROL PANEL WILL CONTROL MOTOR STARTERS/START COMPONENTS FOR VAPOR EXTRACTION BLOWER B1 AND AIR SPARGE COMPRESSOR AC1. CONTROL PANEL CONTAINS TIMER TO ALLOW VARIABLE ON/OFF CYCLING OF SPARGE COMPRESSOR. CONTROL PANEL CONTAINS ON/OFF AND ALARM INDICATION FOR ALL COMPONENTS. CONTROL PANEL IS CAPABLE OF REMOTE MONITORING.

3) ALL AIR SPARGE PIPING ABOVE GRADE IS GALVANIZED STEEL. AIR SPARGE PIPING BELOW GRADE IS SCHEDULE 80 PVC.

4) BLOWER, B1 AND AIR COMPRESSOR, AC1 NOMINAL FLOW RATES ARE BASED ON PILOT TEST DATA. THE SVE SYSTEM IS DESIGNED TO OPERATE WITH 2 POINTS FULLY OPEN. THE AIR SPARGE SYSTEM IS DESIGNED TO OPERATE WITH 12 POINTS FULLY OPEN.



Revisions			
Symbol	Descriptions	Date	Approved
1	ADD KY400	1/25/00	

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PROPOSED PIPING & INSTRUMENTATION DIAGRAM

Designed by: SWL	Scale: AS SHOWN	Sheet reference number: P2	Spec No.
Drawn by: LJA	Date: 1/4/00		Contract No.
Checked by: AEP	Drawing Number 0666P2		Sheet 1 of 1
Reviewed by:			
Approved by:			

IMAGE --- | X-REF --- | OFFICE WIN | DRAWING NUMBER B0666P2-A

VERIFY SCALE 0 1"

DATE: 1/4/00
TIME: 10:12 AM
FORMAT REVISION 2/25/99

DRAWING NUMBER B0666Y1-A
OFFICE WIN
X-REF ---
IMAGE ---

GRASSY AREA

TMP-3S/D

TMP-3-SAT

AS-1S

AS-1D

TMP-4-SAT

SVE-1

VEW-S

VEW-D

TMP-1-SAT

TMP-1S/D

MW-11D

STAR BUILDING (STORAGE)

TMP-2S/D

TMP-5-SAT

TMP-5S/D

PLANT BUILDING

N

LEGEND

- SOIL VAPOR EXTRACTION POINT EX.: VEW-1
- MONITORING WELL EX.: MW-11D
- MULTI-LEVEL MONITORING POINT EX.: TMP-1S/D
- AIR SPARGE POINT EX.: AS-1S
- SATURATED ZONE MONITORING POINT EX.: TMP-3-SAT

NOTES:
1) LOCATIONS ARE APPROXIMATE.
2) S INDICATES SHALLOW. D INDICATES DEEP.
3) PLANT DRAWINGS DO NOT SHOW THE PRESENCE OF ANY UNDERGROUND UTILITIES IN THE REMEDIATION WORK AREA.

SCALE
0 8 16 FEET

VISIBY SCALE 1" 0

Revisions			
Symbol	Descriptions	Date	Approved
A	DEFINE GRASS AREA	1/25/00	

IT CORPORATION

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HORSEHEADS, NY

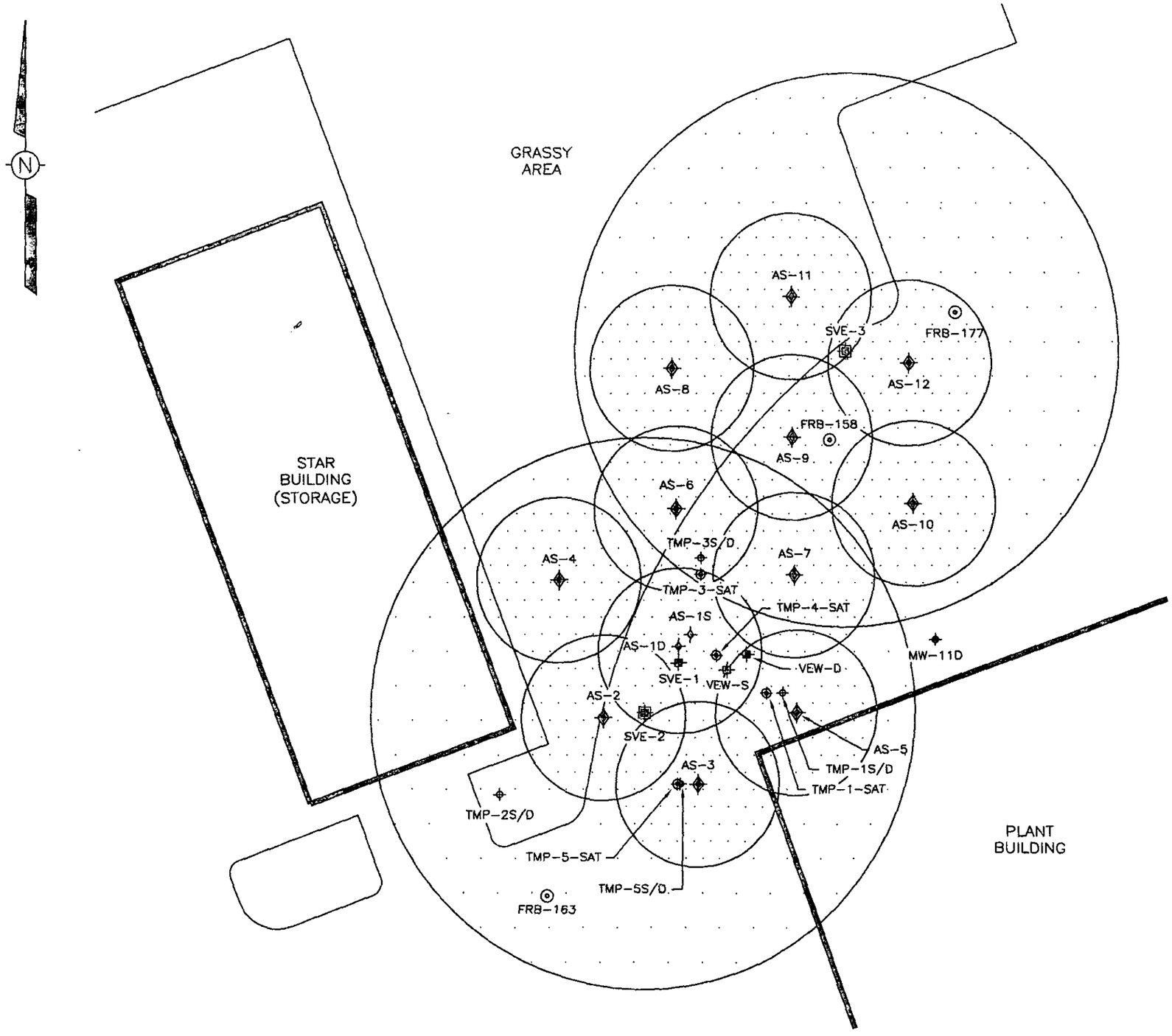
PILOT TEST LAYOUT MAP

Designed by: SWL	Scale: AS SHOWN	Sheet reference number:	Spec No.
Drawn by: LJA	Date: 8/11/99		Contract No.
Checked by: AEP	Drawing Number 0666Y1	Y1	Sheet 1 of 1
Reviewed by:			
Approved by:			

REFERENCE:
VAPOR EXTRACTION WELL AND MONITORING WELL LOCATIONS IN FORMER RUNOFF BASIN FIGURE 2
DWG. NO.: 0666Y1 DATE: 08/27/98 PROJECT NO.: 457100
SCALE 1"=30' PREPARED BY: IT CORPORATION

DATE: 8/11/99
TIME: 9: 12 AM
FORMAT REVISION 2/25/99

DRAWING NUMBER B0666Y2-A
OFFICE WIN
X-REF ---
IMAGE ---



LEGEND

- SOIL VAPOR EXTRACTION POINT EX.: VEW-1
- PROPOSED SOIL VAPOR EXTRACTION POINT EX.: SVE-2
- PROPOSED AIR SPARGE POINT EX.: AS-2
- MONITORING WELL EX.: MW-11D
- MULTI-LEVEL MONITORING POINT EX.: TMP-1S/D
- AIR SPARGE POINT EX.: AS-1S
- SOIL BORING EX.: FRB-163
- SATURATED ZONE MONITORING POINT EX.: TMP-3-SAT
- AIR SPARGE POINT RADIUS OF INFLUENCE
- SOIL VAPOR EXTRACTION POINT RADIUS OF INFLUENCE

NOTES:
1) LOCATIONS ARE APPROXIMATE.
2) S INDICATES SHALLOW. D INDICATES DEEP.
3) ONLY THOSE SOIL BORINGS WITH A MAXIMUM TCE CONCENTRATION IN SOIL GREATER THAN 100 ug/kg ARE SHOWN.

SCALE
0 20 40 FEET

Revisions			
Symbol	Descriptions	Date	Approved
A	ADD SOIL BORINGS	1/25/00	

IT CORPORATION

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OPERABLE UNIT #3
HORSEHEADS, NY

PROPOSED REMEDIATION SYSTEM LAYOUT - RADIUS OF INFLUENCE

Designed by: SWL	Scale: AS SHOWN	Sheet reference number: Y2	Spec No.
Drawn by: LJA	Date: 8/27/99		Contract No.
Checked by: AEP	Drawing Number B0666Y2		Sheet 1 of 1
Reviewed by:			
Approved by:			

REFERENCE:
VAPOR EXTRACTION WELL AND MONITORING WELL LOCATIONS IN FORMER RUNOFF BASIN FIGURE 2
DRN: MFH DATE: 03/02/03 PROJECT NO.: 427100
SCALE 1"=30' PREPARED FOR: PHILIP ENVIRONMENTAL

DATE: 8/11/99
TIME: 9:12 AM
FORMAT REVISION 2/26/99
VERIFY SCALE 0 1"

IMAGE	X-REF	OFFICE	DRAWING NUMBER
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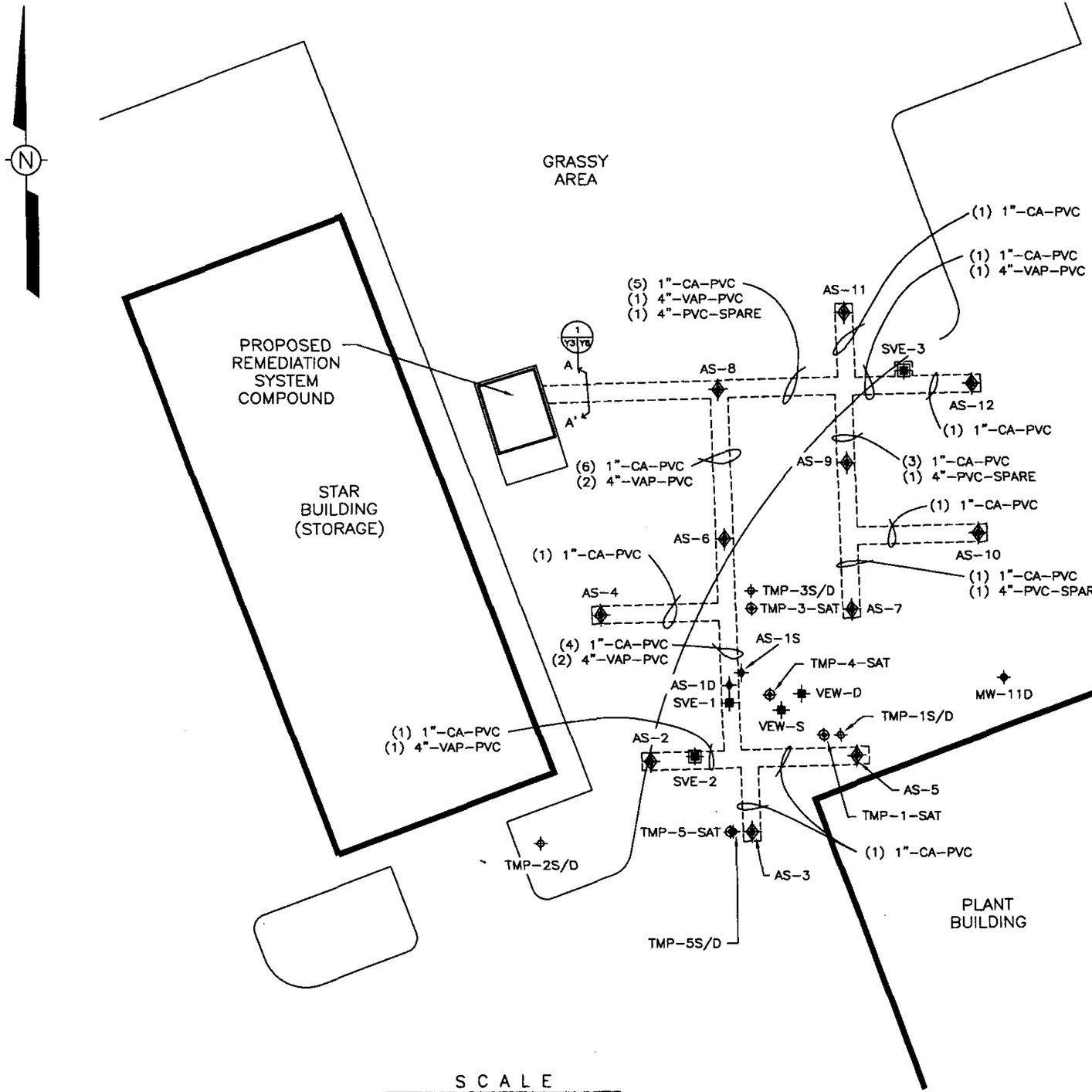


LEGEND

- SOIL VAPOR EXTRACTION POINT EX.: VEW-1
- PROPOSED SOIL VAPOR EXTRACTION POINT EX.: SVE-2
- PROPOSED AIR SPARGE POINT EX.: AS-2
- MONITORING WELL EX.: MW-11D
- MULTI-LEVEL MONITORING POINT EX.: TMP-1S/D
- AIR SPARGE POINT EX.: AS-1S
- SATURATED ZONE MONITORING POINT EX.: TMP-3-SAT
- PROPOSED TRENCHING LOCATION

NOTES:
1) LOCATIONS ARE APPROXIMATE.
2) S INDICATES SHALLOW. D INDICATES DEEP.
3) PLANT DRAWNGS DO NOT SHOW THE PRESENCE OF ANY UNDERGROUND UTILITIES IN THE REMEDIATION WORK AREA.
4) TRENCHING MAY NEED TO CONTAIN ELECTRICAL CONDUITS TO PROVIDE 240/120V OR 480 V, 3-PHASE ELECTRICAL SERVICE FORM NEAREST AVAILABLE SOURCE, TO BE DETERMINED.
5) ALL DISTURBED AREAS SHALL BE RESTORED TO A CONDITION COMPARABLE TO PRE-CONSTRUCTION CONDITIONS.
6) IN AREA WITH CURRENT GRASS SURFACE COVER, DISTURBED AREAS SHALL BE RESTORED BY REPLACING TOPSOIL, GRADING TO BLEND WITH THE SURROUNDING GROUND SURFACE AND PLANTING A MIX OF RAPID-EMERGENT AND PERENNIAL GRASS SEED FREE OF NOXIOUS WEEDS. SEEDED AREAS SHALL BE MULCHED WITH STRAW OR SIMILAR MATERIALS.
7) ALL ELECTRICAL CONNECTIONS SHALL BE INSPECTED AND APPROVED PRIOR TO COVERING WORK OR OTHERWISE HINDERING INSPECTION.
8) THE EXCAVATION CONTRACTOR WILL INSTALL SPARE 4" PVC PIPING WHICH WILL BEGIN AT THE REMEDIATION SYSTEM COMPOUND AND END NEXT TO SPARGE POINT AS-7.

REFERENCE:
VAPOR EXTRACTION WELL AND MONITORING WELL LOCATIONS IN FORMER RUNOFF BASIN FIGURE 2
DWN: MPH DATE: 08/02/95 PROJECT NO.: 427100
SCALE 1"=30' PREPARED BY: PHILIP ENVIRONMENTAL

VERIFY SCALE 0 1"

DATE: 1/4/00
TIME: 10:12 AM
FORMAT REVISION 2/28/99

Revisions			
Symbol	Descriptions	Date	Approved
A	RELOCATE COMPOUND	1/25/00	

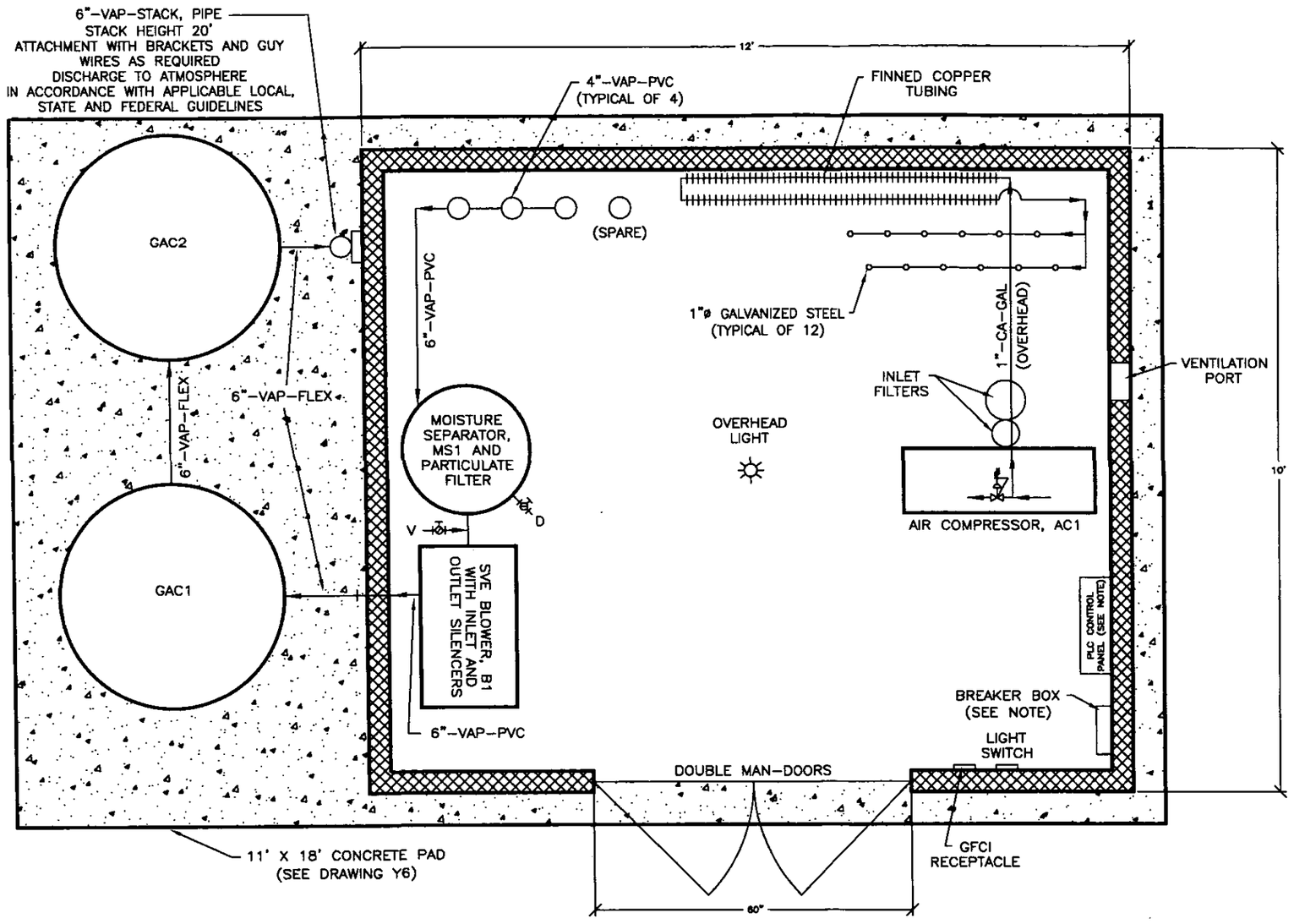
IT CORPORATION

CBS CORPORATION
FORMER RUNOFF BASIN
FORMER WESTINGHOUSE FACILITY
OPERABLE UNIT #3
HORSEHEADS, NY

PROPOSED REMEDIATION SYSTEM TRENCHING LAYOUT

Designed by: SWL	Scale: AS SHOWN	Sheet reference number: Y3	Spec No.
Drawn by: LJA	Date: 1/4/00		Contract No.
Checked by: AEP	Drawing Number B0666Y3		Sheet 1 of 1
Reviewed by:			
Approved by:			

NOTE:
MAINTAIN 36" CLEARANCE IN FRONT OF ALL ELECTRICAL PANELS.



REMEDIATION SHED DETAIL
SCALE: AS SHOWN
(SEE DRAWING Y6)

SCALE
0 2 4 FEET

Revisions			
Symbol	Descriptions	Date	Approved
A	ADD PAD, DELETE ELEVATION VIEW	1/25/00	

IT CORPORATION

CBS CORPORATION
FORMER RUNOFF BASIN
FORMER WESTINGHOUSE FACILITY
OPERABLE UNIT #3
HORSEHEADS, NY

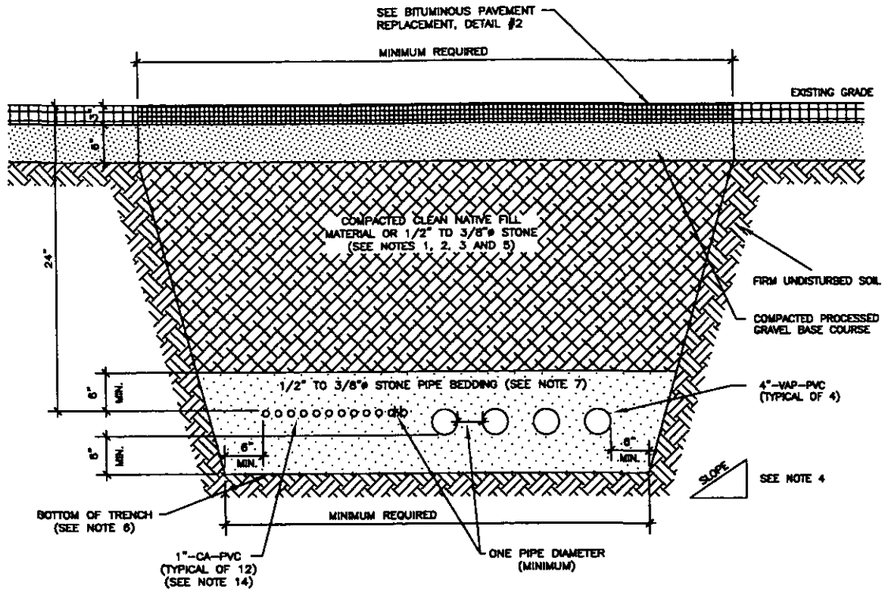
PROPOSED REMEDIATION COMPOUND LAYOUT

Designed by: SWL	Scale: AS SHOWN	Sheet reference number: Y4	Spec No.
Drawn by: LJA	Date: 1/4/00		Contract No.
Checked by: AEP	Drawing Number 0666Y4		Sheet 1 of 1
Reviewed by:			
Approved by:			

IMAGE --- | X-REF --- | OFFICE WIN | DRAWING NUMBER B0666Y4_A

VERIFY SCALE 0 1"

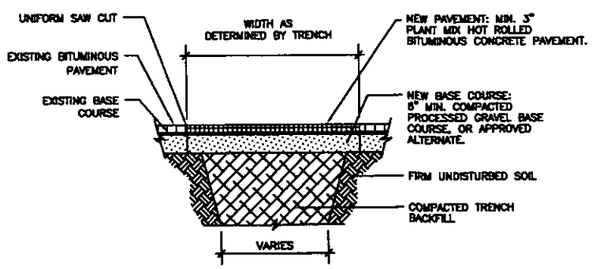
DATE: 1/4/00
TIME: 10:12 AM
FORMAT REVISION 2/28/99



DETAIL #1
TYPICAL TRENCH CROSS SECTION A–A'
NOT TO SCALE

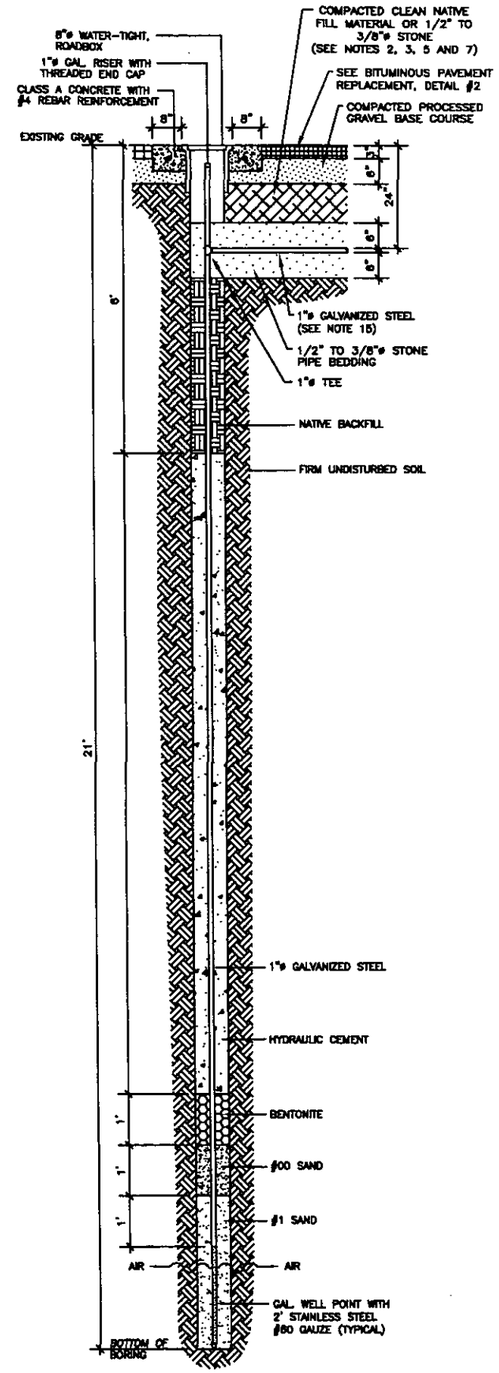
(1 / Y3 | Y6)

NOTES:
1) TRENCH BACKFILL SHALL BE NATIVE SOIL IF ACCEPTABLE, COMPACTED TO A MINIMUM OF 95% STANDARD PROCTOR DENSITY.
2) TRENCH BACKFILL BELOW NON–PAVED AREAS WILL CONSIST OF NATIVE SOIL AND SHALL BE COMPACTED TO A MINIMUM OF 90% STANDARD PROCTOR DENSITY.
3) BACKFILL WILL BE SUBJECT TO TESTING AND, IF THE REQUIRED STATE OF COMPACTION IS NOT OBTAINED, THE OWNER MAY REQUIRE THAT THE BACKFILL BE REMOVED AND RECOMPACTED AT THE CONTRACTOR'S EXPENSE.
4) CUT SLOPE SHALL BE AS DETERMINED BY CONTRACTOR. ALL EXCAVATION WORK SHALL BE PERFORMED IN ACCORDANCE WITH ALL CONDITIONS SET FORTH BY OSHA'S REVISED STANDARDS FOR EXCAVATIONS, 29 CFR 1926 SUBPART P.
5) NATIVE SOIL BACKFILL SHALL BE FREE FROM ORGANIC MATTER, FROZEN SOIL, ROCKS IN EXCESS OF 4"ø, ROOTS, OR DELETERIOUS COMPONENTS.
6) TRENCH BOTTOM SHALL BE FIRM COMPACTED NON–FROZEN SOIL. CONTRACTOR SHALL VERIFY TRENCH BOTTOM SUITABILITY (IN ORDER TO AVOID EXCESSIVE SETTLEMENT) FOR PROJECT. PLACEMENT OF PIPE AND PIPE BEDDING MATERIAL SHALL NOT BE PERFORMED UNTIL APPROVAL OF TRENCH BOTTOM HAS BEEN RECEIVED.
7) PIPE BEDDING MATERIALS SHALL BE PLACED BY HAND AND COMPACTED AS OUTLINED IN 6" (MAX) LIFTS, BANK TO BANK, TO 6" ABOVE THE PIPE SURFACE. COMPACTION OF THE PIPE BEDDING MATERIAL FOR SINGLE PIPE SYSTEMS SHALL BE 92% STANDARD PROCTOR DENSITY AND COMPACTION FOR MULTIPLE PIPE SYSTEMS SHALL BE 95% STANDARD PROCTOR DENSITY.
8) EXCAVATION MATERIAL AND EQUIPMENT SHALL BE KEPT A MINIMUM OF 2' FROM THE EDGE OF THE EXCAVATION.

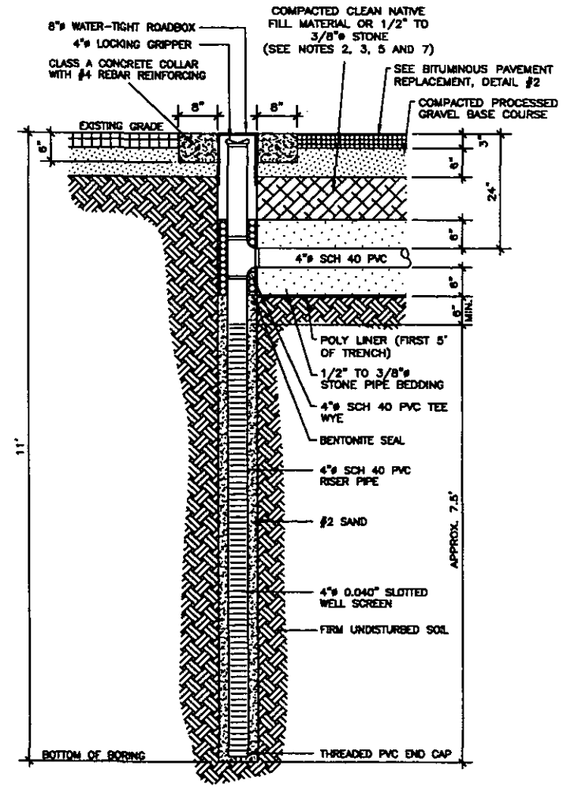


DETAIL #2
BITUMINOUS PAVEMENT REPLACEMENT DETAIL
NOT TO SCALE

NOTES:
9) NEW PAVEMENT AND PROCESSED GRAVEL BASE SHALL BE OF THE SAME TYPE AND THICKNESS AS THAT WHICH IS REMOVED, BUT IN NO CASE SHALL BE LESS THAN INDICATED.
10) TACK COAT ALL SAW CUT EDGES WITH UNIFORMLY EMULSIFIED, GRADE SS–1H LIQUID ASPHALTS.
11) REMOVE AND DISPOSE OF ALL EXCESS MATERIALS IN CONFORMANCE WITH APPLICABLE REGULATIONS.
12) COMPACT 6" (MIN.) BASE COURSE FOR BITUMINOUS CONCRETE TO 95% STANDARD PROCTOR DENSITY.
13) COMPACT TRENCH BACKFILL TO 95% STANDARD PROCTOR DENSITY IN MAX. 12" LIFTS.



DETAIL #4
AIR SPARGE POINT CONSTRUCTION DETAIL
NOT TO SCALE



DETAIL #3
SOIL VAPOR EXTRACTION POINT DETAIL
NOT TO SCALE

NOTES:
14) SPARGE SYSTEM PIPING SHALL CONSIST OF 10' OF GALVANIZED STEEL PIPING ADJACENT TO THE SPARGE POINT. THE REMAINDER OF THE PIPING BELOW GRADE WILL BE SCHEDULE 80 PVC AND TRANSITION BACK TO 1" GAL. WITHIN 10 FEET OF THE EQUIPMENT ENCLOSURE.

Revisions			
Symbol	Descriptions	Date	Approved
A	EDIT NOTES	1/25/00	

IT CORPORATION

CBS CORPORATION
FORMER RUNOFF BASIN
FORMER WESTINGHOUSE FACILITY
OPERABLE UNIT #3
HORSEHEADS, NY

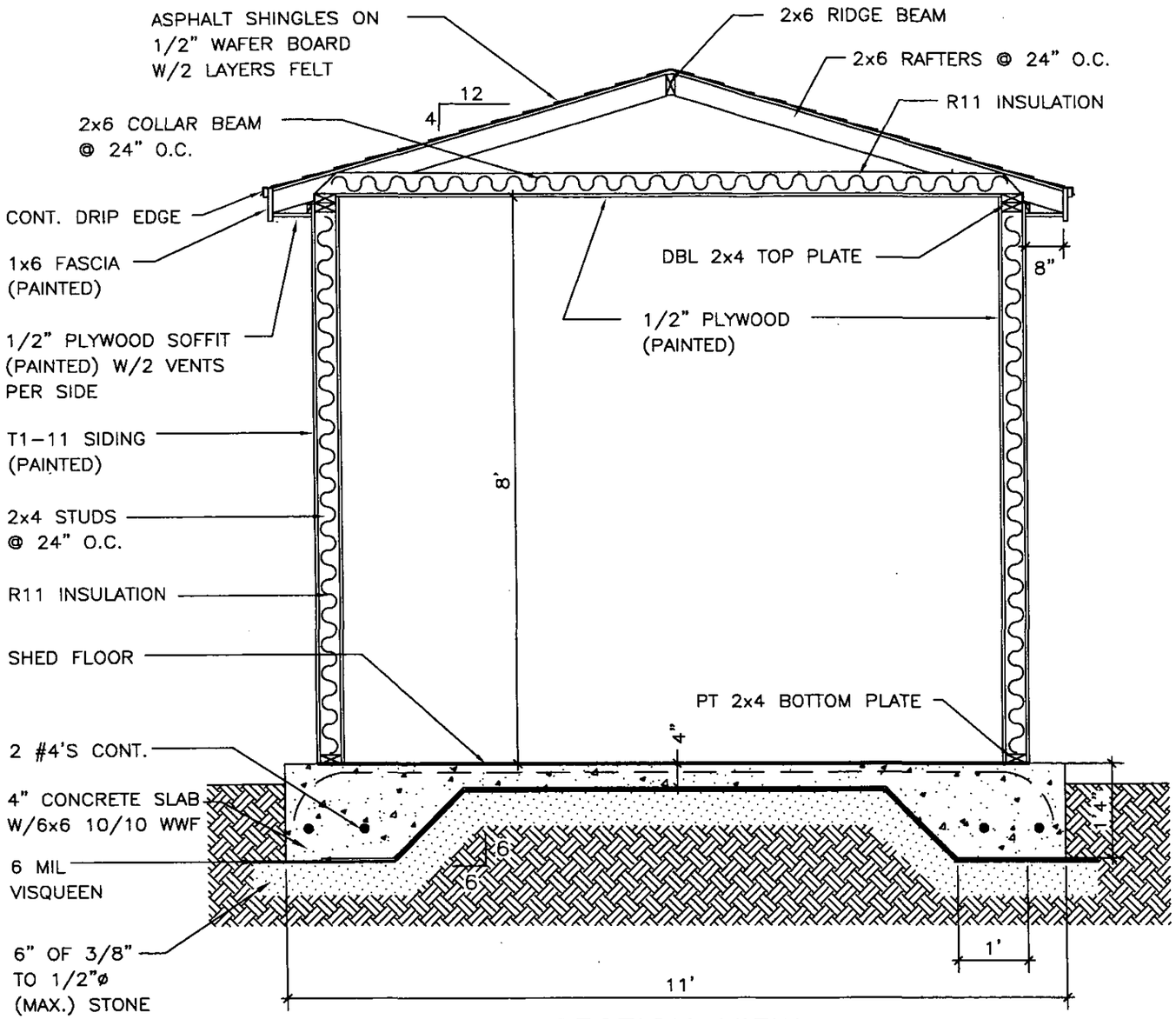
CONSTRUCTION DETAILS

Designed by: SWL	Scale: AS SHOWN	Sheet reference number: Y5	Spec No.
Drawn by: LJA	Date: 1/4/00		Contract No.
Checked by: AEP	Drawing Number 0666Y5		Sheet 1 of 1
Reviewed by:			
Approved by:			

DRAWING NUMBER B0666Y5-A
OFFICE WIN
X-REF ---
IMAGE ---

VERIFY SCALE 0 1"

DATE: 1/4/00
TIME: 10:12 AM
FORMAT REVISION 2/25/99



SECTION VIEW

NOT TO SCALE

NOTES:

1) BUILDING FOUNDATION TO BE EXCAVATED IN NATIVE SOIL AND NOT PLACED ON FILL.
2) CONCRETE SHALL HAVE A MAXIMUM 4-INCH SLUMP AND MAXIMUM WATER-TO-CEMENT RATIO OF 0.5.
3) CONCRETE SLAB SHALL BE FINISHED BY STEEL TROWEL AND BRUSHING TO FORM A FLAT, UNIFORM, SKID-RESISTANT SURFACE.
4) BEFORE PLACING CONCRETE, CONTRACTOR MUST VERIFY FORMS ARE SET TO PRODUCE CONCRETE SLAB IN COMPLIANCE WITH HORIZONTAL AND VERTICAL TOLERANCES FOR BUILDING ERECTION.
5) ALL STUD REINFORCING BARS AND WIRE MESH SHALL BE SET WITH MINIMUM OF 2 INCHES OF CONCRETE COVER.
6) CONCRETE SHALL BE COVERED AND KEPT MOIST FOR MINIMUM OF 7 DAYS AFTER PLACEMENT.

Revisions			
Symbol	Descriptions	Date	Approved

IT CORPORATION

CBS CORPORATION

FORMER RUNOFF BASIN
FORMER WESTINGHOUSE FACILITY
OPERABLE UNIT #3
HORSEHEADS, NY

PROPOSED REMEDIATION SYSTEM
SHED DETAILS

Designed by: SWL	Scale: AS SHOWN	Sheet reference number: Y6	Spec No.
Drawn by: LJA	Date: 1/4/00		Contract No.
Checked by: AEP	Drawing Number 066575		Sheet 1 of 1
Reviewed by:			
Approved by:			

DRAWING NUMBER B066575-A
OFFICE WIN
X-REF ---
IMAGE ---

VERIFY SCALE 0 1"

DATE: 1/4/00
TIME: 10:12 AM
FORMAT REVISION 2/28/99

APPENDIX A

VENT-ROI DATA ANALYSIS

Former Runoff Basin
Kentucky Avenue Wellfield Site
Operable Unit No. 3
Horseheads, NY

Revised Vent-ROI Modeling, IT Corporation, January 2000

OBSERVED AND PREDICTED FLOW RESPONSE TO APPLIED VACUUM

	Applied Vacuum (inches w.c.)	Observed Flow Response (scfm)	Predicted Flow Response (scfm)	Relative Percent Difference
1.	5	92	74.75	-20.7 %
2.	10	124	139.74	11.9 %
3.	15	172	195.05	12.6 %

Mean Value of Relative Percent Difference:	1.3 %
Mean Absolute Value of Relative Percent Difference:	15.1 %
Standard Deviation of Prediction:	23.2 scfm

Soil Permeability in Horizontal Direction (sq cm):	1.432E-06
Standard Deviation of Soil Permeability Estimation (sq cm):	2.86E-07
Ratio of Horizontal to Vertical Permeability:	6.3

Former Runoff Basin
Kentucky Avenue Wellfield Site
Operable Unit No. 3
Horseheads, NY

Revised Vent-ROI Modeling, IT Corporation, January 2000

EFFECTIVE RADIUS CALCULATION FOR CONVENTIONAL SOIL VAPOR EXTRACTION SYSTEM

1. Trichloroethylene (single component, volatile, non-biodegradable)
   Vapor Pressure = 35.33 mm Hg Temperature Constant = 1909 °K
   Mol. Weight = 131.5 Liquid Density = 1.466 g/cc
2. Vertical Wells in 12 Inch Boreholes, Screened from 3.5 to 10.5 feet
3. Vented Soil Interval = 0 to 10.5 feet
4. Slope of log10(P) vs Distance from Pilot Test = .031 per ft
5. Soil Gas Temperature = 50 °F
6. Applied Vacuum = 12.7 in. water column
7. Air Flow Rate per Vapor Extraction Well = 170.8 scfm
8. Desired Time to Cleanup = 365 days
9. Cleanup Goal = 99 % removal

VOLATILIZATION: SINGLE WELL EFFECTIVE RADIUS = 56.91 FEET
INTERWELL EFFECTIVE RADIUS = 50.22 FEET

APPENDIX B

EMISSIONS COMPLIANCE CALCULATIONS

PROJECT DATA

PROJECT NAME: CBS Horseheads/Kentucky Avenue Wellfield Site
LOCATION: Horseheads, NY
APPLICANT NAME: NA
PROJECT NUMBER: 11100666

PROJECT ENGINEER: Sean Lorden
NYS P.E. of RECORD: Anne Proctor
NYS P.E. LICENSE No.:
DATE: 01/24/00

NOTES:
Air sparge/SVE system in 10x12 shed at former runoff basin. Stack is 20' tall, uncapped.
Conservative TCE concentration based on pilot test data.

SOIL VAPOR EXTRACTION SYSTEM OPERATING DATA & SITE INFORMATION

Maximum Air Flow:	344	scfm	Physical Stack Height (Hs):	20	feet
Min. Stack Temp.(T):	100	Degrees F	GEP Stack Height (Hb + 1.5*(Min(Hb or Lmin):	25	feet
Ambient Temp.(Ta):	*50*	*Degrees F*	*Stack Height Above Building:*	*12*	*feet*
Building Height (Hb):	8	feet (appx)	Stack Diameter (d):	6	inches
Building Width (Lmax):	12	feet (appx)	Exit Velocity (V):	29	feet/sec
Building Width (Lmin):	10	feet (appx)	Capped Exit? (Y/N)	N	
Cavity Method (B/R):	B		Dist. To Prop. Line (Dpl):	500	feet

('B' = Basic, 'R' = Refined. Refined is less conservative)

III.D. AMBIENT IMPACT EVALUATION

Contaminant	Mol. Weight (g/mole)	CAS #	Steady State Effluent Concentration (ppm)	(mg/m3)	Effluent Loading Q (lbs/hr)	Qa (lbs/yr)	Annual Limit AGC (µg/m3)	Annual Discharge Ca (µg/m3)	Short-Term Limit SGC (µg/m3)	Short-Term Discharge Cst (µg/m3)	Compliant? (Y/N)
				0.0	0.00E+00	0.00E+00		0.00		0.0	Y
Trichloroethene	131.50	00079-01-6	7.30	39.2	5.05E-02	4.42E+02	4.50E-01	2.18	30,000	141.6	N
				0.0	0.00E+00	0.00E+00		0.00		0.0	Y
				0.0	0.00E+00	0.00E+00		0.00		0.0	Y
				0.0	0.00E+00	0.00E+00		0.00		0.0	Y
				0.000	0.00E+00	0.00E+00		0.00		0.0	Y

Source: Imbedded Calculations from Appendix B of Air Guide-1, October 16, 1995

PROJECT NAME: CBS Horseheads/Kentucky Avenue Wellfield Site
LOCATION: Horseheads, NY
APPLICANT NAME: NA
PROJECT NUMBER: 11100666

II.A. BASIC CAVITY IMPACT ANALYSIS INPUT DATA (Comparative Purposes Only)

Data from Previous Steps:

Building Height (Hb):	8	feet (appx)
Physical Stack Height (Hs):	20	feet
Dist. To Prop. Line (Dpl):	500	feet

II.A.1		
Horizontal Extent (3Hb):	**24.00**	feet
Dpl>3Hb; Cavity impacts confined to on-site receptors; cavity impacts do not need to be calculated		
II.A.2		
Building Cavity Height (Hc):	**NA**	feet
Go to Step III.A		

II.A.3 & II.A.4 included on "III.A.2 Max Impacts" Tab if Basic Cavity Impacts selected.

PROJECT NAME: CBS Horseheads/Kentucky Avenue Wellfield Site
LOCATION: Horseheads, NY
APPLICANT NAME: NA
PROJECT NUMBER: 11100666

II.B. REFINED CAVITY IMPACT METHOD

Data from previous steps:

Building Height (Hb):	8 feet (appx)	Min. Stack Temp.(T):	100 Degrees F
Physical Stack Height (Hs):	20 feet	Ambient Temp.(Ta):	50 Degrees F
Dist. To Prop. Line (Dpl):	500 feet	Exit Velocity (V):	29.2 feet/sec
Building Width (Lmax):	12 feet (appx)	Stack Diameter (d):	6 inches
Building Width (Lmin):	10 feet (appx)	Capped Exit? (Y/N)	N

Define Horizontal Extent of Cavity Impacts

II.B.1
Horizontal Extent (3Hb): **24.00** feet
Dpl>3Hb; Cavity impacts confined to on-site receptors; cavity impacts do not need to be calculated

II.B.2
Go to Step III.A

II.B.3
Go to Step III.A

II.B.4
Go to Step III.A

II.B.4.a.
Value to Right (if any) is Inconsequential: **12** feet

II.B.5. PLUME HEIGHT w/ MOMENTUM FLUX

a. Calc. momentum flux (Fm): **48.53** feet^4/sec^2
Fm = Ta/T * V^2 * (R)^2
Stack outlet area (R): 0.20 feet^2

b. Calc. Effective stack height (He): **NA** feet
He = Hs + 0.25 * (Fm * Hb)^0.33

II.B.6. Calc. Min. Vertical Cross-section (A): **NA** feet^2
A = Hb * Lmin

II.B.7 & II.B.8 included on "III.A.2 Max Impacts" Tab if Refined Cavity Impacts selected.

PROJECT NAME: CBS Horseheads/Kentucky Avenue Wellfield Site
LOCATION: Horseheads, NY
APPLICANT NAME: NA
PROJECT NUMBER: 11100666

II.C. CAVITY IMPACT EVALUATION METHOD

Data from previous steps:

Building Height (Hb): 8 feet (appx)
Dist. To Prop. Line (Dpl): 500 feet
Cavity Method (B/R): B

b. Calc. Effective stack height (He): NA feet
II.B.6. Calc. Min. Vertical Cross-section (A): NA feet^2

				II.A.3 (1)		II.A.4 (2)		
Contaminant	CAS Number	Hourly Q (lb/hr)	Annual Qa (lb/yr)	Cavity (Ann.) Cc (µg/m3)	Limit AGC (µg/m3)	Cavity (S-T.) Ccst (µg/m3)	Limit SGC (µg/m3)	Com-pliant? (Y/N)
0	0	0.000	0.000	NA	0	NA	0	--
Trichloroethene	00079-01-6	0.050	442.143	NA	0.45	NA	30000	--
0	0	0.000	0.000	NA	0	NA	0	--
0	0	0.000	0.000	NA	0	NA	0	--
0	0	0.000	0.000	NA	0	NA	0	--
0	0	0.000	0.000	NA	0	NA	0	--

(1) If **II.A.3** (Basic): Cc = (1.72 * Qa) / Hb^2; **If II.B.7** (Refined): Cc = (1.72 * Qa) / (Hb * Lmin)
(2) If *II.A.4* (Basic): Ccst = *(90400 * Q) / Hb^2*; **If *II.B.8*** (Refined): *Cc = (90400 * Q) / (Hb * Lmin)*

PROJECT NAME: CBS Horseheads/Kentucky Avenue Wellfield Site
LOCATION: Horseheads, NY
APPLICANT NAME: NA
PROJECT NUMBER: *11100666*

III.A.1. PLUME RISE

Data From Previous Steps

Capped Exit? (Y/N)	N
Building Height (Hb):	8 feet (appx)
Physical Stack Height (Hs):	*20 feet*
a. Calc. momentum flux (Fm):	48.53 feet^4/sec^2
Exit Velocity (V):	29.2 feet/sec
Stack Diameter (d):	6 inches
Min. Stack Temp.(T):	100 Degrees F

Stack is Not Capped; Evaluate Plume Rise as Calculated Below

III.A.1.		
Hs/Hb Ratio =	**2.50**	
Hs/Hb >= 1.5; Evaluate Momentum & Buoyancy credits below		
a. Effective Stack Height (He) =	**See Hs + b. + d.**	
There is no momentum credit because Hs/Hb >= 2.5		
b. Momemtum plume rise credit:	**0.00**	feet
There is bouyancy flux credit because Hs/Hb>=2.5		
c. Calculated buoyancy flux:	**0.04**	feet^4/sec^3
Buoyancy flux is < 55		
d. Buoyancy final rise credit:	**0.68**	feet
Hs + b. + d. = Effective stack height (He):	**20.68**	feet
(including momentum and buoyancy rise credits)		

PROJECT NAME: CBS Horseheads/Kentucky Avenue Wellfield Site
LOCATION: Horseheads, NY
APPLICANT NAME: NA
PROJECT NUMBER: 11100666

III.A.2-5. MAXIMUM IMPACTS

Data from Previous Steps:

Building Height (Hb):	8	feet (appx)
Physical Stack Height (Hs):	20	feet
Hs/Hb Ratio =	2.50	
Effective Stack Height (He):	20.68	feet
Capped Exit? (Y/N)	N	

III.A.4. Reduction Factor (RF): **0.75** (Hs/Hb <1.5 ~ RF = 1; >1.5&<=2.5 ~ RF = 0.75, <2.5 ~ RF = 0.4)

				III.A.2	III.A.3	III.A.4		III.A.5
Contaminant	CAS Number	Hourly Q (lb/hr)	Annual Qa (lb/yr)	Max Ann.. Ca (µg/m3)	Max Pot Ann. Cp (µg/m3)	Adjusted by RF Ca (µg/m3)	Adjusted by RF Cp (µg/m3)	Max. Short-Term Cst (µg/m3)
0	0	0.000	0.000	0.00E+00	0.00E+00	**0.00E+00**	**0.00E+00**	**0.00E+00**
Trichloroethene	*00079-01-6*	*0.050*	*442.143*	*2.91E+00*	*2.90E+00*	**2.18E+00**	**2.18E+00**	**1.42E+02**
0	0	0.000	0.000	0.00E+00	0.00E+00	**0.00E+00**	**0.00E+00**	**0.00E+00**
0	0	0.000	0.000	0.00E+00	0.00E+00	**0.00E+00**	**0.00E+00**	**0.00E+00**
0	0	0.000	0.000	0.00E+00	0.00E+00	**0.00E+00**	**0.00E+00**	**0.00E+00**
0	0	0.000	0.000	0.00E+00	0.00E+00	**0.00E+00**	**0.00E+00**	**0.00E+00**

APPENDIX C

EQUIPMENT LIST

PRE-FINAL DESIGN
EQUIPMENT SPECIFICATIONS
for the
PROPOSED AIR SPARGE/SOIL VAPOR EXTRACTION SYSTEM
at the
FORMER RUNOFF BASIN
KENTUCKY AVENUE WELLFIELD SITE
OPERABLE UNIT NO. 3
HORSEHEADS, NEW YORK

1.) SVE Wells (2 new wells) SVE-2 and SVE-3

Nominal Utilization:	172 scfm
Material:	solid PVC riser, 0.040" slotted PVC screen
Diameter:	4"
Depth:	11' (subject to site conditions)
Sand Pack:	#2 sand
Well Seal:	bentonite
Installation Method:	hollow-stem auger drilling

2.) Air Sparge Wells (11 new wells) AS-2 through AS-12

Nominal Utilization:	2 scfm
Material:	galvanized steel riser, galvanized #60 gauze point
Diameter:	1"
Depth:	21' (subject to site conditions)
Sand Pack:	#1 sand, #00 sand
Well Seal:	bentonite, hydraulic cement
Installation Method:	hollow-stem auger drilling

3.) SVE Blower, B1

Nom. Utilization:	344 scfm @ 20 in. w.c. system inlet vacuum (measured at PI101, Drawing P2) and 26 in. w.c. system discharge pressure (measured at PI104, Drawing P2)
Motor:	15 HP / 230 V / 3 phase
Manufacturer:	GRS or equal
Model No.:	Rotron DR10 or equal
Includes:	piped, skid-mounted unit particulate filter and pre- and post-filter vacuum gauges inlet and outlet silencers moisture separator with high level switch and vacuum relief valve, (*Note: Elevate moisture separator on skid to facilitate drainage.*)

4.) Air Compressor, AC1

Nom. Utilization:	24 scfm @ 6 psig
Motor:	2HP / 230 V / 3 phase
Manufacturer:	GRS or equal
Model No.:	Gast 2080-P124-T337 or equal
Includes:	piped, skid-mounted unit particulate filter pressure relief valve set at 15 psig temperature gauge

5.) Control Panel:

Control Description:

The PLC control panel will include a timer to cycle the air sparge compressor AC1 on and off for a duration of 1 to 24 hours.

The PLC control panel will deactivate air sparge compressor AC1 upon low SVE system air flow detected at flow switch FSL100.

The control panel will deactivate vapor extraction blower B1 upon high water level in moisture separator M1 as detected by level switch LSH100 in the moisture separator

The control panel will control motor starters/start components for the vapor extraction blower and air sparge compressor.

The control panel will contain run lights and alarm indications for all components.

The control panel will be capable of remote monitoring providing notification (via facsimile or telephone) in the event of an alarm condition.

The control panel will be suitable for the installation, with the appropriate NEMA rating and safeguards against problems such as moisture buildup in the panel.

Manufacturer: GRS or equal

6.) Vacuum Gauges (1) PI101

Range:	0 – 30 in. w.c. vacuum
MFR:	Ashcroft (or equal)
Model No.	1490a (or equal)

7.) Pressure Gauges (4) PI104 through PI107

Range:	0 – 30 in. w.c.
MFR:	Ashcroft (or equal)
Model No.	1490 (or equal)

8.) Pressure Gauges (12) PI201 through PI212

Range:	0 – 15 psig
MFR:	Ashcroft (or equal)
Model No.	1490 (or equal)

9.) Flow Meters (12) FQI 201 through FQI 212

Range:	40 – 400 scfh
MFR:	Dwyer (or equal)
Model No.	RMB-SSV-55

10.) Granular Activated Carbon Units (2), GAC1 and GAC2

Construction Material:	HDPE
Flow Rate:	344 scfm minimum
Max. Pressure Drop:	12 in. w.c. per unit
Carbon Capacity:	1,000 pounds each
Manufacturer:	Encotech or equal
Model No.	AIR POLY 1000 with 4" Cam-lok connections

CUMMINGS
RITER
CONSULTANTS, INC.

SAMPLING, ANALYSIS, AND MONITORING PLAN
KENTUCKY AVENUE WELLFIELD SITE
OPERABLE UNIT NO. 3

PREPARED FOR:

CBS CORPORATION
11 STANWIX STREET
PITTSBURGH, PA 15222

PROJECT NO. 98245.10/03
JANUARY 31, 2000

339 Haymaker Road • Parkway Building • Suite 201 • Monroeville, PA 15146
(412) 373-5240 • FAX (412) 373-5242 • E-Mail: crc@nb.net

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SAMPLING, ANALYSIS, AND MONITORING PLAN
KENTUCKY AVENUE WELLFIELD SITE
OPERABLE UNIT NO. 3

1.0 INTRODUCTION

This Sampling, Analysis, and Monitoring Plan (SAMP) describes the methods and procedures to be employed for sampling activities to be conducted in conjunction with implementing the remedial action (RA) for Operable Unit No. 3 at the Kentucky Avenue Wellfield site in Horseheads, New York. This SAMP has been prepared by Cummings/Riter Consultants, Inc. (Cummings/Riter) in accordance with the requirements of Paragraph VI of the Consent Decree between CBS Corporation (CBS, formerly Westinghouse Electric Corporation) and the U.S. Environmental Protection Agency (USEPA), and Paragraph D.5.a of the Statement of Work attached therein. Cummings/Riter was assisted in this effort by IT Corporation.

This SAMP contains a description of sampling, analysis, testing, and monitoring to be performed as part of the RA. It describes sample methods, analytical/testing methods, frequency of sampling, and sample depths to be used. Table 1 provides a summary of media to be sampled, sample frequency, analytical parameters, sample containers, sample preservation requirements, and sample holding times.

This document incorporates the RA Quality Assurance Project Plan (RA QAPP) (Appendix A) which describes the analytical and quality assurance/quality control procedures for RA sampling and analysis, which is provided as Appendix A.

2.0 SAMPLING ACTIVITIES

This SAMP defines the methods to be used for collecting water and air samples during start-up and operation of the soil vapor extraction/air sparging (SVE/AS) system, and confirmation soil samples following excavation of Disposal Area F soils and SVE/AS treatment of the Former Runoff Basin Area.

2.1 FORMER RUNOFF BASIN AREA

Air and water samples will be collected periodically at various locations to monitor the performance of the SVE/AS system installed in the Former Runoff Basin Area. Monitoring results will be used to optimize system performance and to make the determination that SVE/AS system operation is no longer necessary. SVE/AS operation will be terminated when Former Runoff Basin Area soils no longer contain trichloroethylene (TCE) at concentrations exceeding the performance standard of 800 micrograms per kilogram (µg/kg). Results of post-treatment soil sampling will be used to confirm effective reduction of TCE concentrations.

The SVE/AS operating methodology and monitoring requirements are described in detail in the SVE/AS Remedial Systems Operations Plan (Appendix D of the Design for Proposed Air Sparge and Soil Vapor Extraction System).

2.1.1 Groundwater Sampling

Groundwater samples will be collected and submitted for laboratory analysis at start-up and quarterly during SVE/AS system operation to evaluate the effectiveness of air sparging at reducing concentrations of dissolved-phase volatile organic compounds (VOCs). Groundwater samples will be collected from seven groundwater monitoring locations (see Section 3.1.2).

2.1.2 Vapor Sample Collection

During SVE/AS system operation, air streams will be sampled for laboratory analysis to quantify vapor-phase concentrations of total VOCs, including TCE. Both the air stream being withdrawn from the subsurface and SVE/AS system effluent air stream will be sampled. The data will be used to calculate mass removal rates in order to evaluate the

effectiveness of the SVE/AS system. Effluent VOC concentrations will also be used to monitor compliance with New York State Department of Environmental Conservation (NYSDEC) air discharge regulations.

Influent vapor samples will be collected from a sample petcock located on the piping between the vapor extraction wells and the SVE blower. Effluent vapor samples will be collected from a sample petcock placed in the discharge piping from the last carbon canister in the treatment train. Influent and effluent vapor samples will be collected at the frequencies identified in Table 1. Data quality objectives and analytical methods for vapor samples have been included in the RA QAPP (Appendix A) .

2.1.3 Soil Sample Collection

Upon completing SVE treatment, soil samples will be collected from the Former Runoff Basin Area to confirm that the soil performance standard (800 µ/kg) has been achieved. A 20-foot square grid will be established over the Former Runoff Basin Area, as shown on Figure 1. The grid will extend downward in two-foot increments from the surface to a depth of 14 feet. For the 20 by 20-foot grid over the affected area, the total number of grid points, in the horizontal plane, is approximately 32.

Samples will be collected of saturated and unsaturated zone soils in two-foot depth intervals using direct push techniques. The water table in the Former Drainage Basin Area ranges in depth from 8 to 11 feet below ground surface. Soil samples will be collected continuously from ground surface to 14-foot depth at 25 percent of the grid points (eight borings). Grid point locations for sample collection will be randomly selected. Specific boring locations will be selected by sequentially numbering each grid node and using a random number generator to identify eight grid nodes. Soil samples will be analyzed for TCE.

The results of this sampling will be statistically evaluated to calculate the 95 percent upper confidence limit of the mean concentration of TCE. This calculation is summarized as follows:

$$UCL=\bar{x}+\frac{S}{\sqrt{n}}t_{(95\%;\nu)}$$

where, UCL = 95 percent upper confidence limit of the mean of TCE;
$\overline{x}$ = sample mean for TCE;
s = sample standard deviation for TCE;
n = number of samples;
$t_{(95\%;\nu)}$ = one-tailed t-statistic for 95 percent confidence at $\nu = n - 1$ degrees of freedom (for $n = 56$, $t_{(95\%;\nu)} = 1.675$)

For this calculation, the underlying data distribution will be examined, and the data set will be transformed (e.g., log normal), if necessary. In accordance with USEPA procedures for similar data evaluation for human health risk assessments, data values reported as less than the minimum detection limit will be taken as one-half of the detection limit.

If upper confidence level (UCL) concentrations for TCE are less than the respective soil performance standards, SVE soil remediation will be deemed complete. These data will be compiled for incorporation in the Certification of Completion as specified in Paragraph XIV of the Consent Decree.

2.2 DISPOSAL AREA F

Based on the results of the remedial design investigation, the approximate limits of surface soils (i.e., zero to two feet) with concentrations of polynuclear aromatic hydrocarbons (PAHs), arsenic and TCE exceeding performance standards are depicted on Figure 2. The approximate limits of subsurface soil with concentrations of TCE exceeding the performance standard (0.8 µg/kg TCE) are shown on Figure 3. These preliminary limits will be located by survey and marked with pin flags or survey stakes, and will serve as the initial excavation limits. Monitoring Wells MW-14S, MW-14R, and MW-14D will be used as survey control points. Control point coordinates and elevations are provided on Figure 2. Post-excavation verification soil samples will be collected to confirm attainment of applicable soil performance standards.

2.2.1 Surface Soil

Following excavation of the topmost two feet of soil from the delineated area (Figure 2), post-excavation surface soil samples will be collected at mid-height along the excavation sidewall every 40 linear feet to verify attainment of surface soil performance standards.

Samples will be analyzed for arsenic, TCE, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene. In addition, post-excavation bottom samples will be collected from the area identified for TCE removal that does not fall within the area identified for subsurface soil removal (see Figure 2), and analyzed for TCE. Bottom sample locations will be identified with an orthogonal grid with 10-foot spacing to be marked out over the excavated area. Post-excavation bottom samples will be collected from the base of the excavation at each grid node from a depth of zero to six inches. Grid nodes will be marked with pin flags or survey stakes.

Data quality objectives and analytical methods are provided in the RA QAPP (Appendix A). If a sample exceeds a performance standard for any of the surface soil parameters of interest, the midpoint between the failed sample and the nearest clean sidewall sample will be marked. The excavation will then be expanded approximately perpendicular to the existing sidewall between the two midpoints a distance of 10 feet. The new excavation sidewalls will then be sampled every 40 linear feet.

2.2.2 Subsurface Soil

Samples collected during the predesign investigation indicated that subsurface soil at two sampling locations (DAF-30 and DAF-31) exceeded the performance standard of 0.8 µg/kg TCE. The samples were collected from the two to four-foot depth interval at each location. No other subsurface soil samples had detected concentrations of TCE exceeding the performance standard. Following the removal of subsurface soil delineated by these two samples (Figure 3), an orthogonal grid with 10-foot spacing will be marked out over the excavated area. Post-excavation verification soil samples will be collected from the base of the excavation at each grid node from a depth of zero to six inches. Grid nodes will be marked with pin flags or survey stakes. In addition, post-excavation sidewall samples will be collected from the subsurface soil excavation area every 40 linear feet. Data quality objectives and analytical methods are provided in the RA QAPP (Appendix A).

If an excavation bottom sample exceeds the soil performance standard, the area represented by the sample will be excavated an additional 6 to 12 inches. The corners of the area to be re-excavated will be taken as the midpoints between the sample exceeding the performance standard and the nearest samples meeting the standard. For every

additional two-foot depth increment that the excavation is lowered, sidewall samples will be collected. If an excavation subsurface sidewall sample exceeds the performance standard, the midpoint between the failed sample and the nearest clean sidewall sample will be marked. The excavation will then be expanded approximately perpendicular to the existing subsurface sidewall between the two midpoints a distance of 10 feet. The new excavation sidewalls will then be sampled every 40 linear feet.

2.2.3 Borrow Material

Following successful demonstration of attainment of the performance standard, the excavation will be backfilled. Off-site borrow material brought on site to backfill the excavation will be sampled for laboratory analysis. Representative grab samples will be collected from each source of fill and analyzed for full Target Compound List/Target Analyte List (TCL/TAL) parameters. TCL/TAL results will be compared to recommended cleanup objectives presented in the NYSDEC *Technical and Administrative Guidance Memorandum on Determination of Soil Cleanup Objectives and Cleanup Levels*. Only soils that meet these standards will be acceptable as fill. One soil sample will be required for each source of off-site borrow. In this context, a "source" refers to a specific borrow pit stratum or location. Gravel or other granular materials with insufficient fine particles for laboratory analysis will not be sampled.

3.0 SAMPLE COLLECTION AND HANDLING PROCEDURES

3.1 FORMER RUNOFF BASIN AREA

3.1.1 Air Samples

All influent vapor samples will be collected in pre-cleaned, evacuated SUMMA canisters provided by the laboratory. Each petcock (and attached tubing) will be flushed for approximately one minute prior to collecting a SUMMA canister sample. Although the sample will be collected from piping that is under a vacuum, the maximum vacuum of the proposed SVE blower(s) (approximately seven inches of mercury) will be less than that of the SUMMA canister (approximately 30 inches of mercury). The SUMMA samples will be collected to reflect an instantaneous (grab) sample VOC concentration in the extracted soil gas. Influent vapor samples will be collected by connecting the SUMMA canister to the sample petcock with either Teflon® lined or stainless-steel tubing, and opening the valve on the SUMMA canister to allow the container to fill until a slight vacuum remains. SUMMA vacuum readings before and after sample collection will be measured using vacuum measuring equipment, supplied by Air Toxics, Ltd., and recorded.

Effluent air samples will be collected in Tedlar® sample bags. The effluent side of the SVE/AS treatment system is downstream of the blower, and will be under pressure. Each petcock (and attached tubing) will be flushed for approximately one minute prior to collecting a vapor sample.

3.1.2 Groundwater Samples

Following purging, groundwater samples will be collected using low-flow purging/collection with dedicated well pumps. Samples will be collected quarterly from three temporary monitoring points (TMP-2D, TMP-1-SAT and TMP-1D) and four monitoring wells (MW-7S, MW-7D, MW-11S, and MW-11D), as shown on Figure 4. Groundwater pH, specific conductivity, temperature, and water level depth will be measured prior to sample collection.

Within three hours of sampling, the wells will be purged. Purging will be performed using bailers, centrifugal lift pumps, or peristaltic pumps, depending on the hydraulic

characteristics of the monitored portion of the formation. Temperature, conductivity, and pH will be measured and recorded a minimum of every five minutes during well purging. The well will be considered properly purged when these parameters have stabilized within 10 percent over three, five-minute sampling intervals and a minimum of three well volumes (casing plus annulus assuming an effective porosity of 50 percent in the well pack) have been removed from the well. Details of well purging will be recorded on field data sheets.

For sample collection, bailers will be lowered to the middle of the well screen and withdrawn slowly through the water column to minimize disturbance. Propylene monofilament (e.g., fishing line) will be attached to the bailer to allow the bailer to be raised and lowered. A bailer of water collected from each well will be used to prepare samples for VOC analysis and will be tested for pH, temperature, and specific conductivity. Contents of the bailer will be transferred to the sample vials in a way that will minimize agitation and aeration. The sampling procedure is as follows:

- Measure and record water level with clean, electronic water level indicator;
- Select sample bottles with hydrochloric acid preservative;
- Lower precleaned bailer into well until it contacts the water surface;
- Allow bailer to sink and fill with minimum water surface disturbance;
- Slowly raise bailer to surface without allowing the bailer line to contact the ground;
- Tip bailer to allow slow discharge from the top to flow gently down the side of the sample bottle with minimum entry turbulence; and
- Perform field analyses (pH, specific conductivity, and temperature) on remaining sample water.

Sampling, water level measurement, and testing equipment will be thoroughly decontaminated prior to use at each well.

3.1.3 Soil Samples

Soil samples will be collected at each location to be sampled using direct push techniques. A 24-inch, split-barrel sampler, or 40-inch, acetate-lined, macro core device will be hydraulically pushed to the pre-determined sample interval to collect the soil sample. A grab sample from the approximate center of the target interval will be selected for TCE analysis. If a macro core device is used, the acetate lining will be cut using a clean, stainless-steel knife, and the contents will be removed from the lining and placed in the appropriate sample container.

Sampling borings will be plugged using bentonite hole-plug for holes less than four feet deep, and grouted by the tremie method using a mixture of 7.5 pounds of potable water and 2.5 pounds of bentonite per 80-pound bag of cement for deeper holes.

3.2 Disposal Area F

Post-excavation samples will be collected using a dedicated stainless-steel hand trowel or disposable metal spatula. Samples collected for TCE analysis will be placed directly into laboratory-supplied sample containers. Samples collected for PAH and arsenic analysis will be mixed in stainless-steel bowls or disposable aluminum baking pans before placement into sample containers. Non-disposable sampling equipment will be cleaned prior to and between sampling locations following the decontamination procedures discussed in Section 4.0.

3.3 Sample Containers and Preservation

A summary of the recommended bottle types and preservation for the project is provided in Table 1. Sample bottles will be supplied by the laboratory. Sample containers will be chosen, cleaned, and quality controlled according to protocol in the OSWER Directive No. 9240.0-05A, *Specifications and Guidance for Contaminant-Free Sample Containers* (December 1992). Analytical proof of sample container quality will be available on site.

Preservation and holding times will follow the protocols established in the Contract Laboratory Program Statement of Work for Organic Analyses (OLM01.9) and Inorganic Analyses (ILM04.1). Aqueous samples will be placed in sample containers that have

been laboratory prepared with the appropriate preservative, as indicated in Table 1. Reagents used for preservation will be of analytical grade and will be documented on the chain-of-custody records.

Aqueous samples to be analyzed for VOCs will be collected and capped with zero headspace. Soil samples collected for TCE analysis will be compacted in the sample container to leave as little void space as possible. Once collected, each sample will be placed in an ice chest with frozen refrigerant packs and/or ice. Samples will be transported to the laboratory promptly to provide ample time for analyses to be conducted within applicable holding times (see Table 1).

3.4 SAMPLE LABELING

Preprinted sample labels will be affixed to sample bottles prior to delivery to the site. The following information is required on each sample label:

- Kentucky Avenue Wellfield OU3,
- Date and time of sample collection,
- Sampler's initials,
- Contractor/company name,
- Unique sample number,
- Preservative, and
- Analysis required.

Each sample will be given a unique identification name corresponding to the type of sample and the location from which it was taken. Sample names will consist of the following parts:

M-LOC-##

where, M = Sample Medium:
- S - soil
- W - water
- A - air
- SD - Sediment

LOC = Location
- DAF - Disposal Area F

- PXB - Post-Excavation Bottom
- PXS - Post-Excavation Sidewall
- FRB - Former Runoff Basin Area
- SAE - SVE system air emissions
- Others (as needed)

= Sample sequence number

For bottom samples collected as a result of a previously failed bottom sample, successive samples from within the same grid cell will be labeled with an alphabetical suffix. For example, if PXB-11 fails performance standards, upon re-excavation of the grid cell represented by PXB-11, the next sample from that cell will be labeled PXB-11A.

Quality control samples will be labeled as follows:

- Rinse blank (equipment) identification numbers will have the prefix "RB" and will be numbered in the order in which they were taken during the specific sampling event and with the date of collection (e.g., RB1-3-15-00).

- Trip blank identification numbers will have the prefix "TB" and will be numbered in the order in which they were taken during the specific sampling event, as well as the month, day, and year (e.g., TB1-3-15-00).

- Blind duplicate samples will be assigned an arbitrary designation by the sampler. The sampler will record in the field notebook the arbitrary designation along with the correct designation of the sample location from where the blind duplicate was obtained, the month, day, and year, and the suffix "DUP." The arbitrary designation submitted to the laboratory on sample bottle labels or on the chain-of-custody form will not include the suffix "DUP" or other indication that the sample is a duplicate.

Sample labels will be promptly completed upon collection. VOC sample containers will then be placed in a resealable plastic bag and immediately placed in a cooler with sealed bags of ice.

3.5 SAMPLE PACKAGING AND SHIPPING

Sample packaging and shipping procedures are designed to ensure that the samples will arrive at the laboratory intact and with the proper chain-of-custody forms. Samples will be prepared for shipment as outlined below:

- Ensure that sample containers have the sample labels securely affixed to the container.
- Check the caps on the sample containers to ensure that they are properly sealed.
- Complete the chain-of-custody form with the required sampling information and ensure that the recorded information matches the sample labels. If the designated sampler relinquishes the samples to other sampling or field personnel for packing or other purposes, the sampler will complete the chain-of-custody prior to this transfer. The appropriate personnel will sign and date the chain-of-custody form to document the sample custody transfer.
- Using duct tape, secure the outside drain plug at the bottom of the cooler.
- Place one to two inches of cushioning material at the bottom of the cooler.
- Place the sealed sample containers into the cooler.
- Place ice in sealed plastic bags and place loosely in the cooler.
- Fill the remaining space in the cooler with cushioning material.
- Place chain-of-custody forms in a sealed plastic bag. Tape the forms to the inside of the cooler lid.
- Close the lid of the cooler and secure with tape.

All samples will be stored at 4°C after collection and maintained at this temperature until arrival at the laboratory. Samples will be shipped to the laboratory within 24 hours of the time of collection via overnight courier. Shipments will be accompanied by a

temperature blank and the chain-of-custody form identifying the contents. The original form will accompany the shipment; copies will be retained by the sampler for sampling office records.

4.0 DECONTAMINATION

Hand augers, stainless-steel spatulas, split-barrel samplers, and Geoprobe® tools will be decontaminated between each use according to the following procedures:

- Wash and scrub with low phosphate detergent;
- Rinse with potable water;
- Rinse with 10 percent nitric acid, ultra pure grade (1 percent solution will be used when carbon steel implements, such as spilt spoons, are used); *
- Rinse with potable water;
- Rinse with acetone only or methanol, followed by hexane (all solvents must be pesticide-grade or better); **
- Final rinse with deionized water (volume of water must be at least five times greater than the volume of solvents used); ***
- Air dry; and
- Wrap in aluminum foil (shiny side out) for transport.

Notes:

* Nitric acid rinse will only be used when samples are collected for inorganics.

** Solvent rinse is required when sampling for organics.

*** A sample of the demonstrated analyte-free water will be collected and submitted for chemical analysis. Analytical results will be kept on site. Determination of analyte-free water will be according to the USEPA Region II CERCLA Quality Assurance Manual.

Other sample handling tools (e.g., spatulas) will either be single-use disposable items or will be similarly decontaminated between each use.

5.0 SAMPLE CUSTODY AND DOCUMENTATION PROCEDURES

5.1 FIELD SAMPLE CUSTODY

Field sample custody assures that samples are not tampered with from sample collection through transport to the analytical laboratory. Persons will have custody of the sample when the samples are in their physical possession, in their view after being in their possession, or in their personal possession and secured. When samples are secured in a restricted area accessible only to authorized personnel, they will be deemed to be in the custody of such authorized personnel. Field custody documentation consists of both field logbooks and chain-of-custody forms.

5.2 CHAIN-OF-CUSTODY FORMS

A chain-of-custody form is a mechanism for tracing custody from the time of collection through reporting of results. The form is initiated by the sampler, who will note the sample location, sampling date and time, and sample matrix and parameters of interest. The sampler then signs the form, includes any pertinent remarks about the samples, and seals it in the sample cooler. Any transfer of samples from individual to individual must be noted on the chain-of-custody form.

5.3 FIELD LOG

Field logs will contain a daily record of events, observations, and measurements during sampling activities. Logs may include notebooks or forms. Information pertinent to sampling activities will be recorded in the log. Entries in the log will include the following:

- Name and title of author,
- Contractor/company name,
- Name(s) of field crew,
- Location of sampling activity,
- Sample matrix,
- Number/volume of samples,
- Date and time of collection,
- Preservatives used,

- Description of sample location,
- Sampling method,
- Sample identification numbers,
- Field observations, and
- Field measurements.

TABLE 1

SAMPLE QUALITY CONTROL SUMMARY TABLE

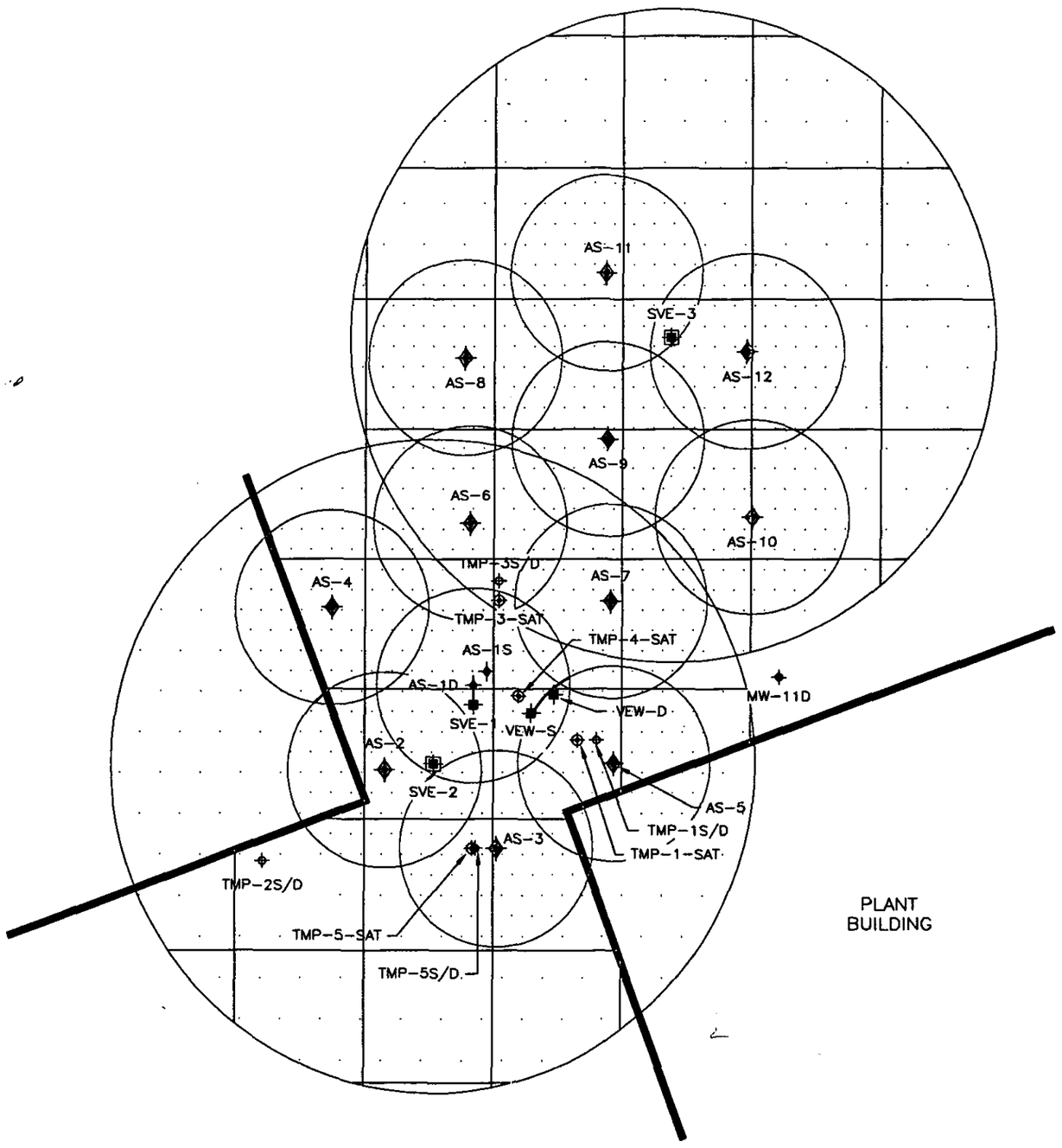
TABLE 1
SAMPLE QUALITY CONTROL SUMMARY TABLE

PROJECTED NUMBER								
MATRIX/DESCRIPTION	SAMPLE FREQUENCY	FIELD BLANKS	TRIP BLANKS	MS/MSD	DUPLICATES	PARAMETERS	CONTAINER[a]	PRESERVATIVE[b]/ HOLDING TIME
Disposal Area F Surface Soil – Post-Excavation	Bottom - 1/100 sq. ft.	1/20 samples	1/trip[c]	1/20 samples	1/20 samples	TCE	G/4 oz	--/14 days
	Sidewall – 1/40 linear ft.	1/20 samples	--	1/20 samples	1/20 samples	Arsenic/Target SVOCs[d]	G/4 oz	--/14 days
Disposal Area F Subsurface Soil – Post-Excavation	Bottom - 1/100 sq. ft. Sidewall – 1/40 linear ft.	1/20 samples	1/trip[c]	1/20 samples	1/20 samples	TCE	G/4 oz	--/14 days
Former Runoff Basin Area Soil – Post-SVE/AS	56 random samples[e]	3	1/trip[c]	3	3	TCE	G/4 oz	--/14 days
Former Runoff Basin Area Groundwater	quarterly – one well, three TMPs	1/20 samples	1/trip[c]	1/20 samples	1/20 samples	VOCs[d]	G/40 ml	HCl/14 days
Former Runoff Basin Area Air – SVE Influent	1/month – 1st yr.; quarterly thereafter	--	--	--	1	VOCs	SUMMA canister	--/14 days
Former Runoff Basin Area Air – SVE Effluent	1/month – 1st yr.; quarterly thereafter	--	--	--	1	VOCs	Tedlar® bag	--/14 days

a. G = glass.
b. All containers stored at 4°C.
c. One per shipment of volatile organic containers.
d. Target SVOCs are benzo(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene.
e. Assumes depth to groundwater table of twelve feet, 20-foot grid spacing, and sampling of 25 percent of identified sample points.

FIGURES

DRAWING NUMBER 98245B18



LEGEND

- SOIL VAPOR EXTRACTION POINT EX.: VEW-1
- PROPOSED SOIL VAPOR EXTRACTION POINT EX.: SVE-2
- PROPOSED AIR SPARGE POINT EX.: AS-2
- MONITORING WELL EX.: MW-11D
- MULTI-LEVEL MONITORING POINT EX.: TMP-1S/D
- AIR SPARGE POINT EX.: AS-1S
- SATURATED ZONE MONITORING POINT EX.: TMP-3-SAT
- BLUE, SOIL VAPOR EXTRACTION POINT RADIUS OF INFLUENCE.
- GREEN, AIR SPARGE POINT RADIUS OF INFLUENCE.
- POST-REMEDIATION SAMPLING GRID

NOTES:
1) LOCATIONS ARE APPROXIMATE.
2) S INDICATES SHALLOW. D INDICATES DEEP.

SCALE
0 20 40 FEET

FIGURE 1
POST SVE/AS TREATMENT SOIL SAMPLING LOCATIONS
KENTUCKY AVENUE WELLFIELD SITE - OU3
HORSEHEADS, NEW YORK

PREPARED FOR
CBS CORPORATON
PITTSBURGH, PENNSYLVANIA

CUMMINGS RITER CONSULTANTS, INC.

DRAWING NUMBER 98245B18

REVISION	DATE	DESCRIPTION		
			DRAWN BY: *T.N. Fitzroy*	DATE: *1-19-00*
			CHECKED BY	DATE:
			APPROVED BY:	DATE:

PLOT SCALE: 1

REFERENCE:
BASE MAP WAS TAKEN FROM IT CORPORATION(DWG. B0666Y2)

DRAWING NUMBER 98245B19

SOIL AREA EXCAVATION COORDINATES		
POINT	NORTHING	EASTING
A	786116.06	428918.22
B	786269.65	429001.80
C	786285.52	429076.26
D	786285.93	429091.15
E	786271.60	429107.80
F	786221.25	429090.69
G	786209.91	429060.23
H	786164.02	429038.54
I	786135.14	429069.52
J	786118.59	429006.66
K	786099.56	428989.48
L	786092.34	428958.50
M	786106.26	428953.85
N	786215.60	429002.33
O	786237.91	429016.04
P	786250.15	429023.73
Q	786275.20	429053.00
R	786258.46	429092.46
S	786220.53	429056.41
T	786201.06	429036.27

E 428800
E 429000
E 429200
N 786200
N 786000
910.3
911.8
909.3
910.0
909.8
908.8
909.5
910
915
PAVED PARKING AREA
GRAVEL TRUCK STAGING AREA
PAVED ROADWAY
RAILROAD TRACKS
RETAINING WALL
MW-14D
N 786,099.10
E 428,889.70
GROUND ELEV.: 909.68
TOP OF CASING: 912.51
MW-14S
N 786,081.44
E 428,885.82
GROUND ELEV.: 910.97
TOP OF CASING: 913.48
MW-14R
N 786,087.84
E 428,904.57
GROUND ELEV.: 910.73
TOP OF CASING: 913.14

LEGEND:

- EXISTING FENCE
- EDGE OF ASPHALT PAVEMENT
- EXISTING MONITORING WELL LOCATION
- INITIAL EXCAVATION LIMITS OF SOIL EXCEEDING RAO FOR PAHs AND ARSENIC.
- INITIAL EXCAVATION LIMITS OF SOIL EXCEEDING RAO FOR TCE.
- AREA FOR TCE POST-EXCAVATION BOTTOM SAMPLE COLLECTION.

SCALE
0 40 80 FEET

FIGURE 2
SURFACE SOIL (0-2 FEET) EXCAVATION PLAN

KENTUCKY AVENUE WELLFIELD SITE - OU3
HORSEHEADS, NEW YORK

PREPARED FOR
CBS CORPORATION
PITTSBURGH, PENNSYLVANIA

CUMMINGS RITER CONSULTANTS, INC.

DRAWING NUMBER 98245B19

REVISION	DATE	DESCRIPTION

DRAWN BY: T.E. McKee DATE: 8-31-99
CHECKED BY: DATE:
APPROVED BY: DATE:

PLOT SCALE: 1=1

98245b12.dwg 12-20-99 4:48:18 pm EST

DRAWING NUMBER 98245B20

SOIL AREA EXCAVATION COORDINATES		
POINT	NORTHING	EASTING
A	786236.04	429024.89
B	786249.17	429025.68
C	786273.32	429054.86
D	786278.83	429087.72
E	786259.14	429090.35
F	786222.92	429055.91

LEGEND:

- EXISTING FENCE
- EDGE OF ASPHALT PAVEMENT
- EXISTING MONITORING WELL LOCATION
- INITIAL EXCAVATION LIMITS OF SOIL EXCEEDING RAO FOR TCE.
- AREA FOR TCE POST-EXCAVATION BOTTOM SAMPLE COLLECTION.

SCALE
0 40 80 FEET

E 428800
E 429000
E 429200
N 786200
N 786000
910.3
911.8
909.3
910.0
909.8
908.8
909.5
910
915
PAVED PARKING AREA
GRAVEL TRUCK STAGING AREA
PAVED ROADWAY
RAILROAD TRACKS
RETAINING WALL
A
B
C
D
E
F

MW-14D
N 786,099.10
E 428,889.70
GROUND ELEV.: 909.68
TOP OF CASING: 912.51

MW-14S
N 786,081.44
E 428,885.82
GROUND ELEV.: 910.97
TOP OF CASING: 913.48

MW-14R
N 786,087.84
E 428,904.57
GROUND ELEV.: 910.73
TOP OF CASING: 913.14

FIGURE 3
SUBSURFACE SOIL EXCAVATION PLAN

KENTUCKY AVENUE WELLFIELD SITE - OU3
HORSEHEADS, NEW YORK

PREPARED FOR
CBS CORPORATION
PITTSBURGH, PENNSYLVANIA

CUMMINGS RITER CONSULTANTS, INC.

DRAWING NUMBER 98245B20

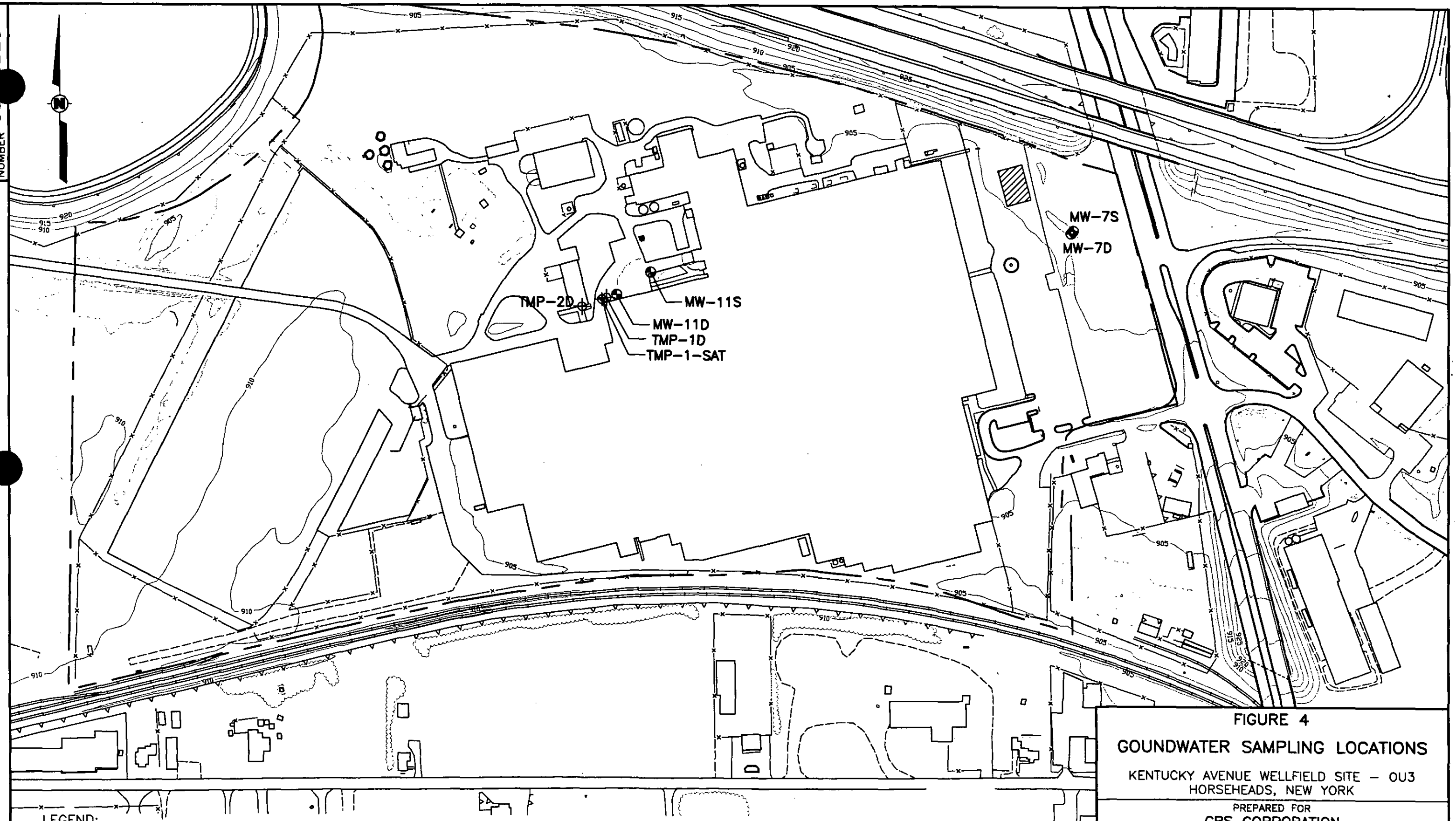
REVISION	DATE	DESCRIPTION

DRAWN BY: T.E. McKee DATE: 8-31-99
CHECKED BY: DATE:
APPROVED BY: DATE:

PLOT SCALE: 1=1

98245b13.dwg 9-1-99 4:26:10 pm EST

DRAWING NUMBER 98245B25



LEGEND:

- APPROXIMATE PROPERTY BOUNDARY (FORMER WESTINGHOUSE FACILITY)
- FENCE
- MW-14D — ON-SITE DEEP MONITORING WELL LOCATION
- BARRIER WELL GROUNDWATER TREATMENT BUILDING
- TMP-1D — MULTI-LEVEL MONITORING POINT
- TMP-1-SAT — SATURATED ZONE MONITORING POINT EX.: TMP-1-SAT

SCALE
0 200 400

REVISION	DATE	DESCRIPTION

FIGURE 4

GOUNDWATER SAMPLING LOCATIONS

KENTUCKY AVENUE WELLFIELD SITE – OU3
HORSEHEADS, NEW YORK

PREPARED FOR
CBS CORPORATION
PITTSBURGH, PENNSYLVANIA

CUMMINGS RITER CONSULTANTS, INC.

DRAWING NUMBER 98245B25

DRAWN BY: T.N. Fitzroy	DATE: 1-28-00
CHECKED BY	DATE:
APPROVED BY:	DATE:

PLOT SCALE: 1

APPENDIX A

REMEDIAL ACTION QUALITY ASSURANCE PROJECT PLAN

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REMEDIAL ACTION QUALITY ASSURANCE PROJECT PLAN KENTUCKY AVENUE WELLFIELD SITE OPERABLE UNIT NO. 3

1.0 INTRODUCTION

This Remedial Action (RA) Quality Assurance Project Plan (QAPP) describes the methods and procedures to be employed for analyses activities to be conducted in conjunction with RA for Operable Unit No. 3 at the Kentucky Avenue Wellfield site in Horseheads, New York. This QAPP has been prepared by Cummings/Riter Consultants, Inc. (Cummings/Riter) in accordance with the requirements of Paragraph VIII of the Consent Decree between CBS Corporation (CBS, formerly Westinghouse Electric Corporation) and the U.S. Environmental Protection Agency (USEPA). The QAPP provides the quality assurance and quality control (QA/QC) requirements for environmental data collection activities as well as for the subsequent steps of data evaluation and management. This document is a companion to the Sampling, Analysis and Monitoring Plan (SAMP) which describes the sampling procedures. Portions of the RA QAPP incorporate corresponding parts of the USEPA approved OU3 Remedial Investigation (RI) QAPP prepared by Phillip, Environmental, Inc.

1.1 OVERVIEW OF ENVIRONMENTAL DATA COLLECTION AND MANAGEMENT ACTIVITIES

During RA at the Kentucky Avenue Wellfield site, additional soil samples will be collected to demonstrate effective removal of affected Disposal Area F soil and treatment of Former Drainage Basin Area soil. Groundwater and air samples will also be collected at the Former Runoff Basin Area to monitor the performance of the soil vapor extraction and air sparging (SVE/AS) system to be installed as part of the RA. During SVE/AS system operation, air streams will be sampled using field screening instruments and for laboratory analysis to determine the concentrations of volatile organic compounds (VOCs). Both the air stream being withdrawn from the subsurface and SVE system emissions will be sampled.

These data will be collected, analyzed, and managed using procedures that ensure the data can be reliably used in decision making. QC is defined as the routine application of procedures for obtaining prescribed standards of performance in the monitoring and measurement process. These procedures include the following:

- Collection of representative samples,
- Preservation of sample integrity,
- Calibration of sampling and analytical equipment,
- Duplication of sample analysis for precision,
- Spiking of samples to evaluate accuracy, and
- Decontamination of equipment.

QA is the review and oversight, at each of the planning, implementation, and completion stages, of an environmental data collection process to assure that the data generated meet the specified quality objectives. The primary QA objective is to develop and implement procedures for sampling, chain-of-custody, laboratory and field analyses, instrument calibration, data reduction and reporting, internal QC audits, preventative maintenance, and corrective action. A QA program is a system of documented checks that ensures the authenticity and validity of the environmental data. The QAPP is an assemblage of management policies, objectives, principles, and procedures by which an agency, laboratory, or company outlines its program to produce data of known and accepted quality.

The activities associated with the collection of physical and chemical data include sampling, analysis, and data manipulation that can affect the validity of data. The environmental data collection activities for the Kentucky Avenue Wellfield site will follow a formal QA program that adheres to the following USEPA guidance:

- *Region II CERCLA Quality Assurance Manual*, USEPA Region II, October 1989;
- *Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans* (QAMS 005/80), December 1980;
- *EPA Requirements for Quality Assurance Project Plans for Environmental Data Operation,* USEPA; and

- *Preparing Perfect Project Plans*, USEPA, 1988.

1.2 PROJECT ORGANIZATION AND RESPONSIBILITY

1.2.1 Project Coordinator

Mr. Richard Smith is the CBS Project Coordinator. Mr. Smith's responsibilities and duties on behalf of CBS and related to the collection, analysis, and management of environmental data are the following:

- Define project objectives and establish project policy and procedures;
- Review and analyze task performance with respect to plan requirements and authorizations;
- Review and approve project deliverables prior to submittal to USEPA;
- Serve as the primary communication link among the USEPA and the Supervising Contractor;
- Supervise QA/QC audits of project activities;
- Approve corrective actions resulting from audits; and
- Coordinate with the Supervising Contractor to ensure compliance with the Remedial Action Work Plan (RAWP) and QAPP.

1.2.2 Supervising Contractor

Mr. Leo Brausch, P.E., is the Supervising Contractor. As Supervising Contractor, Mr. Brausch will conduct the following activities related to the collection, analysis, and management of environmental data:

- Establish and maintain comprehensive project files;
- Review contractor sampling procedures for compliance with the SAMP;
- Review laboratory data packages for compliance with the SAMP; and
- Serve as the primary communication link among the RA construction contractors and the analytical laboratory.

1.2.3 RA Construction Contractors

CBS has identified IT Corporation for design and construction of the SVE/AS system, and GP Environmental Services and Lancaster Laboratories, Inc. for laboratory analytical services. The earthmoving contractor for soil excavation from Disposal Area F has not yet been identified.

Each firm will identify a project manager who will be responsible for overseeing their collection and use of environmental data. In addition, a QA Coordinator (QAC) will be designated by each firm to implement their applicable QA/QC activities. Cummings/Riter will collect the RA soil data related to Disposal Area F. IT Corporation will collect data at the Former Runoff Basin Area and document the performance of the SVE/AS system.

Copies of the laboratory QA/QC plans are available and are maintained in the project files by Cummings/Riter.

1.3 Data Quality Objectives

Data quality objectives (DQOs) are qualitative and quantitative statements that specify the quality of the data required to support decisions made during site-related activities, and are based on the end uses of the data to be collected. Different data uses may require different levels of data quality. Three analytical categories address various data uses and the QA/QC effort and methods required to achieve the desired level of quality. These categories are the following:

- **Screening Data**
  Screening data afford a quick assessment of site characteristics or conditions. This DQO is applied to data collection activities that involve rapid, non-rigorous methods of analysis and QA. It is generally applied to physical or chemical properties of samples, degree of contamination relative to concentration differences, and preliminary health and safety assessment. During RA at the Kentucky Avenue Wellfield site, screening data include measurements using a photoionization detector (PID) in monitoring SVE/AS system operations and soil sample headspace measurements.

- **Screening Data with Definitive Confirmation**
  Screening data will rapidly identify and quantify site conditions, although the quantitation can be relatively imprecise. Definitive

confirmation can be applied to screening data to allow more precise interpretation of these data and to verify less rigorous laboratory-based methods. Quantitative verification is conducted for a select portion of screening sample findings (i.e., 10 percent or more). Air sampling of SVE/AS system operation to "calibrate" PID measurements is an example of this DQO level for RA at the Kentucky Avenue Wellfield site.

- **DEFINITIVE DATA**
  Definitive data are generated using analytical methods, such as approved USEPA reference methods. Data are analyte-specific with confirmation of analyte identity and concentration. Methods produce raw data (e.g., chromatograms, spectra, digital values) in the form of paper printouts or computer-generated electronic files. Sampling and analysis of site soils are examples of this DQO at the Kentucky Avenue Wellfield site. All definitive data collected pursuant to this RA will be Level III (groundwater) or Level IV (soil) quality data, with comprehensive data validation performed in accordance with USEPA data validation guidelines and appropriate Region II modifications to those guidelines.

The intended use and DQO for each area investigated are summarized in Table 1.

1.4 ORGANIZATION OF QAPP

Following this introduction, Section 2.0 describes analysis procedures, including laboratory procedures, sample analysis, calibration, QC, and data management. Section 3.0 describes data reporting. Section 4.0 presents the procedures for auditing and any resulting corrective actions. The methods and procedures to be used in field sample collection and handling are described in the SAMP.

2.0 ANALYTICAL PROCEDURES

2.1 LABORATORY SAMPLE CUSTODY

2.1.1 Laboratory Sample Receipt

Upon receipt at the laboratory, the sample custodian will inspect the samples for integrity, check the shipment against the chain-of-custody, and document any discrepancies on the chain-of-custody form. The laboratory will maintain samples under chain-of-custody at all times.

The laboratory will contact the firm that collected the samples (Cummings/Riter or IT Corporation) to resolve discrepancies. When the shipment and the chain-of-custody are in agreement, the sample custodian will initiate an internal chain-of-custody.

The samples will be logged into the laboratory data system and a unique number will be assigned to each sample. The analyses required are specified by codes assigned to the sample at log-in.

A work order will be created, including a summary of the sample analyses to be completed.

2.1.2 Laboratory Sample Storage

After the samples are labeled, they will be moved to locked refrigerators where they will be maintained at 4° Celsius. Samples to be analyzed for VOCs will be stored separately to minimize the risk of contamination. Access to the refrigerators will be limited to authorized personnel.

Samples and sample extracts will be maintained in secure storage until disposal. Samples will be held for a minimum of 30 days after data submission. The sample disposal date will be noted on the laboratory chain-of-custody by the sample custodian.

2.1.3 Laboratory Document Control

The goal of document control is to assure that documents for a specified project will be accounted for when the project is complete. Document control will begin with the initial client contact and continue throughout the project to include correspondence, faxed information, and phone logs. This information will be kept by the laboratory project manager for the duration of the project. When the project is complete, the information will be filed in the project case file. Internal chain-of-custody forms will be maintained by the sample custodian until sample disposal. Upon sample disposal, the forms will be placed into the project file.

2.2 Calibration Procedures and Frequency

Standards used in the calibration of equipment will be traceable, directly or indirectly, to USEPA-approved reference materials. Standards received will be entered into standard logs. Each analytical group will maintain standard preparation logs that track the preparation of standards used for calibration and QC purposes.

2.2.1 Field Instruments

Field analytical equipment will be calibrated prior to each day's use in accordance with the manufacturer's instructions, and such calibration will be recorded in the field log. Instruction manuals for the operation of field analytical equipment will be available with the equipment.

2.2.2 Laboratory Equipment

Calibration of laboratory equipment will occur as specified for the analytical methods used during the project. Records of instrument calibrations will be maintained by the laboratory.

2.3 Preventative Maintenance

2.3.1 Field Instruments and Equipment

Prior to any field sampling, each piece of field equipment will be checked for proper operation. If the equipment is not operational, it will be serviced prior to use. Meters that require charging or batteries will be fully charged or have fresh batteries. Non-operational field equipment will be either repaired or replaced. Appropriate spare parts

will be maintained for field meters. If instrument servicing is required, the appropriate task manager is responsible for following the maintenance schedule and arranging for prompt service.

2.3.2 Laboratory Instruments and Equipment

Instruments and equipment will be serviced only by qualified personnel. Repairs, adjustments, and calibrations will be documented in the appropriate logbook or data sheet.

Instrument Maintenance: preventative maintenance of laboratory equipment will follow the guidelines recommended by the manufacturer. A malfunctioning instrument will be repaired by in-house staff or through a service call to the manufacturer as appropriate.

The laboratory shall maintain a sufficient supply of spare parts for its instruments to minimize downtime. Whenever possible, backup instrumentation shall be retained.

Analytical equipment is often maintained under a service contract which allows for preventative system maintenance and repair on an "as-needed" basis. In any case, the laboratory shall have sufficient trained staff to allow for the day-to-day maintenance of equipment.

Equipment Monitoring: On a regular basis, the operation of balances, incubators, ovens, refrigerators, and water purification systems will be checked and documented. Any discrepancies will be immediately reported to the appropriate laboratory personnel for resolution.

2.4 ANALYTICAL PROCEDURES

2.4.1 Soil Sample Analysis

Table 2 lists the RA compounds of interest. The specific analytical methods to be employed to demonstrate attainment of soil performance standards are listed in Table 3. The methods for soil attainment demonstration are from the USEPA Contract Laboratory Program (CLP), and will therefore follow the CLP Statement of Work for organic analyses (OLM03.2) and inorganic analyses (ILM04).

2.4.2 Groundwater Sample Analysis

The groundwater data will be analyzed by CLP methods for a select list of VOCs according to SW-846 USEPA Method 8260B by GP Environmental Services of Gaithersburg, Maryland. Method-specific quality control data will be generated by the laboratory as required. Please note that USEPA Method 8260B is the most current update per SW-846 Update III.

2.4.3 Vapor Sample Analysis

Vapor samples collected during the enhanced SVE operation will be analyzed for trichloroethene by CLP analytical methods according to USEPA Method TO-14 by Air Toxics, Ltd. of Folsom, California. Method-specific quality control data will be generated by the laboratory, as required.

2.5 Quality Control Checks

Laboratory duplicates (splits), laboratory blanks, standards, matrix spikes (MS), matrix spike duplicates (MSD), field duplicates, trip blanks, and rinse blanks will be analyzed to provide the means for assessing data quality from both the field and laboratory. Brief explanations of these QC samples follow:

- Laboratory duplicates will be used to measure analytical precision;
- Laboratory blanks will be used to assess reagent quality, background from analytical instruments, as well as analytical variability;
- Reference standards/materials will be used to assess analytical accuracy;
- Field duplicates will be used to assess the overall precision of environmental sampling and laboratory analysis;
- Trip blanks will be used for VOC analyses to measure the effects of storage, field sampling, and transport of the samples; and
- Equipment rinsate blanks (field blanks) will be used to determine the effectiveness of equipment cleaning procedures.

Detailed descriptions, including required frequencies and analytical parameters, of the QC checks for field and analytical data are provided below.

2.5.1 Field Operations

To assess the sample decontamination procedures and the effects of sample handling, trip blanks and equipment rinsate blanks will be performed. Duplicate and replicate sampling will be performed to measure control within the sample collection system.

The trip blank will consist of a set of sample containers filled with certified laboratory grade, analyte-free water. The trip blank sample containers are prepared by the laboratory and will not be opened in the field. One trip blank will be submitted for analysis of select VOCs with each shipping container which includes samples for VOC analysis.

The equipment rinsate will serve as a check on the equipment decontamination process. Analyte-free water will be passed through decontaminated sampling equipment, transferred to a sample bottle, and returned to the laboratory. One equipment rinsate sample will be collected for each decontamination event, not to exceed one per day per sample type per equipment type.

The analyte-free water to be used for trip blanks, equipment rinsate blanks, and decontamination procedures will be demonstrated to be analyte-free water in accordance with the criteria or requirements set forth in USEPA guidance. Documentation confirming the analyte-free nature of each batch of water will be maintained in the project files.

Field duplicates are two samples collected independently at a sampling location during a single act of sampling. A replicate or split sample is a single sample collected then divided in two equal parts. Duplicate soil samples submitted for VOC analysis will be co-located grab samples. Duplicate samples submitted for analysis of other parameters will be split from an aliquot of soil that has been homogenized by coning and quartering. One duplicate sample will be submitted for each 20 samples, and will be analyzed for the same parameters as the corresponding sample. Duplicate samples will be identified uniquely such that the laboratory cannot recognize that the samples are duplicates.

In addition, MS/MSD samples will be collected in the field by submitting triple the normal sample volume from a single sample location. The MS/MSD samples will be spiked by the laboratory as described below, and analyzed for the same parameters as the corresponding sample. One set of MS/MSD samples will be submitted for each 20 samples, and at least one per 14 days of sampling. Soil MS/MSD samples will require no extra sample volume for VOCs or extractable organics. Aqueous samples require triple volume for VOCs.

2.5.2 Laboratory Operations

Method blanks will serve as a measure of contamination attributable to a variety of sources, including glassware, reagents, and instrumentation. The method blank will be initiated at the beginning of an analytical procedure and is carried through the entire process.

For MS/MSD analyses, predetermined quantities of stock solutions of certain analytes are added to the sample prior to digestion and/or analysis. Relative percent differences between the MS and MSD samples are used to assess analytical precision.

Surrogate spikes are organic compounds that have similar properties to those being tested, but are not normally found in environmental samples. They will serve as indicators of method performance and accuracy in organic analyses, and will be added to all blanks and samples subject to VOC and semivolatile organic compound (SVOC) analysis.

Analytical data will be assessed for accuracy, precision, and completeness. Procedures used to assess the data will be in accordance with the appropriate laboratory method.

Laboratory duplicates will serve to measure method precision in inorganic and supplemental analyses.

2.6 QUALITY ASSURANCE OBJECTIVES

The QA objectives for the RA are the same as described in Sections 5.0 and 14.0 of the RI QAPP. Descriptions of accuracy, precision, completeness, representativeness and comparability are provided below, and accuracy and precision objectives are listed in Table 3. Quantitation limits are also provided in Table 3.

2.6.1 Accuracy

Accuracy is defined as the degree of agreement (nearness) of a measurement or the mean of a set of results with an accepted reference or true value. Accuracy is assessed by means of reference samples (spike and spike duplicates) and percent recoveries of these materials. The project objectives for accuracy are to provide data for percent recovery within the guidelines presented in Table 3.

2.6.2 Precision

Precision is the measure of mutual agreement of a set of replicate results among themselves without assumption of any prior information as to the true result. Precision is assessed by means of duplicate/replicate sample analysis and is best expressed in terms of the standard deviation derived under prescribed similar conditions. The project objectives are to generate data for percent variance within the guidelines presented in Table 3.

2.6.3 Completeness

Completeness is a measure of the amount of valid data obtained compared to the amount that was expected to be collected under normal operating conditions. Two completeness objectives will be calculated, one based on the total number of samples collected and the second based on those samples reaching the laboratories intact. The goal for this project is to generate valid data for at least 90 percent of the samples collected and 95 percent of the samples analyzed by the laboratories.

2.6.4 Representativeness

Representativeness expresses the degree to which data accurately and precisely represent a characteristic of a population, a process condition, an environmental condition, or parameter variations at a sampling point. The field QA/QC procedures for sample handling, including chain-of-custody, will provide for sample integrity until the time of

analysis. To make certain that the analytical results of this assessment are representative of true field conditions at the time of sampling, appropriate laboratory QA/QC procedures are prescribed.

2.6.5 Comparability

Comparability expresses the confidence with which one data set can be compared to another. To achieve comparability in this project, the data generated will be reported using consistent units for water and soil samples, respectively.

3.0 DATA REDUCTION, REVIEW, AND REPORTING

3.1 FIELD DATA REDUCTION, REVIEW, AND REPORTING

Information collected in the field through visual observation, manual measurement, or field instrumentation will be recorded in field notebooks, data sheets, or forms. Such data will be reviewed by the appropriate project manager for adherence to this QAPP and consistency of data. Any concerns identified as a result of this review will be discussed with field personnel, corrected if possible, and, as necessary, incorporated into the data evaluation process.

Field logs and related documents will contain:

- Site activities and names of field personnel;
- Date, time, and weather conditions;
- Photo and survey data;
- Sample identities, locations, and time/date of collection;
- Visual description of sampled media;
- Methods/equipment used for sample collection;
- Calibration procedures of field monitoring equipment;
- Readings of field monitoring equipment during sampling activities;
- Deviations from approved sampling or work plans; and
- Other comments and information as necessary.

Entries in field logs will be made in ink and no erasures will be made. If an incorrect entry is made, the information will be crossed out and the correction dated and initialed.

Field data calculations, transfers, and interpretations will be conducted by the field personnel and reviewed for accuracy by the appropriate project managers. Field documentation and data reduction prepared by field personnel will be reviewed by the appropriate project manager. Logs and documents will be checked for the following:

- General completeness,
- Readability,

- Usage of appropriate procedures,
- Appropriate instrument calibration and maintenance,
- Reasonableness in comparison to present and past data collected,
- Correct sample locations, and
- Correct calculations and interpretations.

Where appropriate, field data forms and calculations will be processed and included in appendices to the appropriate report. The original field logs, documents, and data reductions will be kept in the project file at the appropriate contractor's office.

3.2 LABORATORY DATA REDUCTION, REVIEW, AND REPORTING

The calculations to be used for data reduction are specified in each of the analysis methods referenced previously. Whenever possible, analytical data will be transferred directly from the instrument to a computerized data system. Raw data will be entered into permanently bound laboratory notebooks. The data entered will be sufficient to document factors used to arrive at the reported value.

Concentration calculations for chromatographic analyses (VOCs and SVOCs) are based on response factors. Quantitation will be performed using either internal or external standards in accordance with the analytical method.

Inorganic analyses are based on regression analysis. Regression analysis will be used to fit a curve through the calibration standard data. The sample concentrations will be calculated using the resulting regression equations.

Soil values will be reported on a dry-weight basis. Unless otherwise specified, values will be reported uncorrected for blank contamination.

Raw data will be examined to assess compliance with QC guidelines. Surrogate, MS, and QC check sample recoveries will be reviewed, in addition to checking samples for possible contamination or interferences. Concentrations will be checked to ensure that the systems are not saturated; if necessary, dilutions will be performed.

Any deviations from the guidelines will call for corrective action. Those deviations determined to be caused by factors outside the laboratory's control, such as matrix interference, will be noted with an explanation in the report narrative. Calculations will be checked and the report reviewed for errors and oversights.

Once a report is complete, it will be reviewed for discrepancies, errors, or omissions. The data will then be submitted to the laboratory project manager for review. They will review the package, see that any necessary corrections are made, and a copy of the package will be filed in the laboratory project file.

The standard data package for the RA phase at the Kentucky Avenue Wellfield site includes, at a minimum, the following items:

- Narrative,
- Analytical results,
- QC results, and
- Raw data.

Analytical results will be reported according to analysis type, and include the following information, as applicable:

- Sample ID,
- Laboratory ID,
- Date of collection,
- Date of receipt,
- Date of analysis,
- Results (corrected for dilution), and
- Detection limits.

Applicable QC results will be reported as follows:

- Trip blank results,
- Surrogate spike recoveries,
- MS/MSD recoveries,

- Control sample recoveries,

- Duplicate sample results, and
- Method and equipment blank results.

Data packages will include all raw data and related QC data necessary for the performance of data validation in accordance with USEPA guidelines, as modified by Region II.

3.3 REVIEW OF LABORATORY DATA PACKAGES

The project laboratory will perform a review of the data prior to submittal to the project coordinator. After laboratory review, QC data and sample results will be reviewed for validation purposes by an independent data validation service. Level IV soil attainment demonstration data and Level III groundwater data will be validated. No validation of air analysis will be performed. Data validation will be performed by an independent laboratory data validation service, and any inconsistencies or errors will be brought to the attention of the project coordinator for correction. (Please note that the following text is Section 10.2 of the RI QAPP.)

Review of laboratory data packages will include an assessment of compliance with general method guidelines and project-specific requirements. Specifically, this data validation process will include review of the following specific items:

- Comparing data to QA/QC objectives,
- Collecting and reporting field blanks and duplicates,
- Performance results of all necessary field and laboratory instrument calibrations,
- Checking for data outliers,
- Checking for transcription errors,
- Maintenance of sample custody,
- Maintenance of document control,
- Proper preservation of all samples, and
- Sample holding times were observed whenever possible.

The principal criteria that will be used to validate the data integrity during collection and reporting of the data include:

- Verification by the QA/QC Coordinator that all raw data generated have been properly stored and documented in hard copy and the storage locations in the laboratory are coincident with chain-of-custody records;

- Examination of the raw data by the QA/QC Coordinator to verify adequacy of documentation and check the accuracy of calculations;

- Confirmation that calibration standards are within the expected values;

- Reporting of all associated blank, duplicate, spike, standard, and QC data compared with results for analyses of each batch of samples;

- Reporting of all analytical data for samples with no values rejected as outliers because of the completeness goal of 95 percent for the analytical support of this project;

- Data identification checks, including general consistency and outlier checks;

- Unusual event review, including checks for catastrophic events of significant perturbations that may affect accuracy of measurements;

- Deterministic relationship checks that in situ measurements are in agreement with other related data; and

- Data handling checks, including transcription errors.

Data validation will be performed utilizing the following reference materials:

- USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, EPA 540/R-94/013, February 1994;

- USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, EPA 540/R-94/012, February 1994;

- Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd Edition;

- Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd Edition, Final Update I; and

- USEPA Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, March 1983.
- USEPA Contract Laboratory Program Organics Data Review and Preliminary Review, Standard Operating Procedure (SOP) HW-6, rev. 11, June 1996.
- USEPA Evaluation of Metals Data for the Contract Laboratory Program, SOP HW-2, rev. 11, January 1992.

USEPA functional guidelines will provide direction in interpretation of questionable results and operating practices, indicating whether similar situations have resulted in estimated or rejected data points. Groundwater data will not be flagged according to the functional guideline protocols due to the fact that SW-846 methods will be employed for groundwater, not CLP. Application of qualifiers will be determined by the degree of data usability with a comprehensive understanding of the intended project data uses.

The data will be judged by the QC criteria defined in the method of analysis. If a parameter is determined to be outside the method tolerance limit (recovery of a surrogate is less than method specified lower limit), the data will be qualified as recommended in the guidelines.

The laboratory will also be instructed to hold packages open as long as permissible to allow inclusion of as many samples as possible. Packages may contain multiple sets of field QC samples. The validator will be responsible for correlating QC (trip blanks, rinsates, etc.) to appropriate samples.

3.4 PROJECT FILE

Documentation will be placed in a single project file, which will be maintained by Cummings/Riter. This file will consist of the following components:

- Agreements (filed chronologically),
- Correspondence (filed chronologically),
- Memos (filed chronologically), and
- Notes and data (filed chronologically by topic).

Reports (including QA reports) will be filed with correspondence. Analytical laboratory documentation and field data will be filed with notes and data. Filed materials may be removed by authorized personnel on a temporary basis only.

3.5 QUALITY CONTROL REPORTS TO MANAGEMENT

QC reports will be submitted as documentation of compliance with QA/QC objectives. The reports also serve to update the status of the project and to indicate any changes or deviations from the initial plan. Items to be included in the reports include the following:

- Changes to this QAPP;
- Summary of QA/QC programs;
- Results of systems and performance audits;
- Significant QA/QC problems, recommended solutions, and results of corrective action;
- Data quality assessment;
- Evaluation of compliance with DQOs and the resulting impact on decision making; and
- Limitations on the use of measurement data.

3.6 USEPA REPORTING

A copy of results of laboratory analyses conducted as part of the RA will be provided to the USEPA Project Coordinator and the New York State Department of Environmental Conservation (NYSDEC) Project Coordinator within 21 days of receipt of final data by CBS. In addition, the QA/QC reports which evaluate the laboratory data and sampling and analytical procedures used for each sample will also be provided to the USEPA Project Coordinator within 21 days of receipt by CBS.

4.0 AUDITS AND CORRECTIVE ACTION

Laboratory and field work conducted as part of the project may be subject to performance and systems audits. Performance audits check the operation of a specific study component such as a sampling method or an analytical procedure. Systems audits are broader and include a thorough evaluation of both laboratory and field QA methods, such as data validation procedures, corrective action procedures, or sample custody procedures. Audits may be internal (conducted by QA personnel within the organization being audited) or external (conducted by the USEPA or another outside agency).

Audits are randomly scheduled by QA personnel and are generally not announced beforehand. If QA personnel find what seems to be a systematic problem with a particular component of the sampling and analysis program, they will normally perform a series of audits on related activities to identify and correct the problem. Audit results are incorporated into the project reporting system, normally in the monthly report.

4.1 LABORATORY AUDITS

CBS may conduct an independent audit of the project laboratories to verify analytical capability and compliance with the QAPP. In addition, the project laboratories can demonstrate their capabilities through the analyses of performance evaluation samples supplied by the USEPA. The performance evaluation sample analyses will be performed at the request of the USEPA.

4.2 FIELD AUDITS

Internal performance and systems audits of field activities at the Kentucky Avenue Wellfield site will be coordinated by the Supervising Contractor. If the Supervising Contractor deems necessary, a field audit will be conducted to verify that the project sampling procedures are being correctly followed.

A checklist will be prepared based on information contained in the QAPP. Using the checklist, auditors will evaluate whether field personnel are operating in compliance with procedures specified in these plans, including:

- Equipment calibration,
- Field documentation,
- Sample collection,
- Sample labeling, handling, and custody,
- Data collection and record keeping, and
- Equipment and personnel decontamination.

Audit reports will be submitted to the USEPA and the NYSDEC. The report will summarize the audit findings, including deficiencies which adversely affect the data. Any corrective action taken will also be included in the report.

TABLES

TABLE 1
SAMPLING SUMMARY AND DATA QUALITY OBJECTIVES

SAMPLE MEDIUM	DESCRIPTION	PARAMETERS	DATA QUALITY OBJECTIVE
Soil	Post-Excavation Sampling of Disposal Area F Soils	Arsenic, TCE, and Target PAHs [a]	Definitive data
	Post-SVE/AS Treatment of Former Drainage Basin Area	TCE	Definitive data
Air	Influent air stream (composite) – Performance Monitoring	Target VOCs [b]	Definitive data
	Influent air stream (composite), individual SVE wells, between carbon canisters, and effluent – Performance Monitoring	VOCs	Screening data
	SVE system emissions – Performance Monitoring	Target VOCs	Definitive data
Groundwater	Former Drainage Basin Area	Target VOCs	Definitive data

a. Target PAHs - benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene.
b. Target VOCs - benzene; chloroethane; 1,1-dichloroethylene; cis-1,2-dichloroethylene; trans-1,2-dichloroethylene; trichloroethylene; and vinyl chloride.

TABLE 2
RA COMPOUNDS OF INTEREST

AREA	CATEGORY	PARAMETERS
Disposal Area F Soil	PAHs	Benzo(a)anthracene; Benzo(a)pyrene; Benzo(b)fluoranthene; Indeno(1,2,3-cd)pyrene
	Metals	Arsenic
	VOCs	TCE
Former Runoff Basin Area Soil	VOCs	TCE
Former Runoff Basin Area Groundwater	VOCs	Benzene; Chloroethane; 1,1-DCE; cis-1,2-DCE; trans-1,2-DCE; TCE; Vinyl chloride

TABLE 3
ANALYTICAL METHODS, QUANTITATION LIMITS, AND DATA QUALITY OBJECTIVES

Parameter	Analytical Method		Quantitation Limit		QC Limits - Water		QC Limits – Soil	
	Water	Soil	Water (µg/l)	Soil (µg/kg)[a]	Precision	Accuracy	Precision	Accuracy
Volatile Organics: Benzene	8260B	CLP – OLM03.2	1	10	69-123	20	66-142	21
Chloroethane	8260B	CLP – OLM03.2	2	10	54-130	20	NA	NA
1,1-DCE	8260B	CLP – OLM03.2	1	10	61-145	20	59-172	22
cis-1,2-DCE	8260B	CLP – OLM03.2	2	10	69-134	20	NA	NA
trans-1,2-DCE	8260B	CLP – OLM03.2	1	10	67-132	20	NA	NA
TCE	8260B	CLP - OLM03.2	1	10	68-129	20	62-137	24

TABLE 3
ANALYTICAL METHODS, QUANTITATION LIMITS, AND DATA QUALITY OBJECTIVES

Parameter	Analytical Method		Quantitation Limit		QC Limits – Water		QC Limits - Soil	
	Water	Soil	Water (µg/l)	Soil (µg/kg)[a]	Precision	Accuracy	Precision	Accuracy
Vinyl chloride	8260B	CLP – OLM03.2	2	10	45-139	20	NA	NA
PAHs: Benzo(a)anthracene	8270	CLP - OLM03.2	10	330	33-143	23	NA	NA
Benzo(a)pyrene	8270	CLP – OLM03.2	10	330	17-163	30	NA	NA
Benzo(b)fluoranthene	8270	CLP - OLM03.2	10	330	24-159	27	NA	NA
Indeno(1,2,3 cd)pyrene	8270	CLP - OLM03.2	10	330	1-171	37	NA	NA

TABLE 3
ANALYTICAL METHODS, QUANTITATION LIMITS, AND DATA QUALITY OBJECTIVES

Parameter	Analytical Method		Quantitation Limit		QC Limits - Water		QC Limits - Soil	
	Water	Soil	Water (µg/l)	Soil (µg/kg)[a]	Precision	Accuracy	Precision	Accuracy
PCBs:								
Aroclor-1016	8082	CLP -	1	33	46-114	24	30-150	25
Aroclor-1221	for all	OLM03.2	1	67	NA	NA	NA	NA
Aroclor-1232		For all	1	33	NA	NA	NA	NA
Aroclor-1242			1	33	NA	NA	NA	NA
Aroclor-1248			1	33	NA	NA	NA	NA
Aroclor-1254			1	33	NA	NA	NA	NA
Aroclor-1260			1	33	57-130	26	30-150	25
Metals: Arsenic	--	CLP – ILM04.0	--	2000	--	--	75-125	20

a. Soil quantitation limits listed are based on wet weight for low level concentrations. Actual quantitation limits will be based on dry weight and may be higher.

CUMMINGS RITER CONSULTANTS, INC.

CONSTRUCTION QUALITY ASSURANCE PROJECT PLAN
KENTUCKY AVENUE WELLFIELD SITE
OPERABLE UNIT NO. 3

PREPARED FOR:

CBS CORPORATION
11 STANWIX STREET
PITTSBURGH, PA 15222

PROJECT NO. 98245.10/03
JANUARY 31, 2000

339 Haymaker Road • Parkway Building • Suite 201 • Monroeville, PA 15146
(412) 373-5240 • FAX (412) 373-5242 • E-Mail: crc@nb.net

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CUMMINGS RITER

CONSTRUCTION QUALITY ASSURANCE PROJECT PLAN
KENTUCKY AVENUE WELLFIELD SITE
OPERABLE UNIT NO. 3

1.0 INTRODUCTION

This Construction Quality Assurance Project Plan (CQAPP) describes the methods and procedures to be used for field monitoring and construction quality assurance to be conducted in conjunction with remedial action (RA) for Operable Unit No. 3 at the Kentucky Avenue Wellfield site in Horseheads, New York. The RA will include construction of a soil vapor extraction/air sparging (SVE/AS) system to address Former Runoff Basin Area soil and excavation of Disposal Area F soil exceeding performance standards. This CQAPP has been prepared by Cummings/Riter Consultants, Inc. (Cummings/Riter) in accordance with the requirements of Paragraph D.5.b of the Statement of Work attached to the Consent Decree between CBS Corporation (CBS, formerly Westinghouse Electric Corporation) and the U.S. Environmental Protection Agency (USEPA). The objective of this CQAPP is to ensure that the completed project meets or exceeds design requirements, including both performance and technical specifications.

Quality assurance (QA), in the context of this CQAPP Plan, is defined as the planned and systematic actions necessary to provide adequate confidence that design requirements are met. This includes the continuing evaluation of the quality control (QC) program through inspections, verifications, audits, and evaluations of the means employed to control and measure the quality of the constructed component. QA will also include the initiation of corrective measures when necessary.

This CQAPP has been prepared in accordance with USEPA *Technical Guidance Document: Construction Quality Assurance for Hazardous Waste Land Disposal Facilities* (EPA/530-SW-86-031, October 1986) and includes five primary elements:

- Responsibility and authority,
- QA personnel qualifications,
- Inspection and certification of the work,

- Sampling requirements,
- Field performance and testing requirements, and
- Documentation.

Responsibility and authority and personnel qualifications are discussed in Sections 2.0 and 3.0, respectively. Sections 4.0, 5.0, and 6.0 describe the monitoring activities, sampling strategies, and documentation requirements, respectively.

2.0 RESPONSIBILITY AND AUTHORITY

Responsibility and authority are delineated in this CQAPP to establish the lines of communication and assign tasks to qualified personnel. This quality management structure is designed to establish an effective decision-making process during RA implementation. The principal parties involved in QA of the RA construction include the project coordinator, supervising contractor, construction manager (CM) and QA official, and remedial construction contractors. Lines of authority and communication between the parties involved in QA are illustrated on Figure 1. The following sections describe the general responsibilities and authorities of each of these parties with regard to QA. The responsibility and authority of a given party may be modified or expanded as dictated by specific project needs during construction.

2.1 PROJECT COORDINATOR

Mr. Richard Smith is the CBS Project Coordinator. Mr. Smith is responsible for remedial design and RA construction. Accordingly, Mr. Smith has the authority to select and dismiss parties charged with QA and construction activities, and to accept or reject reports and recommendations of the Supervising Contractor. Mr. Smith's responsibilities and duties, on behalf of CBS, related to construction QA are the following:

- Define project objectives and establish project policy and procedures;
- Review and analyze task performance with respect to plan requirements and authorizations;
- Review and approve project deliverables prior to submittal to USEPA;
- Serve as the primary communication link between the USEPA and the Supervising Contractor;
- Supervise QA/QC audits of project activities;
- Approve corrective actions resulting from audits; and

- Coordinate with the Supervising Contractor to ensure compliance with the Remedial Design (RD) Work Plan (Cummings/Riter, April 26, 1999) and QAPP.

2.2 SUPERVISING CONTRACTOR

Mr. Leo Brausch, P.E., is the Supervising Contractor. Mr. Brausch is thoroughly familiar with the available site data, design requirements, and performance specifications set forth in the Consent Decree. During construction, Mr. Brausch will observe and monitor RA activities to ensure compliance with this CQAPP, and will coordinate the efforts of the CM/QA Official.

2.3 DESIGN ENGINEER

Cummings/Riter has performed remedial design for excavation and off-site disposal of Disposal Area F soil. IT Corporation (IT) has provided the remedial design of the SVE/AS system for the Former Runoff Basin Area. For their respective components of the work, Cummings/Riter and IT will provide technical assistance to CBS, as needed, in evaluating or modifying elements of the design due to unforeseen site conditions or changes in construction methodology. Any modifications to the design will be implemented only with the consent of both CBS and USEPA.

2.4 CONSTRUCTION MANAGER AND QA OFFICIAL

Cummings/Riter has been retained by CBS as the CM and QA Official. Cummings/Riter is an environmental engineering consulting firm with experience in construction quality assurance and quality control, particularly on remediation projects involving soil excavation and removal, and treatment system construction. Cummings/Riter will assign technically qualified personnel to the project, including a project manager and QA construction engineer.

Mr. William Smith, P.E., will be the Project Manager for Cummings/Riter. He will have overall responsibility for all aspects of QA and construction management. Mr. Smith has over 18 years' experience in engineering design, evaluation, implementation and QA of soil

and drum removals, landfill caps, and treatment systems. He has been involved in numerous soil excavation and removal projects and projects involving treatment system construction.

Mr. Smith will be responsible for issuing a certification after completion of the work. The certification will indicate that SVE/AS and soil removal activities were conducted in accordance with the plans and specifications and that the constructed product meets the intent of the design and applicable performance standards. The certification will be signed and sealed by Mr. Smith and submitted to the USEPA.

Mr. Bruce Geno will serve as the Supervising Engineer for Cummings/Riter. Mr. Geno has eleven years' experience in engineering design, construction, and QA. He has served as the QA supervising engineer and construction monitor for five soil excavation and removal projects, and two projects involving treatment system construction.

Throughout the construction period, Cummings/Riter personnel will observe construction operations, review sampling and testing results, and document site activities. The CM and QA Official will be responsible for the following:

- Verifying that the contractor's practices and supporting documentation are in accordance with this CQAPP;
- Scheduling and coordinating construction inspections;
- Inspecting the construction work to assure compliance with the design;
- Verifying that any corrective measures are implemented;
- Reviewing and approving project modifications;
- Confirming that any on-site testing equipment is suitable and the appropriate equipment has been properly calibrated;
- Confirming that off-site laboratories used for testing materials are qualified for such work and that such laboratories are independent subcontractors;

- Confirming that test data and inspection information have been properly documented; and

- Providing the Supervising Contractor with construction QA updates and identifying work that should be corrected or rejected.

As CM and QA Official, Cummings/Riter will also establish and maintain comprehensive project files. Resumes for Messrs. Smith and Geno are included in Appendix A.

2.5 REMEDIAL CONSTRUCTION CONTRACTORS

CBS has selected IT as the remedial construction contractor for the SVE/AS system in the Former Runoff Basin Area. IT designed and conducted the pilot scale SVE/AS treatability study, and will convert components of the pilot scale system into full-scale operation.

The Remedial Construction Contractor selected for excavation of Disposal Area F soils is yet to be named. The successful contractor will have completed health and safety training courses in accordance with U.S. Department of Labor, Occupational Safety and Health Administration (OSHA) regulations under 29 Code of Federal Regulations (CFR) 1910.120, and will be experienced in earthwork.

Fagan Engineers, P.C. (Fagan) has been retained to provide surveying services for the metes-and-bounds description of Disposal Area F and the Former Runoff Basin Area. Fagan will provide a professional surveyor licensed in the state of New York for these services.

Analytical services will be contracted to Quanterra for soil and groundwater samples, and to Lancaster Laboratories, Inc. for vapor samples collected in conjunction with SVE/AS operation monitoring. Transportation and disposal services will also be directly contracted to CBS, but providers have not yet been identified.

The contractors are responsible for QC during construction and are required to establish and maintain effective QC systems. QC systems shall consist of plans, procedures, and organization necessary to produce an end-product that complies with contract and design requirements.

The contractors are responsible for performing the work in strict accordance with the design using the necessary construction procedures and techniques. Contractor personnel will coordinate their work with QA personnel. Specific contractor responsibilities include the following:

- Maintaining a continuous line of communication with Cummings/Riter QA personnel to identify and discuss field issues as they arise;
- Providing shop drawings and other submittals (e.g., catalog cuts, delivery tickets) to confirm that the technical specifications are being met;
- Performing QC testing as required in the technical specifications and providing these results to QA personnel;
- Identifying potential design/construction issues as early as possible to allow resolution in a manner that will not impact project performance or the construction schedule; and
- Maintaining an on-site supervisory presence during construction, start-up and initial testing.

Any conflicts between the QA personnel and the contractors regarding the scope of work or performance requirements will be resolved by the Supervising Contractor prior to commencing the task in question.

3.0 REVIEW OF TECHNICAL SUBMITTALS

For some elements of construction, the technical specifications require the contractor to prepare technical data and submit this information for review. The objective of this requirement is to monitor the contractor's understanding of the design and prevent any misinterpretation of the technical specifications that may otherwise impact the design objectives or construction schedule. The submittal of technical data, also referred to as "shop drawing" submittals, encompasses many elements of the construction activity. Typical submittals that are required as part of the technical specifications include material samples; manufacturer's literature describing the component; dimensioned engineering drawings of the component showing sizes, widths, weights, connections, etc.; installation drawings; operating descriptions; layout drawings; detail drawings; and electrical interconnections. A list of project submittals is included as Table 1. Because the SVE/AS system and building are being designed and constructed on a turnkey basis, submittal and approval of shop drawings (i.e., beyond the approved design submittals) is not needed for these components of the work.

The shop drawing review process is an essential activity for QA/QC monitoring before construction is initiated. The contractor's submittal of a shop drawing constitutes his representation that he has determined and verified quantities, dimensions, field construction criteria, materials, model numbers, and similar data. In addition, it demonstrates that he has reviewed or coordinated each shop drawing with the requirements of the technical specifications (including QA/QC requirements) and design drawings.

Shop drawings will be reviewed by the CM/QA Official to determine general compliance with the design drawings and technical specifications. Submitted data are reviewed and classified by the CM/QA Official as follows:

1. "Reviewed and Accepted" if no objections are observed or comments made;

2. "Reviewed and Noted" if minor objections, comments, or additions are made but resubmittal is not considered necessary;

3. "Resubmit" if the objections, comments, or additions are extensive (in this case, the contractor would resubmit the items after correction); and

4. "Rejected" if the submittal under consideration is not, even with reasonable revision, acceptable or when the data submitted are not sufficiently complete to establish compliance with the design drawings and technical specifications.

4.0 MATERIALS AND EQUIPMENT TESTING

In addition to the review of technical data, there are also several requirements in the technical specifications involving specific testing of materials and equipment. In some cases, this testing requirement can be performed by the supplier, while in other instances the testing is required once the component is on site or has been installed. Testing of select material and equipment provides additional assurances that the component has been properly manufactured, installed, and/or coordinated with other components of construction. Specific to SVE/AS construction, building erection, and soil removal at the Kentucky Avenue Wellfield site, the following testing/inspections are required:

- Certified soils laboratory report for proposed backfill materials;
- Analytical laboratory report for proposed backfill materials;
- Agronomic test report for proposed topsoil material;
- Inspection of pipe and appurtenances upon delivery and prior to installation;
- Slump test results for reinforced concrete;
- Sieve analysis of fine and coarse aggregates;
- Plant certification of bituminous concrete pavement;
- Granular activated carbon unit performance testing;
- Inspection of electrical work by a representative of the local authorities having jurisdiction. Certification of compliance with the National Electric Code to be submitted;
- Testing of electric motors in accordance with National Electric Manufacturer's Association (NEMA) standards, as applicable;

- Testing of wire and cable when in-place but before final connections are made;
- Coordination and calibration of instrumentation components; and
- Field tests of miscellaneous electrical controls.

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5.0 ON-SITE INSPECTION

The QA personnel from Cummings/Riter will provide the needed on-site observation and will have the following roles in implementing QA/QC procedures for SVE/AS system construction and soil excavation/removal:

- Record any observed on-site activities that could result in noncompliance with the design documents and report these activities to the Supervising Contractor;
- Collect post-excavation soil samples from Disposal Area F;
- Document field and laboratory testing at the frequency established in the design;
- Delineate areas of non-conformance with the QA/QC requirements based on the results of field and laboratory testing;
- Visually observe construction materials such as soils and pipe delivered to the site to determine general conformance with material specifications;
- Observe and record procedures used for excavation and backfilling to required elevations and compaction;
- Observe and record procedures for placement of clean fill and bedding soil;
- Record any on-site activities that could result in damage to the quality of the construction product; and
- Maintain routine communications with the various remedial construction contractors.

Checks will be performed to assure continuing compliance with contract requirements (including QC testing) until completion of the particular feature of work. Each check performed will be made a matter of record in the QC documentation. Final follow-up checks will be conducted and deficiencies corrected prior to the start of additional

features of work that may be affected by the deficient work. The contractor will not build upon or conceal non-conforming work. Follow-up investigations and compliance checks will be necessary if any of the following occur:

- The quality of ongoing work is unacceptable;
- There are changes in the assigned contractor QC staff or in the on-site production supervision or work crew;
- Work on a definable feature is resumed after a substantial period of inactivity; or
- Other problems develop.

6.0 PROJECT MODIFICATIONS

During the course of construction, modifications may be identified to enhance design performance, improve constructability, or provide better value. The procedures to be employed in the review and approval of any identified modification depend on the significance and magnitude of the change with respect to the overall project. A Field Design Change Request Form (Appendix B) will be completed for each proposed project modification. The three types of modifications are defined as follows:

- **PROCESS-RELATED MODIFICATIONS**
  Proposed design or construction changes that could affect the performance of the Former Runoff Basin Area SVE/AS treatment system or remediation of Disposal Area F soil.

- **OTHER DESIGN MODIFICATIONS**
  Proposed changes to construction components which do not have the potential of affecting attainment of performance standards, but nonetheless require detailed engineering evaluation and approval.

- **MINOR MODIFICATIONS**
  Proposed changes for constructability that do not have the potential of affecting the SVE/AS system or achievement of soil performance standards and require minimal engineering review.

Any Process-Related Modifications to the design will be prepared, as directed by the Supervising Contractor, and presented to the USEPA for review and approval. No Process-Related Modifications will be undertaken without prior USEPA approval. After USEPA approval, the modification will be forwarded to the appropriate contractor(s) for inclusion in the work.

Other Design Modifications may be made from time to time throughout the project to improve constructability or increase value. These modifications will be initiated by the Supervising Contractor, Design Engineer, or the Remedial Construction Contractor(s) as

value engineering changes. Other Design Modifications will be evaluated by the Supervising Contractor, and the USEPA will be notified of any such design modifications.

In addition, the contractor may institute Minor Modifications at the direction of the Supervising Contractor or Design Engineer. In this case, the Supervising Contractor will work closely with the Remedial Construction Contractor to continuously record any changes or modifications to the design drawings or specifications. Minor Modifications will be initiated without prior notification of the USEPA. Documentation of Minor Modifications will be by the as-built record drawings.

7.0 PROJECT MEETINGS

Periodic project meetings will be held during the course of the work to provide a mechanism for QA/QC information transfer and resolution of uncertainties or deficient work. Types of meetings include the following:

- Preconstruction meeting,
- Progress meetings, and
- Resolution and work deficiency meetings.

7.1 PRECONSTRUCTION MEETING

A preconstruction meeting will be held at the site prior to construction to be attended by the responsible parties, including the Supervising Contractor, the Design Engineers, the CM/QA Official, and the contractors' supervisory personnel. USEPA representatives will be invited to the preconstruction meeting. The preconstruction meetings for SVE/AS installation and Disposal Area F soil removal will be conducted together. QA/QC agenda items for the preconstruction meetings will include, but will not be limited to, the following:

- Responsibilities of each organization;
- Lines of authority and communication for each organization;
- Protocols for observations and tests;
- Protocols for handling construction deficiencies, repairs, and retesting;
- Methods for documenting and reporting inspection data;
- Methods for distributing and storing documents and reports;
- Work area security and safety protocols;
- Any appropriate modifications of the CQAPP to verify that site considerations are addressed;
- Contractor submittals; and
- Procedures for the protection of materials and for the prevention of damage from inclement weather or other adverse effects.

Required preconstruction submittals will be made prior to or during the preconstruction meeting. At the time of the preconstruction meeting, the convened parties will conduct a site walk-around to verify that acceptable design criteria, plans, and specifications are understood and to review material and equipment storage locations.

7.2 PROGRESS MEETINGS

Progress meetings will be held biweekly during construction. At a minimum, the meetings will be attended by the contractor(s) actively engaged in site work, Design Engineers, and the CM/QA Official. The purpose of these meetings is to review project schedule, status, and any potential construction problems.

7.3 RESOLUTION AND WORK DEFICIENCY MEETINGS

Resolution and work deficiency meetings will be held, as necessary, to address the following:

- Define and discuss the uncertainty, problem, or deficiency;
- Review alternate solutions;
- Implement a plan to resolve the uncertainty, problem, or deficiency; and
- Discuss procedures to verify that a resolution has been reached and that the uncertainty, problem, or deficiency has been corrected.

Resolution and work deficiency meetings will be attended by the CM/QA Official, Design Engineer, and representatives of those contractors involved.

7.4 SUMMARY OF MEETINGS

A summary of each meeting will be prepared by the CM/QA Official. The summary will become a part of the project file.

8.0 PROJECT COMPLETION AND DOCUMENTATION

8.1 COMPLETION INSPECTION

Based on the Supervising Contractor's and the Design Engineer's concurrence that the work of any of the Remediation Construction Contractors is nearing substantial completion, that contractor's manager, the Supervising Contractor, and CM/QA Official will conduct a detailed inspection. This inspection will be performed at least 14 days prior to the final inspection.

The work will be inspected for conformance to plans, specifications, quality, workmanship, and completeness. The CM/QA Official will prepare an itemized list of work not properly completed, inferior workmanship, or work not conforming to plans and specifications. The list will also include outstanding or incomplete administrative items such as as-built drawings, operation and maintenance manuals, and spare parts. The list will be included in the QA documentation and submitted to the Supervising Contractor and contractor with an estimated date for correction of each deficiency within five working days after conducting this inspection.

8.2 FINAL INSPECTIONS

The final inspection for any contractors' work will be formally scheduled at a date and time agreed to by USEPA, the Supervising Contractor, the CM/QA Official, and the contractor(s). This notice of inspection must include the contractor's assurance that specific items previously identified to the contractor as unacceptable will be acceptably corrected by the date scheduled for the final inspection. If, during the final inspection, the Supervising Contractor or CM/QA Official identifies deficient or incomplete work performed under the contract, the CM/QA Official will develop a list of such work and will subsequently furnish this list to the contractor and Supervising Contractor. The contractor will be responsible for correcting items identified on the final inspection list and arranging for a follow-up inspection.

8.3 PROJECT DOCUMENTATION

Each contractor will maintain current records of QC operations, activities, and tests performed, including the work of subcontractors and suppliers. These records will be on an acceptable form and will include factual evidence that required QC activities and/or tests have been performed, including, but not limited to, the following:

- Identification of subcontractors and their areas of responsibility;
- Weekly work reports;
- Identification of testing or QC activities performed with results and references to specification/plan requirements;
- Identification of deficiencies noted along with corrective action proposed and/or implemented;
- List of material received with statement as to its acceptability and storage;
- Identification of submittals reviewed with contract reference, by whom, and action taken;
- Evaluations of job safety stating what was checked, results, and instructions or corrective actions;
- Conflicts in plans and/or specifications; and
- Statement of verification from the contractor.

These records will indicate a description of work on the project, weather conditions, and any delays encountered. These records will cover both conforming and deficient features and will include a statement that equipment and materials incorporated in the work and workmanship comply with the contract. The original and one copy of these records will be furnished to the CM/QA Official within three workdays following the week covered by the report. Reports need not be submitted for days on which no work is performed. The report from the contractor's QC manager will include copies of test reports and copies of reports prepared by subordinate QC personnel.

8.4 NOTIFICATION OF NONCOMPLIANCE

The CM/QA Official will alert the contractor to any detected noncompliance with the foregoing requirements. If noncompliance is relatively minor and amenable to quick resolution, the CM/QA Official may notify the contractor verbally, providing the contractor the opportunity to rectify the noncompliance without further formality. If the noncompliance is major, the CM/QA Official will notify the contractor in writing. The contractor will, after receipt of such notice and acknowledgment in writing, immediately take corrective action. Such notice, when delivered to the contractor at the site of the work, will be deemed sufficient for the purpose of notification. The contractor will be responsible for promptly implementing any necessary corrective action to bring the construction into compliance.

8.5 CERTIFICATION DOCUMENTATION/SUMMARY REPORT

Documentation of the construction QA activities will be compiled by the CM/QA Official and used in preparation of the Certification of Completion as defined in Paragraph XIV of the Consent Decree. The Certification of Completion will be signed by the CM/QA Official and Supervising Contractor. As-built drawings will be provided by the CM/QA Official based on data provided by the contractor.

TABLE 1

LIST OF CONTRACTOR SUBMITTALS

TABLE 1
LIST OF CONTRACTOR SUBMITTALS
HORSEHEADS, NEW YORK

SUBMITTAL	TO BE SUBMITTED	
	PRIOR TO CONSTRUCTION	DURING CONSTRUCTION
Health and Safety Plan	x	
List of Subcontractors and Facilities for Waste Disposal	x	
Borrow Material Analytical Results		x
Borrow Material Grain-Size Analysis		x
Topsoil Agronomic Test Results		x
SVE/AS Trench Compaction Test Results		x
Seed Certificate of Analysis		x
Fertilizer Label		x
Bituminous Asphalt Plant Certificate of Compliance		x
Processed Gravel Base Coarse Certificate of Compliance		x
PVC Pipe Catalogue Cut Sheets	x	
PVC Valve Catalogue Cut Sheets	x	
Cast-In-Place Concrete Slump and Air Entrainment Test Results		x
Cast-In-Place Concrete Strength Test Results		x
Concrete Vapor Barrier Catalogue Cut Sheet	x	
SVE Blower Catalogue Cut Sheets	x	
AS Compressor Catalogue Cut Sheets		
SVE/AS Controller Catalogue Cut Sheets		
Remediation Shed Electrical Distribution Drawing		x

FIGURE 1

RA PROJECT ORGANIZATION

DRAWING NUMBER 98245B6

PROJECT COORDINATOR
CBS CORPORATION
RICHARD K. SMITH
- CORPORATE OVERSIGHT
- EPA INTERFACE
- BUDGET AND SCHEDULE MANAGEMENT

SUPERVISING CONTRACTOR
LEO M. BRAUSCH, P.E.
- PROJECT BUDGET AND SCHEDULE MANAGEMENT
- TECHNICAL OVERSIGHT
- EPA INTERFACE
- IDW MANAGEMENT
- CONTRACTOR MANAGEMENT

CUMMINGS/RITER CONSULTANTS, INC.
WILLIAM C. SMITH, P.E.
- CONSTRUCTION MANAGEMENT
- CONSTRUCTION QUALITY ASSURANCE

DISPOSAL AREA F RA CONTRACTOR

TRANSPORTATION AND DISPOSAL CONTRACTORS

IT CORPORATION
NICHOLAS A. HASTINGS
- SVE/AS CONSTRUCTION
- SVE/AS SYSTEM OPERATION

LANCASTER LABORATORIES, INC.

FAGAN ENGINEERS, P.C.
STANLEY CRISS
- SURVEYING

QUANTERRA
BARBARA HALL
- ANALYTICAL LABORATORY

FIGURE 1

RA PROJECT ORGANIZATION

KENTUCKY AVENUE WELLFIELD SITE – OU3
HORSEHEADS, NEW YORK

PREPARED FOR
CBS CORPORATION
PITTSBURGH, PENNSYLVANIA

CUMMINGS RITER CONSULTANTS, INC.

DRAWING NUMBER 98245B6

REVISION	DATE	DESCRIPTION

DRAWN BY: T.N. Fitzroy DATE: 1-25-00
CHECKED BY: DATE:
APPROVED BY: DATE:

PLOT SCALE: 1

APPENDIX A

RESUMES

WILLIAM C. SMITH, P.E.
PROJECT MANAGER
CUMMINGS/RITER CONSULTANTS, INC.

Mr. Smith has 13 years of experience on solid and hazardous waste projects. He has participated in the remedial programs for more than 25 NPL projects and numerous industrial facilities. His responsibilities have included work plan preparation, planning and supervising remedial investigations, serving as a field office manager, authoring feasibility studies, preparation of remedial action plans, and technical negotiations with state and federal agencies. He has prepared engineering designs, plans, specifications and cost estimates for several remedial construction projects. Mr. Smith has also provided on-site construction monitoring services at sites involving hazardous materials.

EDUCATION

Graduate Studies, Civil Engineering, University of Pittsburgh
B.S., Civil Engineering, University of Pittsburgh, 1982

REGISTRATIONS/CERTIFICATIONS

Professional Engineer: Pennsylvania and Delaware
Health and Safety Training in accordance with OSHA Regulations 29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response"
Cardiopulmonary Resuscitation and First Aid, American Red Cross

PROFESSIONAL EXPERIENCE

AUGUST 1993 TO PRESENT — **REGIONAL PROJECT MANAGER, CUMMINGS/RITER CONSULTANTS, INC.**

Mr. Smith serves Cummings/Riter as regional manager based in Newark, Delaware. He is responsible for all assessment, investigation, design and construction monitoring/CQA activities performed by staff in that office. He is currently managing the remedial construction activity for the groundwater, soil and surface water remediations at the Koppers Company, Inc. Superfund site. This project involves designing and permitting a groundwater treatment facility, treatment of surface water, NPDES permitting, and wetlands reconstruction. Soil treatment at this site will utilize an innovative technique (base catalyzed dechlorination) for the removal of pentachlorophenol and dioxin from soils.

Mr. Smith is managing the RD/RA for the Blosenski Landfill Superfund site. This project involves both landfill capping and groundwater treatment. The landfill cap was designed by Cummings/Riter and is currently under construction with Cummings/Riter

performing construction monitoring and CQA. Predesign studies are underway for the groundwater pump and treat system. Mr. Smith is also responsible for the investigation and assessment of a 70-acre Superfund landfill site in Kent County, Delaware. Recently, he completed the remediation of a petroleum contaminated former industrial facility in Wilmington, Delaware.

1985 TO AUGUST 1993 **ASST. PROJECT ENGINEER TO BRANCH MANAGER/PROJECT MANAGER PAUL C. RIZZO ASSOCIATES, INC.**

Mr. Smith served as the manager of Paul C. Rizzo Associates' Delaware Valley Operations located in Newark, Delaware. He was responsible for the development and supervision of substantial site characterization programs under both RCRA and CERCLA. These programs included soil and subsurface investigations and geophysics.

Mr. Smith was responsible for predesign investigations, slope stability analysis, and design activities for the Army Creek Landfill Superfund site cap construction. This project involved a value engineering review of the government's design and resulted in a redesign of the cap and grading plan to save the PRPs approximately $3 million. This project consisted of a 52-acre multi-layer synthetic cap and associated E&S control structures, and approximately 350,000 cubic yards of engineered fill.

For the DS&G Superfund site, Mr. Smith was responsible for all aspects for the design of the Inert Area cap and the Drum Disposal Area slurry wall, including technical negotiations, value engineering reviews, predesign investigations, plans, specifications, design analysis report, and the cap construction work plan.

For the U.S. Army Corps of Engineers' Lackawanna Refuse Superfund site capping project in Old Forge, Pennsylvania, Mr. Smith had a major role where he was responsible for the development of conceptual design costs and construction schedules. During the final design phase, he was involved with the cost estimating of the project and was also responsible for coordinating the engineering design and specifications preparation. Specifications were developed and written for construction activities unique to this project.

Mr. Smith supervised the site characterization and design, and prepared the permit application for a proposed 300-acre sanitary landfill expansion project in Salem, Ohio. This landfill expansion involved characterizing shallow underground mine voids beneath one of the expansion areas and developing a mine void remediation program such that the area could be utilized for landfill expansion. This project also involved designing transitions from older fill areas to new expansion cells which were lined with leachate collection. The final capping configuration had to take into account that the landfill was

located within the flight path of the local airport and had to meet FAA requirements for a clear flight path. The permit included data to support a technical equivalency application for liner material.

Mr. Smith served as project engineer for several other sanitary landfill projects in Ohio. These projects included:

- Design of a 900-acre sanitary landfill in Poland, Ohio.
- Site characterization and design for a landfill expansion near Akron, Ohio. This project involved assessing adjacent properties for suitability in landfill expansion and the evaluation of shallow groundwater to meet liner separation regulations.
- A slurry wall investigation and design for the alignment of a proposed slurry wall at a sanitary landfill in Solon, Ohio.
- Preparation of explosive gas monitoring plans for the sanitary landfill in Solon, Akron, and Salem, Ohio.

Mr. Smith served as project manager for a CERCLA removal of 1,000 cubic yards of lead contaminated soil from a packaging facility in a residential/light industrial area in Wheeling, West Virginia. This was a fast-track CERCLA removal project due to regulatory constraints. Of particular note is that within four months of project award USEPA Region III approved the Remedial Action Work Plan, QAPP and Sampling and Analysis Plan; the remediation work was bid and a remediation contractor selected; delineation of excavation areas was performed; approval was obtained for waste disposal; and contaminated soil was removed and disposed of. Post-excavation samples documented lead levels remaining below action level, thus the site was restored and the closure report was submitted. Overall, the project proceeded smoothly with few regulatory comments or problems.

Other activities with which he has been involved include:

- On-site supervision of remediation activities involving drum excavation and removal, conducting geophysical surveys, drum characterization, and approval of remediation contractor charges.

- Project coordination and management of the RI/FS for the Tonolli Corporation NPL site in eastern Pennsylvania.

- Conducted environmental assessments of properties to determine potential environmental liabilities for several industrial clients. Mr. Smith coordinated the field activities and draft/final report preparation for these sites, including a confidential site in Attica, New York.

- Design and construction supervision of an emergency methane cutoff trench and gas venting system for a Pittsburgh area landfill.

- Design and preparation of plans/specifications for a RCRA surface impoundment closure and cap in North Carolina.

- Supervised the investigation of a TCE-contaminated underground fire water reservoir in Ithaca, New York. The investigation involved drilling and analyzing core samples of the concrete walls to evaluate the extent of TCE penetration.

1982 TO 1985 **ENGINEER**
NUS CORPORATION

During his three years with NUS, Mr. Smith coordinated remedial investigations and feasibility studies and prepared reports for abandoned hazardous waste sites under the USEPA's Superfund program. These studies identify applicable technologies and combine them into site-specific remedial alternatives. These alternatives undergo preliminary design and cost estimates and are then evaluated with the goal of determining which is the most cost-effective solution. Mr. Smith also worked in a soil laboratory performing geotechnical testing and compatibility tests to determine what effects various industrial wastes had on the permeability of proposed soil liners for waste disposal.

CONTINUING EDUCATION

Subsurface Monitoring Technology, Sanitary Landfill Gas and Leachate Management, University of Wisconsin, Extension.
Landfill Lining Systems: Design and Installation, Lehigh University,
Introduction to Professional Practice, ASFE-IPP

AFFILIATIONS

American Society of Civil Engineers
Consulting Engineers Council of Delaware
Delaware State Chamber of Commerce

PUBLICATIONS

Mr. Smith co-authored three technical papers concerning the design and construction of remedial measures. These papers were presented at Superfund '87 and Superfund '88 in Washington, D.C. He co-authored and presented a technical paper at the 1992 Caribbean Haztech Conference in San Juan, Puerto Rico on the topic of resource recovery of lead from spent battery case material.

BRUCE GENO
PROJECT SUPERVISOR
CUMMINGS/RITER CONSULTANTS, INC.

Mr. Geno's educational background is in civil/geotechnical and environmental engineering. His ten years of professional experience have focused in environmental design, corrective measures studies/feasibility studies, geotechnical design, cost estimating, and construction monitoring. He has provided field oversight for construction and subsurface investigation activities and has conducted multimedia sampling programs for numerous hazardous waste sites. Mr. Geno has also created work plans and design documents, erosion and sedimentation control plans, performed slope stability analyses, and has prepared construction specifications and drawings.

EDUCATION

M.S., Civil/Geotechnical Engineering, Massachusetts Institute of Technology, 1989
B.S., Environmental Science, Middlebury College, 1985

REGISTRATIONS/CERTIFICATIONS

Health and Safety Training in accordance with OSHA Regulations 29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response"
Standard First Aid, including Cardiopulmonary Resuscitation - American Red Cross

PROFESSIONAL EXPERIENCE

DECEMBER 1994 TO PRESENT — **PROJECT SUPERISOR, CUMMINGS/RITER CONSULTANTS, INC.**

Activities performed at Cummings/Riter include construction oversight for surface water, groundwater and soil remediation projects; preparation of work plans and design documents for soil, surface water and groundwater remediation projects; preparation of NPDES permit applications for storm water discharges and surface discharge of treated groundwater. Mr. Geno has prepared construction packages and related sampling, quality assurance, and bid documents; prepared erosion and sedimentation control plans; and has provided construction monitoring and/or oversight for voluntary cleanup and state and USEPA-led Superfund projects in six states. Mr. Geno has also prepared for agency review and approval. Responsibilities have included contract preparation and bid review/clarification; contractor procurement and scheduling; quality assurance inspection, documentation and reporting; coordination of field design changes with construction contractors and lead agencies; invoice and change order review, negotiation and approval; coordination of property access with private, corporate, and public entities; and scheduling and conducting construction and certification inspections with state and federal representatives. Mr. Geno has provided construction oversight and remedial action documentation for contracts with values up to $2.6 million involving excavation

and off-site treatment, groundwater treatment system construction, in situ soil vapor extraction, earthmoving over soft sediments, and landfill cap construction. Several such projects have occurred in sensitive residential areas.

JULY 1993 TO DECEMBER 1994 **TECHNICAL SPECIALIST - CIVIL ENGINEERING**
ENSR CONSULTING AND ENGINEERING

While at ENSR Mr. Geno created plans and design documents for the excavation and on-site incineration of soil and sludge containing polynuclear aromatic hydrocarbons and polychlorinated biphenols at a Superfund site in Pennsylvania. Design documents included an erosion and sedimentation control plan, a sampling and analysis plan, an operation and maintenance plan, a field sampling plan, a construction quality assurance/quality control plan and a remedial action contingency plan. He evaluated groundwater constant-rate pump test results for hydrogeologic characterization and prepared an alternatives array document for a coal tar manufacturing facility feasibility study addressing soils, sediments, perched groundwater and a confined aquifer. Mr. Geno also prepared detailed cost estimates for the following projects:

- Various soil excavation and removal actions, including underground storage tank closures. Costs were all-inclusive, addressing analytical costs, water management, excavation, transportation, costs for several treatment and disposal options, and backfill.

- Groundwater pump and treat systems and a soil vapor extraction system for remediation of a deep sand aquifer. Estimate included breakdown of direct and indirect capital costs and operation and maintenance costs for a phased remedial approach. The design included a shallow SVE well for soil remediation and carbon treatment for organics removal.

- Remediation of a shallow fractured bedrock aquifer with artesian conditions. Extraction consisted of a groundwater cutoff trench parallel to a nearby stream. Groundwater flow was modeled to estimate flow rates and influent concentrations. Carbon treatment costs were compared to chemical oxidation with ultraviolet catalyzation.

JULY 1990 TO JULY 1993 **ASSISTANT PROJECT ENGINEER**
PAUL C. RIZZO ASSOCIATES, INC.

Mr. Geno performed the following tasks while at Paul C. Rizzo Associates:

- **ENVIRONMENTAL DESIGN**
  - ***Major CERCLA Landfill Cap Design - Pennsylvania:*** Performed slope stability analyses of existing and proposed slopes, designed regraded slopes, selected cap components, designed seep collection systems and drainage layer collection and discharge, and prepared

construction specifications and drawings. Construction was performed in stages, necessitating proper sequencing for erosion and sedimentation control and slope stability.

- ***CERCLA Land Disposal Design - Pennsylvania:*** Designed landfill for on-site disposal of industrial wastes at a former manufacturing facility, performed geotechnical analysis of a disposal unit, prepared geotechnical and geosynthetics construction quality control plans and geosynthetics construction specifications.

- ***Groundwater Treatment System Design - Maryland:*** Prepared construction specifications and drawings for groundwater extraction, treatment, and reinjection system. Groundwater was treated with an air-stripper with vapor phase carbon for off-gas treatment.

- **CORRECTIVE MEASURES STUDIES/FEASIBILITY STUDIES**
  - Feasibility study for an NPL site in central Pennsylvania. Soils and the fractured bedrock aquifer were impacted with volatile organic compounds (industrial solvents).

  - Feasibility study for an NPL site surface and subsurface soils, wetlands, surface water and groundwater impacted as a result of land disposal of industrial sludges and drummed wastes.

  - Feasibility study for a municipal waste landfill within the floodway of, and discharging leachate to, the Susquehanna River.

  - Corrective measures study for an industrial waste landfill closed due to RCRA Part B permit denial. Groundwater and surface water were impacted by three unlined disposal units. Remedial measures evaluated included slurry walls, improved caps, gradient control wells with groundwater treatment, and excavation with redisposal in a lined landfill cell on site.

JULY 1989 TO JULY 1990 **ENGINEER**
GOLDBERG-ZOINO AND ASSOCIATES

While at Goldberg-Zoino and Associates Mr. Geno designed and performed geotechnical investigations for highways, new building construction, and renovations of existing construction. Designs included tieback walls with soldier piles and lagging, reinforced slopes, and building foundations. Analyses performed included settlement of new construction, settlement of existing foundations due to new construction, slope stability and bearing capacity. He also provided construction oversight for retail space, underground structures and general site work.

APPENDIX B

FIELD DESIGN CHANGE REQUEST FORM

FIELD DESIGN CHANGE REQUEST FORM
KENTUCKY AVENUE WELLFIELD SITE
HORSEHEADS, NEW YORK

Request No.

Type of Change:

Process Related Modification

Other Design Modification

Minor Modification

Contractor: _____
Work Scope: _____
Applicable Specification Section: _____
Applicable Drawing No.: _____

Subject: _____
Estimated Cost: _____

Design Change Request:

_____
_____
_____
_____
_____

Reason for Design Change Request:

_____
_____
_____
_____
_____
_____

Accepted by:

_____
Signature of Construction Manager

_____
Date

Accepted by:

_____
Signature of Contractor Representative

_____
Date

CUMMINGS RITER

CUMMINGS
RITER
CONSULTANTS, INC.

HEALTH AND SAFETY/CONTINGENCY PLAN
REMEDIAL ACTION OVERSIGHT
KENTUCKY AVENUE WELLFIELD SITE
OPERABLE UNIT NO. 3

PREPARED FOR:

CBS CORPORATION
11 STANWIX STREET
PITTSBURGH, PA 15222

PROJECT NO. 98245.10/03
JANUARY 31, 2000

339 Haymaker Road • Parkway Building • Suite 201 • Monroeville, PA 15146
(412) 373-5240 • FAX (412) 373-5242 • E-Mail: crc@nb.net

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CUMMINGS RITER

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HEALTH AND SAFETY/CONTINGENCY PLAN
REMEDIAL ACTION OVERSIGHT
KENTUCKY AVENUE WELLFIELD SITE
OPERABLE UNIT NO. 3

1.0 INTRODUCTION

1.1 SCOPE AND OBJECTIVES

This document specifies the health and safety requirements and procedures to be implemented for site personnel engaged in field activities during source control remedial action (RA) at the former Westinghouse Electric Corporation (Westinghouse) plant site in Horseheads, New York. This work, which is being performed under the terms of a consent decree entered between the U.S. Environmental Protection Agency (USEPA) and CBS Corporation (CBS, successor by corporate name change to Westinghouse), comprises a portion of Operable Unit No. 3 for the Kentucky Avenue Wellfield Superfund Site.

The purpose of this Health and Safety/Contingency Plan (HSCP) is to protect the project employees and public from potential exposures during activities involving impacted soils and water. The remedial design (RD) and the Construction Quality Assurance Project Plan describe the activities to be performed. Specific construction activities include installation of an enhanced soil vapor extraction and air sparging (SVE/AS) system in the Former Runoff Basin Area and excavation and disposal of Disposal Area F soils. Installation of the SVE/AS system will include trenching, mechanical assembly, electrical work, and erection of a small building to house the treatment system components. Excavation and off-site disposal of Disposal Area F soils will require excavation, loading of long-haul trucks, decontamination of construction equipment, and backfilling the finished excavation.

The elements of this HSCP include procedures for personnel protection, medical surveillance program requirements, training requirements, and decontamination. The

primary hazards presented by site activities are the physical hazards posed by working around heavy construction equipment.

This HSCP has been developed to define procedures to be employed by Cummings/Riter Consultants, Inc. (Cummings/Riter) personnel and to establish overall site requirements. CBS will contract for remediation construction firms to implement RA. Each remediation construction contractor will be required to prepare its HSCP for its respective portion of the work. The plan prepared by each RA contractor must endorse the provisions of this HSCP and meet applicable regulatory requirements, including U.S. Department of Labor, Occupational Health and Safety Administration (OSHA), regulations (29 CFR 1910 and 1926). For example, CBS will retain Fagan Engineers (Fagan) to assist in post-remediation surveying work for the metes-and-bounds description and mapping of Disposal Area F for use, as needed, in deed notification in accordance with Paragraph 9 of the Consent Decree. The Fagan health and safety plan is attached to this HSCP (Appendix A) and incorporates by reference all relevant health and safety procedures and information provided herein. Cummings/Riter, in its role as site construction manager, will monitor contractor health and safety program implementation.

1.2 TERMINOLOGY AND DEFINITIONS

The following terms are used throughout this plan:

- **HSCP:** Health and Safety/Contingency Plan.
- **HSO:** Health and Safety Officer, the senior Cummings/Riter person responsible for overall project health and safety program development and implementation.
- **HSR:** Health and Safety Representative, the on-site person from each RA contractor responsible for day-to-day implementation of health and safety procedures.
- **Area Monitoring:** Monitoring of airborne contamination in a work area with instruments.
- **Contamination Reduction Zone:** Area external to exclusion zone where contamination is removed from protective clothing.

- **Exclusion Zone:** Area where no one is allowed without protective clothing and training.

Other acronyms used in this plan are defined at their first use.

2.0 PROJECT ORGANIZATION

The project managers and site coordinator will be responsible for seeing that site work is carried out in accordance with the procedures described by RD and the RA Work Plan (RAWP). The HSCP will specifically be implemented through an integrated team effort of the following key Cummings/Riter personnel:

- Site Coordinator - Mr. Bruce Geno
- Project Health and Safety Officer (HSO) - Mr. Kenneth Bird
- Project Manager - Mr. William Smith

The duties of the Project HSO are the following:

- Develop, implement, update as appropriate, and enforce the HSCP;
- Monitor the health and safety practices of RA contractors;
- Provide continuing health and safety support, as needed; and
- Review results of air monitoring and accident reports to formulate corrective response, as needed.

Each RA contractor will designate its on-site Health and Safety Representative (HSR). The HSR will have the necessary training and experience to implement the HSCP provisions applicable to the work of that contractor. The HSR is responsible for safety of its company employees and subcontractors at the work areas during all remedial activities. Each HSR must meet the following minimum qualifications:

- Possess demonstrable experience in developing and implementing health and safety programs at hazardous waste sites,
- Possess at least one year's experience in construction safety techniques and procedures, and
- Have a working knowledge of applicable occupational safety and health regulations.

The HSR or a designated representative shall be present in the work areas during work hours, and the HSR, and/or alternate must be certified in first aid/CPR by the Red Cross or equivalent organization.

The HSR is responsible for assuring that all air monitoring, equipment calibrations, and data reporting are completed in accordance with the air monitoring program. If the provisions of this HSCP are not implemented to the satisfaction of the HSR, the HSR will stop work and will not allow work to resume until corrective action has been initiated.

The HSCP prepared by each RA contractor will present its internal organizational structure that sets forth lines of authority, responsibility, and communication. The HSCP will identify the remediation contractor's key health and safety personnel, including its corporate health and safety officer and HSR and will specify the scope of duties of these personnel.

3.0 HAZARD EVALUATION

RA site activities will present potential exposure to hazardous constituents and conditions. The primary RA oversight tasks are as follows:

- Soil excavation, truck loading, and excavation backfilling in Disposal Area F,
- SVE/AS system construction in the Former Runoff Basin Area,
- Post-excavation soil sampling (Disposal Area F),
- Groundwater and post-remediation soil sampling (Former Runoff Basin Area), and
- Surveying.

These or very similar activities have been safely completed in the past at the Kentucky Avenue Wellfield site during the course of Operable Unit No. 2 RA and interim remedial measures at the former Westinghouse plant site. A summary of past investigation results for the Former Runoff Basin Area and Disposal Area F follows.

3.1 PAST RESULTS

3.1.1 Former Runoff Basin Area

A storm water runoff basin consisting of an oval-shaped depression was formerly located north and west of the main plant building. Prior to its filling in 1961, this area occupied about 0.66 acre. Demolition debris, soil, and other relatively inert materials were reportedly used to fill the basin. The area is now covered by lawn, pavement, and small structures. A 7,500-gallon above ground tank, used for storage of chlorinated solvents, was located in this area at one time.

Composite soil samples were collected before the remedial investigation (RI) from various depths in the Former Runoff Basin Area. Volatile organic compounds (VOCs) and semivolatile organic compounds, including trichloroethylene (TCE) and polycyclic aromatic hydrocarbons (PAHs), were detected in soil samples. Arsenic, cadmium, chromium, copper, lead, nickel, and zinc were also detected.

In the RI, a ground penetrating radar survey did not indicate the presence of any buried objects in the Former Runoff Basin Area. Soil borings did not encounter any inherently waste-like material other than a few thin layers of cinders. Chemicals of potential concern (COPCs) identified for subsurface soils in the Former Runoff Basin Area included TCE, dibenzofuran, PAHs, polychlorinated biphenyls (PCBs), and metals. TCE was detected in 43 of 59 samples analyzed for VOCs with a maximum concentration of 79 milligrams per kilogram (mg/kg).

Data collected during the 1999 RD SVE/AS pilot study are summarized in Table 1. These data, which are considered the most representative of constituents and circumstances that could lead to human health exposure during RA, show TCE and related VOCs in the extracted air stream and shallow groundwater.

3.1.2 Disposal Area F

Plant records indicate that, from about 1971 or 1972 through 1974, TCE still bottoms and degreaser sludges were placed in shallow (two to three feet deep) trenches at Disposal Area F. Although plant records show a smaller size, the disposal area, based on the presence of fill materials encountered during test pit excavation, generally measures about 100 by 150 feet in plan in the southwestern portion of the site. Other wastes placed in Disposal Area F may have included polyvinyl alcohol/water solutions, waste solvents, paints, waste phosphors, and pumice.

Disposal Area F is now generally grass covered and remnants of asphalt pavement and shallow, trench-like depressions are evident. This area is surrounded by construction fencing and plant personnel are prohibited from unauthorized entry.

Results of analyses of pre-RI composite soil samples from Disposal Area F indicated the presence of arsenic, cadmium, chromium, copper, lead, nickel, silver, zinc, benzene, and TCE. Test pits excavated during the RI identified various waste materials at Disposal Area F, including coal and tar-like materials. Debris, rubble, and ash were encountered at some locations in the test trenches. Groundwater was encountered at a depth of between 11 to 12.5 feet below ground surface.

COPCs identified in surface and subsurface soils in Disposal Area F include TCE, PAHs, two chlorinated pesticides (dieldrin and heptachlor epoxide), PCBs, and metals. TCE was detected in both surface soil samples and 31 of 37 subsurface soil samples analyzed for VOCs, with a maximum concentration of 11 mg/kg.

Surface and subsurface soil data collected during the 1999 pre-design investigations are summarized in Table 2. USEPA split soil sample data are provided in Table 3.

3.2 HAZARDS

The overall hazard rating is low based on the concentration of the compounds previously detected in the groundwater and soil and on the site tasks to be performed during RA. With proper air monitoring and emissions controls, project activities are not expected to result in unacceptable off-site exposure.

Some safety hazards are the result of the work itself. The use of heavy equipment to perform excavation and drilling activities poses potential physical hazards to workers. Protective equipment can impair a worker's mobility, hearing and vision. Site personnel will be instructed to constantly look for potential safety hazards and to remain clear of heavy equipment wherever possible. When working in the vicinity of excavators, trucks, or other heavy equipment, workers will maintain sight contact with the operator and use hand signals to facilitate communication. Buried utilities will be located and marked before beginning drilling or excavation activities. RA contractors will address additional hazards specific to their respective construction tasks.

Several potentially hazardous materials (i.e., hexane, nitric acid, and Alconox detergent) will be used during the decontamination of sampling equipment. The Alconox will be diluted with water prior to use, and small quantities of hexane and nitric acid (less than ten milliliters) will be used for decontamination. Material Safety Data Sheets for these compounds are in Appendix B.

4.0 MEDICAL SURVEILLANCE REQUIREMENTS

Site personnel involved with potential exposure to impacted media must be participants in a medical monitoring program in accordance with 29 CFR 1910.120. The exam must indicate no medical restrictions that would inhibit personnel from performing the required work tasks. Copies of certifications for site personnel will be sent to the Project HSO and maintained in each firm's project files.

5.0 PERSONAL PROTECTIVE EQUIPMENT

5.1 LEVEL OF PROTECTION

Personal protective equipment (PPE) was selected based on the hazard evaluation and the types of activities to be performed. The initial level of protection for all project activities will be Level D. The basic Level D PPE for all activities is as follows:

- Work clothes,
- Latex gloves or heavy work gloves,
- Hardhat,
- Safety work boots/shoes, and
- Safety glasses or goggles.

In addition to this basic work uniform, some project activities will require supplemental PPE:

- **SAMPLING ACTIVITY**
  Soil and groundwater sampling will be performed at Level D protection with the addition of rubber boots or disposable boot covers. During groundwater sampling, disposable Tyvek overalls will also be worn.

- **EQUIPMENT DECONTAMINATION**
  Equipment decontamination will be performed at Level D protection, with the addition of rubber boots or disposable boot covers and disposable Tyvek overalls. If an upgrade in protection was required during the sampling event, decontamination will be performed at the upgraded level.

- **SVE/AS SYSTEM OPERATION**
  During SVE/AS system operation, PPE to be worn inside the treatment building will consist of Level D with hearing protection, if interior noise levels exceed 85dBA.

If required by encountered site conditions, the PPE level will be upgraded to Level C. An upgrade in protection to Level C will include the following respiratory and dermal protection:

- Full-face air purifying respirator with GMC-H organic vapor/acid gas high efficiency particulate filter cartridge,
- Latex inner gloves,
- Safety work boots/shoes,
- Hardhat,
- Nitrile outer gloves, and
- Liquid-resistant Tyvek coverall.

5.2 Modification for Personal Protection Requirements

Modifications will be made on the basis of site monitoring or as other site as conditions may warrant. These modifications will be documented and approved by the responsible HSR. The Project HSO will be notified as soon as possible following any required upgrade.

5.3 Site Control

To reduce the spread of contamination and control the flow of personnel and materials into and out of the work area, the contractor will establish work zones within the work area, including exclusion zones, contamination reduction zones, and support zones, as appropriate. The RA contractors will clearly lay out and identify the work zones in the field and limit equipment, operations, and personnel in the zones.

5.4 Hazard Controls

The RA contractors' HSCP will detail the control measures that will be used by each contractor to reduce the potential hazards identified in the site hazard evaluation. These controls may consist of engineering controls, such as watering to reduce dust, administrative controls, such as locating the support zone upwind of the excavation areas, and PPE to reduce the potential for exposure. The initial requirements for PPE are those specified above in Section 5.1, with the provisions for upgrading or downgrading these requirements based on monitoring results. For the SVE/AS system installation, the RA contractor's HSCP must also include discussions of lockout, tag-out procedures for electrical equipment service and confined space entry procedures, as applicable.

6.0 MONITORING EQUIPMENT

A photoionization detector (PID) (HNu with 10.2 eV probe or equivalent) will be used during disturbance of potentially impacted soil (i.e., drilling and sampling). Dust monitors (MiniRAM or DataRAM) will be used during excavation of Disposal Area F soils. This equipment is intended to be used to provide warning and allow appropriate action to be taken to prevent exposure from contaminants released into the atmosphere. The air monitoring equipment will be calibrated daily prior to initiating on-site work activities. Calibration records will be entered on the attached daily calibration record form (Appendix C) and maintained separately.

7.1 DISPOSAL AREA F AND FORMER RUNOFF BASIN AREA

7.1.1 VOC Monitoring

Before initiating any intrusive on-site activities, baseline (background) ambient air quality monitoring in the work areas and perimeter for organic vapors will be conducted using a PID. During active work periods at each work area, and at established work zone perimeter monitoring stations, real-time air monitoring will be performed at least every two hours, or as required by the HSO (including worker breathing zone). In addition, PID readings shall be collected at least four times per day at the site perimeter, downwind and upwind of the work area.

If sustained VOC concentrations exceed background levels in the worker's breathing zone during Level D activities, personnel protection will be upgraded to Level C in accordance with Section 5.0. If sustained VOC concentrations in the work area exceed 5 (ppm) above background levels, continuous monitoring will be instituted at the site perimeter. If sustained VOC concentrations exceed 5 ppm at the site perimeter, work will be stopped and monitoring continued. Work will resume in accordance with provisions outlined in the Vapor Emission Response Plan of the New York State Department of Health Community Air Monitoring Plan.

7.1.2 Particulate Monitoring

Before initiating any intrusive on-site activities at Disposal Area F, the HSO, or his designee, will perform baseline (background) ambient air quality monitoring in the work areas and perimeter for particulates using a real-time particulate monitor.

During active work periods at the work area and at established perimeter monitoring stations, continuous real-time air monitoring will be performed. Perimeter air monitoring locations will be selected in the field depending on the wind direction.

The results of particulate monitoring will be compared to OSHA permissible exposure levels (PEL). The applicable PELs are 0.01 milligrams per cubic meter (mg/m^3) for arsenic, 0.2 mg/m^3 for PAHs, and 15 mg/m^3 for total dust. Airborne dust action levels were calculated based on the highest reported arsenic and PAH concentrations in previously collected soil samples (89.5 mg/kg and 1,060 mg/kg, respectively). Real time monitoring for airborne arsenic and PAH concentrations are not currently possible.

However, the monitoring instruments provide total dust concentrations. The project-specific air monitoring levels based on PAH and arsenic-laden dust is 17 mg/m^3; consequently, the OSHA permissible total dust level of 15 mg/m^3 will dictate because it is the lower of the two. If particulate concentrations in the work area exceed 15 mg/m^3 above background (the action level), worker PPE will be upgraded to Level C (with particulate filter cartridges) in accordance with Section 5.0.

If downwind particulate levels are 150 micrograms per meter cubed ($\mu g/m^3$) greater than upwind levels, engineering controls (e.g., water suppression) will be required at the source to reduce particulates.

7.2 DATA LOGGING

Real-time analysis readings shall be logged and recorded as to location, time, type of monitoring equipment and summarized values of each reading. Copies of daily log sheets shall be included with the daily field activity report for the project file. The following real-time monitoring data will be recorded:

- Date and time of monitoring;
- Instrument, model number, serial number, or appropriate identification;
- Calibration and background levels;
- Type of measurement: breathing zone, point source, worst case, perimeter, work zone;
- Results of monitoring;
- HSR signature; and
- Interpretation of the data and any further recommendations by the HSO.

8.0 STANDARD OPERATING PROCEDURES

The following standard operating procedures (SOPs) will be required for all personnel involved in on-site project activities:

- The "buddy system" will be used during the performance of potentially dangerous activities.
- Eating, drinking, chewing gum or tobacco, smoking or any other practice which increases the potential for hand-to-mouth transfer and ingestion of material is strictly prohibited during sampling activities. Areas will be designated for such activities.
- Potential contamination avoidance should be practiced. Wherever possible, personnel should not walk or sit in potentially contaminated areas.
- Personnel must adhere to the information contained in this HSCP.
- A safety meeting is mandatory before initiating work and periodically thereafter, as needed.
- For Cummings/Riter personnel this plan incorporates, by reference, the policies and procedures established by Cummings/Riter's Corporate Health and Safety Program. (Other contractors are expected to impose a similar requirement for their personnel.)

8.1 SITE ENTRY PROCEDURES

Prior to performance of on-site activities related to this HSCP:

- Each HSR must review the contents of this HSCP with RA contractor personnel who will be on site and answer any questions regarding its content.
- The air monitoring equipment will be checked and calibrated.
- Personnel will follow plant sign-in procedures while on the plant property (daily).

- Personnel will dress out in the appropriate level of protection at the work area.

The maximum number of workers on plant property is anticipated to be less than 20 at any one time.

8.2 SITE EXIT PROCEDURES

Prior to leaving the plant property:

- Personnel shall undergo personal decontamination.
- Personnel shall ensure that the work area and equipment are secured.
- Personnel shall follow plant sign-out procedures (each time they leave the plant property).

9.0 DECONTAMINATION

Personnel working at the project site may become impacted in a number of ways:

- Contacting vapors, gases, mists, or particulates in the air;
- Being splashed by impacted materials;
- Walking through puddles or liquids or on impacted soil; and
- Using impacted instruments or equipment.

Protective clothing and respirators help prevent the wearer from becoming impacted or inhaling constituents, while good work practices help reduce the contamination of protective clothing, instruments, and equipment.

Even with these safeguards potential exposure remains. Harmful materials can be transferred into clean areas exposing unprotected personnel. To prevent such occurrences, decontamination procedures have been developed and will be implemented.

The extent of required decontamination measures depends on the following factors:

- Type of contaminants,
- Amount and concentration of contamination,
- Levels of protection worn,
- Reason for leaving impacted zone, and
- Work function.

The wide variation of site activities and exposure potential does not allow for the use of one general constituent reduction procedure; instead, several procedures will be used depending on the activity. These procedures are described in the following sections.

9.1 EQUIPMENT

Any vehicle working in the exclusion zone will be cleaned with a high-pressure, hot-water spray before leaving the site. Each piece of equipment will be inspected after

cleaning for any soil or sludge remaining on the tires or elsewhere by the HSR. Vehicles that were used in the exclusion zone will be cleaned to the satisfaction of the HSR or his designated assistant prior to leaving the site.

9.2 PERSONNEL

The project area will have an area for the workers to don, store, and remove protective equipment. Prior to removal of protective equipment, personnel will remove constituents from boots, gloves, and disposable suits in the contamination reduction zone. A soap wash followed by a water rinse will be sufficient in most cases.

The disposable coveralls will be placed in double plastic bags for disposal. If other protective equipment is thoroughly impacted, the HSR may decide to dispose of this equipment rather than to try to clean the equipment.

Personnel will wash hands and face following removal of protective clothing. Personnel wash-water residues will be collected, treated (if necessary), and properly disposed of.

10.0 SITE-SPECIFIC TRAINING

This section specifies the minimum requirements for project-specific training for project employees. Each HSR will instruct employees in proper material handling techniques; proper methods for the use, storage and disposal of decontamination fluids; preventative maintenance of safety equipment; personal hygiene practices; and PPE.

The training program will provide instruction for site employees on responding effectively to an emergency. The appropriate response to fire, explosions, and the shutdown of operations will be reviewed. Project employees will be instructed as to the proper response to field monitoring results. Emergency procedures, areas of the site that have restricted access, methods used for project decontamination, and general safety will also be covered in the training.

The project-specific training program will cover the following topics:

- Site history,
- Project organization,
- Explanation of effects of toxic chemicals identified at the site,
- Requirements of personal protection (e.g., respirators, etc.),
- Prohibited actions or procedures,
- Safety precautions,
- Emergency procedures,
- Decontamination procedures,
- Work area, and
- Air monitoring program.

Applicable plant emergency procedures for the facility will be described by a plant representative. Prior to working on site, replacement employees will be required to receive the initial training given by the HSR.

Records of personnel attendance at training sessions will be maintained on site. In addition, the on-plant project employees will be instructed on the facility security and safety program. Applicable portions of the plant facility emergency program will be followed by the project team.

Each HSR will be responsible for verifying that project personnel have the sufficient training and experience required by their job function and responsibility.

Safety meetings will be held by the HSR to discuss safety problems, changes in site conditions, monitoring results, or other safety-related topics. Attendance lists, including signatures and topics discussed, for safety meetings will be maintained.

11.0 REPORTS AND RECORD KEEPING

Records of health and safety activities for the RA will be maintained by Cummings/Riter and other firms. The records will document air monitoring levels, exposure levels, protective equipment worn, incidents, medical monitoring, and training.

11.1 LOGS AND REPORTS

The HSR shall maintain logs and reports covering the implementation of the HSCP. Typical reports include the following:

- **TRAINING LOGS (SHALL BE COMPLETED FOR BOTH INITIAL TRAINING AND REFRESHER TRAINING)**
  - Employee signatures,
  - Topics covered,
  - Materials used,
  - Equipment demonstration,
  - Equipment practice for each employee,
  - Date, and
  - Time.

- **DAILY LOGS**
  - Date,
  - Area (site specific) checks,
  - Equipment utilized by employees and job function,
  - Protective clothing and devices worn by employees,
  - Violations of the HSCP,
  - Instances of job-related injuries and illness,
  - Area monitoring results, and
  - HSO signature and date.

- **INCIDENT REPORT**
  Describes injuries, off-site release or accident (will be reported in writing to the project manager and CBS representative within 48 hours of incident).

- **MEDICAL CERTIFICATIONS**
  Submitted to the HSO prior to employee working on site.

11.2 RECORD KEEPING

Cummings/Riter, Fagan, and the RA contractors shall maintain health and safety records for the project in accordance with OSHA regulations. Access to records by employees is permitted as required under state and federal regulations. Medical files are confidential, and access to these files will only be provided to parties allowed by federal and state law.

12.0 CONTINGENCY PLAN

Emergency response procedures have been developed to cover extraordinary conditions that may occur during RA.

12.1 GENERAL RESPONSE CONSIDERATIONS

Emergencies must be dealt with in a manner that minimizes the health and safety risks to site personnel and the public. Site personnel will not be required to perform emergency related tasks for which they have not received training.

The following procedures shall be implemented in the event of an emergency:

- First aid or other appropriate initial action will be administered by those closest to the accident/event. This assistance will be coordinated by the ranking individual on site and will be conducted in a manner so that those rendering assistance are not placed in a situation of unacceptable risk. The primary concern is to avoid placing a greater number of workers in jeopardy.

- Employees shall immediately report all accidents and unusual events to:
  - HSO,
  - Project manager,
  - Plant representative,
  - HSR, and
  - CBS representative.

- The HSR is responsible for conducting the emergency response in an efficient, rapid, and safe manner. The HSR will decide if off-site assistance and/or medical treatment are required and shall be responsible for alerting off-site authorities and arranging for their assistance.

- The HSR will provide to the above-referenced personnel an Incident Report which includes the following:
  - A description of the incident (including date, time, and duration);

- Date, time, and name of all persons/agencies notified and their response; and
- A description of corrective actions implemented or other resolution of the incident.

- All workers on site are responsible for conducting themselves in a mature, calm manner in the event of an accident/unusual event to avoid spreading the danger to themselves and to surrounding workers.

12.2 RESPONSIBILITIES

The HSR or a designated substitute shall have responsibility for directing response activities in the event of an emergency. He/she will:

- Assess the situation;
- Determine required response measures;
- Notify appropriate response teams;
- Determine and direct on-site personnel during the emergency; and
- With the CBS project representative, contact and coordinate with government agencies.

The HSR or a designated substitute shall coordinate response activities with those of public agencies.

	PHONE NUMBERS
• **IMMEDIATE EMERGENCIES**	
Police, Fire and Ambulance	(607) 739-5668
Fire	(607) 739-3813
• **PLANT ASSISTANCE**	
First Aid	(607) 796-3333
Fire/Security	(607) 796-3222
• **EMERGENCY SUPPORT**	
CBS Representative (Mr. Leo Brausch)	(412) 642-3922 or (724) 444-0377
Cummings/Riter Office	(412) 373-5240
EMR (medical consultants)	(800) 229-3674
USEPA (24-hour hotline)	(800) 424-8802
Plant (Mr. Chip Ramp)	(607) 796-3274
USEPA (Mr. Mark Purcell)	(212) 637-4282
NYSDEC Region 8	(716) 226-2466

The Cummings/Riter project staff will have available the home phone numbers for their HSR, HSO and project manager. No work is expected to be done during non-daylight hours or on weekends. The facility operates on a 24-hour-a-day basis. Telephones are available inside the facility and the groundwater treatment building and Cummings/Riter field staff have cellular phones.

12.3 EMERGENCY RESPONSE EQUIPMENT

Before site operations are initiated, the following emergency equipment must be provided at the site:

- Portable eyewash stations (hand held);
- Locations of nearby plant chemical fire extinguishers;
- List of persons and phone numbers for emergency notification; and
- Facility locations of water for washing hands and face.

There are restroom facilities inside the water treatment building.

12.4 SITE EMERGENCY

Procedures for emergency evacuation will be established for the work area even though the contaminants being handled and the procedures employed make this an extremely unlikely occurrence. The rendezvous point will be the guard building at the rear entrance to the facility. Emergency procedures for facility incidents will be described by a plant representative during the initial safety meeting.

12.5 HOSPITAL

St. Joseph's Hospital is the identified hospital for the Kentucky Avenue Wellfield facility. The directions to the hospital are as follows: Take NY Route 17 east from plant, exit at Church Street (Highway 56) to west, proceed four blocks to hospital on left (555 East Market Street). The facility emergency procedures provide for the use of an ambulance service to take injured personnel to the hospital. This will be the procedure for this project. The following information shall be given for directions to the emergency agency:

- **PLANT PROPERTY INCIDENTS:**
  Toshiba Facility
  Formerly Westinghouse Electric Corporation
  Route 14
  Village of Horseheads

TABLES

TABLE 1
CBS HORSEHEADS
AS/SVE PILOT STUDY

Monitoring Point Data - Wellhead VOC Screening

Well Designation		TMP-1S	TMP-1D	TMP-1SAT	TMP-2S	TMP-2D	TMP-3S	TMP-3D	TMP-3SAT	VEW-S	VEW-D	TMP-4SAT	SVE-1	TMP-5S	TMP-5D	TMP-5SAT	MW-11D	Comments
Distance to SVE-1 (ft)		19.8	19.8	18.3	41.5	41.5	18.7	18.7	16.2	8.5	5.6	5.0	NA	20.9	19.8	22.0	47.5	
Distance to AS-1D (ft)		24.0	24.0	21.6	43.5	43.5	13.8	13.8	11.5	12.5	10.5	8.8	5.2	23.3	21.9	24.0	49.5	
Date	Time	Wellhead VOCs (ppmv)																
6/11	7:06 PM	0.5	0.3	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	Background readings
6/12	8:08 AM	0.3	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.2	0.0	0.0	--	0.0	0.0	0.0	0.0	SVE Activated, 6/11/99 11:30 PM
6/12	3:32 PM	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	--	0.0	0.0	0.0	0.0	AS Activated, 6/12/99 3:15 PM
6/12	5:17 PM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	--	0.0	0.0	0.0	--	
6/12	6:21 PM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	--	0.0	0.0	0.0	--	
6/13	8:00 AM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	--	0.0	0.0	0.0	0.0	
6/13	10:45 AM	Pilot system deactivated																

Notes: ppmv = parts per million by volume
"--" indicates no measurement taken

Monitoring Point Data - Wellhead Vacuum/pressure (in. w.c.)

Well Designation		TMP-1S	TMP-1D	TMP-1SAT	TMP-2S	TMP-2D	TMP-3S	TMP-3D	TMP-3SAT	VEW-S	VEW-D	TMP-4SAT	SVE-1	TMP-5S	TMP-5D	TMP-5SAT	MW-11D	Comments
Distance to SVE-1 (ft)		19.8	19.8	18.3	41.5	41.5	18.7	18.7	16.2	8.5	5.6	5.0	NA	20.9	19.8	22.0	47.5	
Distance to AS-1D (ft)		24.0	24.0	21.6	43.5	43.5	13.8	13.8	11.5	12.5	10.5	8.8	5.2	23.3	21.9	24.0	49.5	
Date	Time	Vacuum/pressure (inches w.c.)																
6/11	7:06 PM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	+ .005	N/A	0.0	0.0	0.0	0.0	Background readings
6/11	11:45 PM	0.035	0.06	--	0.035	0.03	0.055	0.07	--	0.1	0.0	--	--	--	--	--	--	SVE Activated, 6/11/99 11:30 PM
6/12	12:20 AM	0.04	0.07	--	0.035	0.04	--	--	--	--	--	--	--	0.07	0.07	--	0.0	
6/12	12:47 AM	0.05	0.08	--	0.03	0.03	0.065	0.08	--	0.13	--	--	--	0.1	0.09	--	0.0	
6/12	12:58 AM	0.065	0.005	--	0.05	0.04	0.08	0.11	--	0.175	--	--	--	0.105	0.10	--	0.0	
6/12	1:07 AM	0.07	0.105	--	0.05	0.05	0.105	0.14	--	0.23	--	--	--	0.13	0.11	--	--	
6/12	1:14 AM	0.07	0.10	--	0.05	0.04	0.095	0.13	--	0.21	--	--	--	--	--	--	--	
6/12	1:50 AM	0.045	0.065	--	0.04	0.035	0.07	0.08		0.125			--	0.07	0.07	--	N/S	
6/12	7:44 AM	0.05	0.07	--	0.045	0.035	0.07	0.09	--	0.13	--	--	--	0.065	0.075	--	0.0	
6/12	8:08 AM	--	--	--	--	--	--	--	--	0.14	0.0	0.0	--	0.075	0.070	--	N/M	
6/12	2:29 PM	0.045	0.065	--	0.03	0.025	--	--	--	--	--	--	--	0.055	0.06	--	--	AS Activated, 6/12/99 3:15 PM
6/12	3:15 PM	0.045	0.055	0.0	0.35	0.03	0.055	0.065	+ 6.0	0.145	0.0	+ 38	--	0.07	0.065	0.0	--	
6/12	3:32 PM	0.04	0.055	0.0	0.035	0.025	0.06	0.07	+ 7.0 *	0.135	0.0	+ 15 *	--	0.06	0.07	0.0	--	
6/12	5:17 PM	0.04	0.06	0.0	0.035	0.03	0.06	0.07	+ 2.0 *	0.13	0.0	+ 25 *	--	0.06	0.07	0.0	--	
6/12	6:21 PM	0.4	0.06	0.0	0.035	0.03	0.06	0.07	+ 10 *	0.13	0.0	+ 45 *	--	0.06	0.065	0.0	--	
6/13	8:00 AM	0.04	0.055	0.0	0.035	0.03	0.05	0.075	+ 38 *	0.135	+ 0.05	+ 48 *	--	0.065	0.06	0.0	0.0	
6/13	10:45 AM	Pilot system deactivated																

Notes: in. w.c. = inches of water column. A plus sign preceding the numerical value indicates pressure. All other values are vacuum (i.e. relative to ambient pressure).
"--" indicates no measurement taken
An "*" indicates that bubbling was observed in this monitoring point at the given time.

TABLE 1
CBS HORSEHEADS
AS/SVE PILOT STUDY
(CONTINUED)

Monitoring Point Data - Depth to Water (ft)

Well Designation		TMP-1S	TMP-1D	TMP-1SAT	TMP-2S	TMP-2D	TMP-3S	TMP-3D	TMP-3SAT	VEW-S	VEW-D	TMP-4SAT	SVE-1	TMP-5S	TMP-5D	TMP-5SAT	MW-11D	Comments
Distance to SVE-1 (ft)		19.8	19.8	18.3	41.5	41.5	18.7	18.7	16.2	8.5	5.6	5.0	NA	20.9	19.8	22.0	47.5	
Distance to AS-1D (ft)		24.0	24.0	21.6	43.5	43.5	13.8	13.8	11.5	12.5	10.5	8.8	5.2	23.3	21.9	24.0	49.5	
Date	Time	Depth to Water (ft)																
6/11	7:06 PM	Dry	10.99	10.55	Dry	12.22	Dry	10.88	10.38	Dry	10.81	11.11	10.48	Dry	10.94	10.89	10.18	Background readings
6/12	8:08 AM	Dry	11.04	10.59	Dry	12.28	Dry	10.94	10.42	Dry	11.06	11.14	Dry	Dry	11.00	10.94	10.23	SVE Activated, 6/11/99 11:30 PM
6/12	3:32 PM	Dry	11.05	10.60	Dry	12.30	Dry	10.95	5.8	Dry	11.24	10.23	--	Dry	11.01	14.73	10.23	AS Activated, 6/12/99 3:15 PM
6/12	5:17 PM	Dry	11.08	10.60	Dry	12.3	Dry	11.95	9.7	Dry	11.21	10.15	--	Dry	11.02	0.0	--	
6/12	6:21 PM	Dry	11.06	10.6	Dry	12.3	Dry	10.95	7.8	Dry	11.19	9.70	--	Dry	11.01	14.46	--	
6/13	8:00 AM	Dry	11.10	10.63	Dry	12.33	Dry	10.98	7.56	Dry	11.20	8.85	--	Dry	11.03	13.13	10.34	
6/13	10:45 AM	Pilot system deactivated																

Notes: "--" indicates no measurement taken

Monitoring Point Data - Wellhead Helium Concentrations (%)

Well Designation		TMP-1S	TMP-1D	TMP-1SAT	TMP-2S	TMP-2D	TMP-3S	TMP-3D	TMP-3SAT	VEW-S	VEW-D	TMP-4SAT	SVE-1	TMP-5S	TMP-5D	TMP-5SAT	MW-11D	Comments
Distance to SVE-1 (ft)		19.8	19.8	18.3	41.5	41.5	18.7	18.7	16.2	8.5	5.6	5.0	NA	20.9	19.8	22.0	47.5	
Distance to AS-1D (ft)		24.0	24.0	21.6	43.5	43.5	13.8	13.8	11.5	12.5	10.5	8.8	5.2	23.3	21.9	24.0	49.5	
Date	Time	Wellhead Helium Concentrations (%)																
6/11	7:06 PM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	N/A	0.0	0.0	0.0	0.0	Background readings
6/12	8:08 AM	0.0	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.0	0.01	0.0	0.01	0.0	0.0	0.0	0.0	SVE Activated, 6/11/99 11:30 PM
6/12	3:15 PM	0.0	0.0	0.0	0.0	0.0	0.0	0.5	58.0	0.0	0.0	40	--	0.0	0.0	0.1	--	AS Activated, 6/12/99 3:15 PM
6/12	3:32 PM	0.0	0.0	0.0	0.0	0.0	0.0	0.01	59	0.0	0.0	52	--	0.0	0.0	0.01	0.0	
6/12	4:37 PM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36	0.0	0.0	39	--	0.0	0.04	0.0	--	
6/12	5:17 PM	0.0	0.0	0.0	0.04	0.0	0.0	0.0	38	0.0	0.0	38	--	0.0	0.01	0.0	--	
6/12	6:21 PM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18	0.02	0.0	18	--	0.0	0.0	0.0	--	
6/13	8:00 AM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21	0.0	0.02	20	--	0.0	0.0	0.0	0.0	
6/13	10:45 AM	Pilot system deactivated																

Notes: "--" indicates no measurement taken

TABLE 1
CBS HORSEHEADS
AS/SVE PILOT STUDY
(CONTINUED)

Monitoring Point Data - Dissolved Oxygen (mg/l)/Temperature (C)

Well/Sample Location		MW-1D	MW-1S	MW-2D	MW-2S	MW-3D	MW-3S	MW-4S	MW-5S	MW-6D	MW-6S	MW-7D	MW-7S	TMP-1S	TMP-2D	TMP-5-SAT	MW-11D	Comments
Distance to SVE-1 (ft)		19.8	19.8	18.3	41.5	41.5	18.7	18.7	18.2	8.5	5.6	5.0	NA	20.9	19.8	22.0	47.5	
Distance to AS-1D (ft)		24.0	24.0	21.6	43.5	43.5	13.8	13.8	11.5	12.5	10.5	8.8	5.2	23.9	21.9	24.0	49.5	
Date	Time	SDS	SDS	SDS	SDS	SDS	SDS	SDS	SDS	SDS	SDS	SDS	SDS	DO (mg/l)/Temperature (C)				
6/11	7:06 PM	Dry/--	2.05/13.46	2.07/14.26	Dry/--	6.65/11.9	Dry/--	10.91/12.6	10.55/11.3	Dry/--	1.79/11.3	7.60/10.7	Dry/--	Dry/--	8.60/11.5	3.88/11.1	5.1/11.1	Background readings
6/12	8:08 AM	Dry/--	1.75/13.1	1.71/14.1	Dry/--	9.40/11.2	Dry/--	9.85/11.8	9.50/11.4	Dry/--	1.90/11.5	8.90/12.1	Dry/--	Dry/--	9.50/11.5	3.7/11.3	4.41/10.8	SVE Activated, 6/11/99 11:30 PM
6/12	3:32 PM	Dry/--	3.15/13.6	6.81/12.4	--/--	10.23/11.1	Dry/--	9.9/11.5	5.52/11.0	Dry/--	4.0/11.6	5.85/11.1	--/--	Dry/--	6.95/11.5	10.0/13.5	4.41/10.8	AS Activated, 6/12/99 3:15 PM
6/12	5:17 PM	Dry/--	2.33/13.5	7.70/12.5	Dry/--	10.5/11.2	Dry/--	10.62/12.7	9.25/10.9	Dry/--	2.87/11.5	8.76/11.1	--/--	Dry/--	7.2/11.6	9.01/11.0	--/--	
6/12	6:21 PM	Dry/--	3.12/13.9	6.60/13.5	Dry/--	10.7/11.2	Dry/--	9.88/11.6	11.10/11.3	Dry/--	3.22/11.5	11.20/11.3	--/--	Dry/--	8.85/11.8	9.06/11.0	--/--	
6/13	8:00 AM	Dry/--	2.74/12.9	7.90/12.1	Dry/--	10.35/11.3	Dry/--	9.85/11.6	10.80/11.8	Dry/--	2.70/11.5	11.90/11.3	Dry/--	Dry/--	12.25/11.8	8.40/10.8	7.00/10.60	
6/13	10:45 AM	Pilot system deactivated																

Notes: "--" indicates no measurement taken

Monitoring Point Data - Dissolved Trichloroethene (ug/l)

Well/Sample Location		MW-1D	MW-1S	MW-2D	MW-2S	MW-3D	MW-3S	MW-4S	MW-5S	MW-6D	MW-6S	MW-7D	MW-7S	TMP-1S	TMP-2D	TMP-5-SAT	MW-11D	Trip Blank	Comments
Distance to SVE-1		19.8	19.8	18.3	41.5	18.7	18.7	16.2	8.5	5.6	5.0	22.0	47.5	NA	NA				
Distance to AS-1		24.0	24.0	21.6	43.5	13.8	13.8	11.5	12.5	10.5	8.8	24.0	49.5	5.2	NA				
Date	Time	TCE (ug/l)																	
6/12/99	11:42 AM - 12:50PM	33	ND<9.2	ND<1	ND<1	ND<1	ND<5.5	ND<2	ND<1.7	ND <1, ND <1.5	ND<1	ND<5.5	SVE Activated, 6/11/99 11:30 PM						
6/13/99	10:45 AM -1:00 PM	31	4.7	ND <1, ND <1	1.2	0.56 J	17	0.75 J	1.1	0.30 J	0.37 J	ND <1	AS Activated, 6/12/99 3:15 PM						

Notes: "J" indicates estimated value below method detection limit.
Duplicate results obtained for TMP-2D (post air sparge) and TMP-5-SAT (pre air sparge)

TABLE 2
DISPOSAL AREA F
PREDESIGN SOIL SAMPLE RESULTS

Sample ID	Arsenic mg/kg	Benzo(a) anthracene ug/kg	Benzo(a) pyrene ug/kg	Benzo(b) fluoranthene ug/kg	Indeno (1,2,3-cd)pyrene ug/kg	Percent Moisture Percent	TCE ug/kg
S-DAF-1(0-1)	6.6 R	470	550	690	330 J	12.2	1.7 J
S-DAF-1(1-2)	5.7 R	440	530	630	260 J	5.6	< 11
S-DAF-1(2-4)						5.9	< 11
S-DAF-D7(2-4)						7.8	1.3 J
S-DAF-2(0-1)	7.7	150 J	160 J	170 J	130 J	5.9	< 11
S-DAF-2(1-2)	6.5	370	320 J	510	240 J	8.2	3.2 J
S-DAF-2(2-4)						11.7	< 11
S-DAF-3(0-1)	6.6	7500	4600	8400	2500	6.1	< 11
S-DAF-3(1-2)	6.8	220 J	210 J	350 J	180 J	7.4	1.9 J
S-DAF-3(2-4)	7.2 R	120 J	88 J	210 J	91 J	5.2	< 11
S-DAF-4(0-1)	5.8 R	480	600	850	340 J	7.3	2.6 J
S-DAF-4(1-2)	4.3	600	500	620	300 J	7.9	< 11
S-DAF-4(2-4)						11.7	< 11
S-DAF-D8(2-4)						6.3	< 11
S-DAF-5(0-1)	8.0 R	140 J	120 J	260 J	130 J	10.2	< 11
S-DAF-5(1-2)	6.1 R	260 J	180 J	510	180 J	8.3	< 11
S-DAF-5(2-4)	6.4 R	240 J	140 J	430	140 J	9.2	< 11
S-DAF-5D5(2-4)	5.5 R	500	300 J	1100	350	5.7	< 11
S-DAF-6(0-1)	6.4	210 J	270 J	310 J	210 J	5.8	< 11
S-DAF-6(1-2)	5.3	200 J	270 J	370	200 J	9.6	< 11
S-DAF-6(2-4)						9	< 11
S-DAF-7(0-1)	7.9 R	200 J	250 J	440 J	170 J	7.7	< 11
S-DAF-7(1-2)	4.8 R	260 J	330 J	550 J	170 J	6.9	< 11
S-DAF-7(2-4)	5.4 R	270 J	210 J	670	150 J	9	< 11
S-DAF-8(0-1)	6.5 R	840	710	1200	300 J	8.9	< 11
S-DAF-8(1-2)	6.6 R	80 J	70 J	130 J	38 J	8.4	< 11
S-DAF-8(2-4)						13.7	37
S-DAF-9(0-1)	6.1	< 360	< 360	< 360	< 360	9.2	< 11
S-DAF-9(1-2)	5.8	51 J	55 J	61 J	50 J	10.3	< 11
S-DAF-9(2-4)						7.7	2.0 J
S-DAF-10(0-1)	6.4	360	460	370	340 J	5.8	1.2 J
S-DAF-10(1-2)	6.4	360	340 J	360	280 J	6.1	2.5 J
S-DAF-10(2-4)						6.8	2.1 J
S-DAF-11(0-1)	10.1	54000	55000	62000	31000	6.6	2.3 J
S-DAF-11(1-2)	8.5	25000	29000	36000	16000	6.6	3.3 J
S-DAF-11(2-4)	9.8	15000	14000	17000	12000	6.9	13 J
S-DAF-12(0-1)	8.1	140000	120000	140000	71000	9.4	6.8 J
S-DAF-12(1-2)	6.5	53000	48000	55000	41000	9.1	< 11
S-DAF-12(2-4)	8.1	170000	150000	180000	88000	9.4	2.9J
S-DAF-12D1(2-4)	8.1	69000	76000	97000	36000	6.3	< 11
S-DAF-12(4-6)	8.2	43000	49000	59000	26000	7.5	< 11
S-DAF-12(6-8)	6.8	92000	110000	92000	48000	7	< 11
S-DAF-12(8-10)	8.3	17000	19000	23000	9500	6.2	2.3 J
S-DAF-12(10-12)	8.7	18000	20000	25000	10000	9.5	2.9 J
S-DAF-12(12-14)	8.6	62000	62000	76000	31000	15.9	2.9 J
S-DAF-13(0-1)	9.8	32000	30000	30000	24000	6	< 11
S-DAF-13(1-2)	10.4	110000	100000	120000	83000	7.5	< 11
S-DAF-13(2-4)	11.8	83000	76000	95000	61000	6.8	< 11

TABLE 2
DISPOSAL AREA F
PREDESIGN SOIL SAMPLE RESULTS

Sample ID	Arsenic mg/kg	Benzo(a) anthracene ug/kg	Benzo(a) pyrene ug/kg	Benzo(b) fluoranthene ug/kg	Indeno (1,2,3-cd)pyrene ug/kg	Percent Moisture Percent	TCE ug/kg
S-DAF-14(0-1)	12.7	100000	97000	110000	71000	9.9	< 11
S-DAF-14(1-2)	18.7	54000	50000	53000	38000	6	< 11
S-DAF-14(2-4)						9	1.3 J
S-DAF-14(4-6)						10	1.4 J
S-DAF-14(6-8)						9.1	2.5 J
S-DAF-14(8-10)						9.9	3.6 J
S-DAF-14(10-12)						8.5	2.9 J
S-DAF-15(0-1)	30.3	92000	89000	99000	60000	6.7	< 11
S-DAF-15(1-2)	41.1	220000	190000	200000	130000	7.2	< 11
S-DAF-15(2-4)	10	17000	14000	18000	10000	9.7	< 11
S-DAF-16(0-1)	64.7	27000	25000	230000	16000	4.1	< 11
S-DAF-16(1-2)	39.9	24000	24000	200000	150000	4.1	4.1 J
S-DAF-16(2-4)						10	< 11
S-DAF-17(0-1)	11.3	200000	190000	210000	120000	5.5	< 11
S-DAF-17(1-2)	8.2	28000	25000	24000	22000	9.4	< 11
S-DAF-17(2-4)	9.2	14000	13000	15000	8900	5.9	< 11
S-DAF-18(0-1)	9.3	190000	150000	180000	130000	6.8	< 11
S-DAF-18(1-2)	8.2	110000	92000	100000	59000	6.7	< 11
S-DAF-18(2-4)	8.8	65000	55000	72000	45000	8.1	2.0 J
S-DAF-18D2(2-4)	8.9	18000	18000	20000	10000	11.1	< 11
S-DAF-18(4-6)	7.7	59000	52000	57000	33000	5.5	1.4 J
S-DAF-18(6-8)	10.4	130000	120000	57000	82000	10	1.4 J
S-DAF-18(8-10)	8.9	64000	57000	68000	43000	8.8	< 11
S-DAF-18(10-12)	12.6	38000	33000	43000	26000	17.9	2.4 J
S-DAF-19(0-1)	6	< 710	< 710	< 710	< 710	7.4	< 11
S-DAF-19(1-2)	8.6	< 690 J	< 690 J	79 J	< 690 J	4.4	< 11
S-DAF-19(2-4)						11.8	< 11
S-DAF-19(4-6)						12.4	3.9 J
S-DAF-19(6-8)						11.4	7.2 J
S-DAF-19(8-10)						9.7	< 11
S-DAF-19(10-12)						12.2	11
S-DAF-20(0-1)	6.9	630	580	630	260 J	5.5	< 11
S-DAF-20(1-2)	8	260 J	250 J	260 J	140 J	8.7	< 11
S-DAF-20(2-4)	6.6	600	570	550	290 J	7.1	1.2 J
S-DAF-21(0-1)	8.3	130 J	140 J	150 J	85 J	6.2	< 11
S-DAF-21(1-2)	8.4	47 J	48 J	49 J	37 J	6.5	< 10
S-DAF-21(2-4)						10.6	5.4 J
S-DAF-21(4-6)						11.7	< 11
S-DAF-21(6-8)						8.9	< 11
S-DAF-21(8-10)						12.2	1.2 J
S-DAF-21(10-12)						11	2.8 J
S-DAF-22(0-1)	68.1	100000	91000	100000	47000	2.4	< 10
S-DAF-22(1-2)	64.7	97000	92000	110000	50000	5.9	< 11
S-DAF-22(2-4)						11.4	< 11
S-DAF-22(4-6)						4.3	< 10
S-DAF-22(6-8)						8.1	< 11
S-DAF-22(8-10)						17.5	5.0 J
S-DAF-22(10-12)						15.4	< 12

TABLE 2
DISPOSAL AREA F
PREDESIGN SOIL SAMPLE RESULTS

Sample ID	Arsenic mg/kg	Benzo(a) anthracene ug/kg	Benzo(a) pyrene ug/kg	Benzo(b) fluoranthene ug/kg	Indeno (1,2,3-cd)pyrene ug/kg	Percent Moisture Percent	TCE ug/kg
S-DAF-23(0-1)	10.4 J	**10000**	**9200**	**12000**	**8900**	6.3	< 11
S-DAF-23(1-2)	7.1 J	**12000**	**12000**	**15000**	**11000**	7.4	1.8 J
S-DAF-23(2-4)	8.9 J	3400	**3300**	4700	2000	8.8	< 11
S-DAF-23L1(2-4)	8.3 J	**11000**	**11000**	**9800**	4400	5.6	< 11
S-DAF-23(4-6)	7.8 J	6100	**5500**	6600	5100	8	1.1 J
S-DAF-23(6-8)	7.4 J	5800	**5800**	5100	2200	12.1	5.1 J
S-DAF-23(8-10)	8.3 J	7300	**5900**	6500	4700	12.4	5.3 J
S-DAF-23(10-12)	6.1 J	5400	**4900**	6000	4500	11	< 11
S-DAF-24(0-1)	7.3 J	120 J	110 J	150 J	130 J	6.6	< 11
S-DAF-24(1-2)	7.7 J	< 350	< 350	42 J	< 350	6.7	< 11
S-DAF-24(2-4)						9.2	< 11
S-DAF-24(4-6)						9.1	< 11
S-DAF-24(6-8)						9.4	< 11
S-DAF-24(8-10)						8.1	< 11
S-DAF-24(10-12)						12.2	< 11
S-DAF-25(0-1)	5.4 J	74 J	73 J	79 J	100 J	4	< 10
S-DAF-25(1-2)	6.6 J	91 J	89 J	110 J	100 J	5.3	< 11
S-DAF-25(2-4)	7.1 J	64 J	< 360	52 J	54 J	7.9	< 11
S-DAF-26(0-1)	**46.7**	**230000**	**220000**	**260000**	**100000**	3.1	< 11
S-DAF-26(1-2)	**25.9**	**26000**	**26000**	**31000**	**130000**	4.4	7.5 J
S-DAF-26(2-4)						13.6	2.2 J
S-DAF-26(4-6)						10	< 11
S-DAF-26(6-8)						12.6	2.1 J
S-DAF-26(8-10)						10.1	2.4 J
S-DAF-26(10-12)						10.2	5.2 J
S-DAF-27(0-1)	**12.8**	**130000**	**130000**	**140000**	**65000**	5.5	**930**
S-DAF-27(1-2)	8.2	**11000**	**11000**	**13000**	6500	6.6	16
S-DAF-27(2-4)	7.7	650	570	700	400	8.4	9.8 J
S-DAF-27(4-6)	8.5	**20000**	**20000**	**25000**	**11000**	6.2	53
S-DAF-27(6-8)	10.7	**24000**	**24000**	**28000**	**12000**	7.1	29
S-DAF-27(8-10)	8.5	**73000**	**72000**	**92000**	**38000**	8.3	100
S-DAF-27(10-12)	**12.5**	**28000**	**28000**	**35000**	**14000**	6.6	63
S-DAF-28(0-1)	**14.5**	7000	**6100**	7500	2900	1.8	1.1 J
S-DAF-28(1-2)	**29.5**	5400	**5000**	6500	2100	5.2	20
S-DAF-28(2-4)						6.6	14
S-DAF-29(0-1)	7.6 R	1200	**1100 J**	1500 J	300 J	7.4	10 J
S-DAF-29(1-2)	**16.3 R**	4200	**4100**	5800	1200	5.5	12
S-DAF-29D6(1-2)	**14.0 R**	**23000**	**21000**	**29000**	5500	6	61
S-DAF-29(2-4)						11.4	200
S-DAF-30(0-1)	**17.4**	4300	**3800**	5400	2200	6.1	4.9 J
S-DAF-30(1-2)	11.8	**12000**	**11000**	**13000**	5700	4.9	21
S-DAF-30(2-4)	11.1	**11000**	**8100**	**11000**	4300	6.9	240
S-DAF-30L2(2-4)	10.2	7500	**7000**	**8600**	3600	8.3	91
S-DAF-31(0-1)	10.4	**100000**	**96000**	**120000**	**47000**	3.7	3.1 J
S-DAF-31(1-2)	9.7	**110000**	**100000**	**100000**	**72000**	5.7	95
S-DAF-31(2-4)	8.5	**97000**	**87000**	**93000**	**54000**	9.6	**1000**
S-DAF-31(4-6)	9	**180000**	**160000**	**170000**	**71000**	6.8	45
S-DAF-31(6-8)	8.6	**180000**	**160000**	**180000**	**74000**	4.2	6.6 J

TABLE 2
DISPOSAL AREA F
PREDESIGN SOIL SAMPLE RESULTS

Sample ID	Arsenic mg/kg	Benzo(a) anthracene ug/kg	Benzo(a) pyrene ug/kg	Benzo(b) fluoranthene ug/kg	Indeno (1,2,3-cd)pyrene ug/kg	Percent Moisture Percent	TCE ug/kg
S-DAF-31(8-10)	5.9	**260000**	**240000**	**260000**	**140000**	3.9	8.8 J
S-DAF-31(10-12)	8.5	**130000**	**120000**	**130000**	**69000**	8.8	1.3 J
S-DAF-32(0-1)	9.3	1900	**1800**	1900	1200	4.5	2.2 J
S-DAF-32(1-2)	9.8	4800	**4400**	6500	2800	6.7	18
S-DAF-32(2-4)						9.1	31
S-DAF-33(0-1)	9.2	**270000**	**270000**	**310000**	**210000**	4.2	11
S-DAF-33(1-2)	7.3	**170000**	**160000**	**190000**	**100000**	6.4	2.7 J
S-DAF-33(2-4)	7.2	1900	**1900**	2400	1300	7	2.7 J
S-DAF-33(4-6)	6.3	**28000**	**29000**	**34000**	**23000**	9.3	< 11
S-DAF-33(6-8)	6.4	**9000**	**8500**	**12000**	5300	10.5	2.7 J
S-DAF-33(8-10)	6.9	**34000**	**35000**	**45000**	**20000**	10	12
S-DAF-33(10-12)	7.4	**57000**	**58000**	**72000**	**32000**	6.5	1.1 J
S-DAF-34(0-1)	**13.2**	3500	**4100**	5900	3300	19.6	< 12
S-DAF-34(1-2)	6.8	940	**990**	1600	740	3.7	< 10
S-DAF-34(2-4)	7.8	140 J	130 J	170 J	150 J	7.4	< 11
S-DAF-35(0-1)	11.1	1700	**1800**	2700	2100	6.3	1.3 J
S-DAF-35(1-2)	11.1	1000	**1100**	1600	960	6.5	1.2 J
S-DAF-35(2-4)						9	1.9 J
S-DAF-36(0-1)	**21**	710	700	1000	580	7.2	< 11
S-DAF-36(1-2)	**89.5**	620	570	940	800	12.1	< 11
S-DAF-36(2-4)	**155**	1500	**970**	1300	640	17.7	< 12

Note: J = Estimated value.
R = Rejected data, refer to validation report.
< = Less than.
Bold value indicate concentration that exceeds surface soil RAO.

TABLE 3

SUMMARY OF SPLIT SAMPLE DATA FOR DISPOSAL AREA F
KENTUCKY AVENUE WELLFIELD SITE
OPERABLE UNIT 3

SAMPLE LOCATION	SOIL SAMPLE RESULTS											
	Trichloroethylene (ug/kg)		Benzo(a)anthracene (ug/kg)		Benzo(a)pyrene (ug/kg)		Benzo(b)fluoranthene (ug/kg)		Indeno(1,2,3-C,D)pyrene (ug/kg)		Arsenic (mg/kg)	
	CBS	CDM	CBS	CDM	CBS	CDM	CBS	CDM	CBS	CDM	CBS	CDM
DAF-2 (1-2')	11 U	3 J	440	530	530	550	630	850	260 J	420 J	5.7 R	7.1
DAF-3 (2-4')	11 U	11 U	120 J	580	88 J	580	210 J	900	91 J	480	7.2 R	6.6
DAF-5 (2-4')	11 U	11 U	240 J	460	140 J	410 J	430	690	140 J	320 J	6.4 R	8
DAF-7 (2-4')	11 U	12 U	270 J	140 J	210 J	150 J	670	260 J	150 J	140 J	5.4 R	9.1
DAF-19 (1-2')	11 U	11 U	690 UJ	420 U	690 U	420 U	79 J	420 U	690 UJ	420 U	8.6	6.9
DAF-20 (2-4')	1.2 J	11 U	600	1,100	570	*1,000*	550	1,300	290 J	650	6.6	7.3 J
DAF-23 (4-6')	11 U	4 J	6,100	*8,400*	*5,500*	*7,600*	6,600	*10,000*	5,100	4,500	7.8 J	8.7
DAF-24 (6-8')	11 U	11 U										
DAF-25 (2-4')	11 U	11 U										
DAF-26 (6-8')	2.1 J	10 J									8.5	10.8
DAF-27 (8-10')	100	110	*73,000*	*89,000*	*72,000*	*95,000*	*92,000*	*120,000*	*38,000*	*64,000*	11.1	*12.6* J
DAF-30 (2-4')	240	8,600	*11,000*	*24,000*	*8,100*	*19,000*	*11,000*	*24,000*	4,300	6,100	6.6	6.8
DAF-31 (6-8')	6.6 J	36	*180,000*	*350,000*	*160,000*	*350,000*	*180,000*	*380,000*	*74,000*	*200,000*	7.8	*17.3*
DAF-34 (2-4')	11 U	3 J	140 J	260 J	130 J	310 J	170 J	460	150 J	270 J		
DAF-35 (2-4')	1.9 J	7 J									*89.5*	9.1
DAF-36 (1-2')	11 U	12 U	620	1,700	570	*2,000*	940	2,900	800	1,300		

REMEDIAL ACTION OBJECTIVES (RAOs)	
TCE (ug/kg, surface and subsurface soil)	800
Benzo(a)anthracene (ug/kg, surface soil)	7,800
Benzo(a)pyrene (ug/kg, surface soil)	780
Benzo(b)fluoranthene (ug/kg, surface soil)	7,800
Indeno(1,2,3-C,D)pyrene (ug/kg, surface soil)	7,800
Arsenic (mg/kg, surface soil)	12

Notes:
1. Results denoted in bold exceed the RAOs.
2. Results denoted in bold and italics correspond to subsurface soils that exceed the RAOs for surface soils. Based upon historic risk assessment efforts, RAOs for PAHs/arsenic in subsurface soils were not developed.

APPENDIX A

FAGAN HEALTH AND SAFETY PLAN MODIFICATIONS/ENDORSEMENTS

FAGAN ENGINEERS
ACCEPTANCE OF
HEALTH AND SAFETY/CONTINGENCY PLAN
KENTUCKY AVENUE WELLFIELD SITE
OPERABLE UNIT NO. 3

1.0 GENERAL

1.1 Scope And Objectives

Fagan Engineers' involvement in this remedial action will be limited activities which will consist of land surveying and environmental sampling. Personnel will be involved from time to time on an as needed basis and are unlikely to be exposed over permissible exposure limits and published exposure limits.

1.2 Certifications

The designated survey team has received has received 24 hours of off site OSHA Hazardous Materials Handling and Waste Operations training. Sampling personnel designated to this project have received 40 hours of off site OSHA Hazardous Materials Handling and Waste Operations training.

2.0 PROJECT ORGANIZATION

2.1 Key Personnel - Fagan Engineers

Site Coordinator - Stanley Criss
Fagan Engineers
113 East Chemung Place
Elmira, New York 14904
Work Phone (607) 734-2165
Fax (607) 734-2169
E-Mail Fagan1 @ Servtech.com
Home Phone (607) 733-2973
E-Mail Stancriss @ AOL.com

Health and Safety - Stanley Criss

Project Manager - Stanley Criss

3.0 HAZARD EVALUATION

Fagan Engineers' personnel will have limited activity in all of the primary RD task areas. As such, personnel will be briefed as to the potential exposure to hazardous constituents and hazards that exist in each of the area:

Disposal Area F
Former Runoff Basin
Industrial Drainageway

4.0 MEDICAL SURVEILLANCE REQUIREMENTS

Fagan Engineers' personnel involved in hazardous remedial project work will receive annual physical exams to verify no medical restrictions that would inhibit them from performing their required work tasks.

5.0 PERSONAL PROTECTIVE EQUIPMENT

5.1 Level of Protection

Based on the hazard evaluation and activities to be performed by Fagan personnel, the anticipated levels of protection by activity is as follows:

Disposal Area F

Surveying - Initial Topo Survey
The surveying task in this area will be initiated using Level D protection equipment and associated dermal protection.

Surveying - Intermediate Survey
The surveying task in this area will be initiated using Level D protection equipment and associated dermal protection which will include latex or nitrile outer gloves, boots and tyvek coveralls.

Surveying - As-Built
The surveying task in this area will be initiated using Level D protection equipment and associated dermal protection.

Sampling / Field Monitoring
Sampling / monitoring operations will be initiated using Level D protection equipment and associated dermal protection which will include latex or nitrile outer gloves, boots, and tyvek coveralls

Former Runoff Basin

Surveying - Initial Topo Survey
The surveying task in this area will be initiated using Level D protection equipment and associated dermal protection.

Surveying - Final - As-Built Survey
The surveying task in this area will be initiated using Level D protection equipment and associated dermal protection.

Industrial Drainageway

Surveying - Initial Topo & Contour Survey
The surveying task in this area will be initiated using Level D protection equipment and associated dermal protection which will include latex or nitrile outer gloves, boots / hip waders and tyvek coveralls.

Sampling / Field Monitoring
Sampling / monitoring operations will be initiated using Level D protection equipment and associated dermal protection which will include latex or nitrile outer gloves, boots / hip waders, and tyvek coveralls

5.2 Modification for Personal Protection Requirements

Modifications as to level or site specific equipment would me made as conditions warrant. Any modifications will be made only upon approval of Health and Safety Officer's (HSO) knowledge and approval.

6.0 MONITORING EQUIPMENT

Fagan Engineers personnel will use a (PID) HNu meter when involved in any activities or during other related activities in which potentially impacted soils may be disturbed (i.e. sampling / monitoring).

7.0 STANDARD OPERATING PROCEDURES

Fagan Engineers personnel will adhere to all standard operating procedures as outlined by Cummings Riter in the proposed HASP.

8.0 DECONTAMINATION

Fagan Engineers personnel will adhere to all equipment and personal protective equipment decontamination practices and personal hygiene requirements as outlined within the Cummings Riter proposed HASP.

9.0 SITE-SPECIFIC TRAINING

Fagan Engineers has provided site specific training to all personnel which are involved in ongoing activities related to the site. Updates and additional project specific information will continue to be made available through safety meetings to keep personnel involved in the project abreast of changes and conditions of potential exposure to hazardous constituents or hazards that may exist during specific tasks.

10.0 REPORTS AND RECORD KEEPING

Fagan Engineers will maintain a record of health and safety activities of employees at the site. A daily log will be initiated and maintained throughout the project as outlined in the proposed HASP.

11.0 CONTINGENCY PLAN

Fagan Engineers personnel will follow the Contingency Plan as outlined within the HASP.

Fagan Engineers (FE) finds the Health And Safety / Contingency Plan as proposed by Cummings Riter Consultants, Inc. acceptable and consistent with FE operational procedures.

Stanley C Criss

Stanley C. Criss, Health and Safety Officer
Fagan Engineers

Date 3/18/98

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APPENDIX B

MATERIAL SAFETY DATA SHEETS

Genium Publishing Corporation
One Genium Plaza
Schenectady, NY 12304-4690 USA
(518) 377-8854

Sheet No. 7
Nitric Acid

Issued: 10/88 Revision: D, 9/92

Section 1. Material Identification

Nitric Acid (HNO_3) Description: A solution of nitrogen dioxide in water commercially available in many concentrations. Derived by oxidation of ammonia by catalytic process (heated platinum catalyst); or by direct synthesis, combining atmospheric nitrogen and oxygen in an electric arc (an expensive process, thus largely abandoned). HNO_3 is usually found in conjunction with nitrogen dioxide, which is considered more hazardous. Used in fertilizer production (ammonium nitrate), in photoengraving, steel etching, explosives (TNT, nitroglycerin, trinitrophenol); manufacture of metallic nitrates, sulfuric acid, aqua regia and oxalic acid, jewelry, various dyes and dyestuffs, pharmaceuticals; as a laboratory reagant, in metallurgy (*mainly* as a pickling agent) and the printing industy.
Other Designations: CAS No. 7697-37-2, aqua fortis, aqua regia, azotic acid, engravers nitrate, hydrogen nitrate, red fuming nitric acid (RFNA), white fuming nitric acid (WFNA).
Manufacturer: Contact your supplier or distributor. Consult latest *Chemical Week Buyers' Guide*(73) for suppliers list.

Cautions: Nitric acid is a corrosive, strong oxidizer that causes irritation or severe burns to the skin, eyes, and respiratory tract. Exposures to high levels of the concentrated acid can be fatal. Increases the flammability of combustibles. Use extreme caution when handling HNO_3.

	HMIS		NFPA
R 2	H 3*	*Fuming* nitric acid	
I 4	F 0		
S 4	R 1		
K 0	PPE**		
R 2	HMIS		
I 4	H 3*	*> 40%* nitric acid	
S 4	F 0		
K 0	R 1		
	PPE**		
R 2	HMIS		
I 3	H 3*	*≤ 40%* nitric acid	
S 3	F 0		
K 0	R 0		
	PPE**		

* Chronic effects ** See Sec. 8

Section 2. Ingredients and Occupational Exposure Limits

Nitric acid, various %. Commercially available in nearly all concentrations; most common are 56 and 68%. RFNA (85%), WFNA (97.5%).

1991 OSHA PELs
8-hr TWA: 2 ppm (5 mg/m³)
15-min STEL: 4 ppm (10 mg/m³)

1990 IDLH Level
100 ppm

1990 NIOSH REL
8-hr TWA: 2 ppm (5 mg/m³)
15-min STEL: 4 ppm (10 mg/m³)

1992-93 ACGIH TLVs
TWA: 2 ppm (5.2 mg/m³)
STEL: 4 ppm (10 mg/m³)

1990 DFG (Germany) MAK
2 ppm (5 mg/m³)
Category I: local irritants
Peak Exposure Limit: 2 ppm
5 min momentary value, 8 per shift

1985-86 Toxicity Data*
Man, unreported route, LD_{Lo}: 110 mg/kg; toxic effects not yet reviewed
Rat, oral, TD_{Lo}: 5275 g/kg administered from 1 to 21 days of pregnancy caused post-implantation mortality and specific developmental abnormalities of the musculoskeletal system.
Rat, inhalation, LC_{50}: 67 ppm (NO_2)/4 hr; toxic effects not yet reviewed

* See NIOSH, *RTECS* [QU5775000 (nitric acid), QU5900000 (RFNA), QU6000000 (WFNA)] , for additional reproductive and toxicity data.

Section 3. Physical Data

Boiling Point: 186.8 °F (86 °C)
Melting Point: -43.6 °F (-42 °C)
Vapor Pressure: 67% HNO_3 = 6.8 mm Hg at 68 °F (20 °C); 95 to 98% = 113 at 100.4 °F (38 °C)
Saturated Vapor Density (Air = 1.2 kg/m³): 1.212 kg/m³ or 0.0757 lb/ft³ (67 % HNO_3)
pH: 1

Molecular Weight: 63.02
Density: 1.50269 at 77/39.2 °F (25/4 °C)
Water Solubility: Soluble (releases heat)
Ionization Potential: 11.95 eV

Appearance and Odor: Transparent, clear to yellow, fuming liquid with an acrid, suffocating odor which darkens to a brownish color on aging and exposure to light. "Fuming" nitric acid is red-brown in color.

Section 4. Fire and Explosion Data

Flash Point: Noncombustible	Autoignition Temperature: Noncombustible	LEL: None reported	UEL: None reported

Extinguishing Media: For small fires (< 40% HNO_3), use dry chemical, carbon dioxide (CO_2), water spray, or regular foam. For large fires, use water spray, fog, or regular foam. For small fires (> 40% HNO_3), use water spray, dry chemical, or soda ash. For large fires, flood area with water (*do not* get inside HNO_3 containers). Apply water from as far a distance as possible.
Unusual Fire or Explosion Hazards: HNO_3 is noncombustible but is an oxidizer which increases fire involving combustibles and can initiate an explosion. It releases flammable hydrogen gas in contact with many metals.
Special Fire-fighting Procedures: Because fire may produce toxic thermal decomposition products, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in pressure-demand or positive-pressure mode. Structural firefighters' protective clothing is not effective for fires involving nitric acid. Acid-resistant clothing is needed. Apply cooling water to sides of containers until well after fire is out. Stay away from ends of tanks. For massive fire in cargo area, use monitor nozzles or unmanned hose holders; if impossible, withdraw from area and let fire burn. *Do not* release runoff from fire control methods to sewers or waterways.

Section 5. Reactivity Data

Stability/Polymerization: Nitric acid decomposes in air and in contact with light and organic matter. Hazardous polymerization cannot occur.
Chemical Incompatibilities: Nitric acid reacts explosively with combustibles, organics or readily oxidizable materials such as wood, turpentine, metal powder and hydrogen sulfide, carbides, cyanides, and alkalies; causes spattering with strong bases; is corrosive to paper, cloth and most metals (except aluminum, gold, platinum, thorium, and tantalum. Will also attack some forms of plastics, rubber, and coatings. There are at least 150 chemicals and chemical combinations which are incompatible with nitric acid. HNO_3 reacts with water to produce heat and toxic corrosive fumes. Refer to *Genium* references 126 and 159 for further detail. **Conditions to Avoid:** Avoid exposure to moisture, heat, and incompatibles.
Hazardous Decomposition Products: Thermal oxidative decomposition of HNO_3 produces nitrogen peroxide and toxic, irritating nitrogen oxides.

Section 6. Health Hazards Data

Carcinogenicity: The IARC,(164) NTP,(169) and OSHA(164) do not list nitric acid as a carcinogen.
Summary of Risks: Nitric acid is very corrosive to the skin, eyes, digestive and respiratory tract or any tissue it comes in contact with. 58 to 68% (nitric acid) vapors are moderately irritating and can't be tolerated at high concentrations. 95% (nitric acid) vapors cause severe irritation at very low levels and the liquid causes 2nd and 3rd degree burns on short contact with skin or eyes. Vapor inhalation may cause pulmonary edema (fluid in lungs) leading to death. HNO_3 vapor or mist can slowly corrode teeth when chronically exposed. **Medical Conditions Aggravated by Long-Term Exposure:** Chronic respiratory diseases. **Target Organs:** Eyes, skin, respiratory tract, teeth.

Continue on next page

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Section 6. Health Hazard Data, continued

Primary Entry Routes: Inhalation, ingestion, skin and eye contact. Acute Effects: Inhalation symptoms may take several hours and include throat and nose irritation, cough, chest pain, difficulty breathing, salivation, giddiness, nausea, muscular weakness, ulceration of nasal mucous membranes, [redacted]ary edema, and chemical pneumonia. Skin contact is moderately irritating to severely corrosive depending on % of nitric acid. Burns may [redacted]eeply causing ulcers. Skin may be stained yellowish brown. Dilute solutions cause irritation and tend to harden the epithelium (outer skin [redacted]out destroying it. HNO_3 liquid causes yellow discoloration of the eyes and severe burns which may result in permanent damage, i.e., sight loss. [redacted]estion produces immediate pain and digestive tract burns followed by throat swelling, convulsions, risk of stomach perforation (causing a rigid abdomen) and possible coma. Chronic Effects: Repeated inhalation of low concentrations may cause chronic bronchitis, tooth erosion, and/or appetite loss. Repeated exposure to $NO_{(x)}$ such as produced by thermal decomposition of HNO_3 is implicated in chronic lung diseases.

FIRST AID

Eyes: *Do not* allow victim to rub or keep eyes tightly shut. Gently lift eyelids and flush immediately and continuously with flooding amounts of water until transported to an emergency medical facility. Consult a physician immediately. Skin: *Quickly* remove contaminated clothing (*do not force removal if stuck to skin*). Rinse with flooding amounts of water for at least 15 min. Apply a 5% triethanolamine solution to affected area. Wash exposed area with soap and water. For reddened or blistered skin, consult a physician. Inhalation: Remove exposed person to fresh air and support breathing as needed. Ingestion: Never give anything by mouth to an unconscious or convulsing person. Contact a poison control center. Unless the poison control center advises otherwise, have that *conscious and alert* person drink 1 to 2 glasses of water to dilute followed by lime milk or milk of magnesia. Do not induce vomiting. *Do not* give sodium bicarbonate or attempt to neutralize the acid.

After first aid, get appropriate in-plant, paramedic, or community medical support.

Note to Physicians: Observe for several hours since symptoms such as pulmonary edema may be delayed.

Section 7. Spill, Leak, and Disposal Procedures

Spill/Leak: Immediately notify safety personnel, isolate and ventilate area, deny entry, and stay upwind. Cleanup personnel should wear fully-encapsulating vapor-protective clothing. Use water spray to cool and disperse vapor. Keep combustibles away from spilled material. For small spills, take up with earth, sand, vermiculite, or other absorbent, noncombustible material and place in dry containers for disposal. For large spill, flush with water to containment area and neutralize with agricultural (slaked) lime, sodium bicarbonate, crushed limestone, soda ash, or lime. Report any release in excess of 1000 lb. Control runoff and dike for disposal. Follow applicable OSHA regulations (29 CFR 1910.120).

Disposal: Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

EPA Designations

Listed as a SARA Toxic Chemical (40 CFR 372.65)
Listed as a SARA Extremely Hazardous Substance (40 CFR 355), TPQ: 1000 lb
Listed as a RCRA Hazardous Waste (40 CFR 261.22): No. D001, Characteristic of corrosivity
Listed as a CERCLA Hazardous Substance* (40 CFR 302.4): Final Reportable Quantity (RQ), 1000 lb (454 kg) [* per CWA, Sec. 311(b)(4)]

OSHA Designations

Listed as an Air Contaminant (29 CFR 1910.1000, Table Z-1-A)
Listed as a Process Safety Hazardous Chemical (29 CFR 1910.119), TQ: 500 lb

Section 8. Special Protection Data

[redacted]: Wear protective eyeglasses or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133). Because contact [redacted] industry is controversial, establish your own policy. Respirator: Seek professional advice prior to respirator selection and use. Follow [redacted]spirator regulations (29 CFR 1910.134) and, if necessary, wear a MSHA/NIOSH-approved respirator. Select respirator based on its suitability to provide adequate worker protection for given working conditions, level of airborne contamination, and presence of sufficient oxygen. For < 50 ppm, use any supplied-air respirator operated in a continuous-flow mode. For < 100 ppm, use any supplied-air respirator or SCBA with a full facepiece. For emergency or nonroutine operations (cleaning spills, reactor vessels, or storage tanks), wear an SCBA. *Warning! Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.* If respirators are used, OSHA requires a written respiratory protection program that includes at least: medical certification, training, fit-testing, periodic environmental monitoring, maintenance, inspection, cleaning, and convenient, sanitary storage areas. Other: Wear acid-proof gloves, boots, aprons, and gauntlets to prevent skin contact. Ventilation: Provide general and local exhaust ventilation systems to maintain airborne concentrations below OSHA PELs (Sec. 2). Local exhaust ventilation is preferred because it prevents contaminant dispersion into the work area by controlling it at its source.[103] Safety Stations: Make available in the work area emergency eyewash stations, safety/quick-drench showers, and washing facilities. Contaminated Equipment: Separate contaminated work clothes from street clothes. Launder contaminated work clothing before wearing. Remove this material from your shoes and clean personal protective equipment. Comments: Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9. Special Precautions and Comments

Storage Requirements: Prevent physical damage to containers. Store in aluminum, stainless steel, or glass containers on a cement floor in a cool, dry, well-ventilated area away from incompatibles (Sec. 5). Dike around storage tanks with large kirbs or stills to retain the acid in event of leakage. Keep neutralization agents on hand and install a fire hydrant in storage area. (See NFPA Code 43A). Engineering Controls: To reduce potential health hazards, use sufficient dilution or local exhaust ventilation to control airborne contaminants and to maintain concentrations at the lowest practical level. Administrative Controls: Consider preplacement and periodic medical exams of exposed workers that emphasize the eyes, skin, respiratory tract and teeth. Pulmonary function tests (FEV< FVC) are helpful. Educate workers about the hazardous properties of nitric acid.

Transportation Data (49 CFR 172.101)

DOT Shipping Name: *, †, ‡, §, ¥, ψ, ϕ
DOT Hazard Class: 8
ID No.: UN1826 (*†), UN1796 (‡§), UN2031 (¥ψ), UN2032 (ϕ)
DOT Packing Group: I (†§¥ϕ), II (*‡ψ)
DOT Packaging Label: Corrosive (*‡¥ψ), Corrosive, Oxidizer (†§), Corrosive, Oxidizer, Poison (ϕ)
Special Provisions (172.102): B2, T12, T27 (*); T12, T27 (†); B2, T12, T27 (‡); T12, T27 (§); B12, B53, T9, T27 (¥); B2, B12, B53, T9, T27(ψ); 2, B9, B32, B74, T38, T43, T45(ϕ)

Packaging Authorizations
a) **Exceptions:** None
b) **Non-bulk Packaging:** 173.158 (*†‡§¥ψ), 173.227 (ϕ)
c) **Bulk Packaging:** 173.242 (*‡ψ), 173.243 (†§¥), 173.244(ϕ)

Quantity limitations
a) **Passenger Aircraft or Railcar:** Forbidden
b) **Cargo Aircraft Only:** 30L (*‡ψ), 2.5L (†§¥), Forbidden (ϕ)

Vessel Stowage Requirements
a) **Vessel stowage:** D
b) **Other:** 40(*); 40, 66, 89 (†); 40 (‡); 40, 66, 89 (§); 110, 111 (¥); 110, 111 (ψ); 40, 66, 74, 89, 90, 95 (ϕ)

[redacted] acid mixtures spent, < 50% HNO_3
[redacted] acid mixtures spent, > 50% HNO_3
‡ [redacted] acid mixtures, < 50% HNO_3
§ Nitrating acid mixtures, > 50% HNO_3
¥ Nitric acid other than red fuming, > 70% HNO_3
ψ Nitric acid other than red fuming, < 70% HNO_3
ϕ Nitric acid, red fuming.

MSDS Collection References: 26, 73, 89, 100, 101, 103, 124, 126, 127, 132, 136, 139, 140, 148, 149, 153, 159, 162, 163, 164, 167, 168, 171, 174, 175
Prepared by: M Gannon, BA; Industrial Hygiene Review: PA Roy, MPH, CIH; Medical Review: W Silverman, MD

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HEXANES
HEXANES
HEXANES

MATERIAL SAFETY DATA SHEET

FISHER SCIENTIFIC
CHEMICAL DIVISION
1 REAGENT LANE
FAIR LAWN NJ 07410
(201) 796-7100

EMERGENCY NUMBER: (201) 796-7100
CHEMTREC ASSISTANCE: (800) 424-9300

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SUBSTANCE IDENTIFICATION

SUBSTANCE: **HEXANES**

TRADE NAMES/SYNONYMS:
N-HEXANE; NCI-C60571; HEXYLHYDRIDE; NORMAL HEXANE; SKELLYSOLVE B; STCC 4908183; UN 1208; H291; N3; H302; H303; H292; H300; H334; H302SK; N3S; C6H14; ACC10951

CHEMICAL FAMILY:
Hydrocarbon, aliphatic

MOLECULAR FORMULA: C6-H14

MOLECULAR WEIGHT: 86.20

CERCLA RATINGS (SCALE 0-3): HEALTH=U FIRE=3 REACTIVITY=0 PERSISTENCE=1
NFPA RATINGS (SCALE 0-4): HEALTH=1 FIRE=3 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: N-HEXANE — PERCENT: VARIES
CAS# 110-54-3

COMPONENT: 2-METHYLPENTANE — PERCENT: VARIES
CAS# 107-83-5

COMPONENT: 3-METHYLPENTANE — PERCENT: VARIES
CAS# 96-14-0

COMPONENT: 2,3-DIMETHYLBUTANE — PERCENT: VARIES
CAS# 79-29-8

COMPONENT: METHYLCYCLOPENTANE — PERCENT: VARIES
CAS# 96-37-7

COMPONENT: 2,2-DIMETHYLPENTANE — PERCENT: VARIES
CAS# 590-35-2

2,4-DIMETHYLPENTANE
CAS# 108-08-7

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:
N-HEXANE:
50 ppm (180 mg/m3) OSHA TWA
50 ppm (180 mg/m3) ACGIH TWA
50 ppm (180 mg/m3) NIOSH recommended TWA
50 ppm (180 mg/m3) DFG MAK TWA;
100 ppm (360 mg/m3) DFG MAK 30 minute peak, average value, 4 times/shift

Measurement method: Charcoal tube; carbon disulfide; gas chromatography with flame ionization detection; (NIOSH Vol. III # 1500, Hydrocarbons).

HEXANE, ALL ISOMERS OTHER THAN N-HEXANE:
500 ppm (1800 mg/m3) OSHA TWA; 1000 ppm (3600 mg/m3) OSHA STEL
500 ppm (1800 mg/m3) ACGIH TWA; 1000 ppm (3600 mg/m3) ACGIH STEL

Measurement method: Charcoal tube; carbon disulfide; gas chromatography with flame ionization detection; (NIOSH Vol. III # 1500, Hydrocarbons).

ALKANES (C5-C8):
350 mg/m3 NIOSH recommended 10 hour TWA;
1800 mg/m3 NIOSH recommended 15 minute ceiling

OSHA revoked the final rule limits of January 19, 1989 in response to the 11th Circuit Court of Appeals decision (AFL-CIO v. OSHA) effective June 30, 1993. See 29 CFR 1910.1000 (58 FR 35338)

PHYSICAL DATA

DESCRIPTION: Colorless liquid, faint odor, very volatile

BOILING POINT: 136 F (58 C) MELTING POINT: -139 F (-95 C)

SPECIFIC GRAVITY: 0.7 VAPOR PRESSURE: 124 mmHg @ 20 C

SOLUBILITY IN WATER: Insoluble VAPOR DENSITY: 3.0

SOLVENT SOLUBILITY: Alcohol, chloroform, ether

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:
Dangerous fire hazard when exposed to heat or flame.

Vapors are heavier than air and may travel a considerable distance to a source of ignition and flash back.

Vapor-air mixtures are explosive above flash point.

Due to low electroconductivity of the substance, flow or agitation may generate electrostatic charges resulting in sparks with possible ignition.

FLASH POINT: -7 F (-22 C) (CC) *UPPER EXPLOSIVE LIMIT: 7.5%*

LOWER EXPLOSIVE LIMIT: 1.1% *AUTOIGNITION TEMP.: 437 F (223 C)*

FLAMMABILITY CLASS(OSHA): IB

FIREFIGHTING MEDIA:
Dry chemical, carbon dioxide, water spray or regular foam (1990 Emergency Response Guidebook, DOT P 5800.5).

For larger fires, use water spray, fog or regular foam (1990 Emergency Response Guidebook, DOT P 5800.5).

FIREFIGHTING:
Move container from fire area if you can do it without risk. Apply cooling water to sides of containers that are exposed to flames until well after fire is out. Stay away from ends of tanks. For massive fire in cargo area, use unmanned hose holder or monitor nozzles; if this is impossible, withdraw from area and let fire burn. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tank due to fire. Isolate for 1/2 mile in all directions if tank, rail car or tank truck is involved in fire (1990 Emergency Response Guidebook, DOT P 5800.5, Guide Page 27).

Extinguish only if flow can be stopped; use water in flooding amounts as fog. Solid streams may not be effective. Cool containers with flooding quantities of water. Apply from as far a distance as possible. Avoid breathing toxic vapors; keep upwind. Evacuate to a radius of 1500 feet for uncontrollable fires. Consider evacuation of downwind area if material is leaking.

Water may be ineffective (NFPA 325M, Fire Hazard Properties of Flammable Liquids, Gases, and Volatile Solids, 1991)

TRANSPORTATION DATA

U.S. DEPARTMENT OF TRANSPORTATION SHIPPING NAME-ID NUMBER, 49 CFR 172.101:
Hexanes-UN 1208

U.S. DEPARTMENT OF TRANSPORTATION HAZARD CLASS OR DIVISION, 49 CFR 172.101:
3 - Flammable liquid

U.S. DEPARTMENT OF TRANSPORTATION PACKING GROUP, 49 CFR 172.101:
PG II

U.S. DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS, 49 CFR 172.101 AND SUBPART E:
Flammable liquid

U.S. DEPARTMENT OF TRANSPORTATION PACKAGING AUTHORIZATIONS:
EXCEPTIONS: 49 CFR 173.150
NON-BULK PACKAGING: 49 CFR 173.202
BULK PACKAGING: 49 CFR 173.242

U.S. DEPARTMENT OF TRANSPORTATION QUANTITY LIMITATIONS 49 CFR 172.101:
PASSENGER AIRCRAFT OR RAILCAR: 5 L
CARGO AIRCRAFT ONLY: 60 L

TOXICITY

N-HEXANE:
IRRITATION DATA: 10 mg eye-rabbit mild.

TOXICITY DATA: 190 ppm/8 weeks inhalation-human TCLo; 1 pph/6 hours/13 weeks intermittent inhalation-rat TCLo; 120 gm/m3 inhalation-mouse LCLo; 28710 mg/kg oral-rat LD50; 831 mg/kg intravenous-mouse LDLo; 132 mg/kg intravenous-rabbit LDLo; 9100 mg/kg intraperitoneal-rat LDLo; mutegenic data (RTECS); reproductive effects data (RTECS).
CARCINOGEN STATUS: None.
LOCAL EFFECTS: Irritant- skin, eye.
ACUTE TOXICITY LEVEL: Relatively non-toxic by ingestion.
TARGET EFFECTS: Central nervous system depressant; neurotoxin.
AT INCREASED RISK FROM EXPOSURE: Persons with skin, pulmonary, liver, or kidney disorders.
ADDITIONAL DATA: Alcohol may enhance the toxic effect. A low order of myocardial sensitization to epinephrine may occur. Acetone and methyl ethyl ketone may enhance the toxic effects.

2-METHYLPENTANE:
CARCINOGEN STATUS: None.
LOCAL EFFECTS: Irritant- inhalation, skin, eyes.
ACUTE TOXICITY LEVEL: No data available.
TARGET EFFECTS: Central nervous system depressant.
ADDITIONAL DATA: Stimulants such as epinephrine may induce ventricular fibrillation.

3-METHYLPENTANE:
CARCINOGEN STATUS: None.
LOCAL EFFECTS: Irritant- skin, eye, mucous membranes.
ACUTE TOXICITY LEVEL: No data available.
TARGET EFFECTS: Central nervous system depressant.
ADDITIONAL DATA: Consumption of alcohol may potentiate the toxic effects. Use of stimulants such as epinephrine may induce ventricular fibrillation.

2,3-DIMETHYLBUTANE:
CARCINOGEN STATUS: None.
LOCAL EFFECTS: Irritant- inhalation, skin, eye.
ACUTE TOXICITY LEVEL: No data available.
TARGET EFFECTS: Central nervous system depressant.
ADDITIONAL DATA: Alcohol may enhance the toxic effects. Stimulants such as epinephrine may induce ventricular fibrillation.

METHYLCYCLOPENTANE:
TOXICITY DATA: 95,000 mg/m3 inhalation-mouse LCLo.
CARCINOGEN STATUS: None.
LOCAL EFFECTS: Irritant- inhalation, skin, eye.
ACUTE TOXICITY LEVEL: Insufficient data.
TARGET EFFECTS: Central nervous system depressant.
ADDITIONAL DATA: Alcohol may enhance the toxic effects. Use of stimulants such as epinephrine may induce ventricular fibrillation.

2,2-DIMETHYLPENTANE:
CARCINOGEN STATUS: None.
ACUTE TOXICITY LEVEL: No data available.
TARGET EFFECTS: Poisoning may affect the central nervous system.*

* May be based on general aliphatic hydrocarbon information.

2,4-DIMETHYLPENTANE:
CARCINOGEN STATUS: None.
ACUTE TOXICITY LEVEL: No data available.
TARGET EFFECTS: No data available.

HEALTH EFFECTS AND FIRST AID

INHALATION:
N-HEXANE:
IRRITANT/NARCOTIC/NEUROTOXIN.
5000 ppm Immediately Dangerous to Life or Health.
ACUTE EXPOSURE- 880 ppm for 15 minutes has caused upper respiratory tract irritation. Exposure to 1000-5000 ppm may produce headache, nausea, and dizziness. Other effects may include giddiness, coughing, numbness in the extremities, difficulty walking, defects of memory, excitement followed by depression, and unconsciousness. Anesthesia of short duration without sequela is possible. Pulmonary edema, cardiac arrhythmias, brain damage, cardiac arrest and death may result. High concentrations may produce asphyxia. Convulsions have been produced in animals.
CHRONIC EXPOSURE- Results in axonal neuropathy. Neuropathy is of an insidious bilateral, symmetrical, sensorimotor, peripheral nature. 100 ppm daily may produce changes in muscle strength. Prolonged exposure may cause effects as in acute exposure as well as memory loss, progressive weakness, aching muscles, sensory loss in feet and hands, calf cramps, facial numbness, impotence, blurred vision, color vision abnormalities, and paralysis of muscles usually of lower limbs. Examination reveals hypoactive deep knee reflexes, bilateral footdrop, reduction in nerve and sensitive conduction velocities, modification of distal latency, diminishing of sensory potential, and neurogenic atrophy of skeletal muscle. Reproductive effects have been reported in animals.

HEXANES (OTHER THAN N-HEXANE):
IRRITANT/NARCOTIC.
ACUTE EXPOSURE- May cause irritation to the mucous membranes. Liquid aliphatics, C5-C9, have anesthetic and central nervous system depressant actions. Symptoms may include, but are not limited to, dizziness, drowsiness, incoordination, convulsions, collapse or coma. Some isohexane isomers have been documented to sensitize the myocardium to epinephrine.
CHRONIC EXPOSURE- Repeated or prolonged exposure to aliphatic hydrocarbons may result in effects as described in acute exposure.

FIRST AID- Remove from exposure area to fresh air immediately. If breathing has stopped, perform artificial respiration. Keep person warm and at rest. Treat symptomatically and supportively. Get medical attention immediately.

SKIN CONTACT:
N-HEXANE:
IRRITANT.
ACUTE EXPOSURE- Vapor may cause irritation with redness. 2 mL/kg/4 hours on rabbit skin resulted in ataxia and restlessness. At 5 mL/kg/4 hours some deaths occurred.
CHRONIC EXPOSURE- Repeated or prolonged contact may cause dermatitis due to defatting. Blister formation, itching, erythema, pigmentation and pain have been reported. Skin exposures may enhance neurotoxic effects from inhalation exposure.

HEXANES (OTHER THAN N-HEXANE):
IRRITANT.
ACUTE EXPOSURE- May cause irritation and be absorbed through the skin.
CHRONIC EXPOSURE- The C5 and higher liquid aliphatic hydrocarbons are fat solvents, and repeated or prolonged contact may result in defatting dermatitis.

FIRST AID- Remove contaminated clothing and shoes immediately. Wash affected area with soap or mild detergent and large amounts of water until no evidence of chemical remains (approximately 15-20 minutes). Get medical attention immediately.

EYE CONTACT:
N-HEXANE:
IRRITANT.
ACUTE EXPOSURE- Contact may cause irritation with redness and pain. Vapors at 880 ppm for 15 minutes caused irritation.
CHRONIC EXPOSURE- Repeated or prolonged contact with irritants may cause conjunctivitis.

HEXANES (OTHER THAN N-HEXANE):
IRRITANT.
ACUTE EXPOSURE- May cause irritation. Most liquid hydrocarbons cause little or no injury on direct external contact with the eye.
CHRONIC EXPOSURE- Repeated or prolonged contact with irritants may cause conjunctivitis.

FIRST AID- Wash eyes immediately with large amounts of water or normal saline, occasionally lifting upper and lower lids, until no evidence of chemical remains (approximately 15-20 minutes). Get medical attention immediately.

INGESTION:
N-HEXANE:
NARCOTIC.
ACUTE EXPOSURE- May cause central nervous system effects, headache, nausea, vomiting, vertigo, bronchial and general intestinal irritation with abdominal swelling and pain. The fatal human dose may be about 50 grams. May vaporize when aspirated into the tracheobronchial tree with a resultant rapid dilution of alveolar air and marked fall in its oxygen content, with consequent brain damage or cardiac arrest.
CHRONIC EXPOSURE- Reproductive effects have been reported in animals.

HEXANES (OTHER THAN N-HEXANE):
NARCOTIC.
ACUTE EXPOSURE- May cause gastrointestinal disturbances. If sufficient amounts of aliphatic hydrocarbons are ingested and retained, central nervous system depression may occur. Symptoms may include, but are not limited to, nausea, vomiting, dizziness, drowsiness, incoordination, convulsions, and coma. In animal studies, aspiration of 0.2 mL of C6-C8 aliphatics, caused almost immediate death due to respiratory paralysis, asphyxia and cardiac arrest.
CHRONIC EXPOSURE- No data available.

FIRST AID- Extreme care must be used to prevent aspiration. Use gastric lavage with activated charcoal and a cuffed endotracheal tube within 15 minutes. In the absence of depression or convulsions or impaired gag reflex, ipecac emesis can be done. When vomiting begins, keep head lower than hips to prevent aspiration. After vomiting stops, give 30-60 milliliters of Fleet's phospho-soda diluted 1:4 in water. Maintain airway, blood pressure and respiration. (Dreisbach, Handbook of Poisoning, 11th Ed.) Treatment must be administered by qualified medical personnel. Get medical attention.

ANTIDOTE:
No specific antidote. Treat symptomatically and supportively.

REACTIVITY

REACTIVITY:
Stable under normal temperatures and pressures.

INCOMPATIBILITIES:
N-HEXANE:
CALCIUM HYPOCHLORITE: Fire and explosion hazard.
CHLORINE (LIQUID): Fire and explosion hazard.
DINITROGEN TETRAOXIDE: Possible explosion hazard.
FLUORINE: Incompatible.
MAGNESIUM PERCHLORATE: Incompatible.
OXIDIZERS (STRONG): Fire and explosion hazard.
OXYGEN (CONCENTRATED): Fire and explosion hazard.
PLASTICS, RUBBER, AND COATINGS: May be attacked.
SODIUM HYPOCHLORITE: Fire and explosion hazard.

DECOMPOSITION:
Thermal decomposition products may include toxic oxides of carbon.

POLYMERIZATION:
Hazardous polymerization has not been reported to occur under normal temperatures and pressures.

STORAGE AND DISPOSAL

Observe all federal, state and local regulations when storing or disposing of this substance.

Storage

Store in accordance with 29 CFR 1910.106.

Bonding and grounding: Substances with low electroconductivity, which may be ignited by electrostatic sparks, should be stored in containers which meet the bonding and grounding guidelines specified in NFPA 77-1983, Recommended Practice on Static Electricity.

Store away from incompatible substances.

Disposal

Disposal must be in accordance with standards applicable to generators of hazardous waste, 40 CFR 262. EPA Hazardous Waste Number D001.
100 pound CERCLA Section 103 Reportable Quantity.

****

CONDITIONS TO AVOID

Avoid contact with heat, sparks, flames, or other sources of ignition. Vapors may be explosive. Avoid overheating of containers; containers may violently rupture in heat of fire. Avoid contamination of water sources.

****

SPILL AND LEAK PROCEDURES

OCCUPATIONAL SPILL:
Shut off ignition sources. Stop leak if you can do it without risk. Use water spray to reduce vapors. For small spills, take up with sand or other absorbent material and place into containers for later disposal. For larger spills, dike far ahead of spill for later disposal. No smoking, flames or flares in hazard area. Keep unnecessary people away; isolate hazard area and restrict entry.

PROTECTIVE EQUIPMENT

VENTILATION:
Provide local exhaust or general dilution ventilation to meet published exposure limits. Ventilation equipment should be explosion-proof if explosive concentrations of dust, vapor or fume are present.

RESPIRATOR:
The following respirators are recommended based on information found in the physical data, toxicity and health effects sections. They are ranked in order from minimum to maximum respiratory protection.
The specific respirator selected must be based on contamination levels found in the work place, must be based on the specific operation, must not exceed the working limits of the respirator and must be jointly approved by the National Institute for Occupational Safety and Health and the Mine Safety and Health Administration (NIOSH-MSHA).

Any type 'C' supplied-air respirator with a full facepiece operated in pressure-demand or other positive pressure mode or with a full facepiece, helmet or hood operated in continuous-flow mode.

Any self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.

Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode.

CLOTHING:
Employee must wear appropriate protective (impervious) clothing and equipment to prevent repeated or prolonged skin contact with this substance.

GLOVES:
Employee must wear appropriate protective gloves to prevent contact with this substance.

EYE PROTECTION:
Employee must wear splash-proof or dust-resistant safety goggles to prevent eye contact with this substance.

Emergency eye wash: Where there is any possibility that an employee's eyes may be exposed to this substance, the employer should provide an eye wash fountain within the immediate work area for emergency use.

AUTHORIZED - FISHER SCIENTIFIC, INC.
CREATION DATE: 05/23/85 REVISION DATE: 03/03/94

-ADDITIONAL INFORMATION-

THIS INFORMATION IS BELIEVED TO BE ACCURATE AND REPRESENTS THE BEST INFORMATION CURRENTLY AVAILABLE TO US. HOWEVER, WE MAKE NO WARRANTY OF MERCHANTABILITY OR ANY OTHER WARRANTY, EXPRESS OR IMPLIED, WITH RESPECT TO SUCH INFORMATION, AND WE ASSUME NO LIABILITY RESULTING FROM ITS USE. USERS SHOULD MAKE THEIR OWN INVESTIGATIONS TO DETERMINE THE SUITABILITY OF THE INFORMATION FOR THEIR PARTICULAR PURPOSES.

04-322-15C
04-322-15D

Material Safety Data Sheet

May be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200. Standard must be consulted for specific requirements.

U.S. Department of Labor
Occupational Safety and Health Administration
(Non-Mandatory Form)
Form Approved
OMB No. 1218-0072

04-322-15A
04-322-15B

IDENTITY *(As Used on Label and List)* LIQUI-NOX

Note: Blank spaces are not permitted. If any item is not applicable, or no information is available, the space must be marked to indicate that

Section I

Manufacturer's Name ALCONOX, INC.	Emergency Telephone Number (212) 473-1300
Address *(Number, Street, City, State, and ZIP Code)* 215 PARK AVENUE SOUTH	Telephone Number for Information (212) 473-1300
NEW YORK, NEW YORK 10003	Date Prepared MARCH 1, 1992
	Signature of Preparer *(optional)*

Section II — Hazardous Ingredients/Identity Information

Hazardous Components (Specific Chemical Identity; Common Name(s))	OSHA PEL	ACGIH TLV	Other Limits Recommended	% (optional)

THERE ARE NO INGREDIENTS IN LIQUI-NOX WHICH APPEARED ON THE OSHA STANDARD 29 CFR 1910 SUBPART Z. ALL OF THE INGREDIENTS IN LIQUI-NOX ARE CONSIDERED TO BE PROPRIETARY INFORMATION AND WE SHALL EXERCISE THE RIGHT TO CONFIDENTIALITY AFFORDED US UNDER THE FEDERAL LAW.

Section III — Physical/Chemical Characteristics

Boiling Point	214°F	Specific Gravity (H_2O = 1)	1.075
Vapor Pressure (mm Hg.)	NO DATA	Melting Point	N.A.
Vapor Density (AIR = 1)	NO DATA	Evaporation Rate (Butyl Acetate = 1)	SLOWER

Solubility in Water
COMPLETELY SOLUBLE IN ALL PROPORTIONS

Appearance and Odor
YELLOW LIQUID - PRACTICALLY ODORLESS

Section IV — Fire and Explosion Hazard Data

Flash Point (Method Used)	Flammable Limits	LEL	UEL
NONE (CLEVELAND OPEN CUP)		N.A.	N.A.

Extinguishing Media
MATERIAL DOES NOT BURN

Special Fire Fighting Procedures
FOR FIRES INVOLVING THIS MATERIAL, DO NOT ENTER WITHOUT PROTECTIVE EQUIPMENT AND SELF CONTAINED BREATHING APPARATUS.

Unusual Fire and Explosion Hazards
NONE

Section V — Reactivity Data

Stability	Unstable		Conditions to Avoid: NONE
	Stable	XX	

Incompatibility (*Materials to Avoid*): NONE

Hazardous Decomposition or Byproducts: SO_2 MAY BE RELEASED ON BURNING

Hazardous Polymerization	May Occur		Conditions to Avoid: NONE
	Will Not Occur	XX	

Section VI — Health Hazard Data

Route(s) of Entry: Inhalation? NO Skin? YES Ingestion? YES

Health Hazards (*Acute and Chronic*)
SKIN CONTACT MAY PROVE LOCALLY IRRITATING, INGESTION MAY CAUSE DISCOMFORT AND/OR DIARRHEA.

Carcinogenicity: NTP? NO IARC Monographs? NO OSHA Regulated? NO

Signs and Symptoms of Exposure
PROLONGED SKIN CONTACT MAY CAUSE DRYING AND/OR CHAPPING.

Medical Conditions Generally Aggravated by Exposure: NONE

Emergency and First Aid Procedures
EYES - FLUSH WITH PLENTY OF WATER FOR 15 MINUTES. SKIN-FLUSH WITH WATER.
INGESTION - DRINK LARGE QUANTITIES OF WATER. GET MEDICAL ATTENTION FOR DISCOMFORT

Section VII — Precautions for Safe Handling and Use

Steps to Be Taken In Case Material Is Released or Spilled
MATERIAL FOAMS PROFUSELY. RECOVER AS MUCH AS POSSIBLE WITH ABSORBENT MATERIAL AND RINSE REMAINDER TO SEWER, MATERIAL IS COMPLETELY BIODEGRADABLE.

Waste Disposal Method
SMALL QUANTITIES MAY BE DISPOSED OF IN SEWER, LARGE QUANTITIES SHOULD BE SOAKED UP WITH ABSORBENT MATERIAL AND DISPOSED OF ACCORDING TO LOCAL ORDINANCES

Precautions to Be Taken In Handling and Storing
NON REQUIRED - VISCOSITY OF MATERIAL INCREASE AT VERY LOW TEMPERATURE.

Other Precautions
NO SPECIAL REQUIREMENTS OTHER THAN THE GOOD INDUSTRIAL HYGIENE AND SAFETY PRACTICES EMPLOYED WITH ANY INDUSTRIAL CHEMICAL.

Section VIII — Control Measures

Respiratory Protection (*Specify Type*)
NOT REQUIRED

Ventilation	Local Exhaust	NORMAL	Special	N.A.
	Mechanical (*General*)	N.A.	Other	N.A.

Protective Gloves: RECOMMENDED Eye Protection: RECOMMENDED

Other Protective Clothing or Equipment: NOT REQUIRED

Work/Hygienic Practices: NO SPECIAL PRACTICES REQUIRED.

• USGPO 1988-241-524/45775

APPENDIX C

DAILY CALIBRATION RECORD FORM

CUMMINGS RITER CONSULTANTS, INC.

EQUIPMENT CALIBRATION LOG

PROJECT NAME: _____

PROJECT NUMBER: _____

DATE: _____ Performed By: _____

INSTRUMENT TYPE: _____

INSTRUMENT MODEL NUMBER: _____

INSTRUMENT SERIAL NUMBER: _____

DESCRIPTION OF CALIBRATION PROCEDURE:

STANDARD pH OR CONCENTRATION	INSTRUMENT READING

REMARKS: _____

IT Corporation
Kennedy Business Park 2
431-F Hayden Station Road
Windsor, CT 06095-1313
Tel. 860.688.1151
Fax. 860.688.8239
A Member of The IT Group

REMEDIAL SYSTEM OPERATIONS PLAN
SOIL VAPOR EXTRACTION AND AIR SPARGE SYSTEM

FORMER RUNOFF BASIN AREA
KENTUCKY AVENUE WELLFIELD SITE
OPERABLE UNIT #3
HORSEHEADS, NEW YORK

January 2000

Prepared for:

CBS Corporation
373 Westinghouse Building
11 Stanwix Street
Pittsburgh, PA 15222-1384

IT Corporation
Written/Submitted by:

Anne E. Proctor, PE
Project Engineer

IT Corporation
Reviewed/Approved by:

Sean W. Lorden
Staff Engineer

IT Corporation
Reviewed/Approved by:

Nicholas A. Hastings, RPG, LEP
Senior Hydrogeologist

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1.0 INTRODUCTION

This Remedial System Operations Plan has been prepared by IT Corporation for the Soil Vapor Extraction and Air Sparge (SVE/AS) remediation system proposed for the Former Runoff Basin area at the Former Westinghouse Facility, Kentucky Avenue Wellfield Site, Operable Unit #3 in Horseheads, New York. This Plan is a guide to operate the SVE/AS system. Additional information pertaining to the SVE/AS system, including design parameters, system drawings and an equipment list of major system components, is presented in the "Pre-Final Design Engineering Report" prepared by IT dated January 2000.

To optimize system reliability, IT has selected high-quality equipment and instrumentation from reputable vendors. Each component of the remediation system has been carefully evaluated to ensure reliable, low-maintenance operation. Whenever possible, systems with few moving parts and equipment that IT has successfully installed and operated at many other locations has been included. Use of field-proven components will minimize system troubleshooting and will result in reliable system operation. System components will be housed in a locked building with interior lighting and electrical controls. All field components, such as wells, will also be secured from unauthorized tampering with locked access.

Once the system has achieved steady operation, a detailed inspection of the process equipment will be completed. The operating point of each system component will be compared to system specifications to verify that the component is operating in accordance with the design. System influent and effluent soil vapor and groundwater samples will be collected, as required, to document compliance with regulatory guidelines and progress toward project remediation goals. Data, results, conclusions and recommendations will be summarized and reported quarterly.

2.0 START-UP

Start-up of the proposed system will be conducted according to a sequential plan to ensure that adequate data is collected to assess steady-state background site conditions; to assess the beneficial effects of the system on the groundwater and soil quality; and to confirm that the system meets design specifications.

Once the system has achieved steady operation, a detailed inspection of the process equipment will be completed. Pressure/vacuum, flow rate, motor voltage, and motor amperage draw will be recorded. The operating point of each motor will be compared to the manufacturer's performance curve to verify that the equipment is operating in accordance with the design specifications. The pressure drop through the vapor-phase carbon units will be compared to manufacturer's data to ensure compliance with specifications.

As start-up progresses, equipment and operating data will be monitored for compliance with ambient air action levels, system design parameters, system operating parameters (regulatory guidelines) and equipment vendor specifications. Adjustments and changes will be made to operating conditions to optimize system performance and alleviate system problems. Reference the "Initial Testing Program (ITP) Plan" *to be developed* for additional information.

2.1 Data Collection

To assess performance of the proposed system, background or static data will be collected for comparison with data gathered during and after operation of the system. This information will include soil vapor concentrations, groundwater quality, groundwater elevation, and dissolved-oxygen (DO) concentrations.

System start-up will proceed with an initial equipment check, then start-up of the SVE system components, then start-up of the AS system components. The AS system will be operated in pulsed mode by a 24-hour timer initially set to operate 4 hours on/4 hours off. Periodic monitoring of remediation parameters and ambient air monitoring will be required to "balance" the system and to assess remedial effectiveness and initial system settings. **Table 1** outlines data anticipated to be collected at each visit during the start-up period (presumed to be the first month of operation).

2.2 Field Personnel Requirements

Start-up is anticipated to occur according to the following schedule:

Weeks	Personnel Onsite	Number of days
1	Project Engineer	2
	Project Technician	2
2-4	Project Technician	1 day per week
	Additionally, the Project Engineer will monitor the system periodically using a remote telemonitoring system.	

All project field personnel will be HAZWOPER trained and will be familiar with system operation and components through review of project documents and prior field experience with similar systems. Field personnel, at a minimum, will wear Modified Level D Personal Protection Equipment (PPE) including a hard hat, safety glasses, steel-toed shoes, and a traffic vest. Reference the site-specific Health and Safety Plan (HASP) for upgrades to PPE and action levels for ambient air monitoring in the building interiors. Any problems or emergencies will be reported immediately to the Project Manager and in accordance with the HASP. Additionally, all field personnel will report through the current business at the site, Cutler-Hammer, to ensure site security and personnel safety.

3.0 SYSTEM OPERATING PLAN

System operation will include routine system checks and monitoring of operating parameters, recording these parameters on system data sheets and in a notebook style operating log, and comparing all pressures and flows with the prescribed ranges to ensure that the system is operating within approved guidelines. Reference **Drawing P2** for initial, design operating parameters. Periodically, as conditions

change, adjustments may be made to alter the soil vapor extraction rates and the air sparge injection rates and duration. All changes will be documented in the operating log and the associated changes in operating parameters will be recorded. The Project Engineer will review data sheets following each field visit and, in conjunction with the Project Manager and CBS's representative, will initiate all system operational changes. The operating log will be maintained by IT during active system operation and then transferred to CBS to be archived in accordance with regulatory record-keeping requirements. The logs will be made available to USEPA and NYSDEC representatives upon request.

3.1 Data Collection

During operation, system and remediation parameters will be monitored to "balance" the system and to assess remedial effectiveness. The following schedule outlines data collection needs. Monitoring points are indicated on **Drawings P2 and Y2**.

Routine (*Routine monitoring is anticipated to occur monthly for the first year, then quarterly thereafter.*):

- Flow rate at the SVE blower, SVE wells, AS compressor, and AS wells;
- Vacuum/pressure monitoring at the SVE blower, AS compressor, AS wells, SVE wells, and monitoring wells;
- VOC concentrations in extracted soil gas from each SVE well and the SVE system influent, midfluent and effluent to the carbon treatment units as measured by a photo ionization detector (PID);
- Sampling of SVE system, *before and after carbon treatment*, for laboratory analysis by USEPA Method T014 for VOCs;
- VOC concentrations in soil gas, groundwater elevation and DO concentrations (with depth) in monitoring wells;
- Ambient air monitoring at AS wells and building interiors;
- Water level in the moisture separator; and
- Pressure drop across the moisture separator, blower B1 particulate filter and carbon treatment units.

Quarterly:

- Groundwater sampling at monitoring wells TMP-1-SAT, TMP-1D, TMP-2D, MW-7S, MW-7D, MW-8S and MW-8D, and MW-11D.

3.2 Field Personnel Requirements

System operation is anticipated to occur according to the following schedule:

Year	Frequency	Field Personnel	Number of Personnel
1	Monthly	Project Technician	1
	Quarterly	Project Technicians	2
After Yr. 1	Quarterly	Project Technicians	2

Additionally, the Project Engineer will monitor the system at least weekly using a remote telemonitoring system. Emergency and routine field visits can be scheduled should remote monitoring indicate a problem.

All project technicians will be HAZWOPER trained and will be familiar with system operation and components through review of project documents and hands-on training. Field personnel, at a minimum, will wear Modified Level D Personal Protection Equipment (PPE) including a hard hat, safety glasses, steel-toed shoes, and a traffic vest. The site-specific Health and Safety Plan (HASP) will be referenced for upgrades to PPE and action levels for ambient air monitoring in the building interiors. Any problems or emergencies will be reported immediately to the Project Manager and in accordance with the HASP. Additionally, all field personnel will report through the current business at the site, Cutler-Hammer, to ensure site security and personnel safety.

3.3 Potential Problems and Troubleshooting

Routine and non-routine maintenance activities will be performed consistent with the manufacturers' requirements to keep system equipment in good working order. Key system parameters, such as flow rates, pressure, vacuum and temperature, will be recorded and compared to the previous data set, checking for data anomalies that indicate an operational problem.

Operating data will be used to determine the need for equipment maintenance. High pressure drop across the moisture separator, blower B1 particulate filter or carbon treatment units indicates these units need cleaning or component replacement. The moisture separator will be drained upon high water level. Laboratory VOC data will be used to determine when carbon changeout is required. Additional equipment maintenance will be performed in accordance with the manufacturer's recommendations.

Two interlocks are incorporated into the system design to automatically shut down components in the following events:

- Upon high water level in the moisture separator, SVE blower B1 will shut down; and
- To prevent sparging air without coincidental vapor collection, air compressor AC1 will shut down upon low flow or no flow to SVE blower B1.

These shut down conditions will also be relayed to the office of the Project Engineer by facsimile from the Remote Telemonitoring System and emergency field visits will be scheduled accordingly. The most likely causes of system shut down are high water level in the moisture separator, SVE blower B1 particle filter being plugged or some other problem restricting flow to SVE blower B1.

Data from monitoring wells will be used to verify proper system operation. Parameters, including pressure, vacuum, dissolved oxygen, oxygen in soil gas, and depth to water, will be compared from monitoring point to monitoring point checking for anomalies, such as:

- Pressure in the vadose zone (indicating inadequate soil vapor extraction); or
- Interrupted trend in measurements (vacuum, pressure, depth to water, dissolved oxygen, or oxygen) exceeding an acceptable variation (indicating uneven distribution of flow to wells).

Based on the particular air flow anomalies identified, operational adjustments and variations would be investigated first to alleviate the apparent problem. Operational adjustments such as adjusting the vapor extraction or air sparge rates or duration would be tried. If the anomalies persist, then more invasive methods would be used, such as re-developing the well to relieve siltation.

3.4 Waste Handling

Wastes generated during operation and maintenance of the proposed AS/SVE system will be classified and managed in accordance applicable regulations. Anticipated waste streams include personal protection equipment (PPE), spent carbon, decontamination liquids, well sampling purge water and water from the moisture separator. Separate 55-gallon drums will be provided at the site to properly containerize spent PPE and liquids. Spent carbon will be removed from the site by a licensed RCRA hazardous waste vendor and regenerated or disposed in accordance with applicable local, state, and federal regulations. Liquid wastes will be transported to the on-site groundwater treatment plant for disposal as appropriate.

4.0 REPORTING

Formal system evaluations will be performed with the ultimate goal of maximizing the VOC removal rate. These evaluations will include review of the following data:

- system operating flow rates and pressures/vacuums;
- dissolved oxygen concentrations;
- groundwater elevation data and groundwater gradient maps;
- soil gas concentrations and trend analyses; and
- dissolved VOC concentrations and trend analyses.

Additionally, laboratory VOC data will be used to determine the VOC removal rate, by completing a monthly mass balance at the discharge from the SVE blower (influent to the carbon treatment units). This mass balance will be completed by multiplying the rate of soil vapor extraction by the concentration of VOCs contained in the soil vapor. Mass balances for individual compounds will be summed to determine the total mass of contaminants removed by the remediation system.

The result of each evaluation will be a set of recommendations that will govern operation of the system during the period. Based on these recommendations, process adjustments will be made to enhance removal of remaining contaminants. System adjustment recommendations will be based on the following evaluations:

- *Soil Vapor and Groundwater VOC Analyses* - Air injection and/or soil vapor extraction may be adjusted to increase remediation in areas where contaminant concentrations are highest.
- *Induced Vacuums/Pressures and Ambient Air Monitoring* - Soil vapor extraction and air injection rates may be adjusted to create pressure gradients favorable to capture sparge air.
- *Dissolved Oxygen Concentrations* - Air injection rates may be adjusted to increase the dissolved oxygen concentrations in areas where the DO concentration is low, compensating for preferential pathways.

All operating and monitoring data, evaluations and recommendations will be incorporated into a quarterly status report which will be submitted to the USEPA and NYSDEC.

TABLES

TABLE 1

PROPOSED DATA COLLECTION DURING START-UP

Remedial System Operations Plan
Soil Vapor Extraction and Air Sparge System

Former Runoff Basin at the Former Westinghouse Facility,
Kentucky Avenue Wellfield Site, Operable Unit #3, Horseheads, New York

TASK/DATA	FREQUENCY
VOC concentrations in groundwater in monitoring wells by analytical laboratory analysis.	Prior to system initiation (background).
Groundwater elevations in monitoring wells.	Prior to system initiation (background) and each visit, upon arrival.
DO concentrations (with depth) in monitoring wells.	Prior to system initiation (background) and each visit, upon arrival.
Induced vacuums in monitoring wells.	Following system initiation and each visit, upon arrival.
VOC concentrations in soil gas in monitoring wells by field instrument.	Prior to system initiation (background) and each visit, upon arrival.
VOC concentrations in the building interiors by field instrument.	Prior to system initiation (background) and each visit, upon arrival.
Vacuum at each SVE well.	Following system initiation and each visit, upon arrival and departure, if process changes are made.
Extraction rate from each SVE well.	Following system initiation and each visit, upon arrival and departure, if process changes are made.
VOC concentrations in extracted soil gas from each SVE well by field instrument.	Following system initiation and each visit, upon arrival.
Pressure at each AS well.	Following system initiation and each visit, upon arrival and departure, if process changes are made.
Injection rate to each AS well.	Following system initiation and each visit, upon arrival and departure, if process changes are made.
VOC concentration in SVE system effluent before, after and between carbon units, by field instrument.	Following system initiation and each visit, upon arrival and departure, if process changes are made.
VOC concentration in SVE system effluent before, after and between carbon units, by analytical laboratory analysis.	Within one month of system initiation.

FIGURES

DRAWING NUMBER B0666P1 | OFFICE WIN | X-REF --- | IMAGE ---

VALVE AND PIPING SYMBOLS

- GLOBE VALVE
- GATE VALVE
- BUTTERFLY VALVE
- CHECK VALVE
- PLUG VALVE
- 3-WAY VALVE
- ANGLE VALVE
- RELIEF OR SAFETY VALVE
- DIAPHRAGM VALVE
- BALL VALVE
- GLOBE VALVE
- KNIFE GATE VALVE
- FLEXIBLE HOSE
- BASKET TYPE STRAINER
- Y-TYPE STRAINER
- DUPLEX STRAINER
- SLEEVE COUPLING (SC)
- FLOOR DRAIN
- EQUIPMENT DRAIN
- CLEANOUT (CO)
- REMOVABLE PLUG
- REMOVABLE CAP
- BLIND FLANGE
- EXHAUST TO ATMOSPHERE (INSIDE)
- EXHAUST TO ATMOSPHERE (OUTSIDE)
- REDUCER
- UNION
- QUICK DISCONNECT COUPLING
- GAUGE SEAL
- DAMPER
- BACKFLOW PREVENTER
- NO — NORMALLY OPEN
- NC — NORMALLY CLOSED
- SP — SAMPLE PORT
- SELF-CONTAINED PRESSURE REGULATING VALVE W/RELIEF

GENERAL INSTRUMENT SYMBOLS

ONE VARIABLE | TWO VARIABLES

- LOCALLY MOUNTED
- PANEL MOUNTED
- REAR-OF-PANEL MOUNTED
- INTERLOCK
- PURGE

EQUIPMENT SYMBOLS

- SUBMERSIBLE PUMP
- PUMP
- PNEUMATIC DIAPHRAGM PUMP
- BLOWER
- AIR COMPRESSOR

VALVE OPERATOR SYMBOLS

- DIAPHRAGM WITH POSITIONER
- HANDWHEEL OR LEVER
- CHAINWHEEL
- SOLENOID
- MOTOR, ELECTRIC
- DIAPHRAGM

PRIMARY ELEMENT SYMBOLS - FLOW

- ORIFICE PLATE
- PITOT TUBE
- AVERAGING PITOT TUBE
- VENTURI OR FLOW TUBE
- TOTALIZING FLOWMETER
- FLUME
- WEIR
- TURBINE OR PROPELLOR TYPE METER
- MAGNETIC FLOW METER
- ROTAMETER

LINE SYMBOLS

- PROCESS PIPES OR CHANNELS
- CONNECTION TO PROCESS, MECHANICAL LINK OR INSTRUMENT SUPPLY
- PNEUMATIC SIGNAL
- ELECTRIC SIGNAL
- CAPILLARY TUBING (FILLED SYSTEM)
- HYDRAULIC SIGNAL
- ELECTROMAGNETIC OR SONIC SIGNAL NO WIRING OR TUBING

INSTRUMENT IDENTIFICATION TABLE

	FIRST LETTER		SUCCEEDING LETTERS		
	MEASURED OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYSIS		ALARM		
B	BURNER FLAME				
C	CONDUCTIVITY			CONTROL	
D	DENSITY (SP. GR.)	DIFFERENTIAL			
E	VOLTAGE		PRIMARY ELEMENT		
F	FLOW RATE	RATIO			
G	GAUGING (DIMENSIONAL)		GLASS		
H	HAND (MANUAL)				HIGH
I	CURRENT		INDICATE		
J	POWER	SCAN			
K	TIME OR SCHEDULE			CONTROL STATION	
L	LEVEL		LIGHT (PILOT)		LOW
M	MOISTURE OR HUMIDITY				MIDDLE
N					
O			ORIFICE		
P	PRESSURE OR VACUUM		POINT (TEST)		
Q	QUANT. OR EVENT	INTEGRATE			
R	RADIOACTIVITY		RECORD OR PRINT		
S	SPEED OR FREQ.	SAFETY		SWITCH	
T	TEMPERATURE			TRANSMIT	
U	MULTIVARIABLE		MULTIFUNCTION		
V	VISCOSITY			VALVE OR DAMPER	
W	WEIGHT OR FORCE		WELL		
X	UNCLASSIFIED		UNCLASSIFIED		
Y				RELAY OR COMPUTE	
Z	POSITION			DRIVE, ACTUATE	

PROCESS PIPING IDENTIFICATION

PROCESS PIPE — PIPE DIAMETER (INCHES) — 2" XXX-YY-Z

- XXX — PROCESS LINE ABBREVIATION
- YY — PIPING DESIGN TABLE NUMBER
- Z — INSULATION CLASS

INSTRUMENT IDENTIFICATION

FIT 100A

- FIT — FIRST LETTER
- 1 — SUCCEEDING LETTERS
- 00 — LOOP NUMBER
- A — SUFFIX (NOT NORMALLY USED)

FUNCTION ABBREVIATIONS

DO	DISSOLVED OXYGEN
FC	FAIL CLOSED
FI	FAIL INDETERMINATE
FL	FAIL LOCKED
FO	FAIL OPEN
HOA	HAND-OFF-AUTOMATIC
I/I	CURRENT-TO-CURRENT
I/P	CURRENT-TO-PNEUMATIC
LEL	LOWER EXPLOSIVE LIMIT
LR	LOCAL-REMOTE
OC	OPEN-CLOSE
OO	ON-OFF (MAINTAINED)
ORP	OXIDATION REDUCTION POTENTIAL
OSC	OPEN-STOP-CLOSE (MOMENTARY)
SS	START-STOP (MOMENTARY)
>	HIGH SELECT
<	LOW SELECT
√	SQUARE ROOT
Σ	ADD OR TOTALIZE

PROCESS LINE ABBREVIATIONS

AIR	AIR, ATMOSPHERIC PRESSURE
BW	BACKWASH
CA	COMPRESSED AIR
CGW	CONTAMINATED GROUNDWATER
D	DRAIN
EFF	EFFLUENT
EXH	EXHAUST
GW	GROUNDWATER
NPW	NON-POTABLE WATER
P	PRODUCT
PW	POTABLE WATER
S	SANITARY
SL	SLUDGE
SP	SAMPLE PORT
SS	STORM SEWER
TF	TOTAL FLUIDS
V	VENT
VAP	VAPOR

PIPING MATERIAL IDENTIFICATION

CPVC	CHLORINATED POLYVINYL CHLORIDE
CSP	CARBON STEEL PIPE
COP	COPPER
CMP	CORRUGATED METAL PIPE
CIP	CAST IRON PIPE
DIP	DUCTILE IRON PIPE
GAL	GALVANIZED STEEL PIPE
PE	POLYETHYLENE PIPE
PP	POLYPROPYLENE PIPE
PVC	POLYVINYL CHLORIDE PIPE
RCP	REINFORCED CONCRETE PIPE
RUB	RUBBER HOSE
SS	STAINLESS STEEL PIPE
VCP	VITRIFIED CLAY PIPE

Revisions			
Symbol	Descriptions	Date	Approved

IT CORPORATION

CBS CORPORATION
FORMER RUNOFF BASIN
FORMER WESTINGHOUSE FACILITY
OPERABLE UNIT #3
HORSEHEADS, NY

PROPOSED
PIPING & INSTRUMENTATION
DIAGRAM LEGEND

Designed by: SWL			
Drawn by: LJA			
Checked by: AEP			
Reviewed by:	Scale: AS SHOWN	Sheet reference number: P1	Spec No.
Approved by:	Date: 1/4/00		Contract No.
	Drawing Number 0666P1		Sheet 2 of 9

VERIFY SCALE 0 1"

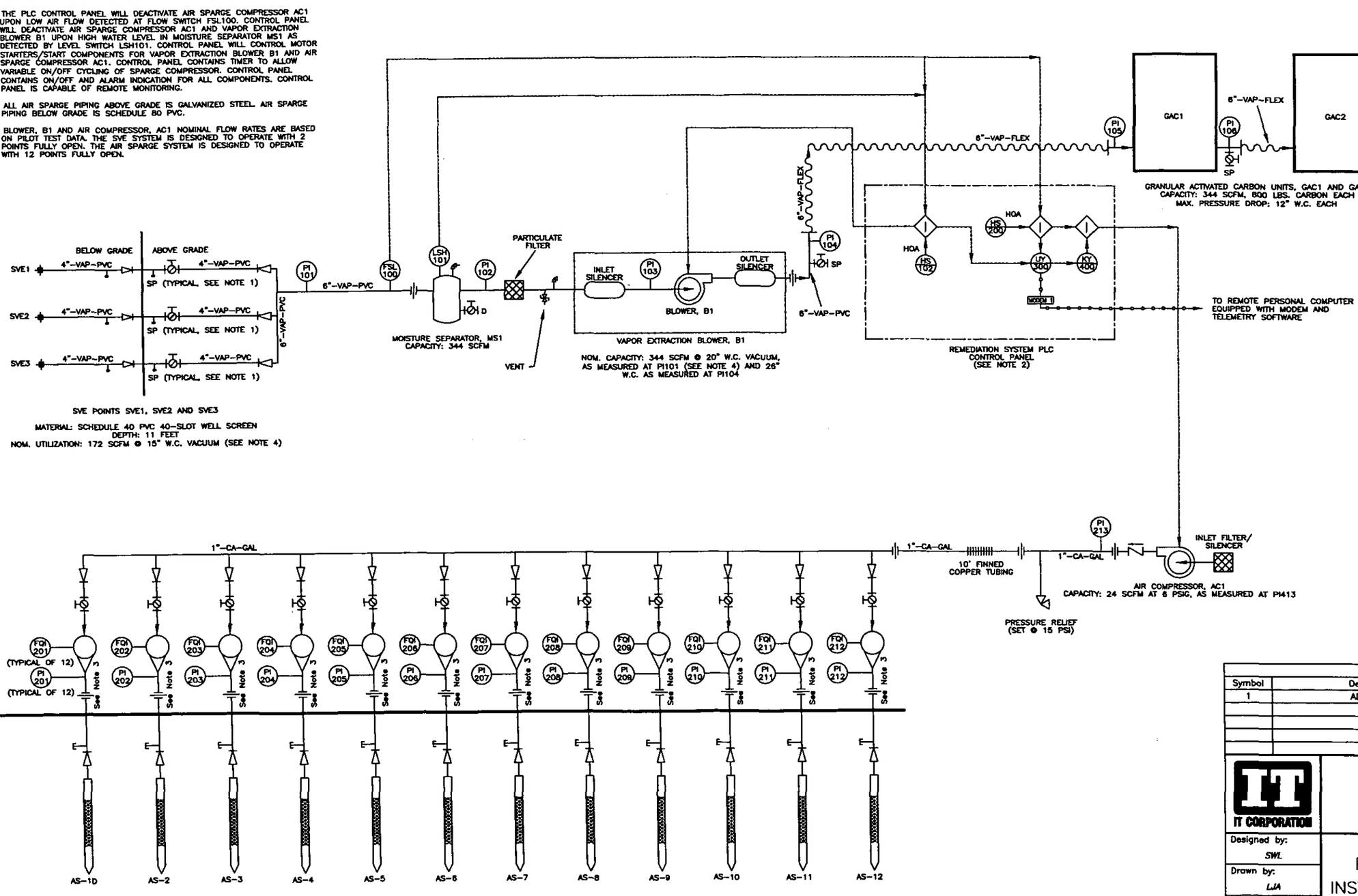
DATE: 1/4/00
TIME: 10:12 AM
FORMAT REVISION 2/26/99

NOTES:
1) SAMPLE PORTS ARE INSTALLED TO ALLOW VAPOR MEASUREMENTS USING A PID, VACUUM MEASUREMENTS USING A MAGNEHELIC GAUGE, AND AIR FLOW MEASUREMENTS USING A PORTABLE THERMAL ANEMOMETER.

2) THE PLC CONTROL PANEL WILL DEACTIVATE AIR SPARGE COMPRESSOR AC1 UPON LOW AIR FLOW DETECTED AT FLOW SWITCH FSL100. CONTROL PANEL WILL DEACTIVATE AIR SPARGE COMPRESSOR AC1 AND VAPOR EXTRACTION BLOWER B1 UPON HIGH WATER LEVEL IN MOISTURE SEPARATOR MS1 AS DETECTED BY LEVEL SWITCH LSH101. CONTROL PANEL WILL CONTROL MOTOR STARTERS/START COMPONENTS FOR VAPOR EXTRACTION BLOWER B1 AND AIR SPARGE COMPRESSOR AC1. CONTROL PANEL CONTAINS TIMER TO ALLOW VARIABLE ON/OFF CYCLING OF SPARGE COMPRESSOR. CONTROL PANEL CONTAINS ON/OFF AND ALARM INDICATION FOR ALL COMPONENTS. CONTROL PANEL IS CAPABLE OF REMOTE MONITORING.

3) ALL AIR SPARGE PIPING ABOVE GRADE IS GALVANIZED STEEL. AIR SPARGE PIPING BELOW GRADE IS SCHEDULE 80 PVC.

4) BLOWER, B1 AND AIR COMPRESSOR, AC1 NOMINAL FLOW RATES ARE BASED ON PILOT TEST DATA. THE SVE SYSTEM IS DESIGNED TO OPERATE WITH 2 POINTS FULLY OPEN. THE AIR SPARGE SYSTEM IS DESIGNED TO OPERATE WITH 12 POINTS FULLY OPEN.



Revisions			
Symbol	Descriptions	Date	Approved
1	ADD KY400	1/25/00	

IT CORPORATION

CBS CORPORATION

FORMER RUNOFF BASIN
FORMER WESTINGHOUSE FACILITY
OPERABLE UNIT #3
HORSEHEADS, NY

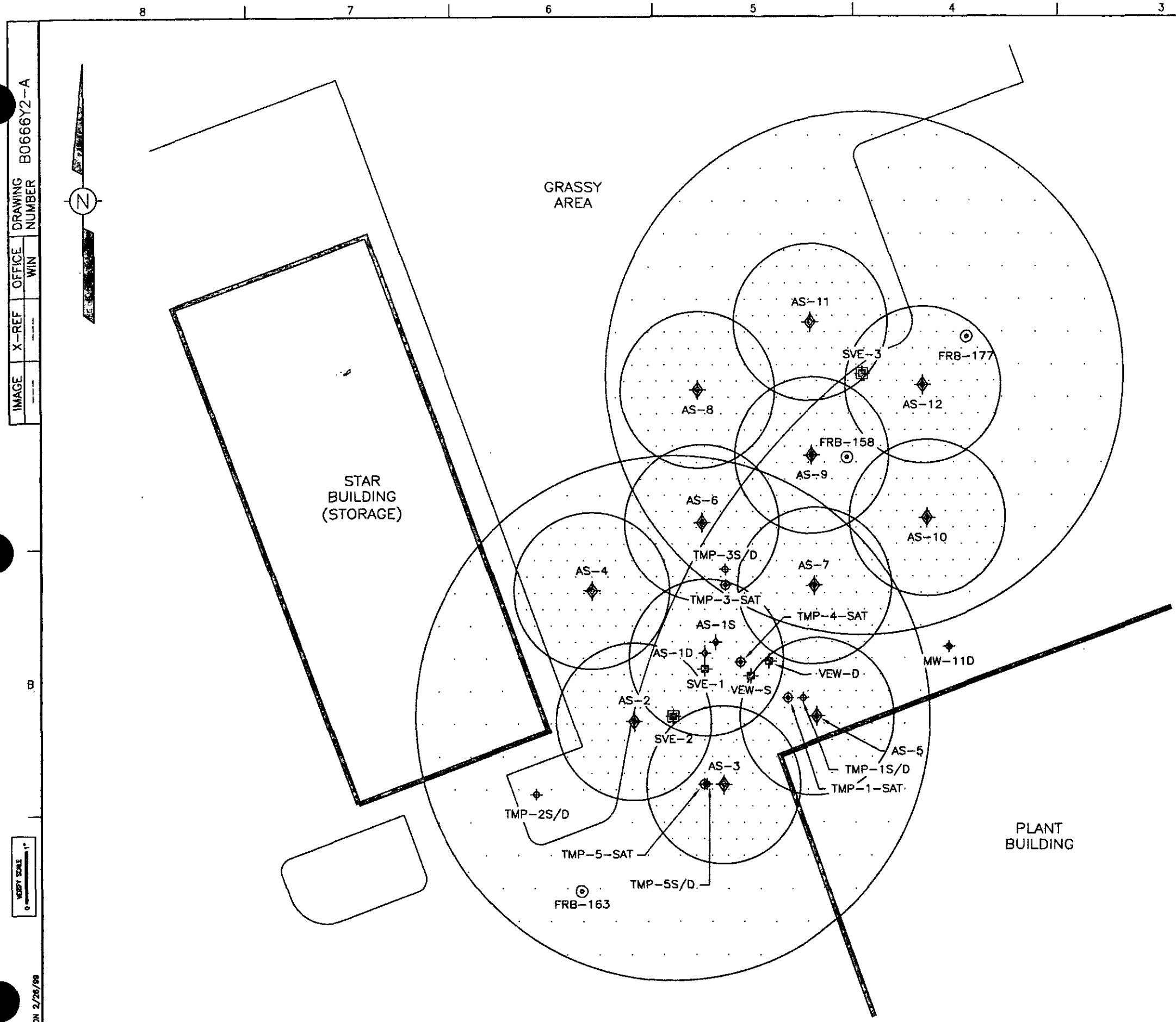
PROPOSED PIPING & INSTRUMENTATION DIAGRAM

Designed by: SWL	Scale: AS SHOWN	Sheet reference number: P2	Spec No.
Drawn by: LJA	Date: 1/4/00		Contract No.
Checked by: AEP	Drawing Number 0666P2		Sheet 1 of 1
Reviewed by:			
Approved by:			

IMAGE | X-REF | OFFICE | DRAWING NUMBER
--- | --- | WIN | B0666P2

VERIFY SCALE 0 1"

DATE: 1/4/00
TIME: 10:12 AM
FORMAT REVISION 2/25/99



LEGEND

- SOIL VAPOR EXTRACTION POINT EX.: VEW-1
- PROPOSED SOIL VAPOR EXTRACTION POINT EX.: SVE-2
- PROPOSED AIR SPARGE POINT EX.: AS-2
- MONITORING WELL EX.: MW-11D
- MULTI-LEVEL MONITORING POINT EX.: TMP-1S/D
- AIR SPARGE POINT EX.: AS-1S
- SOIL BORING EX.: FRB-163
- SATURATED ZONE MONITORING POINT EX.: TMP-3-SAT
- AIR SPARGE POINT RADIUS OF INFLUENCE
- SOIL VAPOR EXTRACTION POINT RADIUS OF INFLUENCE

NOTES:
1) LOCATIONS ARE APPROXIMATE.
2) S INDICATES SHALLOW. D INDICATES DEEP.
3) ONLY THOSE SOIL BORINGS WITH A MAXIMUM TCE CONCENTRATION IN SOIL GREATER THAN 100 ug/kg ARE SHOWN.

SCALE
0 20 40 FEET

Revisions			
Symbol	Descriptions	Date	Approved
A	ADD SOIL BORINGS	1/25/00	

IT CORPORATION

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HORSEHEADS, NY

PROPOSED REMEDIATION SYSTEM LAYOUT – RADIUS OF INFLUENCE

Designed by: SWL	Scale: AS SHOWN	Sheet reference number: Y2	Spec No.
Drawn by: LJA	Date: 8/27/99		Contract No.
Checked by: AEP	Drawing Number B0666Y2		Sheet 1 of 1
Reviewed by:			
Approved by:			

REFERENCE:
VAPOR EXTRACTION WELL AND MONITORING WELL LOCATIONS IN FORMER RUNOFF BASIN FIGURE 2
DRN: MPH DATE: 08/03/98 PROJECT NO.: 427100
SCALE 1"=30' PREPARED BY: PHILIP ENVIRONMENTAL

DRAWING NUMBER B0666Y2-A
OFFICE WIN
X-REF ---
IMAGE ---
WIDEFY SCALE 0 1"
DATE: 8/11/99
TIME: 9: 12 AM
FORMAT REVISION 2/26/98