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FINAL
OPERATIONS MAINTENANCE AND MONITORING PLAN (OMMP)

WASTE DISPOSAL, INC. SUPERFUND SITE
SANTA FE SPRINGS, CALIFORNIA

Prepared for

United States Environmental Protection Agency

Prepared by

TRC

Irvine, California

On Behalf of

Waste Disposal, Inc. Group (WDIG)

Project No. 29022402
August 2006

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Customer-Focused Solutions

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1.0 INTRODUCTION

1.1 OVERVIEW

1. This Final Draft Operations, Maintenance and Monitoring Plan (OMMP) is prepared for the Waste Disposal Inc. (WDI) Superfund Site (Site) located in Santa Fe Springs, California. The OMMP is developed in compliance with the Amended Record of Decision (AROD) (United States Environmental Protection Agency [EPA], 2002) and Consent Decree (CD) with the associated Statement of Work (SOW) (EPA, 2003).

2. This OMMP addresses the requirements in the SOW for the Operations and Maintenance (O&M) Plan, Long-Term Groundwater Monitoring Plan, and the Long-Term Soil Gas, In-Business Air and Ambient Air Monitoring Plan, as indicated in Table 1.0.

3. The remedies that have been implemented at the Site along with the performance requirements are summarized in Table 1.1. The section of the OMMP that addresses each remedy component is also identified in Table 1.1 along with the monitoring/maintenance frequency.

1.2 ORGANIZATION OF THE OMMP

1. This OMMP has been prepared to address the requirements presented in the CD and SOW as well as comments from EPA and other regulatory agencies. The OMMP is organized as follows:
   - Chapter 1.0 – Introduction: Presents an overview, describes how the OMMP is integrated with other plans and reports required by the SOW, and indicates how and where this document complies with SOW requirements.
   - Chapter 2.0 – Project Background: Presents a brief description of the Site, Site history, and Site conditions.
   - Chapter 3.0 – Project Organization: Presents roles and responsibilities of the individuals and entities involved with Operations, Maintenance, and Monitoring.
   - Chapter 4.0 – Long-Term Operations and Maintenance Plan (O&M): Describes operations, inspection, and maintenance of remedial elements at the Site.
   - Chapter 5.0 – Long-Term Monitoring Plans: Presents the Monitoring Plans for ground water, soil gas, in-business air and ambient air.

- Chapter 6.0 – Institutional Controls Monitoring and Enforcement Plan: Briefly discusses institutional controls monitoring and the requirements of the Institutional Controls Monitoring and Enforcement Work Plan (ICMEWP).
- Chapter 7.0 – Contingency Plan: presents contingency plans, emergency response procedures, and emergency repair and replacement procedures.
- Chapter 8.0 – References: Lists the references cited in this OMMP.
- Appendix A – Quality Assurance Project Plan (QAPP): Presents the quality assurance plans and procedures to assure collection of quality data during monitoring and documentation of the data quality. The QAPP also contains Standard Operating Procedures (SOPs) that are used for operations, maintenance, and monitoring activities. Sampling and Analysis Plan (SAP): Describes the locations and analytical procedures for OMMP sampling activities at the Site. Site Access and Security Plan: Presents the access and security requirements and procedures that will be used during implementation of OMMP activities at the Site.
- Appendix B – O&M Inspection and Long-Term Monitoring Data Sheets: Contains inspection checklists and field data log forms for recording O&M and monitoring work performed at the Site.
- Appendix C – Equipment Manuals: Contains manufacturer manuals for operations and maintenance of equipment and machinery at the Site.
- Appendix D – Institutional Controls Monitoring and Enforcement Work Plan (ICMEWP): Discusses institutional controls, and monitoring and enforcement of proposed institutional controls at the Site.

1.3 INTEGRATION WITH OTHER REPORTS AND PLANS

1. This OMMP will be implemented in conjunction with other plans required by the SOW. The other required plans include:

   - Remedial Design Report, Plans and Specifications
   - Construction As-Built Report
   - Remedial Action Workplan (RAWP)
   - Institutional Controls Monitoring and Enforcement Work Plan (ICMEWP)
   - Sampling and Analysis Plan (SAP)
   - Quality Assurance Project Plan (QAPP)
   - Health and Safety Plan (HASP)
   - Site Access and Security Plan
   - Community Relations Participation Plan
   - Annual and 5-Year Status Reports

2. A general description of these plans/documents and how they are integrated with the OMMP is provided in the following sections. Figure 1.0 presents a diagram of how these management plans/documents fit together in the phased sequence of the project work.

1.3.1 REMEDIAL DESIGN REPORT, PLANS AND SPECIFICATIONS

1. The Remedial Design Report, Plans and Specifications provide the approved remedy description, designs and supporting materials for the selected remedial alternative for the soil, subsurface gas and ground water at the WDI Site.

2. The design in the Remedial Design Report is based on the selected remedy presented in the AROD (EPA, 2002), appropriately configured to address the findings of field studies subsequent to the ROD. The Remedial Design Report, Plans and Specifications have been prepared to fulfill the remedial design requirements of the Administrative Order (AO) 94-17 and Amended Administrative Order (AAO) 97-09. The approved Plans and Specifications in the Final (100%) Remedial Design Report, (TRC, 2003b) also address comments provided by EPA, and additional comments provided by the various agencies and interested parties that participated in Technical Exchange Meetings regarding the remedial design.

3. The Remedial Design Report contains the original detailed design information and, as such, is a reference source in support of OMMP activities.

1.3.2 CONSTRUCTION AS-BUILT REPORT

1. The Construction As-Built Report (TRC, 2006) presents the details regarding remedy implementation, including as-built drawings, design modifications and clarifications implemented during construction, Construction Quality Assurance (CQA) information and documentation, and construction related documents.

2. The as-built documents identify changes made to the original design during construction and provide an updated source of information in support of OMMP activities.

1.3.3 REMEDIAL ACTION WORKPLAN

1. The RAWP outlines how construction activities were to be implemented relative to the Design Plans and Specifications. The RAWP also provided an overview of O&M activities

and institutional control procedures at the Site. The O&M activities and institutional control procedures described in the RAWP provided basis for the long-term post-closure O&M plan, institutional control monitoring and enforcement plan included in this OMMP.

1.3.4 INSTITUTIONAL CONTROLS MONITORING AND ENFORCEMENT WORKPLAN

1. The ICMEWP discusses institutional controls, and monitoring and enforcement of proposed institutional controls at the Site. The institutional controls are required by the AROD to ensure the long-term integrity of the remedy and prevent potential exposure of buried wastes remaining at the Site.

2. An ICMEWP was prepared in accordance with Section 5.13 of the SOW and was approved by EPA in June 2003 and revised in November 2005. The most current ICMEWP is included and incorporated in this OMMP in Appendix D. Table 1.2 provides a cross linkage from the ICMEWP requirements to appropriate sections of the OMMP.

1.3.5 SAMPLING AND ANALYSIS PLAN

1. The SAP describes the locations and analytical procedures for sampling activities at the Site. The SAP is used in conjunction with the SOPs in the QAPP to collect and analyze environmental samples at the Site. A separate SAP was prepared for the long-term postclosure sampling and analysis activities. Analytical sampling procedures are provided in the SOPs in the QAPP included in Appendix A. The SAP is also included in Appendix A.

1.3.6 QUALITY ASSURANCE PROJECT PLAN

1. The QAPP describes quality assurance procedures and requirements for the operations, maintenance, and monitoring work. This includes the laboratory procedures to be utilized, the calibration of field and laboratory equipment, quality assurance and quality control of laboratory procedures, data evaluation procedures, performance and system audits, precision and accuracy performance standards, analytical methods/control procedures, and procedures for data handling, analysis and reporting. The QAPP also contains SOPs for performing sampling and analysis associated with the Site, including sample handling and preservation.

2. The QAPP is used to implement the sampling, monitoring and measurement programs described in this OMMP and to assure that quality control is documented for any chemical measurements. The QAPP is included in Appendix A.

1.3.7 HEALTH AND SAFETY PLAN

1. The HASP presents the health and safety requirements and procedures that will be used during implementation of OMMP activities at the Site. The HASP applies to both workers and the public and addresses exposure to releases or spills at and from facilities and environmental control systems at the Site. The HASP also addresses coordination between various parties conducting activities at the WDI Site and emergency response agencies and personnel (e.g., police department, fire department, and other response agencies). Subcontractor health and safety plans must meet the requirements of this document, but may also include additional health and safety procedures and requirements. The HASP is a separate document and is not included in the OMMP herein.

1.3.8 SITE ACCESS AND SECURITY PLAN

1. The Site Access and Security Plan presents the access and security requirements and procedures that will be used during implementation of OMMP activities at the Site. The Plan applies to both OM&M workers and the public and addresses controlling access to the Site during the implementation of OMMP and other SOW activities. The Site Access and Security Plan also addresses coordination between various parties conducting OM&M activities at the WDI Site and emergency response agencies and personnel (e.g., fire department, police department, paramedics and other response agencies). The Site Access and Security Plan is included in Appendix A.

1.3.9 COMMUNITY RELATIONS PARTICIPATION PLAN

1. The Community Relations Participation Plan outlines methods for communicating with the public/community in connection with remedial activities. The Plan discusses procedures for coordination with the Project Coordinator, EPA, State and other regulatory agencies, the public and additional stakeholders. This Plan is administered by the Project Coordinator on an "as-needed" basis and is not included in the OMMP herein.

1.3.10 ANNUAL AND 5-YEAR STATUS REPORTS

1. Annual Reports will be prepared at yearly intervals until the Certification of Completion for the Site is approved by EPA. This Report will contain a summary of Institutional Control monitoring and enforcement effectiveness. Proposed suspension and/or termination of OM&M for any environmental control system or control action at the Site will be included if appropriate.

2. At five-year intervals, a work status report will be prepared for EPA review and approval. This will include any proposed suspension and/or termination of OM&M for any environmental control system or control action at the Site. Additionally, there will be an analysis of OM&M activities regarding cost increases to determine if such increases warrant proposals or additional remedial actions.

1.4 CONSENT DECREE REQUIREMENTS

1. The SOW in the CD includes elements and contents required to be incorporated in the O&M Plan, Long-Term Ground Water Monitoring Plan, Long-Term Soil Gas, In-Business Air and Ambient Air Monitoring Plan, HASP, and QAPP. Table 1.0 presents the SOW required elements and contents and indicates where in this OMMP the requirements are addressed.

2.0 PROJECT BACKGROUND

2.1 SITE DESCRIPTION

1. The Site is located in Santa Fe Springs, Los Angeles County, California on an approximately 38-acre parcel of land. It is bordered on the northwest by Santa Fe-Springs Road, on the northeast by the former Fedco Distribution Center and a private high school, on the southwest by Los Nietos Road, and on the southeast by Greenleaf Avenue (see Figure 2.0 for Site Location Map).

2. The Site is comprised of 22 parcels. Various businesses are currently operating on 19 of the parcels; 3 of the parcels are currently vacant. Figure 2.1 shows the numbers and the names of the owners/tenants of the parcels, and summary of existing businesses on-site is presented in Table 2.0.

3. The Site was conceptually divided into eight areas (Area 1 through 8) based on previous uses and conditions during the initial Remedial Investigation/Feasibility Study (RI/FS) period as shown in Figure 2.1. A 42-million-gallon-capacity crude oil reservoir is buried in the central portion of Area 2. The north corner of Area 2 is used by the owner for storage. The remaining portion of Area 2 is undeveloped. Area 1 (located along Santa Fe Springs Road) and Area 8 (located along Los Nietos Road) contain most of the light industrial complexes and small commercial businesses that are present on the Site. Areas 3 through 7 extend along Greenleaf Avenue. Areas 3 and 4 are undeveloped and are the closest property boundary to nearby residential areas (approximately 50 feet). The building located in Area 5 is used for a light industrial business. Areas 6 and 7 are unoccupied and generally vacant, although there are a couple of concrete foundations that remain from previous structures.

2.2 SITE HISTORY

1. The reservoir was used for crude oil storage from the Santa Fe Springs oil field from 1924 to some undetermined time, probably in the 1930s. During this period, various activities were being performed outside the reservoir, including the storage and mixing of drilling muds. It is inconclusive from aerial photograph review whether waste disposal activities were being systematically carried out during this period.

2. Beginning in the late 1940s to early 1950s, the Site was used for disposal of a range of waste and solid fill materials. After 1949, waste disposal activities were regulated under permit from Los Angeles County, Department of Sanitation until facility closure in 1964. Reliable documentation on disposal was not maintained. As a result, a comprehensive history of Site disposal practices or accepted waste is not available. However, permitted waste included the following: rotary drilling muds; clean earth, rock, sand and gravel; paving fragments; concrete, brick; plaster; steel mill slag; dry mud cake from oil field sumps and acetylene sludge. Investigations have shown that disposed material also included organic wastes, oil refinery waste, solvents, and waste chemicals. Wastes were disposed primarily within the reservoir boundary and in bermed areas surrounding the reservoir. However, field investigations and aerial photograph analyses indicates occurrence of wastes throughout most of the Site.

3. In 1953, the Site began receiving fill material to cover the Site including the reservoir area and unlined bermed disposal pits. The filling of the reservoir area continued until approximately 1966 when grading of the Site was completed.

4. The WDI Site was placed on the National Priorities List (NPL) in July of 1987. In 1988, the EPA undertook a removal action. During the years 1988 to 1993, EPA undertook an RI/FS (EPA, 1993a) which led to a selected remedy for the Site presented in the Record of Decision (ROD) (EPA, 1993b).

5. The Settling Defendants for the Site (a group of Potentially Responsible Parties who carry out the requirements of the ROD under the Site orders and decrees) organized the Waste Disposal, Inc. Group (WDIG). The WDIG conducted a series of pre-design field investigations and treatability studies during 1995 through 2001 under Administrative Order (AO) 94-17 and Amended Administrative Order (AAO) 97-09. The results of these activities were reported in the Remedial Design Investigative Activities Summary Report (Revision 2.0) (TRC, 2001b). After incorporating comments from the EPA and California Department of Toxic Substances Control (DTSC), the report was approved in June 2001.

6. The pre-design field investigations changed the conceptual model for the Site and identified additional conditions to those considered for selection of the remedy incorporated in the ROD. Therefore, a Supplemental Feasibility Study (Revision 4.0) (SFS) (TRC, 2001c) was prepared in 2001. Based on the results of the SFS, the EPA selected a revised remedy,

which was incorporated in the Amended Record of Decision ([AROD], EPA, 2002). A Remedial Design was prepared to construct the remedy presented in the AROD, and the Final (100%) Remedial Design Report (TRC, 2003b) was approved by EPA in June 2003.

7. The main remedy selected for the Site was capping (i.e., RCRA C- and D-equivalent covers). This remedy includes several components as identified in Table 1.1.

8. During the development of the AROD, the EPA and WDIG negotiated a Consent Decree (CD) for implementation of the remedial design. The CD was entered by the United States District Court for the Central District of California in 2003 (EPA, 2003). This Final OMMP is one of the deliverables required under the CD.

9. The implementation of the remedial design at the Site was initiated in March 2004 and the remedial design construction work was performed according to the RAWP (TRC, 2004a) and associated management plans. The construction work was completed in May 2005. Remedial construction activities performed on-site are documented in the Construction As-Built Report and are part of the Final Combined Construction As-Build, Construction Completion and Remedial Action Completion Report (Combined Completion Report, CCR) (TRC, 2006).

2.3 SITE CONDITIONS

1. The Site conditions are summarized in the following sections. A complete description of the objectives and findings of the Site investigations are provided in the following reports:
   - Remedial Design Investigative Activities Summary Report (Rev. 1.0) (TRC, 1999).
   - Draft TM No. 13 Reservoir Liquids Removal Closeout Report (TRC, 2000).
   - Supplemental Subsurface Investigation, RD Investigative Activities, (TRC, 2001a).
   - Remedial Design Investigative Activities Summary Report (Revision 2.0) (TRC, 2001b).
   - 2000 Annual Monitoring Report (TRC, 2002).
   - 2001-2002 Annual Monitoring Report (TRC, 2003a).
   - 2003 Annual Monitoring Report (TRC, 2005).

2. Soil borings were drilled at the WDI Site for geologic logging and chemical characterization during three primary periods of investigation: the 1988 RI conducted by EPA and the 1997

and 2002 Remedial Design Investigations conducted by both EPA and WDIG. Constituents detected in waste include volatile organic compounds (VOCs), primarily benzene, toluene, ethylbenzene, and xylene (BTEX); semi-volatile organic compounds (SVOCs); and heavy metals such as arsenic chromium, copper, and lead. Waste and contaminated soil have been identified throughout Area 2, which contains the buried reservoir, and portions of Areas 1, 4, 5, 6, 7, and 8 where other buried wastes have been found. Figure 2.2 presents a general cross section through the Site showing the locations and depths of the waste, reservoir fill and native materials.

3. The Final (100%) Remedial Design Report provides a delineation of the buried waste extent. Figure 2.1 shows the locations of the various parcels, the limits of the waste, and what businesses are located on buried waste. Site investigations have shown that 11 of the 22 parcels have structures located over buried waste; 8 other parcels have structures, but there is no waste underlying the structure. The three unoccupied parcels have underlying waste, but no structures. The buried waste and impacted soil ranges in thickness from an average of approximately 5 to 10 feet to a maximum of 20 feet.

4. Soil gas "hot spots" are present in the subsurface (vadose zone) within and outside the reservoir (in Area 2) in several areas of the Site, including shallow fill soils, buried waste material, and deeper native soils. The "hot spots" are characterized by elevated levels (e.g., exceeding preliminary remediation screening levels) of BTEX, methane, petroleum hydrocarbons, and chlorinated VOCs in soil gas. The primary VOC constituents detected are methane, benzene, vinyl chloride, trichloroethene (TCE), and tetrachloroethene (PCE).

5. Multiple investigations have indicated the presence of perched liquids and/or leachate both within the reservoir area (in Area 2) and at various isolated locations outside the reservoir. Liquids were encountered within the reservoir at depths ranging between 4 and 12 feet below ground (fbg). These liquids/leachate contain Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) hazardous substances, including but not limited to VOCs, such as benzene, toluene, ethylbenzene, and vinyl chloride; SVOCs; PCBs; and metals such as arsenic, chromium and lead.

6. A description of the regional ground water conditions and hydrogeology is included in the AROD (EPA, 2002). Ground water immediately beneath the Site is generally located from 35 to 57 feet bgs (TRC, 2003b). This places the piezometric surface or the uppermost

water-bearing zone approximately 28 feet below the bottom of the reservoir and at least 25 feet below the bottom of buried waste outside the reservoir area.

7. Based on the Site Annual Monitoring Report (TRC, 2002; TRC, 2003a; TRC, 2005), it can be concluded that ground water flows generally to the south and southwest. The horizontal hydraulic gradient is generally very low across the Site ranging from 0.002 feet/foot to 0.003 feet/foot (TRC, 2003b). In the western corner of the Site, however, the horizontal hydraulic gradient steepens to 0.035 feet/foot in the vicinity of wells GW-22 and GW-23 (see Figure 5.2). The cause of the steepening is not known, but it may be due to active pumping in this area or due to the presence of older offsite deep wells, which were not properly abandoned (CDM Federal, 1999). A definitive assessment of ground water flow rate or seepage velocity at the Site has not been conducted since data gathered to date has indicated that contaminant migration to ground water is not occurring.

8. Vertical hydraulic gradients have been assessed by comparing the ground water elevations between monitoring well installed in clusters (paired shallow and deep wells). These vertical gradients indicated a generally small downward vertical gradient except in the southern corner of the Site (GW-29/GW-30; see Figures 5.2 and 5.3). This is consistent with ground water quality observations which indicate no significant vertical migration of Site-related constituents is occurring (TRC, 2003b).

9. Evaluation of Site ground water data indicates that the primary VOCs detected are PCE and TCE at concentrations less than 20 μg/L. These VOCs have been detected only in the western portion of the Site. Based on ground water flow conditions, the distribution of detections, and information on offsite ground water contamination sites, the sources of the PCE and TCE detected in the monitoring wells in the western portion of WDI Site appear to be from solvent releases associated with upgradient industrial sites. Concentrations of aluminum, iron, manganese, and selenium have been detected in ground water samples, in some cases above primary or secondary drinking water standards. The fact that these metals are detected uniformly across the Site suggests that the concentrations reflect regional water quality conditions and are not related to onsite sources.

2.4 REMEDIAL AND MONITORING COMPONENTS

1. As set forth in the Amended ROD, the following are the remedial and monitoring systems that have been implemented at the Site:

   - RCRA Subtitle C-Equivalent Cover
   - RCRA Subtitle D-Equivalent Cover
   - Surface Drainage Control System
   - Gas Migration Control Systems
     - Reservoir Gas Collection System
     - Building Modifications
     - Sentinel Biovent System
   - Leachate Monitoring/Control System
   - Soil Gas Monitoring Systems
     - Vapor Monitoring Wells
     - Surface Emissions Monitoring
   - Ground Water Monitoring System
   - Stormwater Monitoring System
   - Site Security and Landscape
   - Institutional Controls

   Please refer to the Combined Construction As-Built, Construction Completion and Remedial Action Completion Report (TRC, 2006) for As-built information.

2.4.1 RCRA Subtitle C-Equivalent Cover

1. The RCRA Subtitle C-Equivalent cover was placed in Area 2 above the reservoir in the central part of the Site as shown in Figure 2.2. The RCRA Subtitle C-Equivalent cover system consists of geosynthetic materials (i.e., geosynthetic clay liner, HDPE geomembrane, geocomposites and geotextiles) below a vegetative soil layer.

2. Waste found during the grading and excavation of the RCRA Subtitle C-Equivalent and RCRA Subtitle D-Equivalent covers was reconsolidated and placed under the RCRA Subtitle C-Equivalent cover or transferred offsite to a disposal facility as described in the Specifications.

2.4.1.1 Reservoir Gas Collection System Piping

1. After the subgrade was prepared trenches were excavated to install the Reservoir Gas Collection System piping. Geotextile and two-inch-diameter perforated PVC piping was placed in the trenches. The trenches were then filled with bedding gravel to the level of the subgrade. The piping was installed radially from the high elevation point in the RCRA Subtitle C-Equivalent area as shown on Sheet 7 of the As-Built drawings (TRC, 2006).

2.4.1.2 Geosynthetics

1. After preparation of the subgrade and installation of the gas collection piping in Area 2, the geosynthetics contractor installed a geocomposite gas collection layer that ended just short of the French drain/anchor trench. GCL, 60-mil HDPE geomembrane and a single sided geocomposite drainage layer were then installed in layers on top of the gas collection layer and terminating in the French drain/anchor trench as shown on Sheet 10 of the As-Built drawings (TRC, 2006).

2. The boots around existing soil vapor wells and leachate collection wells were extended and installed, as necessary, due to re-grading of the Site and placement of the cap geosynthetic layers.

3. Two feet of vegetative soil layer was placed and compacted over the geotextile cushion layer to achieve final grades and the graded soil areas were hydroseeded.

2.4.2 RCRA SUBTITLE D-EQUIVALENT COVER SYSTEMS

1. The RCRA Subtitle D-Equivalent cover systems consist of geosynthetic materials (i.e., geosynthetic clay liner and geotextile) in Area 2 outside of the the RCRA Subtitle C-Equivalent cover, asphalt and concrete replacement and/or reconditioning and concrete crack sealing.

2.4.2.1 Geosynthetics

1. After preparation of the subgrade in Area 2, the geosynthetics contractor installed GCL outside the RCRA Subtitle C-Equivalent cover area and then covered the GCL with a cushion geotextile in preparation for the vegetative soil cover. Only as much GCL was placed as could be covered in one day to minimize exposure of the GCL to moisture and other elements. The geosynthetic installation was completed in phases as some of the work around the perimeter of the Site had to be completed prior to placement of the geosynthetics.

2. In areas where crushed CD material was placed as part of the foundation layer, cushion geotextile was placed prior to the installation of the GCL to protect the GCL from potential

puncturing. The areas where the crushed CD material was placed is shown in the As-Built drawings.

3. The boots around existing soil vapor wells and ground water monitoring wells were extended and installed, as necessary, due to re-grading of the Site and placement of the cap geosynthetic layers.

4. Two feet of vegetative soil layer was placed and compacted over the geotextile cushion layer to achieve final grades and the graded soil areas were hydro-seeded.

2.4.2.2 Rehabilitated Existing Asphalt and Concrete in Perimeter Parcels

1. The RCRA Subtitle D-equivalent caps were placed in areas outside the reservoir area that are underlain by waste materials. Rehabilitation activities included removal/replacement of asphalt or concrete slabs and overlay of asphalt with new asphalt.

2.4.3 SURFACE DRAINAGE CONTROL SYSTEM

1. The surface drainage control system consists of the French drain around the perimeter of the reservoir, an asphalt V-Ditch, catch basins, storm drainpipe, soil berms, and gravel drainage outlets. The locations of the drainage control system components are shown in the As-Built drawings (TRC, 2006).

2. A French drain was constructed around the outside perimeter of the RCRA Subtitle C-Equivalent cover to capture infiltrating surface water. The French drain was connected to a 4-inch-diameter PVC drain pipe at the low point of the RCRA Subtitle C-Equivalent reservoir cap. The drain pipe daylights close to the concrete paving in property along Santa Fe Springs Road.

3. A lined V-Ditch was constructed on the western side of the Site. The ditch was constructed as shown on Sheet 7 of the As-Built drawings (TRC, 2006). At the direction of the WDIG, the V-Ditch was constructed from asphalt rather than concrete as described in the Specifications. The ditch length was also increased in a northerly direction.

4. A precast concrete catch basin was installed at the low point of the brow ditch in the northeast corner of Area 2. Flow from the catch basin is transmitted to an existing City basin on Greenleaf Avenue via a 15-inch-diameter PVC storm drain pipe. The connection to the City stormdrain system was made under a permit issued by the County of Los Angeles, Department of Public Works.

5. Surface grading, including soil berms and gravel drainage outlets at Site perimeter (drainage trench) were installed and will be maintained as part of the OMM activities.

2.4.4 GAS MIGRATION CONTROL SYSTEMS

1. A gas migration control system was installed at the WDI Site. The gas migration control system consist of the following elements:
   - Reservoir Gas Collection System piping constructed beneath the containment portion of the RCRA Subtitle C-Equivalent cap. The soil gas is collected by vacuum applied with a blower and is treated by a vapor phase activated carbon system. The system is located above the RCRA Subtitle C-Equivalent cap.
   - Inspection of existing buildings and sealing of cracks and penetrations in the floor slabs.
   - Installation of the Sentinel Biovent System.

2.4.4.1 Reservoir Gas Collection System

1. The Reservoir Gas Collection System was constructed inside the footprint of the concrete reservoir berm beneath the containment portion of the RCRA Subtitle C-Equivalent cap as shown on Sheet 7 of the As-Built drawings (TRC, 2006).

2. The Gas Collection System consists of eight buried pipes installed below the finished subgrade as shown on Sheets 7 and 11 of the As-Built drawings (TRC, 2006). The pipes extend radially from a manifold system constructed at the site high point and end within 25 feet of the edge of the reservoir. Following the installation of the collection piping and manifold, the interior of the reservoir was covered by the RCRA Subtitle C-Equivalent cap. After installation of the RCRA Subtitle C-Equivalent cap was completed, the gas treatment equipment was constructed including piping, vacuum blower, vapor phase carbon vessels and electrical controls.

2.4.4.2 Sealing of Cracks and Penetrations in Floor Slabs

1. Cracks in building slabs were sealed by using a trowel or putty knife to apply an epoxy grout manufactured by ChemCo Systems. Cracks in building concrete slabs were sealed using the following methodology:
   - Building slabs were inspected to evaluate the degree of cracking present. Cracks having a width of 0.5 mm or less were excluded from the sealing process.
   - Old soiled concrete was removed from the cracks using a hand held grinding tool. A shop vacuum was used during all grinding activities to control dust from the grinding process.
   - The grinding tool cut a notch approximately 0.5 inches wide and 0.5 inches deep in each crack to provide a clean surface for sealing.
   - Epoxy grout manufactured by ChemCo Systems was injected into each cleaned crack using a manually operated caulking gun.
   - After the epoxy grout dried (drying time is 24 hours minimum) each crack was buffed to remove excess grout and provide a smooth surface.

2.4.4.3 Sentinel Biovent System

1. Twenty-four Biovent wells were constructed at the Site. Each well was constructed using a CME-75 drill rig and 10-inch-diameter hollow stem augers. A 4-inch-diameter schedule 40 PVC well screen was installed in each well. The elevation of the screening in each well was completed as described in the Schedule of Biovent Wells shown on Sheet 13 of the As-Built drawings (TRC, 2006). Each well was completed using a 4-inch-diameter PVC blank casing pipe extending to the surface. After placement of the well casing pipe, each boring was backfilled with Number 2 1/2 grade sand to 2-inches above the well screen perforations. Approximately 3 feet of bentonite pellets were then placed on top of the sand. Each well was then sealed by filling to the surface using a cement/bentonite grout.

2. Each well casing was fitted with a biovent check type Baroball valve. The top of each well was completed using a 10-inch-diameter vented steel enclosure set in concrete.

2.4.5 LEACHATE MONITORING/CONTROL SYSTEM

1. The Leachate Monitoring/Control System consists of four collection points (wells) installed within the limits of the reservoir. The wells will be used to monitor and control the accumulation of liquids in the reservoir.

2. The leachate collection wells were constructed inside the footprint of the reservoir berm through the containment portion of the RCRA Subtitle C-Equivalent cap at four locations as shown on Sheet 12 of the As-Built drawings (TRC, 2006).

3. Each well was constructed using a CME-75 drill rig and 10-inch diameter hollow stem augers. A 4-inch-diameter stainless steel screen was installed in the bottom 2 feet of each well as shown on Sheet 13 of the As-Built drawings (TRC, 2006). Each well was completed using a 4-inch-diameter schedule 80 PVC blank casing pipe extending to the surface. After placement of the well casing pipe, each boring was backfilled with Number 2 1/2 grade sand to 2 feet above the screen perforations. Approximately 3 feet of bentonite pellets were added on top of the sand. Each well was then filled to the surface using a cement/bentonite grout. Each well was completed at the surface using a 12-inch-diameter locking well cover set in a 3-foot-diameter concrete slab.

2.4.6 MONITORING SYSTEMS

1. Seven settlement monuments were installed to monitor soil settlement during the O&M phase of the RA. The locations of the settlement monuments are shown on Sheet 12 of the As-Built drawings (TRC, 2006).

2. Soil gas and ground water monitoring networks are described in Section 5.0.

2.4.7 SITE SECURITY AND LANDSCAPE

1. Fencing was installed around the perimeter of the Site for Site security. The fencing plan is shown in Sheet 14 of the As-Built drawings (TRC, 2006). Fencing activities at the Site included restoring the fencing at the boundaries of the occupied parcels that was removed during construction activities (i.e., replacing the existing fencing along the active businesses), construction of a new stray ball fence and new fencing around the Reservoir Cap Gas Collection System slab.

2. Fencing activities at the Site also included the installation of new warning signs at intervals around the Site perimeter pursuant to the Site Access and Security Plan. The signage locations for the Site are indicated in Figure 2.6.

2.4.7.1 Perimeter Fencing and Access Gates

1. Fencing around the perimeter of the Site was removed and replaced as needed during construction activities. Fencing was removed and replaced in kind (i.e., a 6-foot high fence without top and bottom rails was replaced with a 6-foot high fence without top and bottom rails). Access gates were installed at four locations along the fence to allow access to and egress from the Site. Perimeter fencing that was removed and replaced and access gates are shown on the As-Built drawings (TRC, 2006).

2.4.7.2 Stray Ball Fencing

1. The Stray Ball fence was constructed as shown on Sheet 14 of the As-Built drawings (TRC, 2006). The fence is approximately 550 feet long and is supported by 10-inch-diameter treated timber poles. The poles were set on 57.5-foot centers, embedded 8 feet below grade and extend 20 feet above ground. Blue nylon netting material was attached to the poles using galvanized cables and hardware. The color of the net was selected at the request of St. Paul High School and at the direction of WDIG. The location of the stray ball fence, as constructed, is shown on the As-Built drawings (TRC, 2006).

2.4.7.3 Reservoir Cap Gas Collection System Fencing

1. The Reservoir Cap Gas Collection System fencing was constructed as shown on Sheet 11 of the As-Built Drawings (TRC, 2006). The fence is 6 feet high and includes a top rail and bottom support cable. A double 10-foot wide gate on the south end provides access to the gas collection system.

2.4.7.4 Access Roads

1. Two access roads were installed at the Site to provide access to the various remedial systems. A 10-foot wide Site access road from Greenleaf Avenue to the gas extraction/venting system and a 10-foot wide Site alternative access road from the driveway of Parcel 30 to the recreational storage lot adjacent to the reservoir were installed. The locations of the roads are shown on Sheet 7 of the As-Built drawings (TRC, 2006).

2.4.7.5 Landscaping

1. Vegetation was planted to minimize erosion and improve aesthetics as shown on Sheet 14 of the As-Built drawings (TRC, 2006).

2. An irrigation system, mulch, and planted trees, shrubs and groundcover plants were installed as shown on the As-Built drawings. Landscaped areas are shown on the As-Built drawings in Appendix A. In addition, landscaping that was removed during construction activities was replaced at parcels 28, 29 and 50.

2.4.8 INSTITUTIONAL CONTROLS

1. Institutional Controls (ICs) are an administrative portion of the final remedy, which are intended to assure access to the Site and land/water use restrictions so as to assure effectiveness of the selected remedy. The vehicle to implement, monitor, and enforce ICs is the Environmental Restrictive Covenant (ERC). In general, the purpose and objectives of the ICs are:
   - To provide notification to all potential Site users of the presence of hazardous materials and on-Site contamination;
   - To provide notification to potential Site users concerning the presence and location of all remedial systems;
   - To minimize the potential for exposure of future Site users to Site related hazardous materials (including waste materials, groundwater and/or soil gas emissions);
   - To protect the integrity of the remedy from any activity that may interfere with the effective O&M of remedial control and monitoring systems;
   - To provide access to the Site for appropriate regulatory agencies and responsible parties engaged in approved remedial actions and monitoring activities;
   - ICs will be implemented by the imposition of ERCs on the properties comprising the Site.

3.0 PROJECT ORGANIZATION

1. This chapter presents the project organization, which includes a description of the responsibilities, authority and qualifications of personnel conducting the operation, monitoring and maintenance, and quality assurance activities for implementation of the remedy.

2. The principal organizations involved in the construction of the remedy components for the Site include EPA, WDIG, and the Project Management Team, including quality assurance officers, and technical consulting oversight.

3. Figure 3.0 provides the project organization chart for the Operations, Maintenance and Monitoring (OM&M), indicating reporting structures and lines of communication. The responsibilities of key organizations and positions directly involved in OM&M activities are described below and in Table 3.0.

3.1 PROJECT ROLES AND RESPONSIBILITIES

3.1.1 U.S. ENVIRONMENTAL PROTECTION AGENCY

1. The EPA is the lead agency, as defined in the National Contingency Plan (NCP), for the Site. EPA's review and approval of deliverables and other submittals provided in the CD or required by the SOW will be conducted in accordance with the provisions of Section XII of the CD and Section 4 of the SOW. EPA will implement procedures to facilitate consultation between EPA, the WDIG, and the Interagency Committee (IAC), which represents other public entities. The EPA is further supported in its activities by the US Army Corps of Engineers and its technical/engineering consultants.

2. The EPA will establish and chair the IAC that meets on a periodic basis (e.g., quarterly) to advise the member agencies on the status of WDI Site project activities and developments. The purpose of the IAC is to provide a forum for public-sector agencies involved with the WDI Site to enhance and facilitate interagency coordination, to provide input to EPA in its role as lead agency, and to engage in ongoing consultations regarding the remedial action. The IAC for the WDI Site includes EPA as the lead agency and other State and local agencies as designated by EPA (e.g., DTSC, City of Santa Fe Springs). The IAC provides the primary mechanism for coordination and consultation for project-related matters among the member agencies for this project.

3.1.2 WDIG

1. The WDIG consists of the Settling Defendants named in the Consent Decree. The WDIG is responsible for the design, construction and operation maintenance and monitoring of the remedy. This responsibility includes complying with the EPA requirements and obtaining approval activities during the OM&M period.

2. The WDIG will assemble a team of professionals to implement the OMMP. The WDIG has the authority to select and dismiss organizations charged with OM&M activities and QA oversight. The WDIG also has the authority to accept or reject design plans and specifications, OMMP modifications, QA plans, reports and recommendations of the QA officers, and the materials and workmanship of contractors. WDIG's work will conform to requirements of the AROD, CD and SOW.

3.1.3 WDIG PROJECT COORDINATOR

1. The WDIG Project Coordinator is the Site representative of WDIG. Responsibilities of the WDIG Project Coordinator are outlined in Table 3.0.

2. The WDIG Project Coordinator will be the focal point for communications with EPA and other parties working at the WDI Site. The WDIG Project Coordinator will serve as the primary point of contact for the EPA, WDIG, OM&M Supervising Contractor and Design Engineer and will coordinate work activities to be implemented by WDIG.

3. The WDIG Project Coordinator is Roberto Puga of Project Navigator, Ltd. The WDIG Project Coordinator has the following main role and responsibilities:
   - Represents WDIG at meetings.
   - Coordinates/liaises between EPA, WDIG, OM&M Supervising Contractor, Design Engineer, and the CQA Contractor.
   - Coordinates submittal of deliverables required by the SOW.
   - Fulfills the duties and requirements for the Project Coordinator as described in Section XIII of the CD.
   - Provides project management for OMMP implementation.

3.1.3.1 WDIG Project Coordinator Change

1. If the Project Coordinator initially designated is changed, the identity of the successor will be given to the EPA at least 5 working days before the change occurs, unless impracticable,

but in no event later than the actual day the change is made. The WDIG Project Coordinator shall be subject to disapproval by EPA and shall have the technical expertise sufficient to adequately oversee all aspects of the Work.

3.1.4 OM&M SUPERVISING CONTRACTOR

1. An OM&M Supervising Contractor will be selected by the WDIG. The selected contractor for the first year is TRC Solutions, Inc., under subcontract to Remedial Construction Services, L.P. The OM&M Supervising Contractor performs the OM&M activities and oversees field personnel, subcontractors, quality control testing, field engineering and project support services. Responsibilities of the OM&M Supervising Contractor and its Field Engineer are outlined in Table 3.0.

3.1.5 DESIGN ENGINEER

1. The Design Engineer will have responsible charge of the work as defined in the Professional Engineers Act (Section 6703 of the Business and Professions Code of California), and will report directly to WDIG through the WDIG Project Coordinator as directed. The Design Engineer responsibilities are summarized in Table 3.0.

2. The Design Engineer must be a California Professional Engineer. The selected engineer is Ken Floom, P.E. of Project Navigator, Ltd. The Design Engineer has responsible charge of the design approved by EPA, and will maintain independent control and direction of engineering work on this project.

3. The Design Engineer will assure that the statistical analysis requirements for evaluating monitoring data are performed by qualified personnel. The statistical analysis personnel shall have demonstrated experience in statistical analysis procedures including the use of DUMP Stat.

3.1.6 PROJECT LABORATORIES

1. Contracted laboratories for this project will adhere to the requirements summarized in Table 3 in the SOW. Project laboratories shall demonstrate the ability to meet all Performance Standards pursuant to the SOW and shall attain a minimum Data Quality Standard consistent with the Regional Data Quality Objectives (DQOs) and adhere to the

requirements of the QAPP. This will generally be consistent with a Level III data quality standard.

3.1.7 TECHNICAL CONSULTING AND PROJECT SUPPORT PERSONNEL

1. The project work for implementation of the OMMP will be performed by qualified personnel under the direction of the WDIG Coordinator or his designee. These activities will include sampling, field testing, data analyses, interpretations, and reporting. Technical consulting and project support personnel assigned to the project will have the experience and/or training required to complete their project assignment.

2. If necessary, project personnel will receive specific training that is required to perform their project-related duties. Such training may include but is not limited to:
   - Special health and safety training (see Site Health and Safety Plan).
   - Spill control procedures.
   - Operation of field equipment.
   - Vapor treatment system operation.
   - Hydraulic testing of wells.
   - Sampling of ground water, soil gas, or ambient air.
   - Surveying.

3. The work to be performed by technical consulting and project support personnel will be under the direction of the WDIG Project Coordinator or OM&M Supervising Contractor as appropriate to support these parties in fulfilling their various roles.

3.1.8 OM&M QA OFFICER

1. The OM&M QA Officer will assure that the requirements of the QAPP are met, which in turn assure that data quality objectives are met and the remedy is effective. The responsibilities of the OM&M QA Officer are summarized in Table 3.0 and further discussed in the QAPP (Appendix A).

4.0 LONG-TERM OPERATIONS AND MAINTENANCE PLAN

1. This section presents the Long-Term O&M Plan proposed for the Site remedial systems following Site closure. The long-term O&M activities will include:

   - Inspection of the RCRA Subtitle C-equivalent and Subtitle D-equivalent caps.
   - Reservoir gas collection, venting and treatment system operation, inspection and carbon changeouts.
   - Ground water and soil vapor monitoring well inspections.
   - Biovent well inspections.
   - Stormwater drainage system inspections.
   - Monitoring of leachate levels and leachate removal.
   - Landscape maintenance.
   - Site security.
   - Reporting.

   The locations of major remedy components listed above are shown in Figure 4.0. Design and engineering details of the remedy components are available in the Final (100%) Remedial Design Report (TRC, 2003b), Section 2.0 of the RAWP (TRC, 2004a), and the Combined Completion Report (TRC, 2006).

2. Appendix B includes a summary of the OMMP Inspection and Monitoring Data Sheets, inspection/monitoring frequency, form number and where the forms/sheets are referenced in the OMMP for the Site remedial systems identified above. Copies of the O&M forms/sheets are also included in Appendix B.1 through B.11.

3. Tenants who may be affected by O&M or monitoring activities will be notified at least one week in advance of the activities. The notification will be made by the WDIG Coordinator or the OM&M Supervising Contractor. The method of notification will include U.S. Mail, telephone, e-mail and/or direct contact. A list of current tenants is presented in Table 2.0. Table 2.0 will be updated as necessary to reflect changes in tenants and land owners that may occur over time.

4.1 INSPECTION OF RCRA EQUIVALENT COVERS

1. The performance requirements for the RCRA Equivalent covers are summarized in Table 1.1.

2. The RCRA Subtitle C- and D-equivalent covers (Figure 4.0) will be visually inspected on an annual basis during the summer months for signs of erosion, settlement, vegetative growth,

and cracks and fractures in asphalt/concrete surface areas by an independent engineer per the requirements of Title 22, Section 66264.228(k), (p) and (r). The condition of existing slope along the northwest perimeter of Area 2 close to VW-46, BW-24 and BW-25 (see Figure 4.0) will also be inspected for signs of erosion and/or settlement (e.g., cracking, slippage, etc.) during the scheduled inspection of the RCRA Subtitle D-equivalent cover. Any problems relating to the RCRA Equivalent covers observed during the inspection will be reported to the WDIG Project Coordinator for the planning of follow-up maintenance activity. The maintenance activities for the RCRA Subtitle C-equivalent cover will be performed to meet the requirements of Title 22, Section 66264.310. The cover maintenance will include conducting an annual survey by a California-State licensed land surveyor to determine the horizontal location and elevation (i.e., settlement) of the covers settlement monuments and other containment, monitoring and drainage features. The survey will locate the settlement monuments according to the state-plane coordinate system and elevation according to the NAVD system. Local benchmarks used throughout the project history will be used for survey control points. An annual survey of the monuments will occur. The survey will have an accuracy of ± 0.01 ft.The RCRA cover inspections will likely be performed concurrently with other monitoring activities described in Section 5.0.

3. The O&M Inspection Sheet for RCRA Subtitle C-equivalent cover is provided in Appendix B.1. The O&M Inspection Sheet for RCRA Subtitle D-equivalent cover is provided in Appendix B.2. If a problem is observed (i.e., erosion, burrowing rodents, etc.) during the inspection, the WDIG Project Coordinator will be issued a Problem Identification and Corrective Action Report (see Appendix B.18), which will describe the problem and propose a corrective action.

4. To maintain the integrity and effectiveness of the final cover, the cover maintenance will include making repairs to the cap as necessary to correct the effects of settlement, subsidence, erosion, or other detrimental events. The RCRA Subtitle C-equivalent cover and the soil portions of the Subtitle D-equivalent cover will be examined on an annual basis for signs of erosion or settling. If excessive erosion or settlement is discovered, corrective measures will be implemented for areas of the cover with observed problems. Additional soil material (consistent with cap design specifications) will be imported as necessary to replace surface soil eroded during heavy storm events.

5. As noted in Item 2 above, applicable regulations require monitoring of settlement in the cover areas. This will be performed with annual surveys of settlement monument

elevations. The seven settlement monument locations are shown in Figure 4.0. The locations were selected based on the thickness of underlying waste and include areas with no waste for control elevations. The settlement analysis discussed in the Final (100%) Remedial Design Report indicated that no settlement is expected due to closure since the post-remedy overburden pressure is essentially the same as the pre-remedy overburden pressure.

6. The surface drainage control system has been sized in the Final (100%) Remedial Design Report to accommodate the 100-year, 24-hour storm. The construction work of the surface drainage control system was completed in May 2005 and is documented in TRC, 2006b. The final surface grades were designed to average 2 to 3 percent to allow long-term drainage, radially away from the center of the Site. The surface grades will be examined periodically during annual surveys at the Site, and maintained at an average slope of 2 to 3 percent to promote lateral drainage, and prevent ponding and erosion of containment structures.

7. The annual soil loss due to sheet erosion was calculated for the Site in the Final (100%) Remedial Design Report for the proposed grading plan during the critical period prior to permanent vegetation taking hold. Since the surface (vegetation) layer for both Subtitle C- and Subtitle D-equivalent covers are similar (with the exception of the asphalt and concrete cover areas), the sheet erosion calculations considered the entire soil cover area, i.e., the reservoir and surrounding areas. The results show that the soil loss is anticipated to be less than 0.04 feet of soil in 100-years (TRC, 2003b). The as-built surface grading (top of cover) over the Site is close to the design topography of the RCRA Subtitle C- and D-equivalent covers (see Sheet 7 of the Final As-Built Drawings submitted in July 2005) and, therefore, it is expected that soil loss due to sheet erosion during the establishment of permanent vegetation will be on the same order of magnitude.

8. A single lane access road with a turnaround is provided on the Site to allow access from Greenleaf Avenue to the reservoir gas collection system and other monitoring points located in the RCRA Subtitle C-equivalent and Subtitle D-equivalent cover areas. The as-built access road alignment and cross-section are shown on Sheet 7 of the Final As-Built Drawings (TRC, 2006b). The access road cross-section consists of a 10-foot-wide, 6-inch-thick, crushed aggregate base course that is integrated within the top cover of RCRA Subtitle C-equivalent and Subtitle D-equivalent cover areas. The access road will be inspected during the annual inspection of RCRA Subtitle C-equivalent cover as indicated on

the O&M inspection sheet B.1. Repairs to the access road may include the addition of base course that may have been eroded during significant storm events at the Site. Evaluation of the access road grading will be performed during the annual surveys of the covers, and identified problems will be reported to the WDIG Project Coordinator on a Problem Identification and Corrective Action Report (Appendix B.18), if necessary. Routine maintenance and rehabilitation of the access road may also include fine grading to provide proper drainage and prevent excessive ponding.

4.2 SOIL GAS MIGRATION CONTROL SYSTEMS

1. The soil gas migration control systems include:
   - Reservoir Gas Collection System
   - Building Modifications
   - Sentinel Biovent System

   The engineering details of Reservoir Gas Collection System, building modifications and sentinel biovent system are provided in the Final (100%) Remedial Design Report (TRC, 2003b). As-built details for these systems are provided in TRC, 2006b. Manufacturer manuals for O&M of equipment related to these systems are provided in Appendix C. The equipment maintenance schedule is summarized below:

Soil Gas Migration Control System
Maintenance Schedule

Equipment	Maintenance Schedule
• Blower	• Visual inspection at every monitoring cycle (monthly for active operation and semiannual for passive operations).
• GAC units	• Manufacturer states little to no inspection required until carbon is spent.
• Pressure Gages	• No lubrication or periodic servicing is required. Keep case exterior and cover clean. Occasionally disconnect pressure lines to vent both sides of gage to atmosphere and re-zero.
• Sensaphone	• Perform Testing Procedure if system is in active operation.

2. The performance requirements for the soil gas migration control systems are as follows:
   - Control migration of soil gas.
   - Compliance with soil gas performance requirements at points-of-compliance.

3. Start-up/Shut down procedures for the soil gas migration control systems can be found in (TRC, 2005a).

4.2.1 RESERVOIR GAS COLLECTION SYSTEM

1. The performance requirements for the Reservoir Gas Collection System are summarized in Table 1.1.

2. The Reservoir Gas Collection System (see Figures 4.1 and 4.2) consists of gas collection geocomposites incorporated in the RCRA C-equivalent cap, perforated collection piping in gravel filled trenches under the RCRA C-equivalent cap, and the gas treatment system. The gas treatment system consists of a blower, granular activated carbon canisters for removal of organic vapors, vent stack, and the electrical control system. The gas treatment system also includes an autodialer that will contact the designee of the O&M Supervising Contractor in case of system shutdown. If the auto dialer is activated by the system, a technician will be called to the Site to observe conditions, perform any repairs necessary, restart the system, and prepare a Problem Identification and Corrective Action Report (Appendix B.18).

3. The Reservoir Gas Collection System can be operated in either an active or passive mode. The system will be operated in an active mode (i.e., under suction provided by the blower in the gas treatment system) for a period of one year. After the first year, the performance data will be reviewed to determine if a change to the passive mode is appropriate. The "trigger" for switching to the passive mode is based on the methane emission rate dropping to below 2.3 lbs/day.

4. Monthly O&M inspection will be performed for the Reservoir Gas Collection System for the first 12 months after site-closure and commencement of long-term O&M. If the system is switched to the passive mode after 12 months, the O&M inspections will be performed semi-annually. Otherwise, O&M for the system will continue to be performed monthly until the system is switched to the passive mode. Appendix B.3 provides O&M inspection forms for the Reservoir Gas Collection System.

5. The O&M inspection for the Reservoir Gas Collection System will include the manufacturer's recommendations from the equipment manuals, visual inspection of system integrity (i.e., gate, lock, fence, piping, instruments, filters, equipment, vent stack, etc), electrical meter readings, and blower running amperages.

4.2.2 BUILDING MODIFICATIONS

1. The performance requirements for the Building Modifications are summarized in Table 1.1.

2. The O&M for the Building Modifications involve review of in-business air monitoring results. If site-related constituents are detected from in-business air monitoring above Indoor Air Threshold Levels (Table 5.2), the affected parcel(s) will be inspected more frequently than the annual inspection frequency. The frequency will be based on the Decision Matrix, Figure 5.5, as discussed in Section 5.2. The parcel inspections will involve inspecting building foundations and locations where filling or re-sealing of cracks have been performed, in addition to other areas covered with RCRA Subtitle D-equivalent covers. Appendix B.4 provides a parcel inspection sheet.

3. Additional building modification O&M work may also include additional engineering controls as discussed in Section 5.2.5 and Figure 5.4. The need for engineering controls will be based on Indoor Air Monitoring results and remedial investigations related to indoor air.

4.2.3 SENTINEL BIOVENT SYSTEM

1. The performance requirements for the Sentinel Biovent System are summarized in Table 1.1.

2. The Sentinel Biovent System consists of 24 passive biovent wells at the perimeter of areas where waste is located as shown in Figure 4.1. Semi-annual O&M inspections will be performed for each well to inspect integrity of the well head components. A detailed construction diagram of a biovent well is shown in Figure 4.3 and a biovent well O&M inspection sheet is provided in Appendix B.5.

4.3 GROUND WATER AND SOIL VAPOR WELLS

1. The performance requirements for ground water and soil vapor monitoring wells are summarized in Table 1.1.

2. The ground water and soil vapor monitoring wells will be inspected during each monitoring event for well head integrity and surrounding area conditions (i.e., heavy vegetation, construction debris, equipment storage, etc.). The locations of the wells are shown in Figure 4.1, and detailed construction diagrams of ground water and soil vapor monitoring wells are shown in Figure 4.3. Ground water and soil vapor monitoring wells inspection sheets are provided in Appendix B.6 and B.7, respectively. Any damage found during the inspection will be reported to the WDIG Project Coordinator on a Problem Identification and Corrective Action Report (see Appendix B.18). See Sections 5.1 and 5.2 for the Long-Term Ground Water and Soil Vapor Monitoring.

4.4 STORMWATER DRAINAGE SYSTEM

1. The performance requirements for the stormwater drainage system are summarized in Table 1.1.

2. The stormwater drainage system consists of berms, swales, ditches, cleanouts, drain pipe from the french drain of RCRA Subtitle C-equivalent cap and a precast concrete catch basin near the eastern corner of the Site. Figure 4.4 shows the major drainage systems at the Site. The stormwater drainage system will be inspected for excessive vegetation, sedimentation and debris in the channels or around the drains and catch basin inlet, and for soil erosion. In addition, the condition of the existing slope along the northeast Site perimeter (see Figure 4.1) will be inspected for signs of erosion (e.g., gullies, sloughing, etc.) during scheduled inspections of the stormwater drainage systems.

3. Protection against stormwater runoff is provided by the stormwater drainage system. Stormwater runoff at the Site is also conveyed through sheet flow and concentrated areas of surface flow. Natural and planted vegetation is used at the Site to prevent surface erosion and help control surface water flow. During the establishment of cover vegetation, Best Management Practices (BMPs) will be implemented to prevent silt and debris from entering the stormwater catch basin on the east side of the Site. BMPs may include the installation of straw wattles, hay bales, sand bags, silt fencing, detention basins or a combination of these sediment control measures in September prior to the beginning of the wet season or during/after significant storm events if necessary. These BMPs will be removed prior to May (i.e., after the wet season).

4. The implemented BMPs will be examined during the inspection of the stormwater drainage system. Observed silt accumulation and damaged areas will be reported to the WDIG Project Coordinator on a Problem Identification and Corrective Action Form (see Appendix B.18), and repairs, such as catch basin clean-out and re-establishment of runoff protection, will be performed once approved and as soon as Site conditions permit. Temporary stormwater runoff protection will be removed at the end of the wet season in May, if appropriate.

5. The stormwater drainage system will be inspected twice a year; in the fall (September), prior to the beginning of the wet season (typically beginning in October) and again in the middle of winter (i.e., mid-January to mid-February). In addition, unscheduled inspections of the stormwater drainage system will be performed following significant storm events with accumulated precipitation greater than 2 inches over a 24-hour period. During these unscheduled inspections the surface will be visually inspected for ponding and/or erosion.

6. For each major drainage system (berms, swales, ditches, cleanouts, drain pipe from french drain of RCRA Subtitle C-equivalent cap and precast concrete catch basin near the eastern corner of the Site), the O&M inspector will complete the stormwater drainage system O&M inspection sheet as shown in Appendix B.8. If any degradation to the stormwater drainage system is identified, it will be reported to the WDIG Project Coordinator on a Problem Identification and Corrective Action Form (see Appendix B.18). Any repairs recommended, such as removal of sediment build-up behind drainage berms, would be performed once approved.

7. Visual inspection of the stormwater drainage system will also be performed during the stormwater monitoring events, and the observed conditions will be submitted with the stormwater quality analysis results (see Section 5.3). If damage or problems are observed, they will be reported as noted in Item 6 above.

4.5 LEACHATE MONITORING/CONTROL SYSTEM

1. The performance requirements for the leachate monitoring/control system are summarized in Table 1.1.

2. The leachate monitoring/control system consists of four Leachate Collection Points (LCs). The locations of LCs are shown in Figure 4.1. A detailed construction diagram of a leachate

monitoring/control well is shown in Figure 4.3. The O&M of the four LCs will involve periodic inspection of the well integrity, and monitoring and recovery of leachate that accumulates in the wells. O&M inspection and monitoring data sheets for the LCs are provided in appendices B.9 and B.12, respectively.

3. Based on the leachate collection (LC) well monitoring and bailing results discussed in the CT Report (TRC, 2006), a management strategy is provided to reduce and maintain the leachate levels in the LC wells at or below 12 inches above the bottom of the well. The strategy is intended to maintain liquid levels in the LC wells throughout the operations, maintenance and monitoring (OM&M) period in accordance with the ARARs and performance criteria. Specifically, if the liquid level in an LC well reaches 12 inches or more, the liquid will be removed from the well and properly disposed of offsite.

4. The strategy consists of removing liquids from the wells according to criteria discussed in Section 4.5.1 below and in Table 1.1. Liquids removal will occur throughout the OM&M period as necessary to maintain the liquid levels in accordance with the ARARs and performance criteria.

4.5.1 LEACHATE COLLECTION WELL MANAGEMENT STRATEGY

1. The liquids management strategy consists of monitoring and bailing or limited duration pumping at various frequencies based on the measured liquid level in each well. In general, the strategy for determining whether to bail or pump consists of the following:
   - **Liquid Level <12 inches prior to liquids removal:** Monitor Liquid Level Monthly. Bail liquids to below 12 inches if the liquid level is >12 inches and increase monitoring frequency if the liquid level remains above 12 inches for 2 consecutive monthly monitoring periods.
   - **Liquids Level 12 to 36 inches prior to liquids removal:** Weekly Monitoring & Bailing or Limited Duration Pumping to below 12 inches
   - **Liquid Level 36 to 72 inches prior to liquids removal:** Twice Weekly Monitoring & Bailing or Limited Duration Pumping to below 12 inches.
   - **Liquid level >72 inches:** Limited Duration Pumping. A recharge test will be conducted prior to discontinuing pumping.

   The overall goal would relate to reducing leachate levels below the 12-inch standard as soon as possible subject to technical constraints such as low conductivities and recovery rates within the buried waste materials.

2. Recharge testing will be conducted prior to liquids control transitioning from pumping to bailing. The purpose of the recharge test is to demonstrate that the liquid level does not rise above 6 feet within a 3-day period. If the liquid level recovers to less than 6 feet over a 3-day period, liquid control will be accomplished with either bailing or continued pumping at the discretion of the WDIG under the criteria discussed above.

4.5.2 REPORTING FOR LEACHATE MONITORING/CONTROL SYSTEM

1. Reporting on LC wells monitoring, bailing and pumping will occur both as part of progress calls and in the semi-annual OM&M Report. Information similar to that currently being taken and reported will be included in the reports. The Leachate collection Monitoring Data Sheets and the Leachate Well Sounding forms for the recharge tests are included in Appendix B. In addition, the incremental and cumulative volume of liquids pumped will be reported.

4.6 SITE SECURITY

1. Inspection of the perimeter fencing, gates, and other Site security features (see Figure 4.5) will be conducted at least quarterly. Partial inspections will also be performed during each visit by O&M Supervising Contractor personnel. These inspections will include checks for vandalism or other damages to Site security features such as fencing, gates, and locks as listed in Appendix B.10 (Site Security Inspection Sheet). The integrity of the fence will be checked to insure that the fencing is secure (e.g., no holes or breaks) and gates are working properly and locks are in place. More details related to Site security are provided in the Site Access and Security Plan presented in Appendix A.3.

2. A 20-foot-high "stray ball" fence is constructed along the top of the slope in the northeast portion of the Site at the boundary with St. Paul High School. This is the area where stray balls may land during field play at the athletic field of the high school. The stray ball fence is not meant to be part of the Site security measures and controls, but is intended to reduce the potential for stray balls to be lost. A man-gate is provided between the perimeter security fence and the High School athletic field, as shown in Figure 4.5. The area between the perimeter security fence and the stray ball fence is a fenced enclosure to prevent trespass onto the Site. The fence fabric is made of nylon twine that is designed to be in-service for approximately 20 years. The fabric is stretched between wooden posts and is suspended from steel cables attached to the posts. The stray ball fence will be inspected for damage,

such as rips/tears in the fabric or loose steel cables/hardware, during the Site security inspection. Any observed damage will be reported to the WDIG Project Coordinator on a Problem Identification and Corrective Action Report (see Appendix B.18), and will be repaired, if necessary.

3. If the Site fencing, signs or gates are damaged, the WDIG Project Coordinator will be issued a Problem Identification and Corrective Action Report (see Appendix B.18), which will initiate a corrective action process. If there is evidence of trespass or vandalism, the WDIG Project Coordinator will be notified and responses/actions will be discussed among the various project entities. Action may include notifying the tenants, the school, the police, etc.

4. Access to the Site during O&M will be controlled by the OM&M Supervising Contractor with the approval of the WDIG Project Coordinator. Any inspection, maintenance monitoring, or regulatory personnel, or others are required to obtain approval for Site access through the OM&M Supervising Contractor. Personnel shall be granted access to conduct activities such as Site inspections, maintenance, monitoring, investigations, and/or sampling. A master set of lock keys will be maintained by the WDIG Project Coordinator. Any changes made by the OM&M Supervising Contractor to the key set will include notifying the WDIG Project Coordinator. Additional Site security issues, such as transfer of Site control from the WDIG Project Coordinator to another entity, are discussed in the ICMEWP presented in Appendix D. Please see Section 6.0 for additional details on the ICMEWP implementation.

4.7 LANDSCAPE AND VEGETATION MAINTENANCE

1. The purpose of landscape maintenance is to maintain the overall aesthetic quality of the Site. Maintenance of the landscaping will include irrigation of the trees and shrubs near the high school to the northeast of the Site, and periodic Site maintenance work such as mowing the capped areas and pruning vegetation, and extermination of unwanted weeds. The landscape vegetation near the school will be irrigated until the planted shrubs become established and can live without further irrigation. The shrubs selected for the design are low maintenance, so the irrigation is not expected to last more than one year. The irrigation system instructions are included in Appendix C, and the frequency and duration of watering will be implemented according to the recommendations of the landscaping subcontractor that performs the landscaping work. A complete list of landscape maintenance inspection items is provided in Appendix B.11, Landscape Maintenance Inspection Sheet. The following

table summarizes the landscape and vegetation maintenance tasks, performance standards and frequencies.

Landscape/Vegetation
Performance Standards, Tasks and Frequencies

Task	Performance Standards	Frequencies
Vegetative Cover Mowing	Maintain neat appearance, allow easy access to monitoring wells	Three to four months, more frequent if neighbors request. One mowing will be performed one to two weeks prior to St. Paul High School Graduation day.
Vegetative Cover Replacement	70 percent vegetation coverage	Bi-annually in Spring and Fall
Tree Pruning	Promote healthy growth of site trees, prevent damage to stray ball fence, plant off-site encroachment	Annual or as necessary, based on Site conditions.
Landscape Area Weed Control	Maintain healthy appearance of trees, bushes and ground cover	Monthly or as necessary, based on Site conditions.
Site Housekeeping	Removal of debris, trash or wastes from the Site.	Annual or as necessary, based on Site conditions.

2. Mowing of the vegetation on the capped areas will be performed approximately every four months or more frequently if requested by the neighbors (e.g., the high school). Pruning and weed control will be performed annually or as necessary based on inspection of conditions.

3. Based on informal qualitative acceptance criteria for vegetation/ground-cover growth employed by California State Agencies, counties and cities, a 70 percent vegetation coverage over the RCRA Subtitle C- and D-equivalent covers will be considered acceptable. A vegetation inspection will be performed in the Spring months (March, April or May) and early in the rainy season (October or November), to evaluate vegetation growth. All bare and substandard vegetation areas will be prepared and seeded according to the relevant Project Design Specifications (Sections 02600 and 02610), included in Appendix I of the

Final (100%) Remedial Design Report (TRC, 2003b). The re-establishment of vegetation will be scheduled to occur at the appropriate time of the year to support regrowth (e.g., re-seeding will occur early in the rainy season).

4. The area near the northwest corner of the Site is presently occupied by vehicles, equipment and containers stored by Mr. Marvin Pitts (Owner). The area in the vicinity of these materials and equipment was not hydro-seeded as part of the original seeding at the Site. Following removal of such items from the Site, the area will be disked and hydro-seeded as necessary to control erosion. This future work will be scheduled to occur at the appropriate time as recommended by a specialized landscaper. Please see Section 4.11 for landowner coordination procedures.

5. Landscaping (including trees, bushes and ground-cover) will be inspected during mowing activities as described in Item 2 above. Landscaping will be evaluated as follows:
   - Landscaping in irrigated areas showing signs of distress (yellow, dead or falling leaves) will be inspected to verify that proper amounts of water are being applied. If necessary, adjustments or repairs may be performed to the irrigation system.
   - Trees and bushes showing signs of distress will be pruned to remove damaged sections. Amendments may be added to the soil if needed. If the plant continues to show signs of distress, it will be removed and replaced in kind.
   - Ground-cover showing signs of distress may be improved. Amendments, including mulch, may be added to the soil if needed. If the plant continues to show signs of distress, it will be removed and replaced in kind.

6. All landscape and vegetation work is sub-contracted. These sub-contractors will be using equipment and techniques common to there industries. Typical equipment expected to be used includes:
   - Tractor pulled/mounted mowers
   - Weed whackers
   - Cherry Pickers
   - Gardening equipment (e.g., spades, hoes, rakes)

7. Community concerns regarding the Site landscape and maintenance that are received directly by the OM&M Supervising Contractor or field staff or subcontractors performing the work will be recorded and the WDIG Project Coordinator will be issued a Problem

Identification and Corrective Action Report (see Appendix B.18). An experienced landscaping sub-contractor will be part of the evaluation, if necessary. The WDIG Project Coordinator will review these reports and others that are submitted directly to him from the community and recommend to WDIG additional modifications in the work or corrective action if necessary. The reestablishment of landscape plants and vegetation will be scheduled during the appropriate time as recommended by a specialized landscaper.

8. Site housekeeping will also be performed as part of landscape maintenance. Site housekeeping will include an inspection of the interior grounds and perimeter fencing for the accumulation of debris, trash, wastes or other materials from OM&M or tenant/owner activities or deposited onsite by others or windblown. These materials will be collected and disposed of appropriately. Tenants and/or owners whose activities are generating such materials will be notified by the WDIG Project Coordinator in an effort to minimize or eliminate future occurrences.

4.8 PROBLEM IDENTIFICATION, CORRECTIVE ACTION, AND MAINTENANCE AND REPAIR ACTIVITY REPORT

1. As noted in the O&M activities above, if problems or conditions are identified that warrant action or attention, a Problem Identification and Corrective Action Report will be prepared (see Appendix B.18). If the recommended corrective action is approved and the work performed, a Maintenance and Repair Activity Report (see Appendix B.19) will also be prepared and submitted to the WDIG Project Coordinator.

2. The problem identification, corrective action, and maintenance and repair activity report procedure is as follows:
   - Identify problem via site inspections
   - Formulate a corrective action recommendation, including an alternatives analysis, including cost estimates
   - Submit B.18 for agency approval
   - Upon approval, perform Corrective Action
   - Submit B.19 to EPA

4.9 MANAGEMENT AND REPORTING

1. All O&M related records (i.e., Site O&M inspection sheets, Problem Identification and Corrective Action Reports, Maintenance and Repair Activity Reports, etc.) will be kept on

file by the OM&M Supervising Contractor and will be included in the Semi-Annual OM&M Status Reports. The OM&M Status Reports will also include a summary of the monitoring activities performed (see Section 5.0). Further details on the report contents regarding monitoring is provided in Section 5.6. The Semi-Annual OM&M Reports will be submitted to the WDIG Project Coordinator for review and submission to EPA.

2. The WDIG Project Coordinator will also prepare an annual OM&M cost summary identifying costs incurred for OM&M activities, including any additional costs for repairs and maintenance. The cost summary will also include the WDIG Project Coordinator and WDIG project management and overhead costs. The WDIG Project Coordinator will manage all project costs and their integration into a financial control system. An access database will be used and costs will be entered monthly and reporting will be in the form of Monthly Spend, Cost to Date and Cost vs Budget. Such controls are consistent with the relevant standards and publications of the General Accounting Office (GAO) (e.g., GAO/AIMD-0021.3.1 and GAO-01-1008G).

3. In addition, the WDIG Project Coordinator will notify EPA of all Problem Identification and Corrective Action Reports, and any non-compliance events (e.g., emissions of soil gas in excess of required limits) when they occur (e.g., each event). A Non-Compliance Notification Report will be prepared for each event and submitted to the WDIG Project Coordinator for review and submittal to EPA. The report will describe the non-compliance event along with any supporting data and will include a description of planned/completed corrective actions.

4. After EPA's review and approval of the reported non-compliance events and corrective actions described in the Non-Compliance Notification Report, the WDIG Project Coordinator and OM&M Supervising Contractor will plan, initiate and coordinate corrective-maintenance work as outlined in the report if it has yet to be completed. After the maintenance work is completed and the system compliance has been restored to meet the performance requirements, a "Non-Compliance Correction Report", will be prepared by the OM&M Supervising Contractor for the WDIG Project Coordinator to submit to EPA. The Non-Compliance Correction Report will also include details of corrective-maintenance work procedures employed and status of the maintenance results.

4.10 REVISIONS TO THE O&M PLAN

1. The O&M Plan is an "evergreen" document that is subject to revision. Revisions may be proposed by the WDIG Project Coordinator for EPA review and approval. Alternatively, the EPA, subject to the governing decision documents for the Site (e.g., AROD, CD/SOW, RD and related deliverables), may direct WDIG to prepare revisions to the O&M Plan for EPA review and approval to address deficiencies or needed enhancements. Such revisions may include, but are not limited to, revisions in SOPs, corrective actions, or instrumentation to address potential monitoring or safety concerns.

4.11 COMMUNICATION AND COORDINATION PLAN

1. This section describes the types of interactions with project stakeholders that will be necessary to be maintained during the performance of the OMM. The key stakeholders are:
   - Regulatory Agencies (EPA and DTSC)
   - On-site Owners and Tenants
   - St. Paul High School
   - Adjacent Residential Neighborhood
   - Adjacent Industrial/Commercial Neighbors
   - City of Santa Fe Springs
   - Land Developers/New Owners

2. The purpose of establishing a communications and coordination plan is to direct the regular interaction between the key stakeholders and the OMMP team. This regular interaction will minimize coordination issues while implementing the OMMP and assure that important information is disseminated efficiently and in a timely manner. The types of issues that will need to be communicated and coordinated include
   - Concerns about site appearance
   - Monitoring events
   - Operational Emergencies
   - New Building Construction

3. Table 4.0 contains a summary of the key stakeholders, their contact information and the frequency and nature of communication and coordination. It is the responsibility of the WDIG Project Coordinator to implement this communication and coordination plan.

5.0 LONG-TERM MONITORING PLANS

1. This section provides Long-Term Monitoring Plans for various Site media including ground water, soil gas, in-business air, ambient air and stormwater. Table 5.0 summarizes the purpose and objectives of Long-Term Monitoring Plans. This section also discusses the monitoring locations, frequencies and constituents, as well as long-term monitoring data validation, management, reporting and statistical analysis pursuant to the requirements described in the AROD, CD and associated SOW. The monitoring plans integrate the QAPP and SOPs (Appendix A), which provide the methods and procedures for sample collection and analysis in a manner to assure data quality objectives are met. The Long-Term Monitoring Plans included herein will be implemented following EPA approval of remedial construction.

5.1 LONG-TERM GROUND WATER MONITORING PLAN

1. This section presents the Long-Term Ground Water Monitoring Plan including long-term ground water monitoring objectives and requirements, detection monitoring program for ground water, monitoring parameters and contaminants of concern, and monitoring frequency.

5.1.1 OBJECTIVES AND REQUIREMENTS

1. The primary objectives of the Long-Term Ground Water Monitoring Plan are to establish a detection monitoring program for identifying changes in ground water elevation (to monitor changes in ground water velocity and flow direction) and potential releases, leaching, or migration of waste materials from onsite sources to the ground water. A further objective is to locate onsite background wells such that they can also be utilized to track the movement of contaminants from offsite sources. These objectives are based on the Long-Term Ground Water Monitoring Plan requirements established in the CD with associated SOW and requirements for a detection monitoring program as specified in State of California regulations for interim status hazardous waste management unit or facilities, plus technical discussions with EPA during the RA construction period.

2. Since the AROD establishes that existing ground water conditions are due to offsite, upgradient sources and that ground water treatment systems are not required, there is no specific Performance Standard for ground water in the CD or SOW. Therefore, the analytical results for ground water will be evaluated against Maximum Contaminant Levels (MCLs) as a basis for comparison. However, the statistical data analysis program presented in Section 5.5 is included to identify measurably significant changes in water quality in accordance with ARARs (i.e., Title 27 of CCR).

3. As noted above, the existing ground water conditions are due to natural conditions and offsite, upgradient sources. As part of the long-term monitoring program, the historical and new monitoring data will be evaluated to determine if additional impacts to ground water are occurring and, if so, if they are from offsite or onsite sources. This evaluation will be performed using several methods including direct data comparison, trending, statistical, spacial and constituent type/source analysis.

4. Direct data comparison will involve a review of historical and new data to identify significant changes in COC concentrations. This approach will provide a rapid identification of obvious changes in ground water conditions in one or more monitoring wells. Less obvious changes will be identified by preparation of trend tables and/or graphs of the key and new constituents detected in wells. The data will be evaluated further using the statistical analysis plan described in Section 5.5 to provide an early detection of possible changes in ground water conditions.

5. The evaluations noted above will be used to determine if changes in ground water conditions are occurring. If it is determined that changes have occurred or are potentially occurring, additional evaluations will be performed to assess the potential source(s) of the changes (e.g., offsite or onsite sources). A spacial evaluation, both horizontal and vertical, will be used to assess the likely source of constituent changes in monitoring wells (e.g., the presence of higher concentrations of contaminants in upgradient/background or side-gradient wells versus lower concentrations in downgradient near-source/compliance/verification onsite wells may indicate offsite sources). The constituent type(s) detected will also be evaluated to determine if there are potential sources of these constituents' onsite or offsite based on historical investigation data and site uses. The spacial and constituent-type evaluations will be utilized to assess the offsite or onsite nature of changes in ground water conditions.

6. The evaluations noted above to determine changes in ground water conditions and potential sources will be summarized in the monitoring reports. These evaluations are also used in the decision matrix presented in Figure 5.1 to determine changes in the monitoring frequency and when to notify EPA or propose other changes in the monitoring program or corrective action. Should ground water conditions indicate potential impacts from onsite sources, recommended changes in the monitoring program and evaluation monitoring measures will be included in the monitoring reports.

7. Figure 5.1 the decision criteria associated with monitoring corrective actions to be followed relative to groundwater. The criteria are based on changes to groundwater quality, if any. The groundwater at the site has not been affected by historic activities at the site. If groundwater quality remains unaffected by the site, the decision matrix leads to reductions in sampling frequency. If groundwater quality indicates significant changes or an upward trend in concentrations, the following responses will be considered according the Figure 5.1:
   - Confirmatory sampling
   - EPA notification
   - Evaluation of potential causes for groundwater quality changes
   - Increased monitoring frequency
   - Corrective actions (i.e. additional wells, groundwater treatment)

   Any changes to groundwater monitoring, additional wells, or corrective measures will be discussed with and approved by EPA and DTSC prior to implementation.

8. The Long-Term Ground Water Monitoring Plan requirements, as specified in the CD and associated SOW, and references to where they are addressed in this OMMP are summarized in Table 1.0.

5.1.2 GROUND WATER MONITORING PARAMETERS

1. As addressed in the SOW, the Long-Term Ground Water Monitoring Plan will include monitoring of field parameters (listed in ground water monitoring data sheet; Appendix B.13), and ground water sampling and analysis of Chemicals of Concern (COCs) identified in the AROD. The ground water COCs include benzene, xylene, vinyl chloride, arsenic, lead, manganese, mercury, toluene, carbon tetrachloride, chloroform, PCE, and TCE. Table 5.1 lists the COCs for the ground water analysis and the MCL for each.

5.1.3 GROUND WATER MONITORING PROGRAM

1. In accordance with Title 22 California Code of Regulations (CCR) §66265.97, the ground water detection monitoring program includes background wells, point of compliance wells, and other wells suitable for early detection of a release from a waste unit. The selected wells for the proposed ground water monitoring are based on ground water conditions, flow, and distribution of contaminant sources at the Site as required in the SOW. The locations of selected long-term ground water monitoring wells are shown in Figure 5.0. These are the same monitoring locations that were proposed in the Remedial Design (TRC, 2003).

2. Ground water samples will be collected and analyzed pursuant to the procedures and methods described in the QAPP and associated SOPs included in Appendix A.

5.1.3.1 Background Wells

1. Background wells are onsite or offsite wells that have not been impacted by Site activities (typically they are located upgradient or cross-gradient of the Site). The background wells are screened within the uppermost aquifer to monitor and document onsite-impacted ground water quality. The selected background wells for the Long-Term Ground Water Monitoring Plan include wells GW-01, -02 and -32. In addition, well GW-11 will also be monitored for deep background cross-gradient ground water quality. The locations of background wells are shown in Figure 5.0. These wells are also situated such that they will continue to monitor contaminants derived from offsite upgradient sources.

5.1.3.2 Point of Compliance Wells

1. Point of Compliance (POC) wells are onsite monitoring wells located at the point of compliance (i.e., downgradient edge of the waste unit). The POC wells are screened within the uppermost aquifer to monitor and detect potential releases and impacts to ground water from site-related waste sources. Based on hydrogeologic conditions at the Site, shallow aquifer POC wells, approximately 200 feet apart, were selected for long-term detection monitoring. The selected POC wells include ground water wells GW-22, -23, and -26.

5.1.3.3 Near-Source Detection Wells

1. Near-Source Detection Wells are onsite detection wells located near the waste source area. The objective of near-source detection wells is to detect potential site-related releases of contaminants before impacts are measured at the POC. The near-source wells are located closer to the waste unit than POC well or directly below waste. Wells GW-10 and -33 are selected as near-source detection wells for long-term ground water monitoring.

5.1.3.4 Verification Wells

1. The verification wells are onsite wells located near the property line of the Site downgradient of the Site waste source. The verification wells are included to assure that Site contaminants do not migrate offsite and potentially impact private or municipal water supply wells. The existing downgradient monitoring wells GW-27, -29, and -30 will serve as verification wells for long-term ground water monitoring.

5.1.4 LONG-TERM GROUND WATER MONITORING FREQUENCY

1. Long-term ground water monitoring will initially be performed on a semi-annual basis. However, the program includes automatic adjustment to the frequency as conditions warrant. In addition, EPA can direct collection of samples at selected locations at a higher (i.e., quarterly) or lower (i.e., annually or bi-annually) frequency. The monitoring events will be conducted during the same month each calendar year, 6 months apart, one in the winter and one in the summer. For each monitoring event, the selected ground water monitoring wells will be sampled and analyzed for all the COCs identified in Table 5.1. Any outlying monitoring results determined from the statistical analysis may trigger additional confirmatory sampling.

2. After the first year of semi-annual monitoring, the OM&M QA Officer can propose a new monitoring schedule from the decision matrix shown in Figure 5.1. The decision matrix provides criteria for determining the frequency of ground water monitoring based on the ground water analyses results obtained from previous monitoring events. As indicated in the figure, the changes to monitoring frequency would be implemented in the subsequent monitoring event, and documented in the semi-annual report. The decision matrix in Figure 5.1 also indicates when to notify the EPA and to propose changes in the monitoring program and/or propose evaluation monitoring and/or corrective action.

3. The background wells will be scrutinized for indications of an onset or increase in flux of offsite contaminants. Previous monitoring has established that PCE and TCE concentrations have been detected mainly in the intermediate water-bearing zone beneath the western side of the Site. The primary indicators for the presence of and/or increases in offsite contaminant migration are:
   - Elevated contaminants in upgradient background wells versus lower or nondetect levels in downgradient near-source/compliance/verification wells.
   - Elevated contaminants in intermediate and deeper water-bearing zones versus shallow zones in onsite wells.
   - Presence/detection of constituent type(s) in onsite wells that were not detected in soils/solid wastes investigated onsite.

   The ground water elevation contour maps and flow directions for the shallow and deep water bearing zones for the most recent monitoring event (fourth quarter 2003) are shown in Figures 5.2 and 5.3. Changes to the established pattern of contaminants will be noted, and changes to the monitoring frequency or well network will be proposed in the monitoring reports.

4. As noted in Section 5.1.1 above, the historical and new monitoring data will be evaluated to determine if additional impacts to ground water are occurring and, if so, if they are from offsite or onsite sources. This evaluation will be performed using several methods including direct data comparison, trending, statistical, spacial and constituent type/source analysis as noted in Section 5.1.1 and Section 5.5.

5.2 LONG-TERM SOIL GAS, IN-BUSINESS AIR AND AMBIENT AIR MONITORING PLAN

1. This section presents the Long-Term Soil Gas, In-Business Air and Ambient Air Monitoring Plan including monitoring objectives and requirements, detection monitoring programs, soil gas performance standards and in-business air threshold levels, and monitoring frequencies.

5.2.1 OBJECTIVES AND REQUIRMENTS

1. The primary goals of the Long-Term Soil Gas, In-Business Air and Ambient Air Monitoring Plan are to detect potential releases and/or migration of waste materials from onsite sources to the atmosphere and to the building spaces onsite, and to determine compliance with

specified standards or threshold levels. This monitoring plan also addresses the requirements for the Long-Term Soil Gas and In-Business Air Monitoring Plan (see Table 1.0) as specified in the CD and associated SOW.

2. The monitoring results for soil gas and in-business air will be evaluated to determine compliance with the Soil Gas Performance Standards and Indoor Air Threshold Levels (IATLs), respectively. The Performance Standards for soil gas and IATLs for in-business air are presented in Table 5.2.

3. The EPA adopted standards for soil gas as part of the development of the AROD. The soil gas standards are for comparison with gas concentrations in the subsurface and, therefore, determine the potential for health risks associated with gas migration. The EPA developed IATLs for the Site COCs. The IATLs are for comparison with concentrations of gas constituents measured in Site buildings and, therefore, determine if potential health risks to tenants and employees are present.

5.2.2 SOIL GAS, IN-BUSINESS AIR AND AMBIENT AIR MONITORING PARAMETERS

1. Selected vapor wells will be monitored for field parameters and soil gas COCs. The field parameters for soil gas monitoring are listed in the vapor well monitoring data sheet (Appendix B.14). The soil gas COCs and Performance Standards are listed in Table 5.2. The COCs include seventeen halogenated and aromatic VOCs and methane. The soil gas will also be monitored for total gaseous nonmethane organics (TGNMO). The reservoir gas collection and treatment system will also be monitored for the soil gas COCs, TGNMO and methane for compliance with South Coast Air Quality Management District regulations.

2. The in-business air will also be monitored for field parameters and the soil gas COCs and TGNMO. The field parameters for in-business air are listed in the monitoring data sheet for in-business air and ambient air shown in Appendix B.17. The list of in-business air COCs and corresponding IATLs are also presented in Table 5.2. During the sampling of in-business air, ambient (outdoor) air samples will also be collected and analyzed for in-business air COCs and TGNMO.

5.2.3 SOIL GAS MONITORING PROGRAM

1. The soil gas monitoring program involves monitoring of selected vapor wells and the reservoir gas collection system at the Site. These sampling locations will provide representative and adequate areal coverage, based on existing Site data and known conditions, for establishing compliance with soil gas performance standards, and for assessing changes in or near known noncompliance areas that may be indicative of vapor migration.

2. Soil gas samples will be collected and analyzed pursuant to the procedures and methods described in the QAPP and associated SOPs included in Appendix A.

3. The biovent wells are secondary gas control systems for aerating soils to stimulate in-situ aerobic biological activity and to promote biodegradation and/or inhibit formation of methane. Since the wells are secondary treatment systems, there are no specific performance goals for these wells. Furthermore, because the wells are not constructed as monitoring systems, the biovent wells do not have data quality objectives for compliance monitoring as do the vapor wells. Therefore, the biovent wells are not part of the soil gas monitoring program.

5.2.3.1 Vapor Well Monitoring

1. The selected vapor wells for long-term soil gas monitoring include: VW-25, -29 through -39, -41, -42, -46, -49, -51, -55, -56, -58, -61 and -62. The locations of the selected wells are shown in Figure 5.0. The existing vapor wells at the Site that have not been selected for soil gas monitoring will remain in place; however, plugging or abandonment of these wells after the first year of post-closure soil gas monitoring will be considered.

2. Vapor monitoring wells VW-29 to -39, -41, and -42 are located at the perimeter of the Site (see Figure 5.0) and were selected to monitor potential migration of soil gas to offsite areas and buildings nearby. These perimeter wells will be monitored for their compliance with Soil Gas Performance Standards listed in Table 5.2.

3. Vapor monitoring wells VW-25, -46, -49, -51, -55, -56, -58, -61 and -62 are located in or near historic areas of soil gas noncompliance (see Figure 5.0). These wells were selected to be monitored for changes in soil gas conditions near the sources and, thereby, determine the

potential for continued and/or increased gas migration. The monitoring results of these wells will not be compared to the Soil Gas Performance Standards. Rather, the concentrations will be evaluated to determine if statistically significant concentration changes occur using the computer program DUMPSat.

5.2.3.2 Reservoir Gas Collection System Monitoring

1. The monitoring of Reservoir Gas Collection System in the reservoir area will involve influent and effluent gas sampling of the treatment system (granular activated carbon [GAC] drums) and calculation of influent and effluent emission rates for VOCs, TGNMO, and methane. The objective of monitoring the gas collection and treatment system is to establish the composition of the soil gas being collected and determine if a permit and treatment for emissions is required (i.e., influent VOC emission rate greater than 1.0 lb/day requires SCAQMD permit and treatment). The influent and effluent sampling results will also determine the change-out requirements of the GAC drums. Also, TGNMO levels must be reduced by 98 percent (by treatment if necessary) or not exceed 20 ppmv. If the influent methane emission rate is less than 2.3 lb/day (SCAQMD daily emission standard) after the first year, the system can be operated in the passive mode.

2. If the lead GAC drum effluent TGNMO concentration exceeds 20 ppmv, it will be changed-out and the lag GAC drum moved into the lead position. A new recharged GAC drum will be placed in the lag position. However, if the lag GAC drum effluent TGNMO concentration exceeds 20 ppmv, both lead and lag drums will be changed out.

5.2.4 IN-BUSINESS AND AMBIENT AIR MONITORING PROGRAM

1. The objective of in-business and ambient air monitoring is to assure that subsurface soil gas is not migrating from waste source areas to the surface and tenant-occupied building areas onsite. A series of in-business and ambient air monitoring events in the past has shown few exceedances of IATLs, and the observed exceedances were attributable to the tenants and operations conducted at the occupied buildings.

2. The Long-Term In-Business Air and Ambient Air Monitoring Plan will include the monitoring locations selected in the EPA approved In-Business Air Monitoring Program

(2001) and additional locations as shown in Figure 5.0. The monitoring locations selected for in-business and ambient air monitoring are as follows:

- Monitoring locations from EPA approved In-Business Air Monitoring Program:
  - IBM-03: 12635E Los Nietos Road
  - IBM-41: 12811E Los Nietos Road
  - IBM-03B: 12633 Los Nietos Road
  - IBM-24B: 12637A Los Nietos Road
  - IBM-24: Outside the Building at 12637 Los Nietos Road
  - IBM-37: 12803 Los Nietos Road
  - IBM-50: 9843 S. Greenleaf Avenue
  - IBM-49: Southeast corner of Los Nietos Road and Greenleaf Avenue (Outside)
- Supplementary Sampling Locations:
  - IBM-21: 9620 Santa Fe Springs Road
  - IBM-22: 9630 Santa Fe Springs Road
  - IBM-28: 9640 Santa Fe Springs Road
  - IBM-32: 12747 Los Nietos Road

All monitoring locations listed above are for in-business air monitoring except locations IBM-24 and -49, which are ambient air monitoring locations.

3. In-business air and ambient air samples will be collected and analyzed pursuant to the procedures and methods described in the QAPP and associated SOPs included in Appendix A.

5.2.5 LONG-TERM SOIL GAS, IN-BUSINESS AIR AND AMBIENT AIR MONITORING FREQUENCY

1. For the first year, the long-term soil gas, in-business air and ambient air monitoring will be conducted quarterly as stated in the SOW. After the first year of quarterly monitoring, the monitoring data will be used to update the monitoring schedule for soil gas and in-business air and ambient air from decision matrices shown in Figures 5.4 and 5.5, respectively, and discussed in more detail in the paragraphs below. . The monitoring schedule updates will be documented in the Semi-Annual O&M Reports and would apply in the subsequent monitoring event.

2. Figure 5.4 provides a decision matrix for soil gas monitoring based on soil gas concentrations measured at specific vapor wells. If the soil gas does not indicate a

statistically significant increase or concentrations above the SGPS, the monitoring frequency will be reduced to semiannual after the first year. If soil gas concentrations indicate a statistically significant increase in concentrations above SGPS for compliance wells, the following will be considered:

- An episodic Indoor Air Monitoring event will occur in the building(s) associated with the vapor probe(s) indicating an increase, if in-door air at that location has not been sampled at that location in the past month. The in-door air sampling results would be evaluated based on Figure 5.5 discussed in paragraph 3 below.
- If soil gas concentrations in compliance wells are ≥ SGPS for 2 consecutive events, the EPA and DTSC will be notified and potential causes for the exceedances will be evaluated, as well as proposing a new monitoring program and frequency if appropriate. A Non-compliance Notification Report will be prepared.
- An evaluation will be made as to the need for corrective measures and documented in a Corrective Action Plan.

Any changes to the monitoring program and corrective actions due to soil gas concentration results will be discussed with and approved by the EPA and DTSC prior to implementation.

3. Figure 5.5 provides a decision matrix for in-business and ambient air monitoring. The matrix will be followed in deciding to reduce monitoring frequency or implement engineering controls (corrective measures). The in-door and ambient air monitoring results from the bases for the decisions as directed below.

Results ≤ IATL

Reductions to monitoring frequency may occur when in-door air monitoring results are less than the IATL. If results are < IATL for four consecutive quarters, the monitoring frequency will be changed to semiannual. If results are < IATL for 12 consecutive monitoring events or 5 years, the monitoring frequency will be changed to annual.

Results > IATL

When monitoring results are > IATL and not attributable to in business activities, the monitoring frequency remains quarterly or increases from semiannual or annual according to Figure 5.5. In addition, in building activities at the timed sampling will be assessed along with confirmation-sampling. If the confirmation-sampling indicates exceedances of IATL that are not related to in business activities, the following actions will be conducted:

- EPA will be notified within 2 weeks.
- Remedial investigations will be conducted within 6 weeks to determine need for engineering controls.
- A Non-compliance Notification Report will be prepared
- If engineering controls are necessary to control in-door air quality, their design will be completed within 16 weeks thereafter.

All changes to the monitoring program and engineering controls construction will be discussed with and approved bye the EPA and DTSC prior to implementation.

4. The monitoring frequency of the reservoir gas collection and treatment system will depend on the operational status of the system. The treatment system will be monitored monthly while the system is operating in active mode. Once the system is switched to a passive operating mode (when the methane emission rate is less than 2.3 lb/day), the long-term monitoring will be performed on a semi-annual basis. The monitoring measurements for the treatment system will include COCs, TGNMO and methane.

5.3 LONG-TERM STORMWATER MONITORING PLAN

1. The Long-Term Stormwater Monitoring Plan will involve monitoring of stormwater runoff quality and volume (see Appendix B.17), and inspection and maintenance of stormwater drainage system at the Site (see Section 4.4 for O&M inspection of the stormwater drainage system).

2. A Stormwater Pollution Prevention Plan is not required since there are no known sources of potential surface pollutants to stormwater runoff from the Site area. Also, there have been no significant quantities of spills, leaks, treatments, or storage of known materials at the Site since the Site has been closed as a waste disposal facility in the mid to late 1960s. The fill soils comprising the RCRA-C equivalent and RCRA-D equivalent caps have been demonstrated to not be contaminated.

5.3.1 OBJECTIVES AND REQUIREMENTS

1. The objectives of Long-Term Stormwater Monitoring Plan is to control and monitor stormwater runoff quality and volume to determine effectiveness of the RCRA Subtitle C- and D-equivalent covers and implemented surface drainage control systems (i.e., stormwater management system), and potential degradation of stormwater quality due to tenant-related activities and/or migration of buried wastes.

2. There are no Long-Term Stormwater Monitoring Plan requirements or Performance Standards identified in the CD. The Long-Term Stormwater Monitoring Plan is designed based on the stormwater runoff quality and volume monitoring requirements identified herein.

5.3.2 STORMWATER MONITORING PARAMETERS

1. The stormwater runoff quality monitoring parameters will include the COCs identified for Long-Term Ground Water Monitoring Plan (see Table 5.1). The stormwater is monitored for ground water COCs in order to detect potential migration of contaminants from buried Site waste material. The stormwater COCs will also include contaminants related to onsite activities (due to business conducted by the tenants of the onsite buildings). This will provide information on possible contamination and environmental impacts caused by the tenant activities at the Site. The contaminants related to tenant onsite activities include oil and grease, metals, and total suspended solids (TSS). Table 5.3 lists the COCs that will be analyzed for stormwater runoff along with the associated MCLs.

2. The stormwater runoff volume will also be monitored, as shown in Appendix B.17, to verify the implemented surface drainage system meets the design requirements. The key design requirements identified for the Site surface drainage control system are as follows:
   - Prevent erosion of containment structure.
   - Design system for 100-year, 24-hour storm.
   - Integrate with existing offsite infrastructure.
   - Final grade to promote lateral drainage and prevent ponding due to future settlement.
   - Final grade to consider post-closure land use.

5.3.3 STORMWATER MONITORING PROGRAM

1. The proposed stormwater monitoring program includes monitoring of stormwater runoff quality and visual inspection of surface drainage control systems implemented at the Site (post construction).

2. The stormwater monitoring sampling locations, SW-1 through SW-6, are shown in Figure 5.6. The selected locations are the surface drainage catch basin (SW-2), which is located at the low spot of the Site to collect stormwater runoff and convey the collected water to the stormwater sewer system, and the locations within stormwater drainage paths

(SW-3 through SW-6). Note that the sampling point SW-1 is not located within the catch basin area or drainage paths; instead the SW-1 location is the highest point (highest elevation) at the Site. The analytical results of the sample collected at SW-1 will provide "background concentrations" of rainfall precipitation before it has significant Site surface contact and is conveyed to a runoff point. Stormwater samples will be collected and analyzed pursuant to the procedures and methods described in the QAPP and associated SOPs included in Appendix A.

5.3.4 STORMWATER MONITORING FREQUENCY

1. The stormwater sampling and drainage system inspection will be conducted following the first significant storm event after construction of the Site remedies is completed and again after a second significant storm event. A significant storm event is one that has accumulated precipitation at the Site greater than 2 inches over a 24-hour period. Additional monitoring events may be performed as needed or at the direction of EPA.

5.4 SAMPLING AND ANALYSIS

1. The sampling and analysis protocols of long-term monitoring plans included herein will be performed pursuant to the sampling methods and procedures provided in the SOPs included in the QAPP, (Appendix A). The SOPs assure qualitative sampling and analysis will be performed in the long-term monitoring plans.

5.5 STATISTICAL ANALYSIS PLAN

1. The long-term monitoring results of primary Site media (ground water and soil gas) will be evaluated through statistical analysis as required in the CD and associated SOW. An "Intra-Well" statistical method will be used pursuant to the "Control Chart" method described under "Allowable Data Analysis Method" included in Title 27 CCR §20415. The use of control charts as a graphical tool provides a basis for action to determine when changes in data patterns over time should be further examined to evaluate potential causes. The Intra-Well statistical analysis will be performed using a computer-based statistics program called "DUMPStat" (Robert D. Gibbons Ltd.). Statistical analysis is limited to inorganic constituents with a natural concentration and VOCs with a frequency of concentrations above the detection limit of 25% or more.

2. The DUMPStat program allows for the selection of appropriate statistical methods (e.g., parametric or nonparametric prediction limits or control charts). General statistical procedures included in the DUMPStat program allow for differentiation between upgradient and downgradient monitoring locations and variations in detection frequency (e.g., DF > 50 percent; DF >0 percent and <50 percent, and DF = 0 percent). Intra-Well comparisons using the Shewart-CUSUM control charts may provide meaningful insight as to the relative significance of changes in measured concentrations within a specific well or sampling point. The Shewart-CUSUM control chart method is sensitive to both gradual and rapid releases and is also useful in detecting "trends" in data.

3. Normality testing of the data distribution is conducted by using the multiple group version of the Shapiro-Wilk test. If the results of the normality testing indicate that the data are not normally distributed, the measurements are converted to the natural log measurement and a lognormal prediction limit is derived. In the event that neither normal nor log normally transformed data compute nonparametric prediction limits, an alternative method (e.g., Poisson prediction limits) will be applied. The DUMPStat program includes the capability of establishing prediction limits for both parametric and nonparametric measurements.

4. Apparent fluctuations in concentrations overtime will also be evaluated with regard to seasonal changes. If the historical time series of data is long enough to establish a number of full seasonal cycles, separate control charts may also be constructed for different parts of the cycle. For example, if historical data indicate higher concentrations in summer and lower concentrations in winter, separate control charts may be constructed for each season.

5.5.1 INTRA-WELL COMPARISON

1. As described in Title 27 CCR §20415, a control approach gives control limits for each COC or monitoring parameter. Likewise, the Intra-Well comparison method uses the combined Shewart-CUSUM control chart for determining the control limits from historical data collected during a specific background period. For WDI Site, all historical monitoring data will be used to determine the control limit for each COC. The control limits will be updated as new monitoring results are obtained and the new monitoring data will be included in the calculation to determine new control limits.

2. The Shewart-CUSUM control limits are based on three separate parameters: ***h*** – the value against which the cumulative sum will be compared, ***k*** – a parameter related to the displacement that should be quickly detected and ***SCL*** – the upper Shewart limit representing the number of standard deviations used to define a significant change as compared to historical data. The DUMPStat program uses the following values: ***h*** = 4.5, ***k*** = 1, and ***SCL*** = 4.5 for less than 12 samples. For increased statistical power, ***h*** and ***SCL*** are set to 4.0 and ***k*** is set to 0.75 when greater than 12 samples have been obtained. It should be noted that unlike prediction limits, which provide a fixed confidence interval (e.g., 95 percent CUL) for a given number of future comparisons, control charts do not provide explicit confidence levels. The values cited above allow for a displacement of two standard deviations from the mean to be detected quickly. Since 1.96 standard deviations corresponds to 95 percent confidence on a normal distribution, the methodology would provide an approximate confidence of 95 percent.

3. The combined Shewart-CUSUM control chart procedure assumes that the data are independent and normally distributed with a fixed mean and constant variance. For this method, nondetects can be replaced by the method detection limit without serious consequence; however, this procedure should only be applied to those constituents that are detected at least in 25 percent of all samples, otherwise, constant variance is not adequately defined. Where sample results are below the practical quantitation limit, a surrogate value of one-half the detection limit will be used.

4. When detection frequency is less than 25 percent, Poisson control limit may be used instead of the Shewart-CUSUM control limit as an alternative to nonparametric prediction limits for rarely detected constituents (i.e., less than 25 percent detects). Where sample results are below the practical quantitation limit, a surrogate value of one-half the detection limit will be used.

5. For those cases in which the detection frequency is greater than 25 percent, DUMPStat program substitutes the mean reporting limit for the nondetects. In this way, changes in reporting limits do not appear to be significant trends. As was previously stated, sample results that are below the practical quantitation limit, will be assigned a surrogate value of one-half the detection limit. In some instances, it may be necessary to evaluate the reported data and conclusions regarding trending that result from changes in the laboratory reporting limits.

6. The Shewart-CUSUM control limits for each COC will be determined after the last monitoring event has been performed (before start of long-term monitoring) to assure the control limits used for the statistical analysis of the long-term monitoring data are calculated from the most updated background data.

5.6 DATA VALIDATION, MANAGEMENT, AND REPORTING

1. All long-term monitoring data will be submitted to the OM&M QA Officer for data validation, management, and reporting. The OM&M QA Officer will coordinate full data validation review of laboratory analyses received for a minimum of 10 percent of the sample data collected from long-term monitoring events. The validated data will be formatted and archived into tables for data management purpose.

2. After the data has been validated and formatted, the OM&M Supervising Contractor will include the data in the Semi-Annual OM&M Status Report for the WDIG Project Coordinator to submit to EPA for review. The semi-annual report includes monitoring data for ground water, soil gas , in-business air and ambient air, reservoir gas collection system, and stormwater , if applicable (there may not be any storm events), along with O&M data.

3. It is noted that exceedances in Soil Gas Performance Standards and/or IATLs that are detected will be reported to EPA pursuant to the requirements in the SOW. The EPA notification requirements are included in the decision matrix criteria for ground water, soil vapor and in-business and ambient air shown in Figures 5.1, 5.4 and 5.5, respectively.

4. The WDIG Project Coordinator will notify EPA of all Problem Identification and Corrective Action Reports, and any noncompliance events (e.g., emissions of soil gas in excess of required limits) when they occur (e.g., each event). A Noncompliance Notification Report will be prepared for each event and submitted to the WDIG Project Coordinator for review and submittal to EPA. The report will describe the noncompliance event along with any supporting data and will include a corrective maintenance plan.

5. After EPA's review and approval of the reported noncompliance events and corrective maintenance plan described in the Noncompliance Notification Report, the WDIG Project Coordinator and O&M Supervising Contractor will plan, initiate and coordinate

corrective-maintenance work as outlined in the report. After the maintenance work is completed and the system compliance has been restored to meet the performance requirements, a "Noncompliance Correction Report", will be prepared by the OM&M Supervising Contractor for the WDIG Project Coordinator to submit to EPA. The Noncompliance Correction Report will also include details of corrective-maintenance work procedures employed and status of the maintenance results.

5.6.1 LONG-TERM MONITORING DATA REPORT

1. The OM&M QA Officer shall prepare and submit a data report that includes analytical results obtained from all long-term monitoring performed within the first half (first 6 months) of the calendar year. The data report will include a brief summary of the monitoring activities, including any deviations from the long-term monitoring plans, and present the measurements and field sampling records for the monitoring round performed, and identify monitoring locations and contaminants that exceeded the corresponding Performance Standards and/or IATLs.

5.6.2 ANNUAL LONG-TERM MONITORING AND EVALUATION REPORT

1. The Annual Long-Term Monitoring and Evaluation Report will be included with the Semi-Annual OM&M Status Report prepared by the O&M Supervising Contractor for WDIG Project Coordinator to submit to the EPA within six weeks following the completion of all scheduled long-term monitoring plans for the calendar year. The Annual Long-Term Monitoring and Evaluation Report shall provide the following information:
   - Summary of the requirements of the detection monitoring and compliance/performance monitoring program;
   - Summary of the monitoring and sampling activities completed during the calendar year monitoring period and schedule for future monitoring activities;
   - Summary and evaluation of sample analyses obtained during the calendar year monitoring period. A tabular listing of current and historical sampling results by well and by sample date shall be included as an appendix;
   - Identification of soil gas monitoring wells and specific contaminants that exceed the Soil Gas Performance Standards;
   - Identification of ground water monitoring wells and specific contaminants that exceed the MCLs;

- Interpretative maps and cross section(s) of data to evaluate the performance of the gas extraction or gas migration control systems;
- Interpretative maps and cross sections(s) of water quality data to evaluate the ground water conditions;
- Potentiometric surface maps prepared for the primary ground water flow units and discussion of horizontal and vertical hydraulic gradients;
- Discussion of baseline ground water conditions to be used for evaluating monitoring data collected during future monitoring;
- Discussion of migration of contaminants from offsite sources onto the WDI Site, if any;
- Presentation and evaluation of all monitoring results including statistical and trend analyses performed;
- Presentation and evaluation of the detection monitoring results, including statistical analyses performed;
- Summary of QA/QC activities performed and data quality issues identified during the monitoring period.
- Discussion of any monitoring well or probe maintenance or repair completed during the monitoring period, or required before the next monitoring event;
- Discussion of the adequacy of the current monitoring program and any proposed changes or additions to the detection monitoring and compliance/performance monitoring programs, including recommendations for new wells or probes, and incorporation of additional monitoring systems installed for new buildings constructed on the Site (from redevelopment by other entities); and
- Status and schedule for detection monitoring and compliance testing activities.

6.0 INSTITUTIONAL CONTROLS MONITORING AND ENFORCEMENT PLAN

1. This section discusses institutional controls, and monitoring and enforcement of proposed institutional controls at the Site. The institutional controls are required by the AROD to ensure the long-term integrity of the remedy and prevent potential exposure of buried wastes remaining at the Site. This section also outlines procedures for new building construction.

2. The objectives of institutional controls for the WDI Site are:
   - To provide notification to all potential Site users of the presence of hazardous material and onsite contamination.
   - To provide notification to potential Site users concerning the presence and location of all remedial systems.
   - To expressly prohibit residential land use on any part of the Site and limit future uses to certain industrial activities.
   - To minimize the potential for exposure of future Site users to site-related hazardous materials (including waste materials, ground water, and/or soil gas emissions).
   - To protect the integrity of the remedy from any activity that may interfere with the effective operation and maintenance of remedial control and monitoring systems.
   - To provide access to the Site for appropriate regulatory agencies and responsible parties engaged in approved remedial actions and monitoring activities.

3. An Institutional Controls Monitoring and Enforcement Work Plan (ICMEWP) was prepared in accordance with Section 5.13 of the SOW and was approved by EPA in June 2003 and revised in November 2005. The most current ICMEWP is included and incorporated in this OMMP in Appendix D.

6.1 NEW BUILDING CONSTRUCTION

1. The protocol for new building construction interaction is outlined below
   - During discussions with property owners regarding new construction, a list of property specific OM&M requirements will be formulated by EPA and WDIG representatives
   - The OM&M requirements will be documented in the EPA approval of the new construction plans.

- A transitioning plan for the construction and post-construction periods may be necessary.

It is the responsibility of the WDIG Project Coordinator to assure that adequate coordination with new building construction entities is established and maintained.

2. In addition to the protocol for new building construction listed above, please refer to the Coordination and Communications Plan in Section 4.11 for additional detail or new building construction interaction.

7.0 CONTINGENCY PLAN

1. This section presents potential risks and contingency plans associated with the long-term operations and maintenance, and monitoring of the Site. The potential risks include, but are not limited to: remedial system performance degradation, and physical and/or other structural failures of the remedial systems such that the remedial systems are no longer meeting the Performance Standards, and are no longer protective of human health and the environment. Table 7.0 summarizes the identified risks and corresponding conceptual contingency plans.

2. All reported remedial system impairments or performance requirement failures identified during the long-term O&M or monitoring events will be notified to the EPA and the DTSC by the OM&M QA Officer. The OM&M QA Officer will prepare "Corrective Action Plan" addressing the observed degradation in system performance and planned corrective actions or emergency repairs that have been performed. The Corrective Action Plan will also include new or replacement remedial system components required and any modifications to the pre-design and design submittals, construction, compliance testing, and the OMMP herein.

7.1 EMERGENCY RESPONSE AND CORRECTIVE ACTION

1. Table 7.0 addresses potential risks associated with Site remedial systems or waste materials. However, in cases where the failures or insufficient performance outputs of the remedial systems result in release of hazardous material, fire, or explosions that cause immediate (i.e., acute toxicity) or substantial level of adverse impacts (i.e., carcinogenic) on human health or the environment, the responsive procedures provided in Emergency Response Guide Book (United States Department of Transportation) should be followed. Based on the nature of the remedial elements and Site history, the risk of emergency related to failure of the systems is extremely low. Because the bulk of the waste mass is not in close proximity to various tenant businesses, it is unlikely that an accident at a tenant business could cause a hazardous emergency that is exacerbated by the presence of waste at the Site.

2. If any corrective action procedures need to be taken in regard to perimeter parcels, both landowners and tenants will be notified with the formal owner/tenant notification form. This coordination will notify all appropriate parties of any additional actions that may need to occur and will identify a specific timeframe for the duration of the work.

3. In most cases, emergency situations (relative to environmental protection and worker safety) occur due to accidental spills or release of hazardous materials. In such cases following responses may be applied:
   - Notify all facility personnel including Site property owners, tenants, and users about the spill or release of the hazardous substances.
   - Report to the OM&M QA Officer and appropriate State or local agencies with designated response roles if their help is needed (emergency contact lists are provided in Emergency Response Guide Book).
   - Identify the character, amount, aerial extent, and source of the contamination.
   - Assessment of the released substances will be planned and conducted to identify the hazardous/toxic impacts caused by the released material. The assessment will consider both direct and indirect effects of the release.

4. During an emergency response both the OM&M QA Officer and the Project Coordinator will refer to the OM&M HASP and Section 4.11-Communication and Coordination Plan for additional guidance.

7.1.1 Operational Emergencies

1. Protocol for Operational Emergency
   A. An operation emergency is defined as a failure in any active remedial component. As of 2006, the only active remedial components at the WDI Site are the Soil Vapor Extraction System and the Leachate Collection System. All other remedial components are passive (i.e., bio-vent wells, or monitoring).
   B. If upon an inspection of the site or a notification by a third party it is discovered that an active system has become inoperable, the following steps will be taken:
      a. A notification to EPA will be made via telephone call within 48 hours of the discovery of the emergency
      b. Upon discovery of the emergency, the Project Manager will send a repair crew to the site to access the problem and recommend repairs.

Simple repairs will be made on the spot. Complicated repairs or need for component replacement will be communicated to the Project Manager.

c. Within five working days of discovery of the operational emergency either a repair report or a plan, including timetable, for the repair will be submitted to EPA

d. Within two weeks of discovery repairs will be initiated.

7.0 CONTINGENCY PLAN

1. This section presents potential risks and contingency plans associated with the long-term operations and maintenance, and monitoring of the Site. The potential risks include, but are not limited to: remedial system performance degradation, and physical and/or other structural failures of the remedial systems such that the remedial systems are no longer meeting the Performance Standards, and are no longer protective of human health and the environment. Table 7.0 summarizes the identified risks and corresponding conceptual contingency plans.

2. All reported remedial system impairments or performance requirement failures identified during the long-term O&M or monitoring events will be notified to the EPA and the DTSC by the OM&M QA Officer. The OM&M QA Officer will prepare "Corrective Action Plan" addressing the observed degradation in system performance and planned corrective actions or emergency repairs that have been performed. The Corrective Action Plan will also include new or replacement remedial system components required and any modifications to the pre-design and design submittals, construction, compliance testing, and the OMMP herein.

7.1 EMERGENCY RESPONSE AND CORRECTIVE ACTION

1. Table 7.0 addresses potential risks associated with Site remedial systems or waste materials. However, in cases where the failures or insufficient performance outputs of the remedial systems result in release of hazardous material, fire, or explosions that cause immediate (i.e., acute toxicity) or substantial level of adverse impacts (i.e., carcinogenic) on human health or the environment, the responsive procedures provided in Emergency Response Guide Book (United States Department of Transportation) should be followed. Based on the nature of the remedial elements and Site history, the risk of emergency related to failure of the systems is extremely low. Because the bulk of the waste mass is not in close proximity to various tenant businesses, it is unlikely that an accident at a tenant business could cause a hazardous emergency that is exacerbated by the presence of waste at the Site.

2. If any corrective action procedures need to be taken in regard to perimeter parcels, both landowners and tenants will be notified with the formal owner/tenant notification form. This coordination will notify all appropriate parties of any additional actions that may need to occur and will identify a specific timeframe for the duration of the work.

3. In most cases, emergency situations (relative to environmental protection and worker safety) occur due to accidental spills or release of hazardous materials. In such cases following responses may be applied:
   - Notify all facility personnel including Site property owners, tenants, and users about the spill or release of the hazardous substances.
   - Report to the OM&M QA Officer and appropriate State or local agencies with designated response roles if their help is needed (emergency contact lists are provided in Emergency Response Guide Book).
   - Identify the character, amount, aerial extent, and source of the contamination.
   - Assessment of the released substances will be planned and conducted to identify the hazardous/toxic impacts caused by the released material. The assessment will consider both direct and indirect effects of the release.

4. During an emergency response both the OM&M QA Officer and the Project Coordinator will refer to the OM&M HASP and Section 4.11-Communication and Coordination Plan for additional guidance.

7.1.1 Operational Emergencies

1. Protocol for Operational Emergency
   A. An operation emergency is defined as a failure in any active remedial component. As of 2006, the only active remedial components at the WDI Site are the Soil Vapor Extraction System and the Leachate Collection System. All other remedial components are passive (i.e., bio-vent wells, or monitoring).
   B. If upon an inspection of the site or a notification by a third party it is discovered that an active system has become inoperable, the following steps will be taken:
      a. A notification to EPA will be made via telephone call within 48 hours of the discovery of the emergency
      b. Upon discovery of the emergency, the Project Manager will send a repair crew to the site to access the problem and recommend repairs.

Simple repairs will be made on the spot. Complicated repairs or need for component replacement will be communicated to the Project Manager.

c. Within five working days of discovery of the operational emergency either a repair report or a plan, including timetable, for the repair will be submitted to EPA

d. Within two weeks of discovery repairs will be initiated.

8.0 REFERENCES

CDM Federal. 1997. *Subsurface Gas Contingency Plan. Waste Disposal, Inc. Superfund* Site. United States Army Corps of Engineers Contract No. DACW05-96-D-0008. July 17, 1997.

CDM Federal. 1999. *Ground Water Data Evaluation Report. Waste Disposal, Inc. Superfund Site, Santa Fe Springs, California.* United States Army Corps of Engineers Contract No. DACW05-96-D-0008. January 1999.

Environmental Protection Agency (EPA). 1993a. *Feasibility Study Report for Soils and Subsurface Gas, Waste Disposal, Inc. Superfund Site, Santa Fe Springs, California.* August 2, 1993.

EPA. 1993b. *Record of Decision (ROD) - Soils and Subsurface Gas Operable Unit.* December 22, 1993.

EPA. 2002. *Amended Record of Decision (AROD) - Soils and Subsurface Gas Operable Unit.* June 2002.

EPA. 2003. *Consent Decree: USA vs. Archer Daniels Midland et al.*

TRC. 1999. *Remedial Design Investigative Activities Summary Report (Rev. 1.0), Waste Disposal, Inc. Superfund Site.* August 1999.

TRC. 2000. *Draft TM No. 13 Reservoir Liquids Removal Closeout Report, Waste Disposal, Inc. Superfund Site.* August 2000.

TRC. 2001a. *Supplemental Subsurface Investigation, RD Investigative Activities, Waste Disposal, Inc. Superfund Site.* February 2001.

TRC. 2001b. *Remedial Design Investigative Activities Summary Report (Revision 2.0).* May 2001.

TRC. 2001c. *Supplemental Feasibility Study (Revision 4.0), Waste Disposal, Inc. Superfund Site.* March 2001.

TRC. 2002. *2000 Annual Monitoring Report, Waste Disposal, Inc. Superfund Site.* February 2002.

TRC. 2003a. *2001-2002 Annual Monitoring Report, Waste Disposal, Inc. Superfund Site.* April 2003.

TRC. 2003b. *Final (100%) Design Report Soils, Subsurface Gas and Ground Water Remedial Design, Waste Disposal, Inc. Superfund Site.* May 2003.

TRC. 2004a. *Final Remedial Action Workplan (RAWP). Waste Disposal, Inc. Superfund Site.* March 2004.

TRC. 2004b. *Final Construction Quality Assurance Plan (CQAP). Waste Disposal, Inc. Superfund Site.* January 2004.

TRC. 2004c. *Sampling and Analysis Plan (SAP). Waste Disposal, Inc. Superfund Site.* January 2004.

TRC. 2004d. *Quality Assurance Project Plan (QAPP). Waste Disposal, Inc. Superfund Site.* January 2004.

TRC. 2005. *2003 Annual Monitoring Report. Waste Disposal, Inc. Superfund Site.* March 2005.

TRC. 2005a. *Soil GeoCollection, Venting, and Treatment System/Startup Protocol. Waste Disposal, Inc. Superfund Site.* February 2005.

TRC. 2006a. *Final Compliance Testing Report. Waste Disposal, Inc. Superfund Site.* June 2006(a).

TRC. 2006b. *Final Combined Construction As-Built, Construction Completion and Remedial Action Completion Report. Waste Disposal, Inc. Superfund Site.* July 2006(b).

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TABLES

TABLE 1.0

LONG-TERM OPERATIONS MAINTENANCE AND MONITORING PLAN REQUIREMENTS
CD SCOPE OF WORK (SOW)
WASTE DISPOSAL, INC. SUPERFUND SITE

REQUIREMENT	WHERE ADDRESSED IN OMMP
LONG-TERM OPERATIONS AND MAINTENANCE PLAN	
1. Description of existing and new Site facilities and environmental control systems addressed by the Consent Decree.	Section 4.0
2. WDI Site administration, utility and support facilities, data management and management information systems, and reporting.	Section 4.8
3. Procedures for verifying and documenting compliance with quality control requirements.	QAPP; Appendix A
4. Operational procedures (equipment and systems startup and shutdown, normal operational procedures, and procedures for abnormal conditions).	SOP; Appendix A
5. Procedures of operational emergency responses.	Section 7.0
6. Maintenance procedures and schedules.	Sections 4.1 to 4.7
7. Compliance and process monitoring procedures and schedules.	Sections 4.1 to 4.7
8. Procedures for surface settlement monitoring and reporting.	Section 4.1
9. Parts and equipment inventory.	Appendix C
10. Well and probe abandonment procedures.	SOP; Appendix A
11. Equipment decontamination procedures.	SOP; Appendix A
12. Equipment salvage procedures.	SOP; Appendix A
13. Formats for Noncompliance Notification, Compliance Action Plan and Noncompliance Correction Report.	Section 4.8

TABLE 1.0

LONG-TERM OPERATIONS MAINTENANCE AND MONITORING PLAN REQUIREMENTS
CD SCOPE OF WORK (SOW)
WASTE DISPOSAL, INC. SUPERFUND SITE
(Continued)

REQUIREMENT	WHERE ADDRESSED IN OMMP
LONG-TERM OPERATIONS AND MAINTENANCE PLAN (Continued)	
14. For remedial systems, contingency plan with cost estimates that provide an organized, planned, and coordinated course of action to be followed by the Settling Defendants (in accordance with Section 3.15 of this SOW) in case of an unexpected failure of remedial systems or release or threat of release of Waste Materials.	Section 7.0 (no cost estimates)
15. Emergency repair and replacement procedures.	Section 7.0
16. Appendices, including sampling plans for each of the monitoring and sampling activities, if not addressed as separate documents.	Appendix A
17. Compliance Testing requirements that are described in Section 3.6 of the SOW.	Compliance Testing Plan
18. Procedures for management and control of project data.	Section 4.8
19. Procedures for transitioning O&M requirements and activities to new building owners, as approved by EPA.	Section 6.0
20. Liquids monitoring and management plan, including provisions for the monitoring of Site liquids (e.g., leachate) and reporting activities.	Section 4.5
21. Long-term post-construction commercial access control procedures.	Section 6.0
22. Stormwater Pollution Prevention Plan and related monitoring and reporting activities, if not addressed in a separate document.	Section 4.4

TABLE 1.0

LONG-TERM OPERATIONS MAINTENANCE AND MONITORING PLAN REQUIREMENTS
CD SCOPE OF WORK (SOW)
WASTE DISPOSAL, INC. SUPERFUND SITE
(Continued)

REQUIREMENT	WHERE ADDRESSED IN OMMP
LONG-TERM GROUND WATER MONITORING PLAN	
1. An introduction outlining the requirements and Performance Standards.	Section 5.1.1
2. Description of and rationale for the detection monitoring program, including wells to be sampled, analytical parameters, sampling frequency, and sampling procedures.	Sections 5.1.2 to 5.1.4 SOP; Appendix A
3. Description of and rationale for water level monitoring activities, including monitoring locations, frequency, and procedures.	Sections 5.1.3 and 5.1.4 SOP; Appendix A
4. Identification of the analytical laboratory to be used, and sampling documentation and laboratory quality control methods.	Laboratory has not been selected
5. Procedures and responsibility for data validation.	Section 5.6 Appendix A
6. Description of statistical analyses and methods to be used in evaluating the water quality data collected during detection monitoring and evaluating ground water conditions.	Section 5.5
7. Description of field sampling procedures, sample management procedures, QA/QC procedures, data management and reporting procedures.	Appendices A and B
8. Schedule for monitoring and reporting.	Sections 5.1.4 and 5.6

TABLE 1.0

LONG-TERM OPERATIONS MAINTENANCE AND MONITORING PLAN REQUIREMENTS
CD SCOPE OF WORK (SOW)
WASTE DISPOSAL, INC. SUPERFUND SITE
(Continued)

REQUIREMENT	WHERE ADDRESSED IN OMMP
LONG-TERM SOIL GAS, IN-BUSINESS AIR AND AMBIENT AIR MONITORING PLAN	
1. Determine soil gas conditions at minimum at the following areas: • Site perimeter • Adjacent to onsite structures	Sections 5.2.3 and 5.2.4
2. Determine near-source soil gas conditions with Near-Source Detection Wells.	Section 5.2.3.1
3. Determine ground surface emissions from semi-annual monitoring surveys.	Sections 5.2.3.1 and 5.2.4
4. Determine emission rates and COC concentrations in discharges from the gas extraction and treatment system from the reservoir in Area 2.	Section 5.2.3.2
5. Determine compliance with Performance Standards for all remedial systems required under the Consent Decree and SOW.	Section 5.2.2
6. Monitor in-business ambient air conditions in buildings and compare results with ambient air standards determined by EPA.	Section 5.2.4
7. Correlate, where possible, soil gas data with in-business and ambient air data to determine if there is a link between subsurface gas migration and in-business air quality.	Sections 5.2.3 and 5.2.4
8. Submit quarterly and annual data and evaluation reports, or at a frequency otherwise directed by EPA.	Section 5.6

TABLE 1.0

LONG-TERM OPERATIONS MAINTENANCE AND MONITORING PLAN REQUIREMENTS
CD SCOPE OF WORK (SOW)
WASTE DISPOSAL, INC. SUPERFUND SITE
(Continued)

REQUIREMENT	WHERE ADDRESSED IN OMMP
INSTITUTIONAL CONTROLS MONITORING AND ENFORCEMENT WORK PLAN	
1. Description of all properties where access agreements and Environmental Restriction Covenants are required by the Consent Decree. Such description shall include names and addresses of the owners and tenants of the properties, the locations of the properties at the Site, current land use, and anticipated future land use.	Section 6.0 and Appendix D
2. Description of all properties where access agreements and Environmental Restriction Covenants have been implemented in accordance with the requirements of the Amended ROD. Such descriptions shall include names and addresses of the owners and tenants of the properties, the locations of the properties at the Site, current land use, and anticipated future land use.	Section 6.0 and Appendix D
3. Draft and final access agreements and Environmental Restriction Covenants to be implemented pursuant to the Consent Decree and the Amended ROD.	Section 6.0 and Appendix D
4. Description of the monitoring activities to be performed by Settling Defendants.	Section 1.0
5. Discussion of potential enforcement mechanisms to be used in cases of noncompliance, including but not limited to: • Discussion of the formats and organization of Institutional Controls Compliance checklists; • Discussion of the formats, organization, and procedures for Noncompliance Notification to Landowners; • Discussion of the formats, organization, and procedures for reporting of noncompliance notifications to EPA; and • Discussion of the formats and organization of Corrective Action Procedures and Correction Reports.	Sections 4.8, 5.6, 6.0, 7.0 and Appendix D

TABLE 1.1

PERFORMANCE REQUIREMENTS AND FREQUENCY OF OPERATIONS MAINTENANCE AND MONITORING FOR ONSITE REMEDIES AND MONITORING SYSTEMS[1] WASTE DISPOSAL, INC. SUPERFUND SITE

REMEDIAL AND MONITORING SYSTEMS PERFORMANCE REQUIREMENTS	FREQUENCY		OMMP REFERENCE
	Operations and Maintenance	Monitoring	
RCRA C-Equivalent Cover [2]	Annually	N/A	Section 4.1
• designed and constructed to meet RCRA-equivalent engineering standards for hazardous waste containment			
• existing fill material complies with performance requirements including hydraulic conductivity, compaction, density, moisture content, and structural loading			
• soil cover/foundation layer sustains reasonable loads			
• cover includes a composite low hydraulic conductivity layer below a geomembrane (barrier layer)			
• resist infiltration equivalent to a geomembrane over a 2-foot-thick soil layer with a hydraulic conductivity of 1E-07 cm/sec or less			
• provide a water drainage layer above the barrier layer			
• provide a filter layer above the drainage layer to prevent clogging			
• include an overlying vegetative layer thick enough to protect the barrier layer, support vegetation, and prevent erosion from damaging cover and root penetration into the filter layer			
• assure cover integrity (no settlement or intrusion)			
• provide surface grades sufficient to prevent ponding or surface run-on			
• Annual inspection by independent Professional Engineer			
• Annual cover surface survey			
RCRA D-Equivalent Cover [2]	Annually	N/A	Section 4.1
• designed and constructed to meet RCRA-equivalent engineering standards for solid waste containment			
• existing fill material complies with performance requirements including hydraulic conductivity, compaction, density, moisture content, and structural loading			
• foundation layer sustains reasonable loads			
• low hydraulic conductivity layer with infiltration equivalent to a minimum 1-foot-thick soil with a hydraulic conductivity of 1E-06 cm/sec or less			
• vegetative/erosion resistant layer thick enough to support vegetation (for soil based cover) and resist erosion			
• assure cover integrity (no settlement or intrusion)			
• provide surface grades sufficient to prevent ponding or surface run-on			
• Annual cover surface survey			
Surface Drainage Control System	Annually	N/A	Section 4.1
• prevents erosion of containment structure			
• capable of handling 100-year, 24-hour storm			
• integration with existing offsite infrastructure			
• sufficient grading to promote lateral drainage and prevent ponding			
• final grading considers post-closure land use			

(1) Performance requirements are described in the Amended Record Of Decision (AROD) and Statement Of Work (SOW).

(2) Also complies with requirements set for in Title 22, 66264.310 and 66264.228 (k), (p) and (r).

N/A = Not Applicable

TABLE 1.1

PERFORMANCE REQUIREMENTS AND FREQUENCY OF OPERATIONS MAINTENANCE AND MONITORING FOR ONSITE REMEDIES AND MONITORING SYSTEMS[1] WASTE DISPOSAL, INC. SUPERFUND SITE (Continued)

REMEDIAL AND MONITORING SYSTEMS PERFORMANCE REQUIREMENTS	FREQUENCY		OMMP REFERENCE
	Operations and Maintenance	Monitoring	
Soil Gas Migration Control Systems	Varies (see below)	Varies (see below)	Sections 4.2 and 5.2
• control soil gas migration			
• compliance with soil gas performance requirements at points-of-compliance			
1. Reservoir Gas Collection System	Active - Monthly Passive - Semiannually	Active - Monthly Passive - Semiannually	Sections 4.2.1 and 5.2
• system designed to handle maximum expected gas flow rate			
• Treat extracted gas for at least the first year			
• compliance with applicable rules of South Coast Air Quality Management District (SCAQMD)			
• VOC emission rate less than 1.0 lb per day; if greater than 1.0 lb per day, extracted gas shall be treated and a SCAQMD permit-to-operate obtained			
• Reduce NMOC by at least 98% by weight or reduce NMOC concentration to less than 20 ppmv dry basis as hexane at 3% oxygen			
• Convert to passive system if methane emission rate is less than 2.3 lb per day after 1 year			
• Emissions comply with ARARs for Chemicals Of Concern (COCs) in subsurface soil gas			
2. Building Modifications	Annually	See Figure 5.5	Sections 4.2.2 and 5.2
• Sealing cracks in and penetrations through floor slabs			
• In-business air quality complies with EPA Indoor Air Threshold Levels (IATL) (Table 5.2)			
• Methane concentration maintained at or below 1.25% by volume in air within buildings			
3. Sentinel Biovent System	Semiannually	N/A	Section 4.2.3
• Air flow into the well			
Leachate Monitoring / Control System	Leachate Level >12"	Leachate Level <12": Monthly Leachate Level 12"-36": Weekly Leachate Level >36": Twice Weekly or Continuous Pumping	Section 4.5
• System designed to collect and maintain liquid head at leachate collection wells at or below 12 inches			
• Leachate disposal off-site			

(1) Performance requirements are described in the Amended Record Of Decision (AROD) and Statement Of Work (SOW).

N/A = Not Applicable

TABLE 1.1

PERFORMANCE REQUIREMENTS AND FREQUENCY OF OPERATIONS MAINTENANCE AND MONITORING FOR ONSITE REMEDIES AND MONITORING SYSTEMS[1]
WASTE DISPOSAL, INC. SUPERFUND SITE
(Continued)

REMEDIAL AND MONITORING SYSTEMS PERFORMANCE REQUIREMENTS	FREQUENCY		OMMP REFERENCE
	Operations and Maintenance	Monitoring	
Monitoring Systems			
1. Ground Water	To be performed at monitoring frequency	See Figure 5.1	Sections 4.3 and 5.1
• System designed to meet appropriate monitoring objectives: background, point-of-compliance, near-source detection, and verification/guard			
• Ground water monitoring to assure current conditions maintained or improved			
2. Soil Gas	To be performed at monitoring frequency	See Figure 5.4	Sections 4.3 and 5.2
• System designed to monitor appropriate zones and to provide representative samples			
• Soil vapor from respective vapor wells complies with the following:			
- Compliance Vapor Wells (perimeter wells): Levels meet Soil Gas Performance Standards (Table 5.2), levels maintained at or less than concentrations prior to remedy implementations, and methane concentration maintained at or below 5.0% by volume in soil gas at the Site boundary			
- Non-Compliance Vapor Wells: levels maintained at or less than concentrations prior to remedy implementations, or are not at levels of health concern.			
3. Surface Emissions - Outdoor	Annually	See Figure 5.5	Sections 4.2.2 and 5.2
• Sealing cracks in pavement			
• Surface emission testing for methane (e.g., methane concentration maintained at or below 1.25% by volume in air near buildings)			
4. Stormwater	Twice a year and following significant storm events (>2" of precipitation over a 24-hour period)	First two significant storm events after completion of remedial construction	Sections 4.4 and 5.3
• System designed to prevent flooding or ponding at Site during storm events			
• Stormwater quality complies with discharge criteria for site			
Landscaping and Vegetation			
• Vegetative Cover Mowing to maintain site appearance and allow easy access to monitoring wells	Every 3 to 4 months, and at least one week before St. Paul High School graduation.	N/A	Section 4.7
• Vegetative Cover Replacement if 70% coverage standard is not met.	As necessary	Bi-Annual	Section
• Vegetative Draining to promote healthy growth, prevent damage to stray ball fence and prevent off-site encroachment	Annually	N/A	Section 4.7
• Landscape Area weed control to maintain healthy appearance of trees, bushes, and ground cover	During mowing vents	N/A	Section 4.7
• Site housekeeping to remove accumulated debris, trash and waste	Annually	N/A	Section 4.7
• Site fences, signs and gates will be inspected and repaired, as necessary.	Annually	N/A	Section 4.6

(1) Performance requirements are described in the Amended Record Of Decision (AROD) and Statement Of Work (SOW).

N/A = Not Applicable

TABLE 1.2

ICMEWP REQUIREMENTS CROSS REFERENCE

ICMEWP REQUIREMENT	OMMP REFERENCE
Institutional Controls Monitoring	Section 6.0 Section 4.11
Property Records Review	Section 6.0
Non-Compliance Enforcement	Section 4.11
Application for Exceptions	Section 4.11

TABLE 2.0

SUMMARY OF EXISTING BUSINESSES
WASTE DISPOSAL, INC. SUPERFUND SITE

PARCEL NO.	UNIT NO.	TENANT	TENANT CONTACT	TENANT ADDRESS	TENANT PHONE NO.	CURRENT LAND USE
3	1	Metro Diesel Injection	Monty Torres	12631 Los Nietos Rd	562-944-4846	Manufacturing
	2	Ben Vasquez	Ben Vasquez	12633 Los Nietos Rd	562-903-1770	Unknown
	3	Vacant		12635 Los Nietos Rd		
	4	Stansell Brothers	Vern Stansell	12635 Los Nietos Rd	562-946-6676	Machine Shop
4	1	Air Liquide	Bruce Beaton	9756 Santa Fe Springs Rd	562-906-8710	Industrial Gas Distribution
7	1		Katherine Thrower	9618 Santa Fe Springs Rd #1	562-941-1821	Storage
	2	Ink Print	Martha De la Huerta	9618 Santa Fe Springs Rd #2	213-215-2103	Print Shop (business cards)
	3	The Polish Shop	Patrick Renish	9618 Santa Fe Springs Rd #3	714-362-1773	Polish Shop
	4	Cardon Cutting Tools	Abe & Frances Quighano	9618 Santa Fe Springs Rd #4	562-544-1420	
	5	Fontenont Construction	Jaret Fontenont	9618 Santa Fe Springs Rd #5	562-307-5371	
	6	Green Mountain Studios	Peter Schneckee	9618 Santa Fe Springs Rd #6&7	562-903-8556	Studio
	7					
	8		J. Silva	9618 Santa Fe Springs Rd #8	562-695-0132	Coffee Pots
	9		Jose Ramirez	9618 Santa Fe Springs Rd #9	310-787-7175	Welding
	10		Hugo Trujillo	9618 Santa Fe Springs Rd #10	714-447-4478	Welding - fences & gates
	11		Jesus Ramirez	9618 Santa Fe Springs Rd #11	562-212-2535	Metal Forming
	12	Conrad Enterprises	William Saxton	9618 Santa Fe Springs Rd #12	562-903-4006	
	13	City Steel	George Sullivan	9618 Santa Fe Springs Rd #13	562-944-3936	
	14		Leroy Bentaleou	9618 Santa Fe Springs Rd #14	310-779-1090	
	15		Mike Ferris	9618 Santa Fe Springs Rd #15	310-920-1296	Auto Electric
	16		Dennis Rodriguez	9618 Santa Fe Springs Rd #16	562-652-3516	Machine Shop
	1	Go Fast	Ronnie Tagle	9606 Santa Fe Springs Rd	562-698-2652	Auto/Machine Shop
	2		Roy Law	9608 Santa Fe Springs Rd		Wood Shop
	3	A & L Sweep Systems	Kim Goines	9610 Santa Fe Springs Rd	562-693-2971	Street Sweeping
11	1	AAG Metal Industries	Albert Leung		562-698-9762	Import company, cast iron for commercial stoves
12	1			12645 Los Nietos Road		
	2			12647 Los Nietos Road		
	3			12649 Los Nietos Road		
21	1	Chillers Services	Bruce Kolstad	9620 Santa Fe Springs Rd	562-906-0105	Air Conditioning/Demolition
22	1	Gold Coast Refractory	Robert Black	9630 Santa Fe Springs Rd	562-946-1942	Metal Work
24	1	Buffalo Bullet	Ronald Dahlitz	12637A Los Nietos Rd	562-944-0322	Bullet Manufacturing
	2	C & E Metal Products, Inc.	Mark Ellis	12637B Los Nietos Rd	562-946-6661	Machine Shop
25		Marvin Pitts (Reservoir Area/Storage Lot)	Marvin Pitts		562-756-7949	
26						
28	1	Mersits Equipment	Tom Mersits	9640 Santa Fe Springs Rd	562-946-5707	Heavy Equipment Rentals
29	1				562-946-5806	
30	1	Marvin Pitts (Driveway)	Marvin Pitts			
32	1	California Reamers	Dave/Lori Neptune	12747 Los Nietos Rd	562-946-6377	Machine Shop
37	1			12803 Los Nietos Rd	562-777-0994	Sporting Good Wholesaler
	2	Unknown				
41	1	Four C's Transmission	Julian Nieto	12807A Los Nietos Rd	562-946-9272	Automotive Shop
	2	Seal Methods, Inc.	Eugene Welter	12807B Los Nietos Rd	562-944-0291	Gadgets and Manufacturing
	3	2 Stage Enterprises	David Campion	12809A Los Nietos Rd	562-841-5149	
	4			12809B Los Nietos Rd	562-777-0994	Sporting Good Wholesaler
	5	Seal Methods, Inc.	Eugene Welter	12811A Los Nietos Rd	562-944-0291	Gadgets and Manufacturing
	6	Storage	Eugene Welter	12811B Los Nietos Rd		
	7	Leo's Lawnmower	Leo Rojas	12811C Los Nietos Rd	562-944-0538	Machine Shop
	8	Hernandez Auto	Octavio Hernandez	12811D Los Nietos Rd	562-777-1197	Automotive Shop
	9	H & H Contractors	Roger Hall	12811E Los Nietos Rd	562-946-5108	Contractors
	10			12811F Los Nietos Rd		
42	1	Airbrake Associates	Daniel Wedge	12741 Los Nietos Rd	562-946-4960	Automotive Manufacturing
43	1	Timmon's Wood Products	Ed Timmons	12723 Los Nietos Rd	562-946-5401	Wood Product Manufacturing
44	1	Sisneros Office Furniture	Dave Hoffman	12717 Los Nietos Rd	562-777-9797	Furniture Manufacturing
49		Vacant Lot				
50	1	Brothers Machine & Tool	Jose Razo	9843 S. Greenleaf Ave.	562-903-1117	Machine Shop

NOTE: See Figure 2.1 for parcel locations.

TABLE 3.0

SUMMARY – KEY POSITION RESPONSIBILITIES
WASTE DISPOSAL, INC. SUPERFUND SITE

POSITION	RESPONSIBILITIES
WDIG Project Coordinator **Roberto Puga,** **(Project Navigator, Ltd.)**	• Overall project management. • Overall RA work confirms to AROD, CD, SOW, RAWP and related Site Management Plans, and Remedial Design Plans. • Coordinates implementation of the Institutional Controls Monitoring and Enforcement Work Plan (to be implemented by WDIG Trustee) and Community Relations Participation Plan. • Understands applicable requirements of the CD, AROD, SOW and the Remedial Design Plans. • Fulfills the duties and requirements for the Project Coordinator as described in Section XIII of the Consent Decree. • Serves as the focal point for communication between the EPA, WDIG, IAC and the technical consultants. • Technical and managerial responsibility for the project, including assisting with contract negotiations and authorization and accounting for the following: - Analytical laboratories. - Technical consultants. - Construction contractors/subcontractors and suppliers. • Provides overall management and implementation of project-wide QA. • Provides Site implementation of OMMP and project management for OM&M activities. • Reviews applications for payment with Design Engineer, the CQA Contractor, OM&M Supervising Contractor, subcontractors, technical consultants and vendors. • Monitors performance with respect to project schedules, budgets and objectives.

TABLE 3.0

SUMMARY – KEY POSITION RESPONSIBILITIES
WASTE DISPOSAL, INC. SUPERFUND SITE
(Continued)

POSITION	RESPONSIBILITIES
Design Engineer: **Ken Floom, P.E.** **(Project Navigator, Ltd.)**	• Understands the requirements of the CD, AROD, SOW and the Remedial Design Plans. • Professional Engineer in responsible charge of the project as defined by the Professional Engineers Act (Business and Professions Code Section 6700 et seq.) • Acts as technical liaison for the WDIG Coordinator and EPA for engineering design concerns, as directed by the WDIG Coordinator. • Provides and/or interprets drawings or other engineering information for the WDIG Coordinator or his designate. • Reviews and evaluates construction and OM&M contractor's suggestions for modifications in engineering design plans. Reports the results of the review or evaluation, and suggestions and modifications to the WDIG Coordinator. • Implements changes to Remedial Design Plan Engineering Drawings and other engineering information as directed by the WDIG Coordinator. • Prepares, reviews, and submits As-Built Drawings and/or reports required for this project, ensuring the technical quality of reports and submissions are acceptable and that procedures used to develop conclusions and recommendations are appropriate and correctly applied. • Assures that the statistical analysis requirements for evaluating monitoring data are performed by qualified personnel who demonstrate experience in statistical analysis procedures includes the use of DUMPStat.
OM&M Supervising Contractor (Remedial Construction Services, L.P.)	• Understands the requirements of the Remedial Design Plans. • Understands requirements of the AROD, CD, SOW, RAWP, OMMP, and Remedial Design Plans. • Performs OM&M as authorized by the WDIG. • Understands the Remedial Design construction specifications and plans. • Manages the day-to-day activities of the subcontractors and project support services with respect to schedules, budgets and objectives. • Prepares project summary and status reports. • Reviews inspection and correction action reports with respect to the work efforts of the subcontractors and technical consultants. • Provides construction and project management for construction and OM&M activities. • Serves as the WDIG Coordinator's liaison with subcontractors and Design Engineer for construction and OM&M related tasks.

TABLE 3.0

SUMMARY – KEY POSITION RESPONSIBILITIES
WASTE DISPOSAL, INC. SUPERFUND SITE
(Continued)

POSITION	RESPONSIBILITIES
Field Engineer	• Supervises/oversees implementation of field elements of the OMMP, QAPP and SAP under the direction of the OM&M Supervising Contractor. • Coordinates with Field Technicians, Sampling Teams,, subcontractors, Design Engineer and CQA Contractor to address technical questions, issues, modifications and problems. • Coordinates the approval and implementation of field OMMP and engineering changes. • Prepares activity logs. • Provides general support to Field Technicians.
OM&M QA Officer (TRC)	• Assures that performance standards will be attained and OM&M activities meet the OMMP requirements. • The OM&M QA Officer must be independent from the OM&M contractors and subcontractors. • Has authority to stop OM&M activities. • Understands the requirements of agreements/contracts with contractors, subcontractors, and material equipment and instrumentation suppliers/vendors used for OM&M activities. • Administers and verifies compliance with QAPP and SAP. • Trains support personnel, if necessary, for OM&M oversight activities.
OM&M QA Officer (TRC) (Continued)	• Monitors implementation of corrective actions and modifications. • Verifies that system or component tests, equipment and system start-ups, are conducted in the presence of appropriate personnel, and documenting and maintaining records thereof. • Accompanies visiting inspectors representing public, regulatory, or other agencies having jurisdiction over the project. Reports results of these inspections to the WDIG Coordinator, and documents and maintains records thereof. • Reviews and evaluates contractor's suggestions/requests for modifications in Drawings or Specifications. Evaluates, reports and documents suggestions and modifications with the WDIG Coordinator and the Design Engineer.

TABLE 3.0

SUMMARY – KEY POSITION RESPONSIBILITIES
WASTE DISPOSAL, INC. SUPERFUND SITE
(Continued)

POSITION	RESPONSIBILITIES
Technical Consulting and Project Support Services Personnel	• Reports to the WDIG Coordinator or OM&M Supervising Contractor. • Understands applicable requirements of the CD, AROD, SOW and Remedial Design Plans. • Administers and verifies compliance with QAPP. • Understands and performs project activities according to scope, schedule, and budget. • Understands and performs OM&M activities in accordance with accepted technical and safety procedures. • Performs corrective actions as requested by the WDIG Coordinator and/or OM&M Supervising Contractor. • Prepares and reviews reports required for this project, ensuring technical quality. • Conducts field activities including training of field personnel, sample collection, field measurements and quality control. • Performs data validation procedures (as necessary).
Project Analytical Laboratories	• Performs all analyses in accordance with requirements of the OMMP, QAPP and SAP for AROD contaminant constituents according to accepted EPA methods as indicated in the CD, which include methods documented in 40 CFR Part 136 and *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (SW-846) and any additions or revisions to these requirements. • Capable of producing submittals of sufficient quality to meet the current requirements for the Contract Laboratory Program Statement of Work for Inorganic Analysis and for Organic Analysis. • Participate in an EPA or EPA-equivalent QA/QC program.

TABLE 4.0

COMMUNICATION AND COORDINATION PLAN
WASTE DISPOSAL, INC. SUPERFUND SITE

Stakeholder	Contact Information	Nature of Communication/ Coordination	Frequency
Regulatory Agencies		Operational Emergencies	Within 3 days of discovery
EPA	Russell Mechem	Progress Reports	Quarterly
	(415) 972-3192	Monitoring Reports	Bi-annually
	mechem.russell@epa.gov	Corrective Actions	As Necessary
DTSC	Jessy Fierro	Operation Emergencies	As Necessary
	(818) 551-2174		
	jfierro@dtsc.ca.gov		
On-site	See Table 2.0	Monitoring Events	One week prior to event
Owner/Tenants		Operation Emergencies	Immediately
		Changes/repairs to remedial components	At least two weeks before change/repair
		On-site equipment storage coordination	As necessary
		New building construction coordination	As necessary
St. Paul High School	Lois Maldonado	Site maintenance events (mowing, tree pruning, landscaped are a maintenance)	Two weeks
	(562) 698-6245		
	stpaulhsalumni@netscape.net	Expressed concerns	Respond within 48 hours and immediately inform EPA.

TABLE 4.0

COMMUNICATION AND COORDINATION PLAN
WASTE DISPOSAL, INC. SUPERFUND SITE

Stakeholder	Contact Information	Nature of Communication/ Coordination	Frequency
Adjacent Residential Neighborhood		Expressed concerns Major site construction or activity	Refer concern to EPA within 48 hours of receipt Coordinate with EPA the preparation of Fact Sheets, Public Meetings, notices as appropriate.
Adjacent Industrial/ Commercial Neighbors		Expressed concerns	Refer concern to EPA within 48 hours of receipt
City of Santa Fe Springs	Steve Masura (562) 868-08511 stevemasura@santafesprings.org	Expressed concerns New building construction	Refer concern to EPA within 48 hours of receipt

TABLE 4.0

COMMUNICATION AND COORDINATION PLAN
WASTE DISPOSAL, INC. SUPERFUND SITE

Stakeholder	Contact Information	Nature of Communication/ Coordination	Frequency
Land Developers/New Owners		Proposed new building construction at the Site • Establish a plan review structure and timeline with the new owner. • Coordinate the review protocol with EPA and DTSC. • During construction coordinate with new owner to allow construction inspections. • Prepare a transition plan if the new owner will be responsible for OMM activities.	As necessary

TABLE 5.0

SUMMARY OF LONG-TERM MONITORING PLANS
WASTE DISPOSAL, INC. SUPERFUND SITE

ACTIVITY	GROUND WATER MONITORING	SOIL VAPOR MONITORING			STORMWATER MONITORING
		Vapor Wells	Biovent Wells	Reservoir Gas Collection System	
Objectives	To fulfill monitoring requirements and identify changes in ground water conditions.	To fulfill monitoring requirements and indentify changes in soil gas conditions.	To verify effectiveness of Biovent Well operation.	To fulfill monitoring requirements and indentify changes in soil gas conditions.	To fulfill monitoring requirements and identify changes in surface water quality conditions.
Intended Data Use	Confirm that current ground water conditions are being maintained or improve.	Confirm that soil gas in Compliance Vapor Wells is meeting Soil Gas Performance Standards listed in the Amended Record of Decision (AROD) and Table 5.2 and evaluate changes in soil gas conditions in Compliance and Non-Compliance Vapor Wells.	Confirm that wells are operating properly.	Confirm that soil gas is meeting AROD requirements, SCAQMD rules, and ARARs.	Confirm that stormwater runoff water quality does not indicate the presence of Site or tenant COCs.
Contaminants of Concern	VOCs, Metals, SVOCs	VOCs, Methane, TGNMOs	None; monitor to confirm air flow only.	VOCs, Methane, TGNMOs	VOCs, Metals, SVOCs, Oil & Grease, TSS
Regulatory Standards	MCLs[2]	Soil Gas Performance Standards[1]	Not applicable	SCAQMD Emissions Limits	MCLs[2]
Sampling Location	See Figure 5.0	See Figure 5.0	Not applicable	See Figure 4.0	See Figure 5.6

[1] Soil Gas Performance Standards from EPA Amended Record of Decision, Waste Disposal, Inc., June 2002, and Table 5.2.
[2] MCLs are not Performance Standards. There are no Performance Standards in the AROD for this media.

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TABLE 5.1

MAXIMUM CONTAMINANT LEVELS FOR GROUND WATER CHEMICALS OF CONCERN WASTE DISPOSAL, INC. SUPERFUND SITE

COMPOUND	MAXIMUM CONTAMINANT LEVEL[4] (ppm)
Arsenic	0.01
Lead	TT Action Level[1] = 0.015
Manganese	0.05[2]
Mercury	0.002
Benzene	0.005
Toluene	1.0
Xylene (total)	10.0
Carbon Tetrachloride	0.005
Chloroform	NA[3]
Tetrachloroethene	0.005
Trichloroethene	0.005
Vinyl Chloride	0.002

(1) Lead and copper are regulated by a Treatment Technique that requires systems to control the corrosiveness of their water. If more than 10% of tap water samples exceed the action level, water systems must take additional steps. For lead, the action level is 0.015 mg/L.
(2) Secondary MCL.
(3) There is no MCL for chloroform.
(4) MCLs are not Performance Standards. There are no Performance Standards in the AROD for ground water.

TABLE 5.2

SOIL GAS PERFORMANCE STANDARDS AND INDOOR AIR THRESHOLD LEVELS WASTE DISPOSAL, INC. SUPERFUND SITE

COMPOUND	SOIL GAS PERFORMANCE STANDARD[1] (ppbv)	INDOOR AIR THRESHOLD LEVEL[2] (ppbv)[3]
Benzene	10	2.0
Carbon Tetrachloride	21	0.68
Chloroform	20	3.4
1,2-Dibromoethane	1	0.06
1,2-Dichloroethane	20	3.6
cis-1,2-Dichloroethene	180	18.6
1,1-Dichloroethene	100	53[4]
1,2-Dichloropropane	20	1.86
trans-1,2-Dichloroethene	400	36.8
Ethylbenzene	5,000	490
Tetrachloroethene	500	10.6
Toluene	2,000	212.0
1,1,1-Trichloroethane	3,600	368.0
Trichloroethene	200	3.0 $\mu g/m^3$ [5]
Vinyl Chloride	10	0.25
m,p-Xylene	4,000	142.8
o-Xylene	4,000	142.8
Methane	1.25% (near buildings) 5.0% (site perimeter)	1.25%

(1) EPA, Amended Record of Decision, Waste Disposal, Inc. June 2002.

(2) CDM Federal Programs Corporation, Subsurface Gas Contingency Plan, Waste Disposal, Inc. Superfund Site, July 1997.

(3) Indoor Air Threshold Levels are expressed in part per billion volume (ppbv), except for Trichloroethene (TCE) that is expressed in $\mu g/m^3$.

(4) Developed separately by EPA (i.e., subsequent to the *Subsurface Gas Contingency Plan* [see footnote (2)]).

(5) Pursuant to EPA policy requirements, the indoor air *interim* threshold level for Trichloroethene (TCE) has been revised to 3.0 $\mu g/m^3$ (0.56 ppbv at 25 °C and 1 atm) for the in-business ambient air monitoring program. Please note that this value may be subject to future revision.

TABLE 5.3

MAXIMUM CONTAMINANT LEVELS FOR STORMWATER RUNOFF CHEMICALS OF CONCERN WASTE DISPOSAL, INC. SUPERFUND SITE

COMPOUND	MAXIMUM CONTAMINANT LEVEL[5] (ppm)
Arsenic	0.01
Lead	TT Action Level[1] = 0.015
Manganese	0.05[2]
Mercury	0.002
Benzene	0.005
Toluene	1.0
Xylene (total)	10.0
Carbon Tetrachloride	0.005
Chloroform	NA[3]
Tetrachloroethene	0.005
Trichloroethene	0.005
Vinyl Chloride	0.002
Oil and Grease	NA
Metals (total & dissolved) [4]	specific for each metal constituents
Total Suspended Solids	NA

W:\Project_Documents\MgmtPlans_Reports\OperationsMaintenanceMonitoringPlan\Final_OMMP_August2006\YasserF\Tbl 5.3

(1) Lead and copper are regulated by a Treatment Technique that requires systems to control the corrosiveness of their water. If more than 10% of tap water samples exceed the action level, water systems must take additional steps. For lead, the action level is 0.015 mg/L.
(2) Secondary MCL.
(3) There is no MCL for chloroform.
(4) Same metal constituents that were analyzed for past ground water monitoring events.
(5) MCLs are not Performance Standards. There are no Performance Standards in the AROD for stormwater.

TABLE 7.0

RISKS AND CONTINGENCIES
WASTE DISPOSAL, INC. SUPERFUND SITE

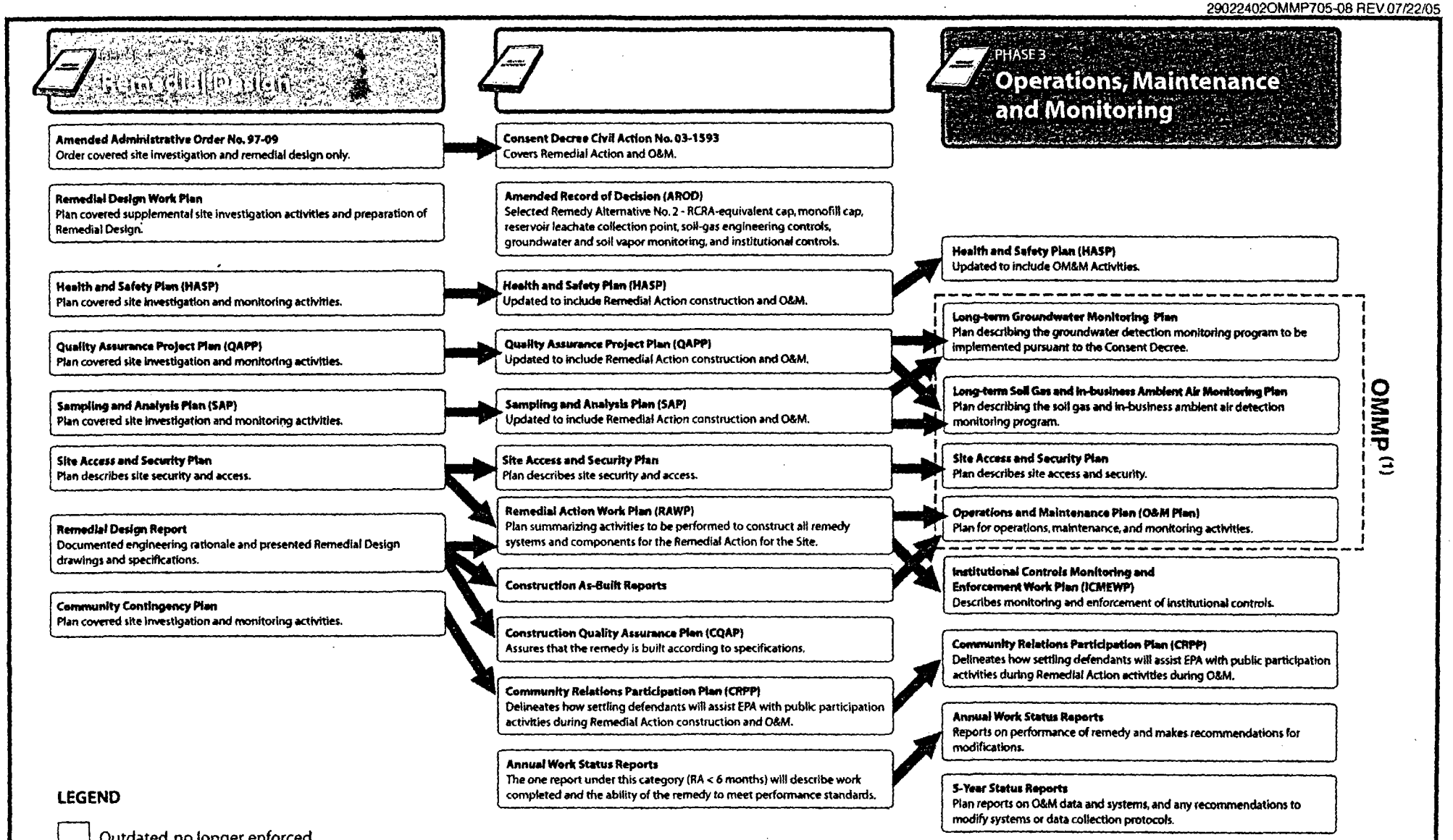
POTENTIAL RISKS	CONCEPTUAL CONTINGENCY PLAN
Unanticipated changes in conditions are observed during ground water or soil gas monitoring.	• Implement response plan that will be incorporated into the long-term monitoring plans - Agency notification. - Confirmatory analysis. - Evaluation of likely causes for the change. - Evaluate and select corrective actions, as necessary. - Implement corrective actions (which may include additional engineering controls for buildings in the event of exceedances of health protective levels of soil gas constituents in buildings).
Wells or vapor probes become damaged.	• Replace damaged well.
Asphalt or concrete pavement fails sooner than anticipated.	• Investigate causes of failure (i.e., poor foundation layer, traffic conditions other than design). • Repair failures in consideration of identified causes.
Power or other failure shuts down gas venting system.	• Gas vent system has autodialer (on battery) to call operator in event of shut down. • Wait until power comes back on. • Go through startup procedure for gas venting system. • Notify agency and note occurrence in operating log. • Implement procedure outlined in Section 7.1.1.
Landscape vegetation fails viability criteria.	• Replace individual trees or shrubs if within the first year of planting; consider use of alternative species. • Inspect irrigation system to confirm it is working properly and watering all areas. • Remove dead vegetation as part of maintenance.
Theft or vandalism of equipment (i.e., the blower or other equipment on the gas venting system).	• Obtain assistance from the police. • Evaluate potential improvements to site security. • Replace the stolen/vandalized piece of equipment.

TABLE 7.0

RISKS AND CONTINGENCIES
WASTE DISPOSAL, INC. SUPERFUND SITE
(Continued)

POTENTIAL RISKS	CONCEPTUAL CONTINGENCY PLAN
Power or other failure shuts down the leachate collection system.	• Wait until power comes back on. • Go through startup procedure for gas venting system. • Notify agency and note occurrence in operating log. • Implement procedure outlined in Section 7.1.1.
Seismic or major fire events.	• In case of a major fire or seismic event on the site the WDIG Project Coordinator will inform EPA and DTSC within 24 hours of identification of the event. • A joint WDIG, EPA, and DTSC site inspection will be scheduled within one week of identification of the event. • Identify damaged remedial components and implement corrective action, if necessary.

Figures



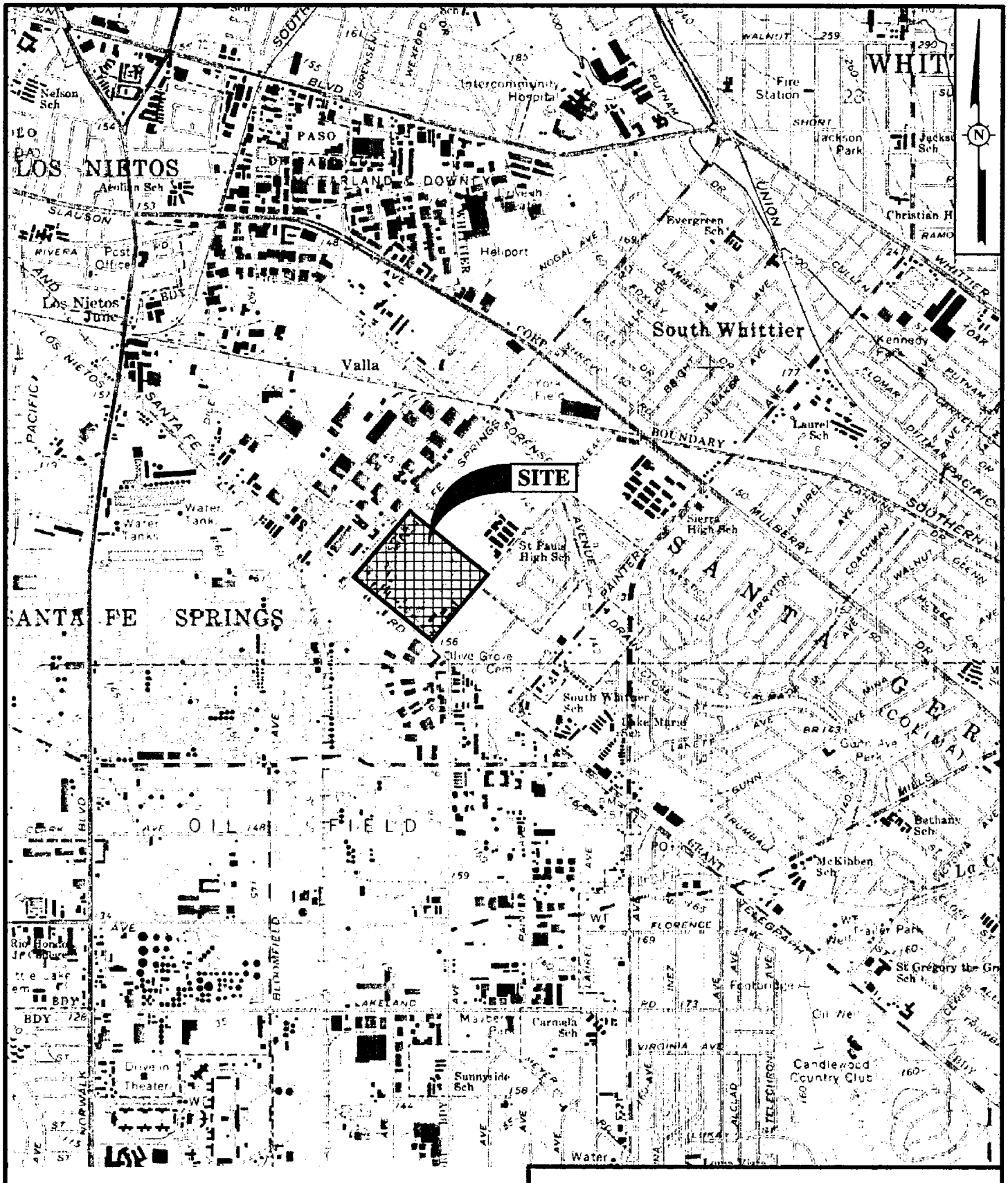
NOTE:
(1) The Project QAPP and SAP are included as appendices in the OMMP.

REPORTS AND DOCUMENTS SUMMARY

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC | FIGURE 1.0

29022402OMMP705-01 REV.06/23/05



0 2,000 4,000 FEET

SCALE

REFERENCE: USGS 7.5 MINUTE TOPOGRAPHIC MAP OF WHITTIER, CALIFORNIA, DATED 1981.

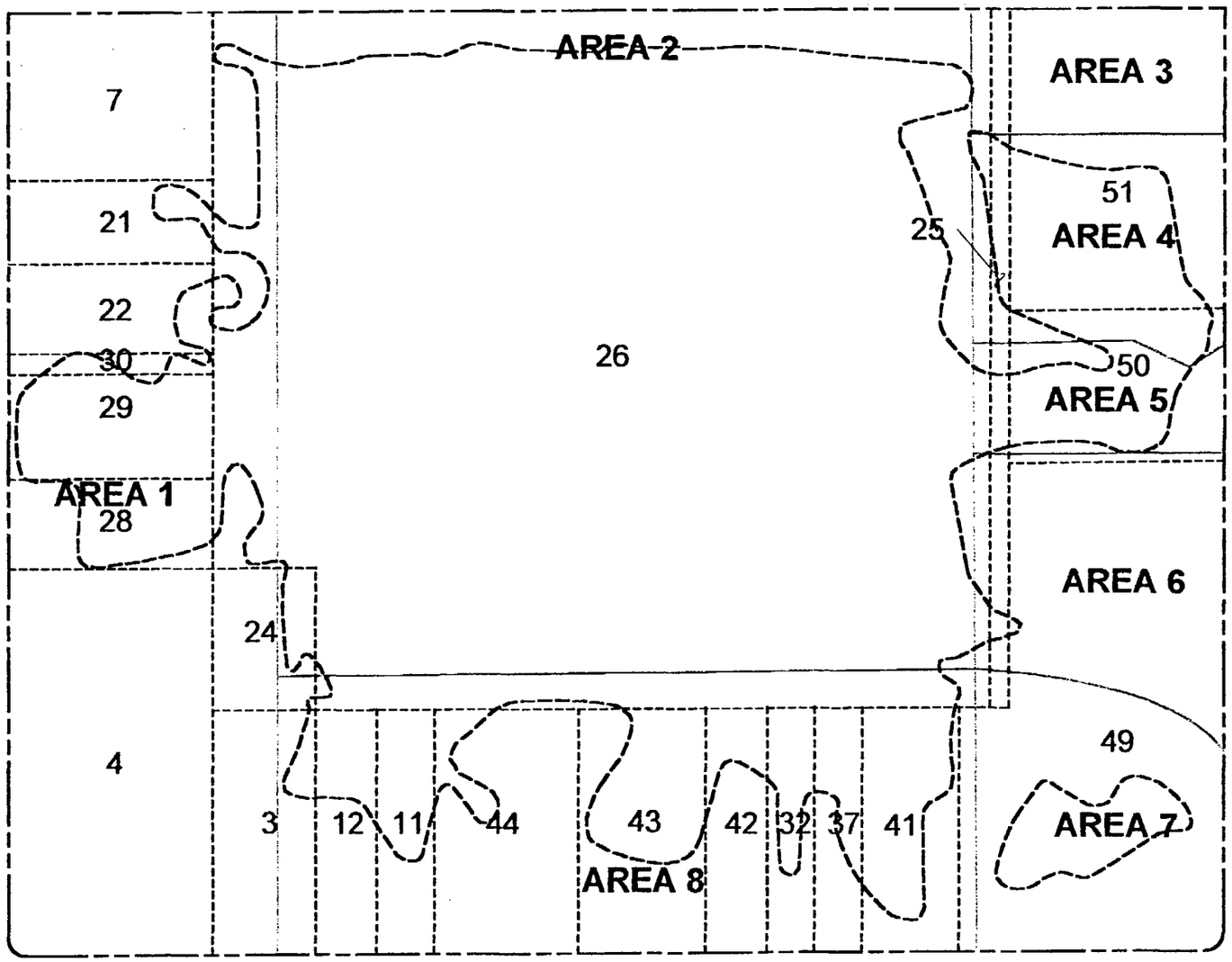
SITE LOCATION MAP

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 2.0

29022402OMMP705-10 REV.08/23/06



Parcel No./Owner

3 Raymond & Donnis Holbrook Trust
4 Dia-Log Company
7 Eugene and Geraldine Welter Trust
11 Albert C K & Betty Leung
12 Albert C K & Betty Leung
21 Lucille F. Ferris Living Trust
22 John I. Maple Family Partnership
24 Raymond & Donnis Holbrook Trust
25 Marvin W. Pitts and Cecilia Pitts, trustees under Declaration of Trust, dated February 1, 1982 (Pitts Family Trust), Adeline R. Bennet, M.D. Living Trust
26 Marvin W. Pitts and Cecilia Pitts, trustees under Declaration of Trust, dated February 1, 1982 (Pitts Family Trust), Adeline R. Bennet, M.D. Living Trust
28 Thomas J. Mersits, Irene L. Mersits Trust
29 Thomas J. Mersits, Irene L. Mersits Trust
30 Marvin W. Pitts and Cecilia Pitts, trustees under Declaration of Trust, dated February 1, 1982 (Pitts Family Trust), Adeline R. Bennet, M.D. Living Trust
32 David Joseph Neptune Family Trust
37 Lula Graziano, Trustee of Trust "A" of the Graziano Trust as restated March 4, 1992
Lula Graziano, Trustee of Trust "B" of the Graziano Trust as restated March 4, 1992, Jovita I. Ortega
41 Eugene and Geraldine Welter Trust
42 Danny R. Peoples & Dena Peoples
43 Eddie Earl Timmons
44 Sisneros Family Trust
49 Phil Campbell & Diane Cote Family Trust, Gwen Campbell
50 Brothers Machine & Tool, Inc.
51 Marvin W. Pitts and Cecilia Pitts, trustees under Declaration of Trust, dated February 1, 1982 (Pitts Family Trust), Adeline R. Bennet, M.D. Living Trust

LEGEND

———	SITE BOUNDARY
———	AREA BOUNDARY
- - - -	PARCEL BOUNDARY
7	PARCEL NUMBER
- - - -	LIMIT OF WASTE
	EXISTING BUILDING

REFERENCE:NUNEZ ENGINEERING, SURVEY DRAWING NE 97187, OCT. 31, 1997.

0 150 300 FEET
SCALE

SITE FEATURES

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

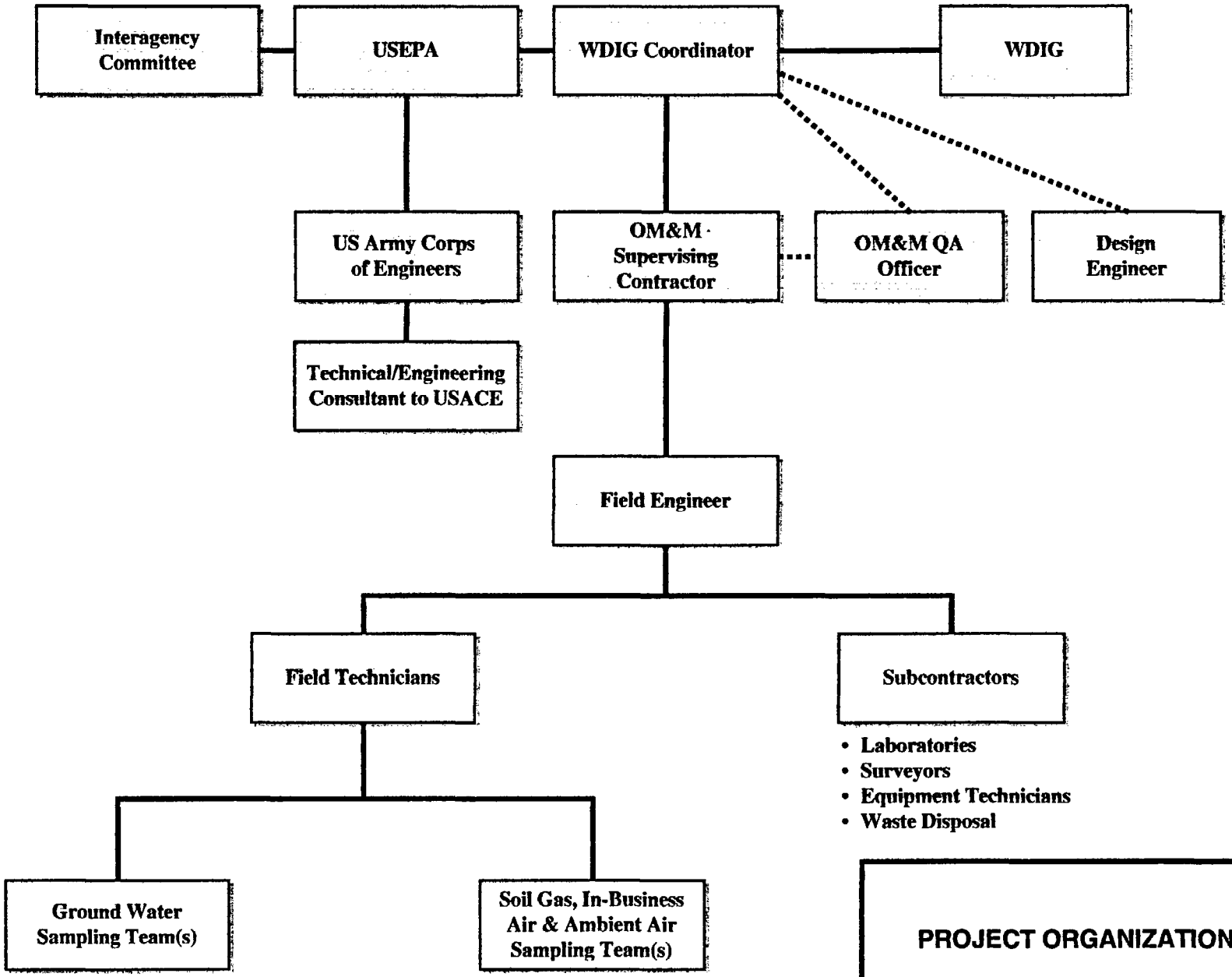
TRC

FIGURE 2.1

PARTIALLY SCANNED OVERSIZE ITEM(S)

See document # 2096942
for partially scanned image(s).

For complete hardcopy version of the oversize document contact the Region IX Superfund Records Center at (415) 536-2000

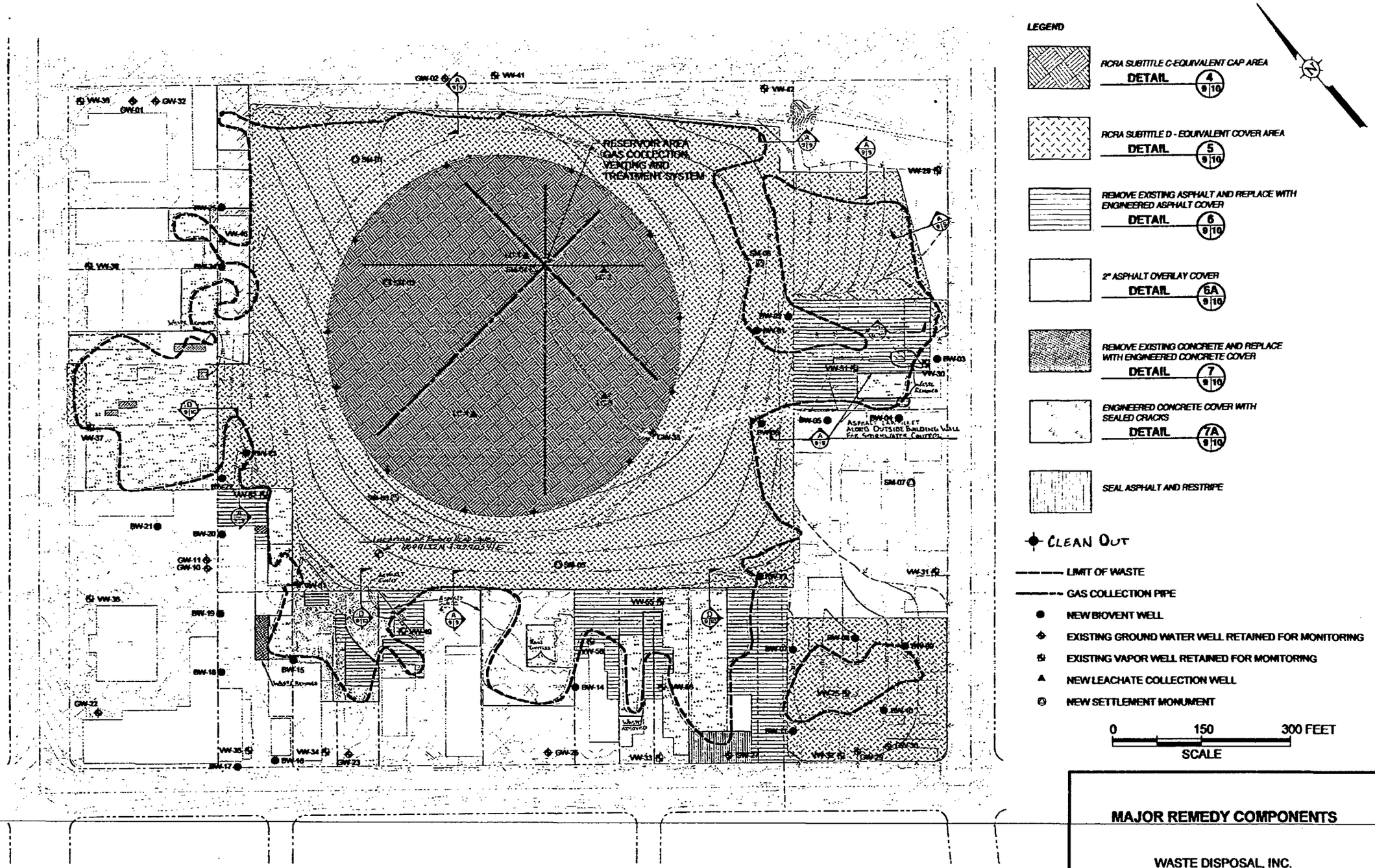


PROJECT ORGANIZATION CHART

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC | FIGURE 3.0

29022402OMMP70s-17 REV.07/22/05

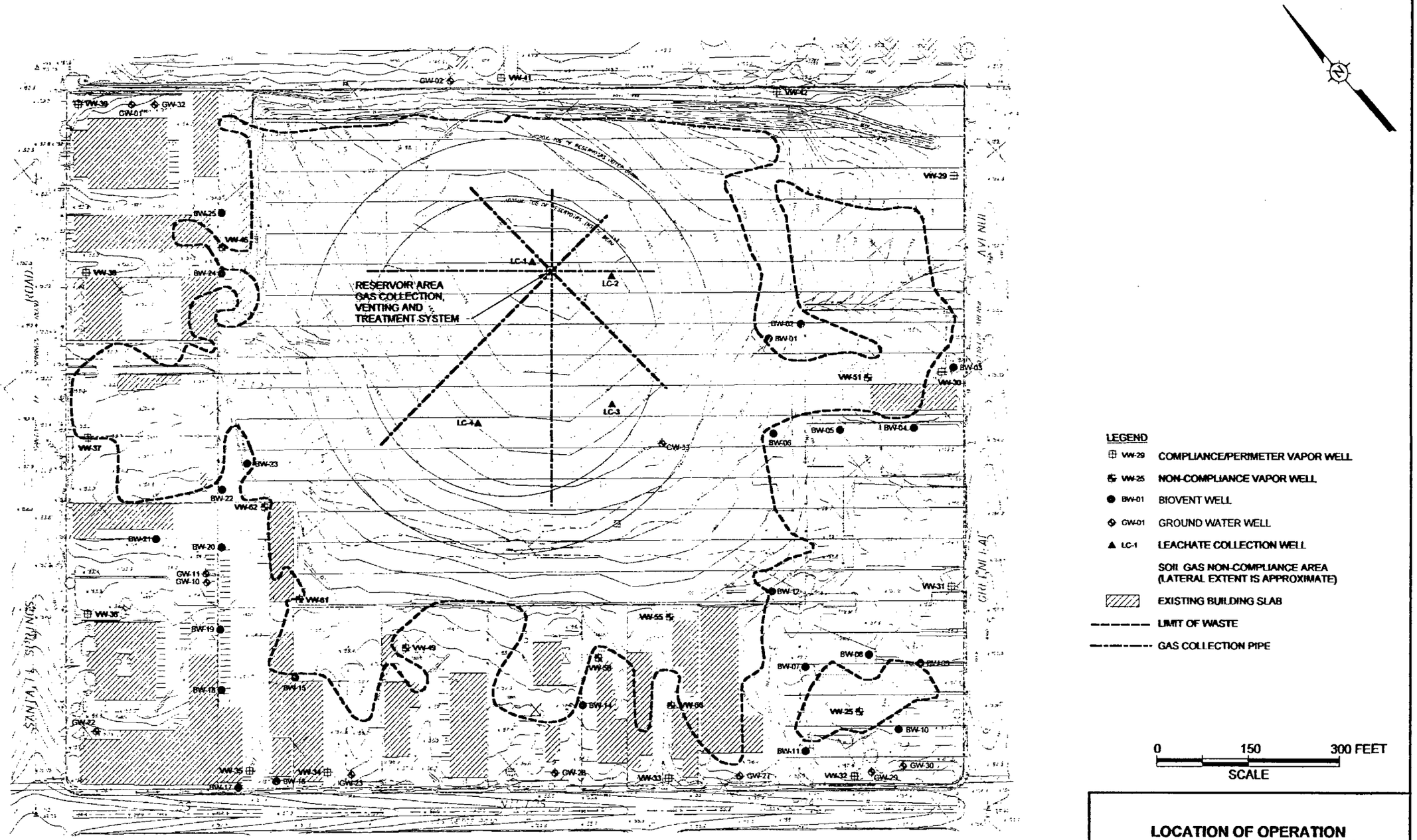


MAJOR REMEDY COMPONENTS

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 4.0



REFERENCE: TOPOGRAPHY BY NUNEZ ENGINEERING (DECEMBER 1998)

LOCATION OF OPERATION AND MAINTENANCE SYSTEMS

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 4.1

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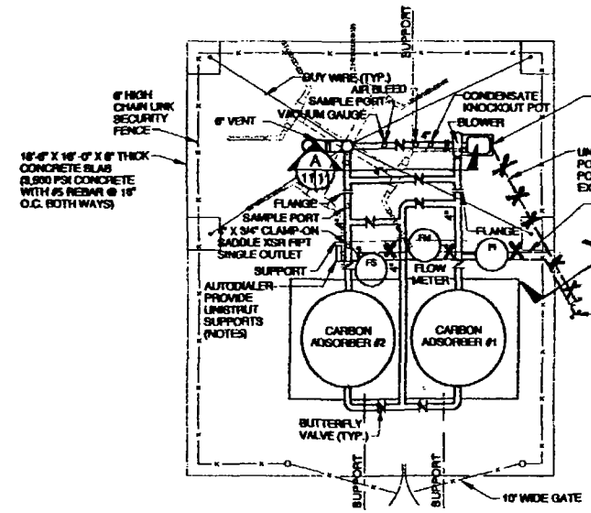


SEE ELECTRICAL SITE PLAN & DETAILS SHEETS 17 & 18 OF AS-BUILT DRAWINGS FOR CONDUIT ROUTING AND CONDUCTORS

CONDUIT FOR PHONE LINE TO AUTODIALER (CONTRACTOR TO FIELD ROUTE AFTER DETERMINING LOCATION OF CONNECTION TO PHONE SERVICE)

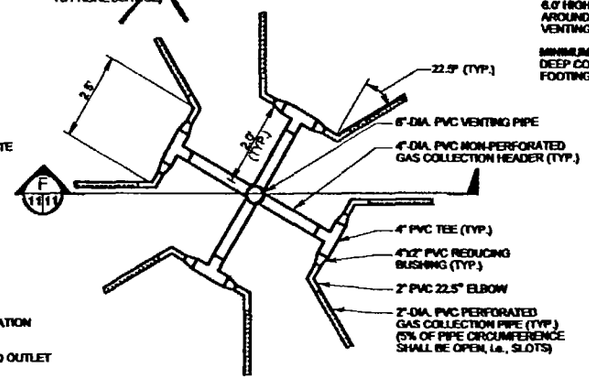
DETAIL PLAN 1/7/11

RESERVOIR AREA GAS COLLECTION, VENTING AND TREATMENT SYSTEM

SCALE 0 3 6 FEET

NOTES

1. PIPE ROUTING MAY REQUIRE MODIFICATION DEPENDING ON LOCATION AND ELEVATION OF CONNECTIONS AT THE CARBON ADSORBERS.
2. BREAKOUT CONNECTIONS MUST BE INSTALLED AT THE INLET AND OUTLET OF THE CARBON ADSORBERS TO FACILITATE CHANGEOUT.
3. SEE DETAIL 4/1111 FOR FLOW DIAGRAM.
4. SEE MATERIALS LIST ON THIS SHEET.
5. CONTRACTOR TO PROVIDE PHONE LINE TO AUTODIALER AND PROVIDE PLAN TO WDIG REPRESENTATIVE FOR NOTIFICATION OF SYSTEM FAILURE.



DETAIL PLAN 2/7/11

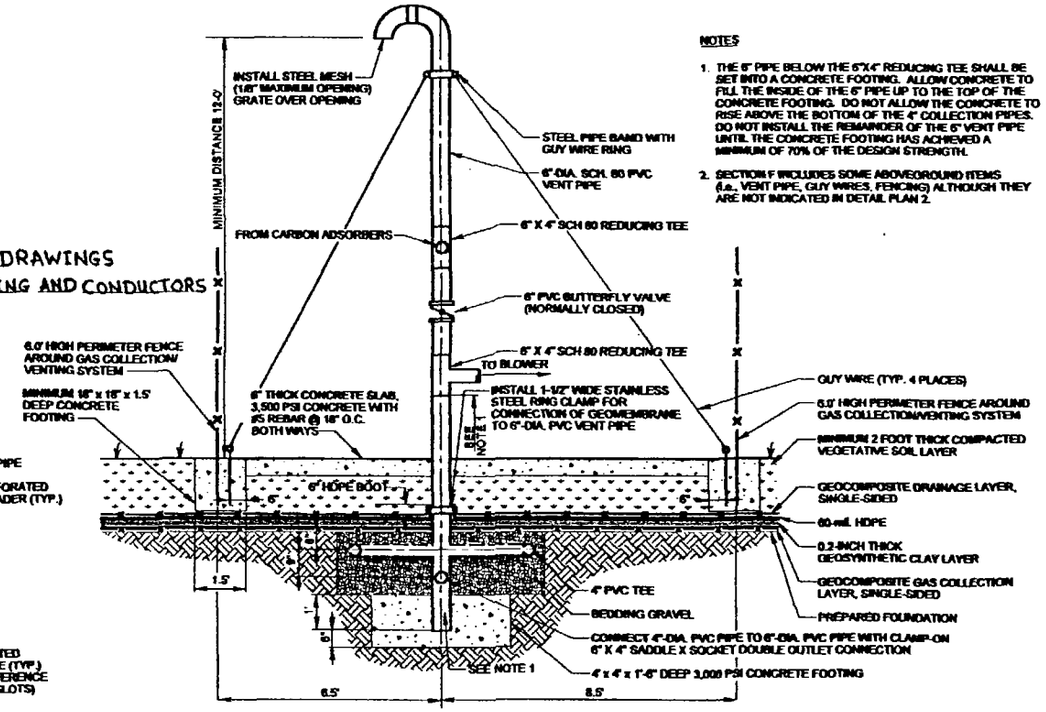
GAS COLLECTION CONVEYANCE AND VENTING SYSTEM

0 2 4 FEET

HORIZONTAL AND VERTICAL SCALE

NOTES

1. THE 6" PIPE BELOW THE 6"X4" REDUCING TEE SHALL BE SET INTO A CONCRETE FOOTING. ALLOW CONCRETE TO FILL THE INSIDE OF THE 6" PIPE UP TO THE TOP OF THE CONCRETE FOOTING. DO NOT ALLOW THE CONCRETE TO RISE ABOVE THE BOTTOM OF THE 4" COLLECTION PIPES. DO NOT INSTALL THE REMAINDER OF THE 6" VENT PIPE UNTIL THE CONCRETE FOOTING HAS ACHIEVED A MINIMUM OF 70% OF THE DESIGN STRENGTH.
2. SECTION F INCLUDES SOME ABOVEGROUND ITEMS (i.e., VENT PIPE, GUY WIRES, FENCING) ALTHOUGH THEY ARE NOT INDICATED IN DETAIL PLAN 2.



SECTION F/1111

GAS COLLECTION CONVEYANCE AND VENTING SYSTEM (NOTE 2)

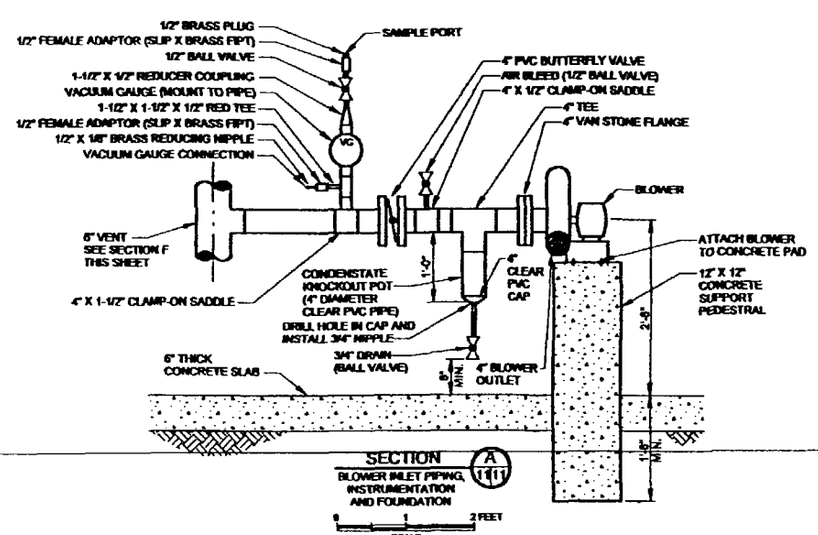
0 2 4 FEET

HORIZONTAL AND VERTICAL SCALE

RESERVOIR AREA GAS COLLECTION AND VENTING SYSTEM

MATERIALS LIST

ITEM	DESCRIPTION	QTY
BLOWER	MCMASTER-CARR 1954K999 CAST ALUMINUM HIGH PRESSURE BLOWER, 1/3 HP, ODP MOTOR, 115/230 VOLT, 3450 RPM, 225CFM AT 1" STATIC PRESSURE WITH ANSI FLANGES OR EQUAL	1
CARBON ADSORBER	CARBTROL VAPOR PHASE ADSORBER MODEL G-4 OR EQUAL	2
VACUUM GAUGE	DWYER MAGNAHELIC #2010, RANGE 0-10" H O WITH A-610 PIPE MOUNTING KIT OR EQUAL	1
BUTTERFLY VALVE	HAYWARD 4" PVC OR EQUAL	8
BUTTERFLY VALVE	HAYWARD 6" PVC GEAR OPERATED OR EQUAL	1
BALL VALVE	SPEARS 1/2" TRUE UNION PVC OR EQUAL	2
BALL VALVE	SPEARS 3/4" TRUE UNION PVC OR EQUAL	1
FLOW METER	DWYER MODEL 166-6-CF PITOT TUBE AND DWYER SERIES 475 I/K III HANDHELD DIGITAL MANOMETER	1
PRESSURE GAUGE	RANGE 0-60 psi	1
FLOW SWITCH	OMEGA MODEL NO. FST-323 OR EQUAL	1
AUTO DIALER	OMEGA OMA-GUARDIT AUTOMATIC ALARM DIALER OR EQUAL	1

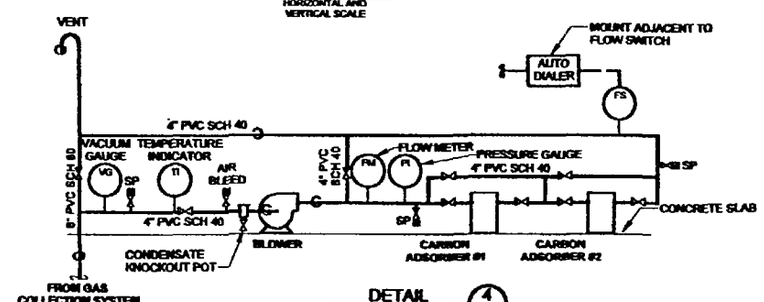


SECTION A/1111

BLOWER INLET PIPING, INSTRUMENTATION AND FOUNDATION

0 1 2 FEET

SCALE



DETAIL 4/1111

RESERVOIR AREA GAS COLLECTION AND VENTING SYSTEM FLOW DIAGRAM

NOT TO SCALE

AS-BUILT

RESERVOIR AREA GAS COLLECTION, VENTING AND TREATMENT SYSTEM PLANS, SECTIONS AND DETAILS

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 4.2

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18 REV 07/22/05

J-03 REV 07/22/05

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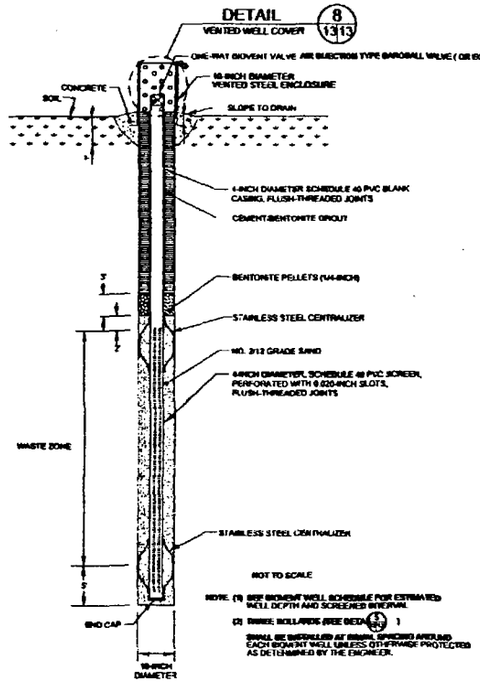

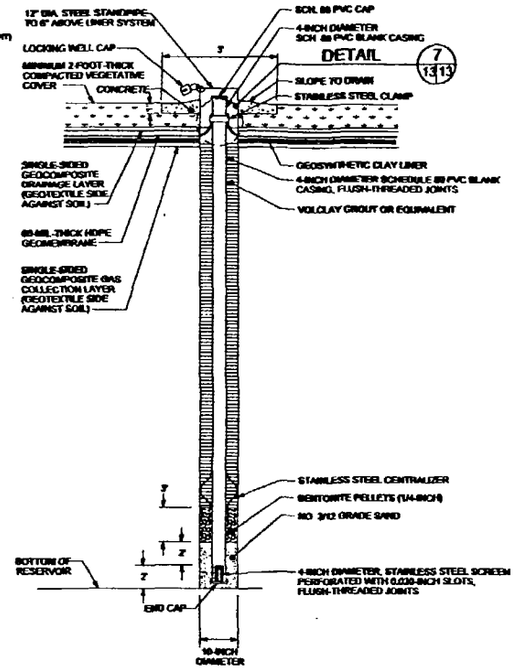

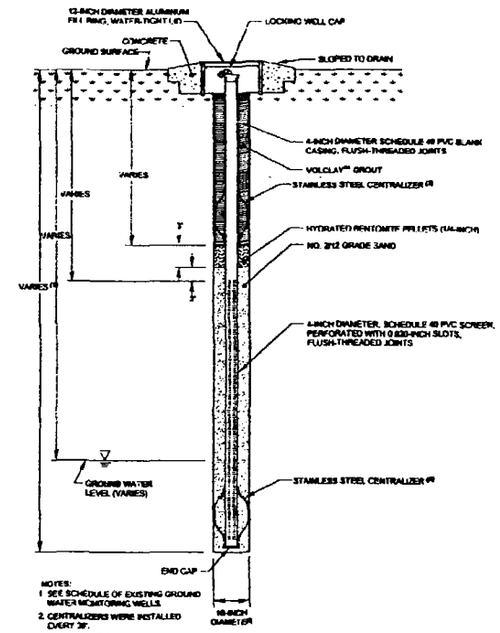

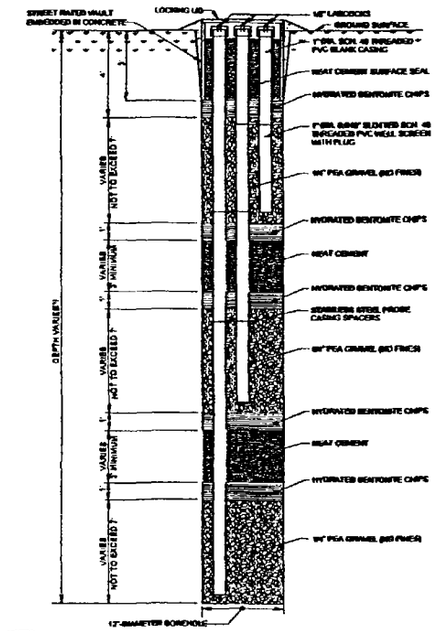

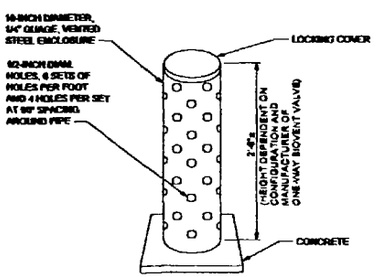

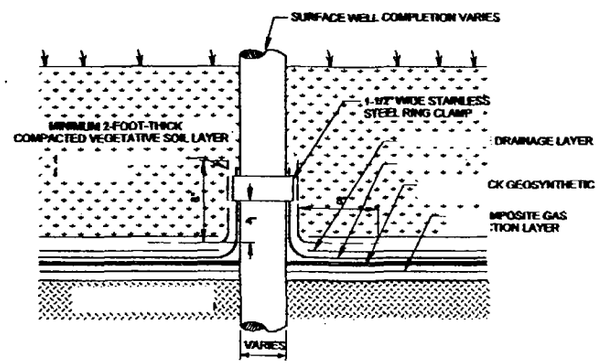

SCHEDULE OF EXISTING SOIL VAPOR MONITORING WELLS TO BE RETAINED FOR MONITORING
WASTE DISPOSAL, INC. SUPERFUND SITE

WELL NUMBER	TOP OF CASING ELEVATION (ft above msl)	WELL DEPTH (ft)	DIMENSIONS WITH AL BIO AND MATERIAL TYPES[1] Shallow Probes	Material Type	Intermediate Probes	Material Type	Deep Probes	Material Type	CS Probes	Material Type	WELL TYPE
VW-01	98	16	6-16	P	-	-	33-35	S	-	-	Perimeter
VW-02	100	20	5-15	P	-	-	33-35	S	-	-	Perimeter
VW-03	98	20	5-15	P	-	-	33-35	S	-	-	Perimeter
VW-04	98	20	5-15	P	-	-	33-35	S	-	-	Perimeter
VW-05	98	20	5-15	P	-	-	33-35	S	-	-	Perimeter
VW-06	100	20	5-7	P	-	-	33-35	S	-	-	Perimeter
VW-07	98	20	3-10	P	10-15	S	33-37	S	-	-	Building/Perimeter
VW-08	98	20	3-10	P	10-15	S	33-35	S	-	-	Building/Perimeter
VW-09	100	20	5-7	P	-	-	33-35	S	-	-	Perimeter
VW-10	100	20	5-7	P	-	-	33-35	S	-	-	Perimeter
VW-11	98	20	3-10	P	10-15	S	33-35	S	-	-	Perimeter
VW-12	100	20	5-7	P	-	-	33-35	S	-	-	Perimeter
VW-13	98	20	3-10	P	10-15	S	33-35	S	-	-	Building/Perimeter
VW-14	100	20	5-7	P	-	-	33-35	S	-	-	Perimeter
VW-15	98	20	3-10	P	10-15	S	33-35	S	-	-	Building/Perimeter
VW-16	100	20	5-7	P	-	-	33-35	S	-	-	Perimeter
VW-17	98	20	3-10	P	10-15	S	33-35	S	-	-	Building/Perimeter
VW-18	100	20	5-7	P	-	-	33-35	S	-	-	Perimeter
VW-19	98	20	3-10	P	10-15	S	33-35	S	-	-	Building/Perimeter
VW-20	100	20	5-7	P	-	-	33-35	S	-	-	Perimeter
VW-21	98	20	3-10	P	10-15	S	33-35	S	-	-	Building/Perimeter
VW-22	100	20	5-7	P	-	-	33-35	S	-	-	Perimeter
VW-23	98	20	3-10	P	10-15	S	33-35	S	-	-	Building/Perimeter
VW-24	100	20	5-7	P	-	-	33-35	S	-	-	Perimeter
VW-25	98	20	3-10	P	10-15	S	33-35	S	-	-	Building/Perimeter
VW-26	100	20	5-7	P	-	-	33-35	S	-	-	Perimeter
VW-27	98	20	3-10	P	10-15	S	33-35	S	-	-	Building/Perimeter
VW-28	100	20	5-7	P	-	-	33-35	S	-	-	Perimeter
VW-29	98	20	3-10	P	10-15	S	33-35	S	-	-	Building/Perimeter
VW-30	100	20	5-7	P	-	-	33-35	S	-	-	Perimeter
VW-31	98	20	3-10	P	10-15	S	33-35	S	-	-	Building/Perimeter
VW-32	100	20	5-7	P	-	-	33-35	S	-	-	Perimeter
VW-33	98	20	3-10	P	10-15	S	33-35	S	-	-	Building/Perimeter
VW-34	100	20	5-7	P	-	-	33-35	S	-	-	Perimeter
VW-35	98	20	3-10	P	10-15	S	33-35	S	-	-	Building/Perimeter
VW-36	100	20	5-7	P	-	-	33-35	S	-	-	Perimeter
VW-37	98	20	3-10	P	10-15	S	33-35	S	-	-	Building/Perimeter
VW-38	100	20	5-7	P	-	-	33-35	S	-	-	Perimeter
VW-39	98	20	3-10	P	10-15	S	33-35	S	-	-	Building/Perimeter
VW-40	100	20	5-7	P	-	-	33-35	S	-	-	Perimeter
VW-41	98	20	3-10	P	10-15	S	33-35	S	-	-	Building/Perimeter
VW-42	100	20	5-7	P	-	-	33-35	S	-	-	Perimeter
VW-43	98	20	3-10	P	10-15	S	33-35	S	-	-	Building/Perimeter
VW-44	100	20	5-7	P	-	-	33-35	S	-	-	Perimeter
VW-45	98	20	3-10	P	10-15	S	33-35	S	-	-	Building/Perimeter
VW-46	100	20	5-7	P	-	-	33-35	S	-	-	Perimeter
VW-47	98	20	3-10	P	10-15	S	33-35	S	-	-	Building/Perimeter
VW-48	100	20	5-7	P	-	-	33-35	S	-	-	Perimeter
VW-49	98	20	3-10	P	10-15	S	33-35	S	-	-	Building/Perimeter
VW-50	100	20	5-7	P	-	-	33-35	S	-	-	Perimeter
VW-51	98	20	3-10	P	10-15	S	33-35	S	-	-	Building/Perimeter
VW-52	100	20	5-7	P	-	-	33-35	S	-	-	Perimeter
VW-53	98	20	3-10	P	10-15	S	33-35	S	-	-	Building/Perimeter
VW-54	100	20	5-7	P	-	-	33-35	S	-	-	Perimeter
VW-55	98	20	3-10	P	10-15	S	33-35	S	-	-	Building/Perimeter
VW-56	100	20	5-7	P	-	-	33-35	S	-	-	Perimeter
VW-57	98	20	3-10	P	10-15	S	33-35	S	-	-	Building/Perimeter
VW-58	100	20	5-7	P	-	-	33-35	S	-	-	Perimeter
VW-59	98	20	3-10	P	10-15	S	33-35	S	-	-	Building/Perimeter
VW-60	100	20	5-7	P	-	-	33-35	S	-	-	Perimeter
VW-61	98	20	3-10	P	10-15	S	33-35	S	-	-	Building/Perimeter
VW-62	100	20	5-7	P	-	-	33-35	S	-	-	Perimeter
VW-63	98	20	3-10	P	10-15	S	33-35	S	-	-	Building/Perimeter
VW-64	100	20	5-7	P	-	-	33-35	S	-	-	Perimeter
VW-65	98	20	3-10	P	10-15	S	33-35	S	-	-	Building/Perimeter
VW-66	100	20	5-7	P	-	-	33-35	S	-	-	Perimeter
VW-67	98	20	3-10	P	10-15	S	33-35	S	-	-	Building/Perimeter
VW-68	100	20	5-7	P	-	-	33-35	S	-	-	Perimeter
VW-69	98	20	3-10	P	10-15	S	33-35	S	-	-	Building/Perimeter
VW-70	100	20	5-7	P	-	-	33-35	S	-	-	Perimeter
VW-71	98	20	3-10	P	10-15	S	33-35	S	-	-	Building/Perimeter
VW-72	100	20	5-7	P	-	-	33-35	S	-	-	Perimeter
VW-73	98	20	3-10	P	10-15	S	33-35	S	-	-	Building/Perimeter
VW-74	100	20	5-7	P	-	-	33-35	S	-	-	Perimeter
VW-75	98	20	3-10	P	10-15	S	33-35	S	-	-	Building/Perimeter
VW-76	100	20	5-7	P	-	-	33-35	S	-	-	Perimeter
VW-77	98	20	3-10	P	10-15	S	33-35	S	-	-	Building/Perimeter
VW-78	100	20	5-7	P	-	-	33-35	S	-	-	Perimeter
VW-79	98	20	3-10	P	10-15	S	33-35	S	-	-	Building/Perimeter
VW-80	100	20	5-7	P	-	-	33-35	S	-	-	Perimeter
VW-81	98	20	3-10	P	10-15	S	33-35	S	-	-	Building/Perimeter
VW-82	100	20	5-7	P	-	-	33-35	S	-	-	Perimeter
VW-83	98	20	3-10	P	10-15	S	33-35	S	-	-	Building/Perimeter
VW-84	100	20	5-7	P	-	-	33-35	S	-	-	Perimeter
VW-85	98	20	3-10	P	10-15	S	33-35	S	-	-	Building/Perimeter
VW-86	100	20	5-7	P	-	-	33-35	S	-	-	Perimeter
VW-87	98	20	3-10	P	10-15	S	33-35	S	-	-	Building/Perimeter
VW-88	100	20	5-7	P	-	-	33-35	S	-	-	Perimeter
VW-89	98	20	3-10	P	10-15	S	33-35	S	-	-	Building/Perimeter
VW-90	100	20	5-7	P	-	-	33-35	S	-	-	Perimeter
VW-91	98	20	3-10	P	10-15	S	33-35	S	-	-	Building/Perimeter
VW-92	100	20	5-7	P	-	-	33-35	S	-	-	Perimeter
VW-93	98	20	3-10	P	10-15	S	33-35	S	-	-	Building/Perimeter
VW-94	100	20	5-7	P	-	-	33-35	S	-	-	Perimeter
VW-95	98	20	3-10	P	10-15	S	33-35	S	-	-	Building/Perimeter
VW-96	100	20	5-7	P	-	-	33-35	S	-	-	Perimeter
VW-97	98	20	3-10	P	10-15	S	33-35	S	-	-	Building/Perimeter
VW-98	100	20	5-7	P	-	-	33-35	S	-	-	Perimeter
VW-99	98	20	3-10	P	10-15	S	33-35	S	-	-	Building/Perimeter
VW-100	100	20	5-7	P	-	-	33-35	S	-	-	Perimeter

(3) Destroyed during remedial construction.
(4) Covered with asphalt by tenant/owner.

As Built
SCHEDULE OF BIOVENT WELLS TO BE CONSTRUCTED

WELL NUMBER	PROPOSED GROUNDSURFACE ELEVATION (approximate)	TOP OF CASING[1] ELEVATION (ft above msl)	BOTTOM OF WELL SCREEN[2] ELEVATION (ft above msl)
BW-1	100.0	100.0	100.0
BW-2	101.3	101.3	101.3
BW-3	100.0	100.0	100.0
BW-4	100.1	100.1	100.1
BW-5	100.0	100.0	100.0
BW-6	101.1	101.1	101.1
BW-7	100.7	100.7	100.7
BW-8	100.7	100.7	100.7
BW-9	100.0	100.0	100.0
BW-10	100.0	100.0	100.0
BW-11	100.0	100.0	100.0
BW-12	100.0	100.0	100.0
BW-13	100.0	100.0	100.0
BW-14	100.0	100.0	100.0
BW-15	100.0	100.0	100.0
BW-16	100.0	100.0	100.0
BW-17	100.0	100.0	100.0
BW-18	100.0	100.0	100.0
BW-19	100.0	100.0	100.0
BW-20	100.0	100.0	100.0
BW-21	100.0	100.0	100.0
BW-22	100.0	100.0	100.0
BW-23	100.0	100.0	100.0
BW-24	100.0	100.0	100.0
BW-25	100.0	100.0	100.0
BW-26	100.0	100.0	100.0
BW-27	100.0	100.0	100.0
BW-28	100.0	100.0	100.0
BW-29	100.0	100.0	100.0
BW-30	100.0	100.0	100.0

ELIMINATED

SCHEDULE OF EXISTING GROUND WATER MONITORING
WELLS TO BE RETAINED FOR MONITORING
WASTE DISPOSAL, INC. SUPERFUND SITE

WELL NUMBER	TOP OF WELL CASING ELEVATION (ft above msl)	WELL DEPTH	WELL SCREEN (ft bgs)	WELL TYPE
GW - 07	102.3	Shallow	30 - 50	Background Well
GW - 08	102.3	Shallow	30 - 50	Background Well
GW - 10	104.7	Shallow	30 - 50	Post-Waste Deposition Well
GW - 11	104.7	Deep	110 - 130	Background Well
GW - 07	100.7	Shallow	30 - 50	Point of Compliance Well
GW - 08	100.7	Shallow	30 - 50	Point of Compliance Well
GW - 09	100.6	Shallow	45 - 65	Point of Compliance Well
GW - 10	100.6	Shallow	44 - 64	Point of Compliance Well
GW - 11	100.6	Shallow	45 - 65	Point of Compliance Well
GW - 12	100.6	Shallow	45 - 65	Point of Compliance Well
GW - 13	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 14	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 15	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 16	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 17	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 18	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 19	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 20	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 21	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 22	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 23	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 24	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 25	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 26	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 27	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 28	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 29	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 30	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 31	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 32	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 33	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 34	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 35	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 36	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 37	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 38	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 39	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 40	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 41	100.4	Shallow	45 - 65	Point of Compliance Well
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GW - 46	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 47	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 48	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 49	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 50	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 51	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 52	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 53	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 54	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 55	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 56	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 57	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 58	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 59	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 60	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 61	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 62	100.4	Shallow	45 - 65	Point of Compliance Well
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GW - 64	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 65	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 66	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 67	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 68	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 69	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 70	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 71	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 72	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 73	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 74	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 75	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 76	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 77	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 78	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 79	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 80	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 81	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 82	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 83	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 84	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 85	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 86	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 87	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 88	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 89	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 90	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 91	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 92	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 93	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 94	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 95	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 96	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 97	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 98	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 99	100.4	Shallow	45 - 65	Point of Compliance Well
GW - 100	100.4	Shallow	45 - 65	Point of Compliance Well

AS-BUILT

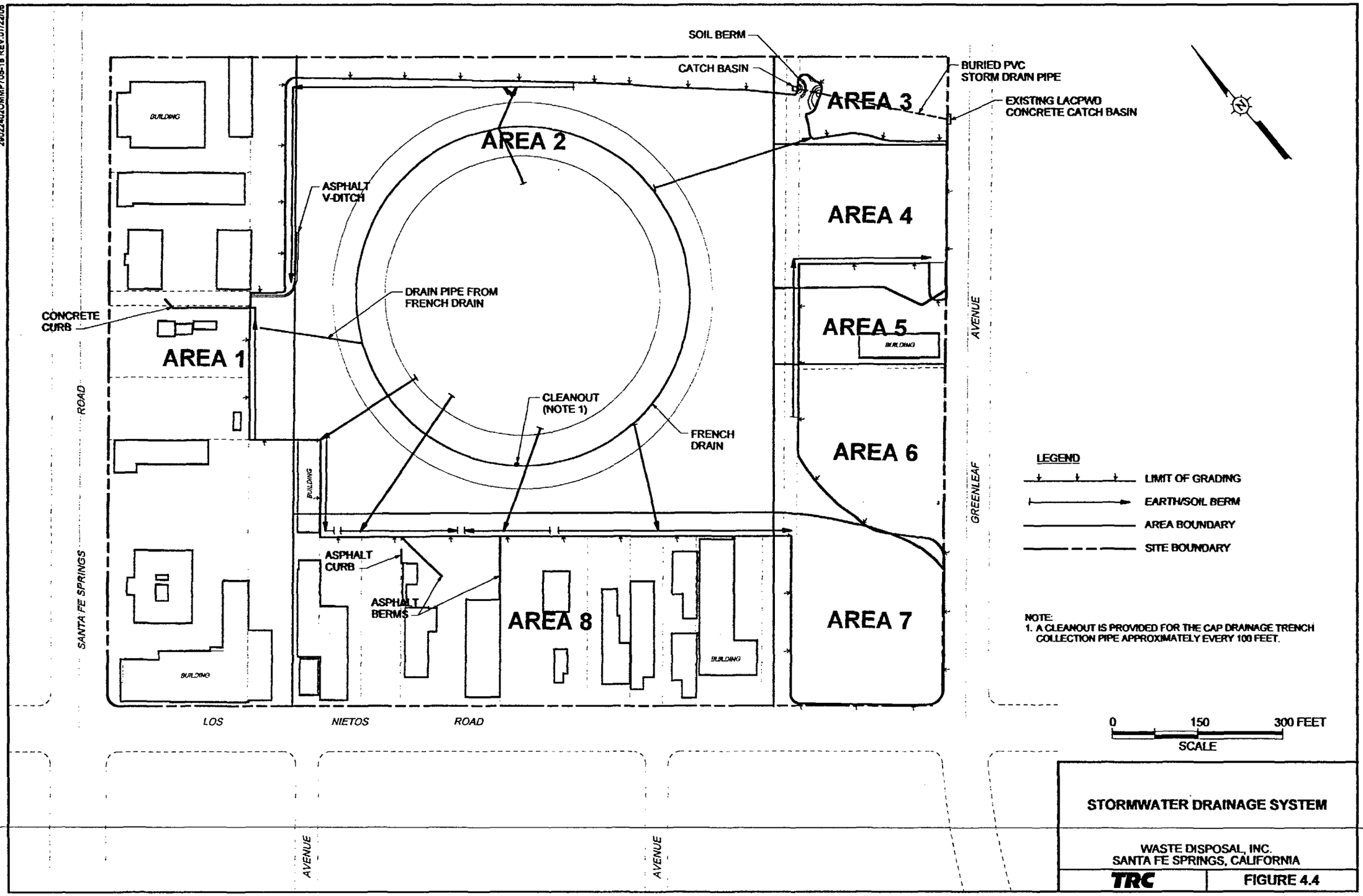
BIOVENT, VAPOR, GROUND WATER AND LEACHATE WELL DETAILS

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 4.3

29022402OMMP703-1B REV.07/22/08

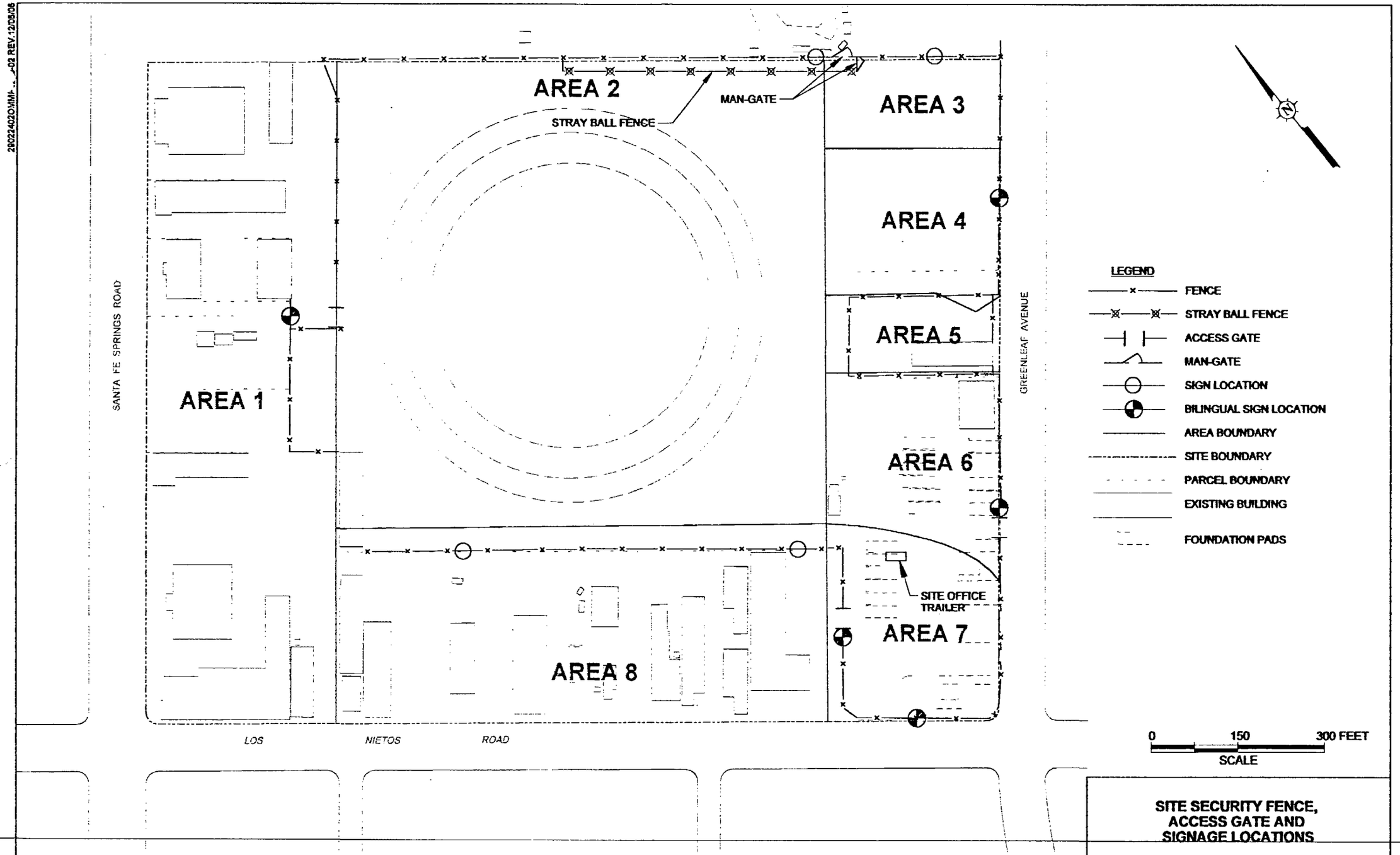


STORMWATER DRAINAGE SYSTEM

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 4.4



SITE SECURITY FENCE, ACCESS GATE AND SIGNAGE LOCATIONS

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

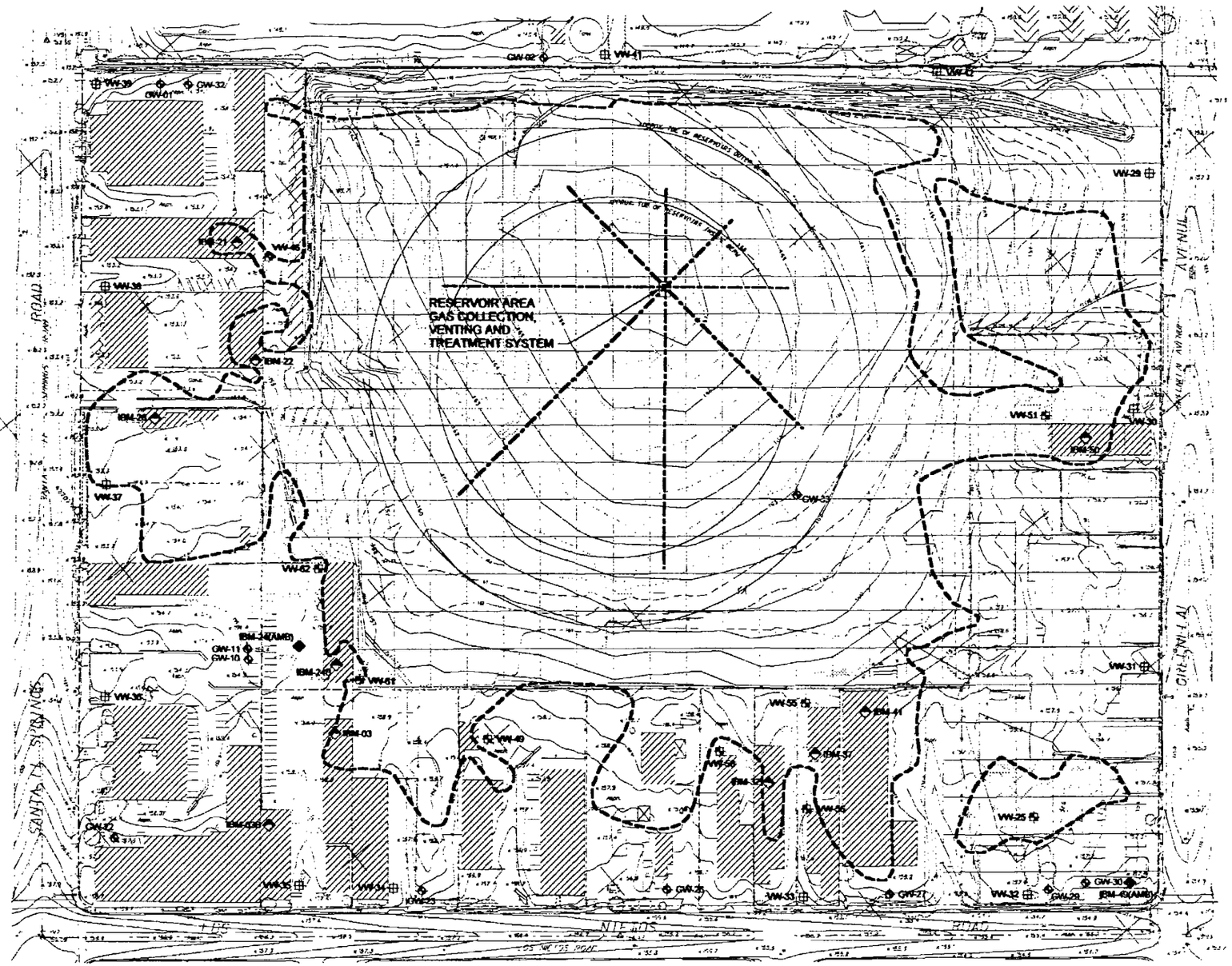
TRC

FIGURE 4.5

REFERENCE: NÚNEZ ENGINEERING.

29022402OMM... -02 REV.12/05/06

28022402OMMP1x05-04 REV.12/05/06



LEGEND

- GW-01 — GROUND WATER WELL
- VW-29 — COMPLIANCE/PERIMETER VAPOR WELL
- VW-25 — NON-COMPLIANCE VAPOR WELL
- IBM-22 — IN-BUSINESS AIR MONITORING
- IBM-24 (AMB) — AMBIENT AIR MONITORING
- SOIL GAS NON-COMPLIANCE AREA (LATERAL EXTENT IS APPROXIMATE)
- EXISTING BUILDING SLAB
- LIMIT OF WASTE
- GAS COLLECTION PIPE

0 150 300 FEET
SCALE

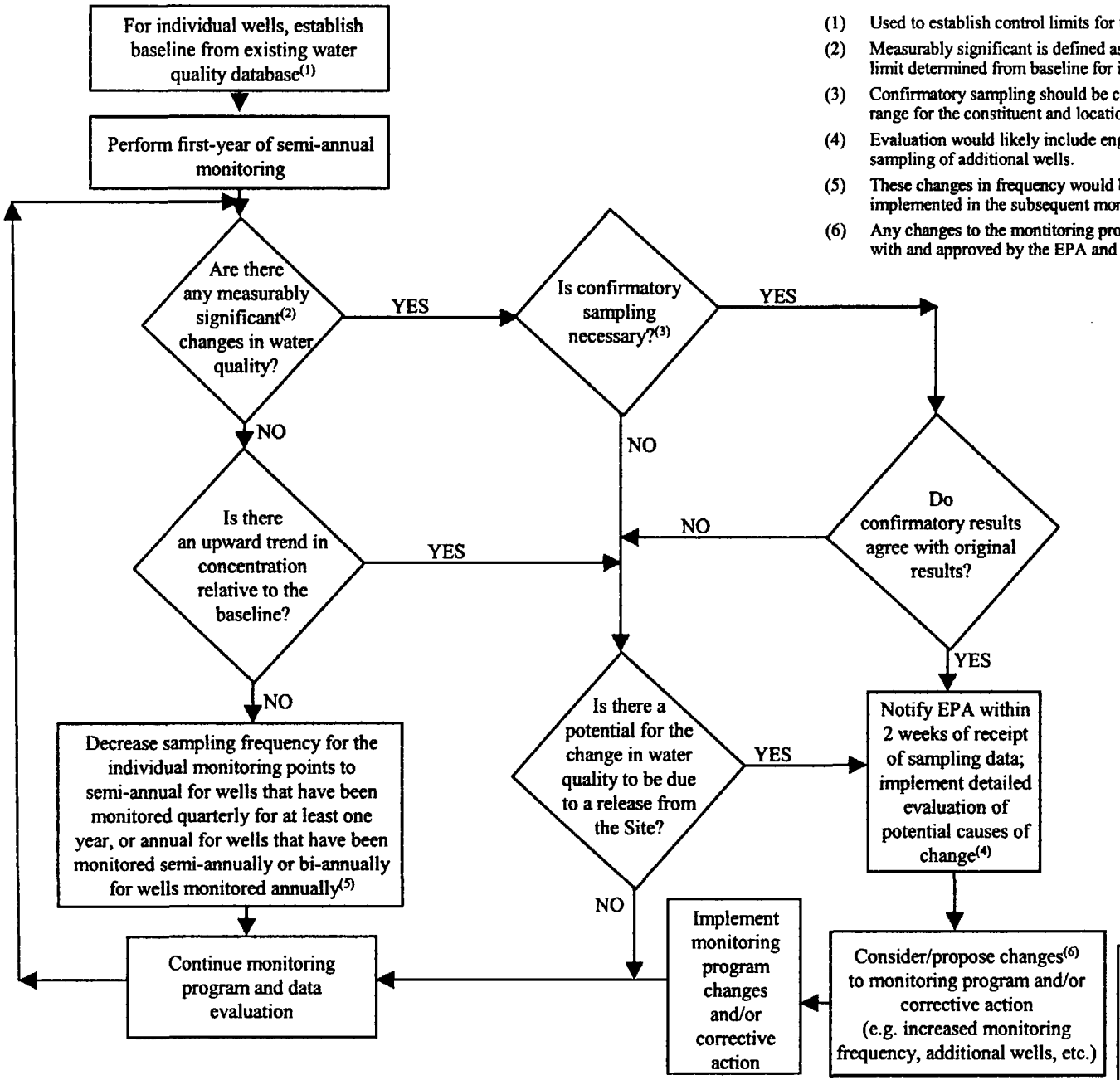
REFERENCE: TOPOGRAPHY BY NUNEZ ENGINEERING (DECEMBER 1998)

LOCATION OF MONITORING SYSTEMS

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 5.0



(1) Used to establish control limits for the statistical evaluation of monitoring data.

(2) Measurably significant is defined as a result which exceeds the statistical control limit determined from baseline for intra-well comparisons.

(3) Confirmatory sampling should be considered for results that are >5x the typical range for the constituent and location, or exceed the control limit by >2x.

(4) Evaluation would likely include engineering and hydrogeologic analyses, and sampling of additional wells.

(5) These changes in frequency would be documented in the monitoring report and implemented in the subsequent monitoring event.

(6) Any changes to the montitoring program and corrective actions will be discussed with and approved by the EPA and DTSC prior to implementation.

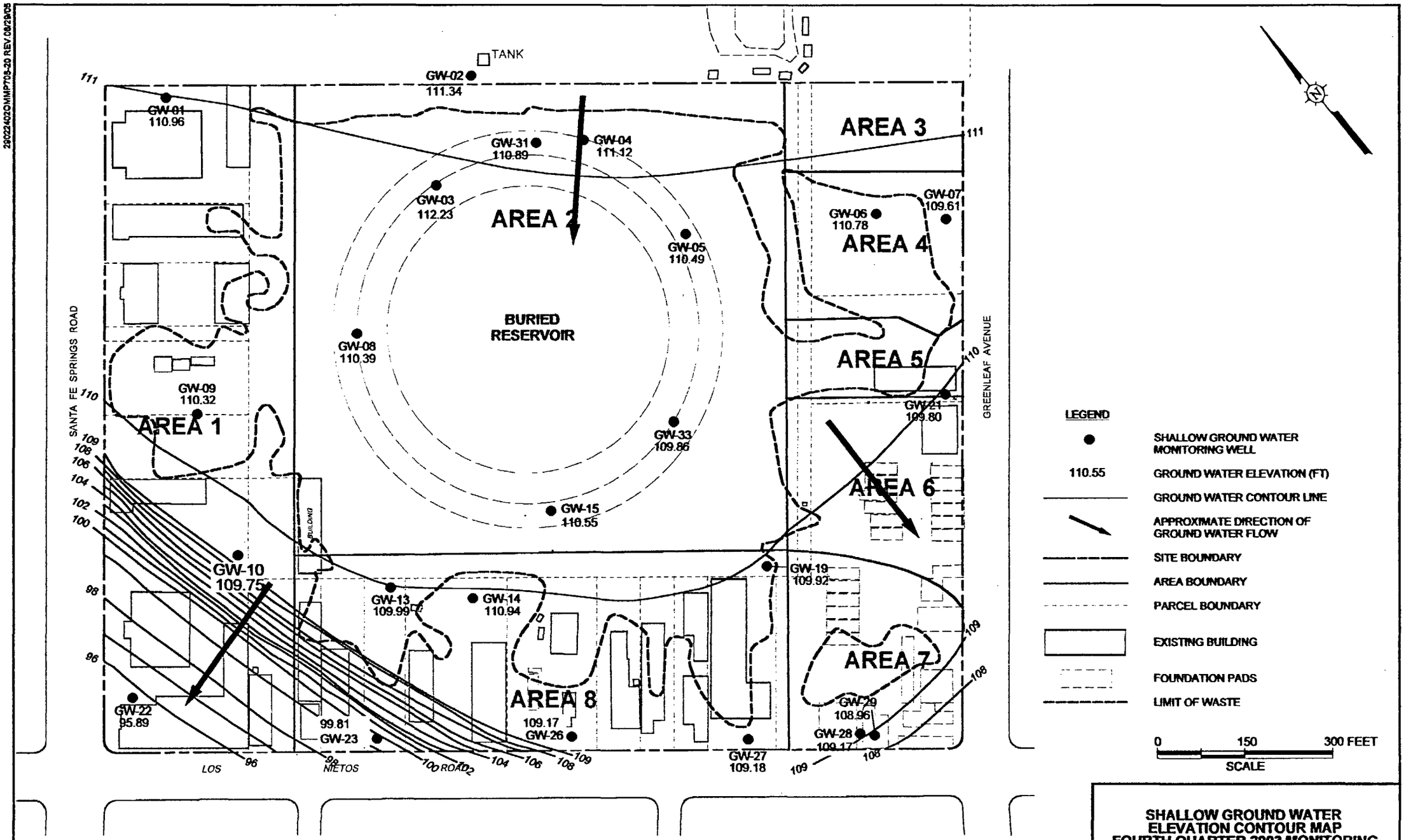
DECISION MATRIX CRITERIA FOR GROUND WATER MONITORING

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 5.1

C:\move to W-Temp Server\RM-07-22-05_WDI_OMMP\Tables-Figures\RM-07-22-05_WDI_Final Draft_OMMP_Figure 5.1(7/22/05/rm)



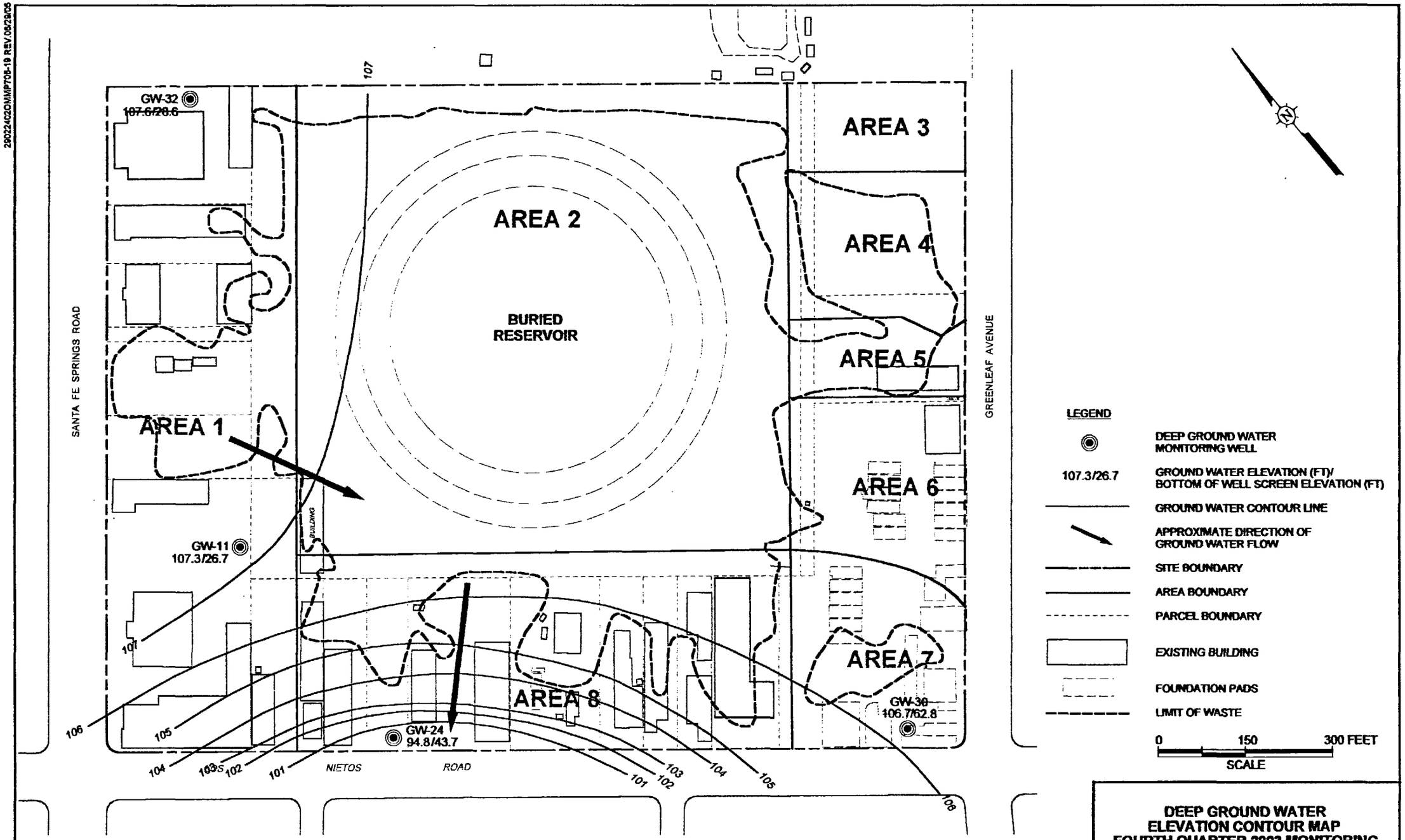
SHALLOW GROUND WATER ELEVATION CONTOUR MAP FOURTH QUARTER 2003 MONITORING

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 5.2

29022402OMMP705-20 REV.08/29/05



DEEP GROUND WATER ELEVATION CONTOUR MAP FOURTH QUARTER 2003 MONITORING

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

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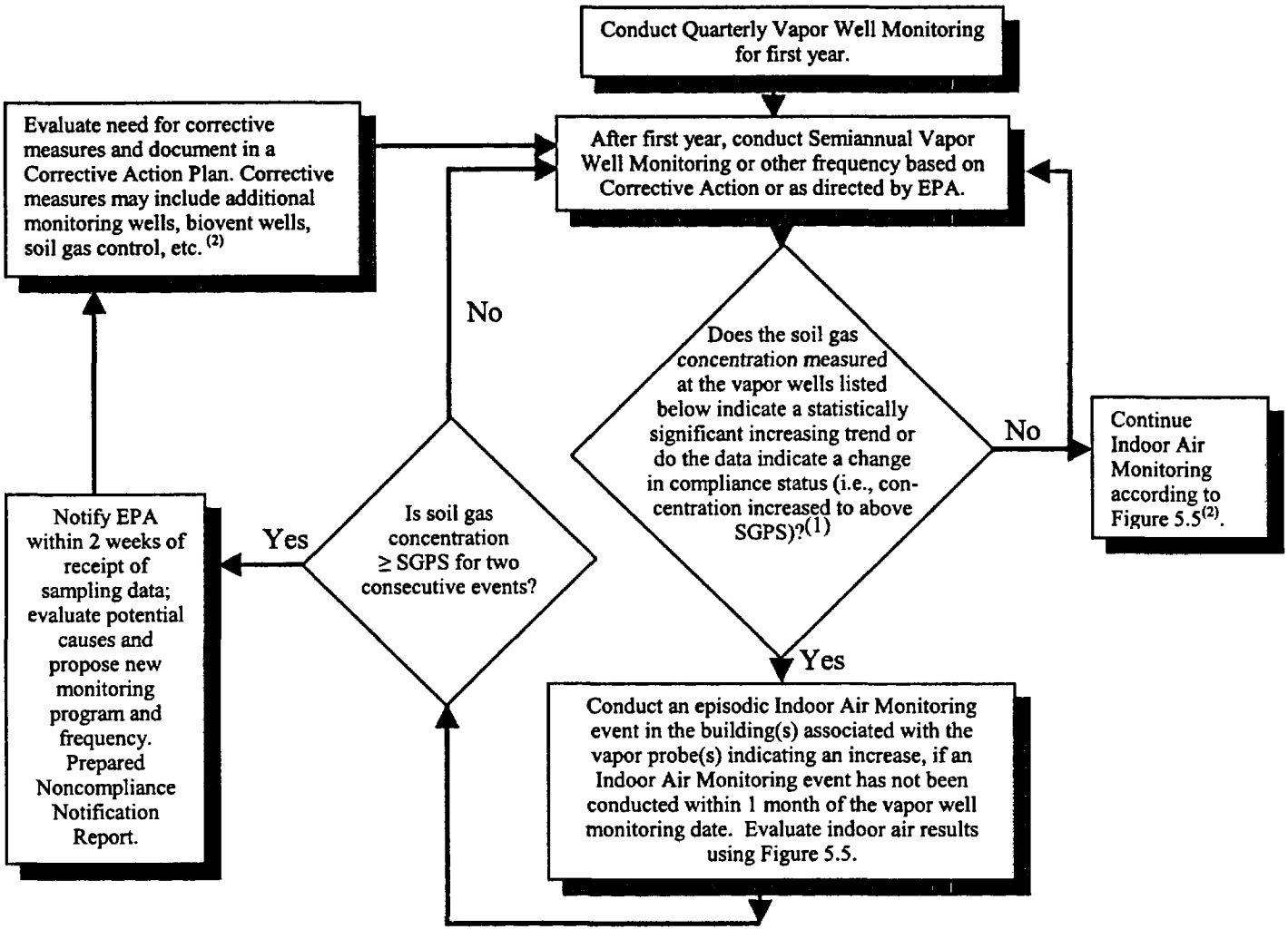
FIGURE 5.3

29022402OMMP705-19 REV.08/29/05



PARCEL NO.	PARCEL ADDRESS	VAPOR WELL NUMBER
021	9620 Santa Fe Springs Road	VW-46
022	9630 Santa Fe Springs Road	VW-46
024	12637 Los Nietos Road	VW-61 and VW-62
003	12635 Los Nietos Road	VW-61
012	12639 Los Nietos Road	VW-61
044	12715-17 Los Nietos Road	VW-49
043	12723 Los Nietos Road	VW-58
042	12741 Los Nietos Road	VW-58
032	12747 Los Nietos Road	VW-55 and -56
037	12801 Los Nietos Road; 12803 Los Nietos Road	VW-55 and -56
041	12807B, 12807A, 12809, 12811, and 12813 Los Nietos Road	VW-55 and -56
050	9843 Greenleaf Avenue	VW-30 and -51

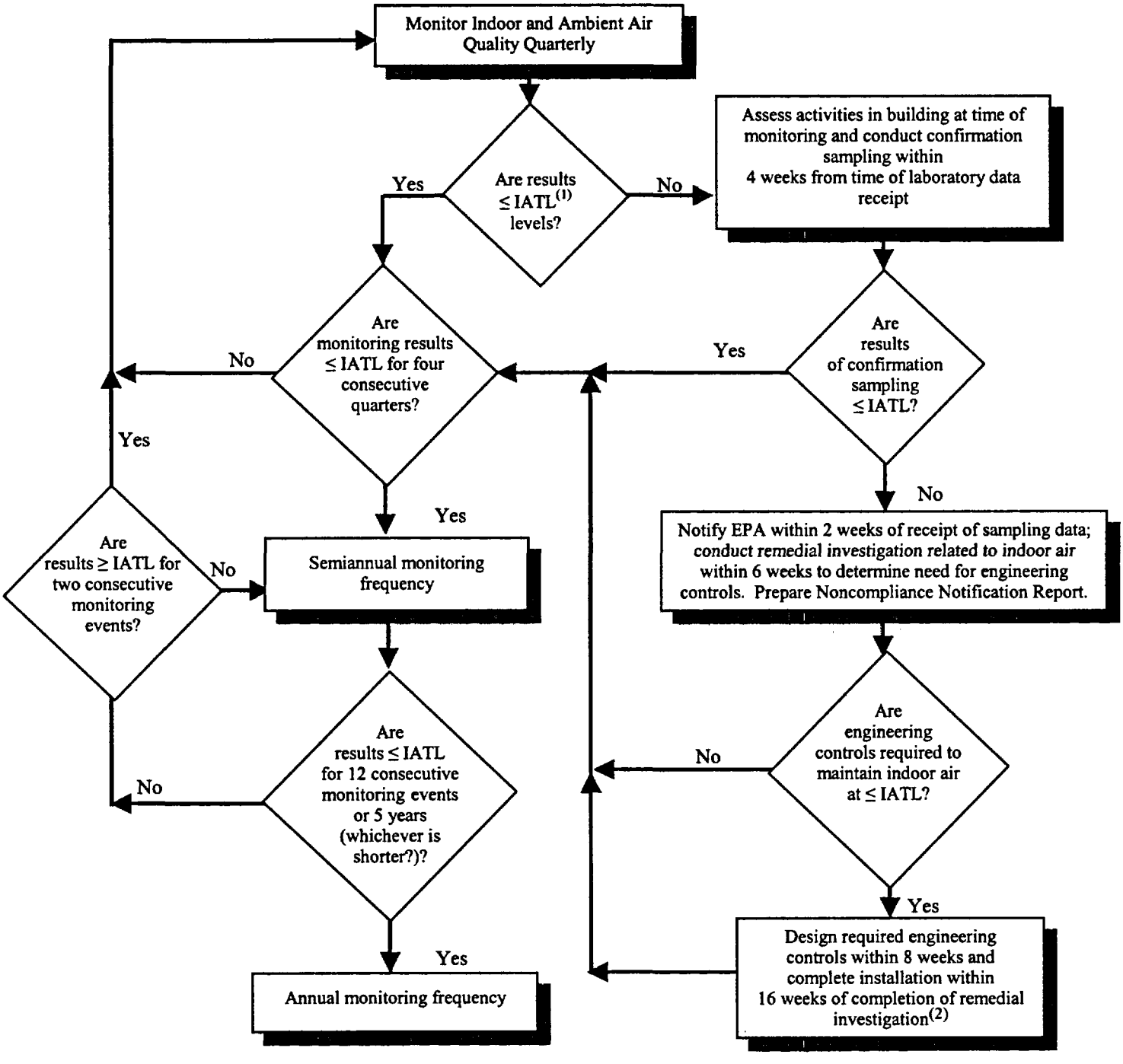
(1) SGPS = Soil Gas Performance Standard. See Table 5.2.

(2) Any changes to monitoring program and corrective actions due to soil gas concentrations ≥ SGPS for two consecutive events will be discussed with and approved by the EPA and DTSC prior to implementation

DECISION MATRIX CRITERIA FOR SOIL GAS MONITORING DATA

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC | FIGURE 5.4



(1) IATL = Indoor Air Threshold Levels (see Table 5.2).

(2) Required engineering controls may include but are not limited to soil vapor extraction system outside building, passive or active foundation vent system, or HVAC system improvements. Any corrective measures will be discussed with and approved by EPA and DTSC prior to implementation.

(3) Decision matrix may be revised to include additional actions based on the concentration of the exceedance, e.g., as discussed in the Subsurface Gas Contingency Plan, CDM Federal Programs Corporation, July 17, 1997.

C:\Documents and Settings\jmarquart\Desktop\RM_-07-22-05_WDI_Final Draft_OMMP_Fig 5.5-DaMa.doc(7/22/05/rm)

DECISION MATRIX FOR IN-BUSINESS AND AMBIENT AIR MONITORING
(See Footnote 3)

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

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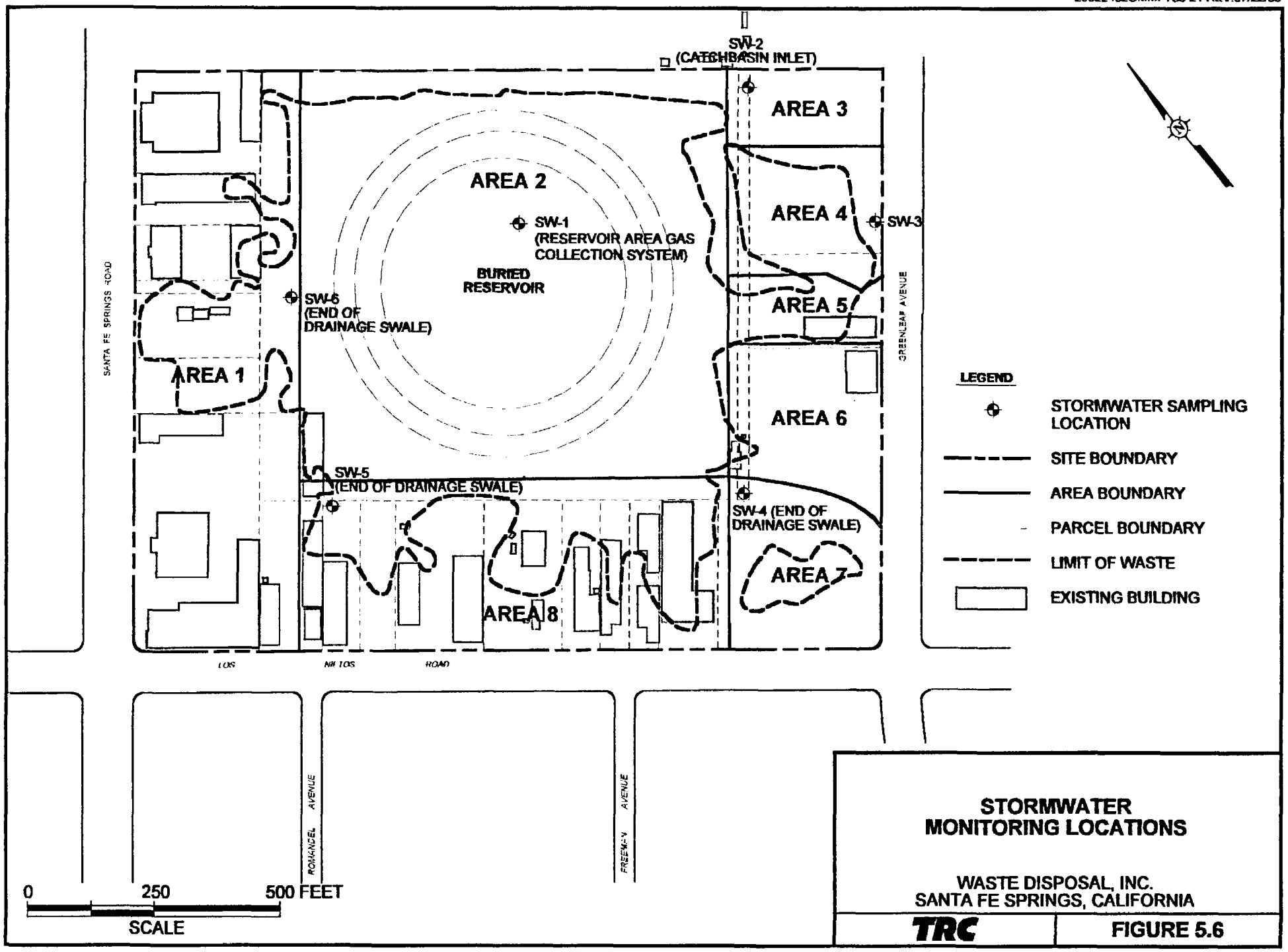
FIGURE 5.5

29022402OMMP705-21 REV.07/22/05



STORMWATER MONITORING LOCATIONS

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 5.6

APPENDIX A

A.1 QUALITY ASSURANCE PROJECT PLAN
A.2 SAMPLING AND ANALYSIS PLAN
A.3 SITE ACCESS AND SECURITY PLAN

APPENDIX A.1

QUALITY ASSURANCE PROJECT PLAN

TRC

QUALITY ASSURANCE PROJECT PLAN

WASTE DISPOSAL, INC.
SUPERFUND SITE
SANTA FE SPRINGS, CALIFORNIA

Prepared for

United States Environmental Protection Agency

Prepared by

TRC

On Behalf Of

Waste Disposal Inc., Group (WDIG)

January 2004
Revised: September 2006

TRC

QUALITY ASSURANCE PROJECT PLAN

WASTE DISPOSAL, INC. SUPERFUND SITE
SANTA FE SPRINGS, CALIFORNIA

Prepared for

United States Environmental Protection Agency

Prepared by

TRC

On Behalf Of

Waste Disposal Inc., Group (WDIG)

Approvals:

(Name) Project Coordinator Waste Disposal, Inc., Group	(Name) Quality Assurance Officer TRC
(Name) Remedial Project Manager - Regulatory Agency	(Name) Quality Assurance Officer - Regulatory Agency

Project No. 29022401
January 2004
Revised: September 2006

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30747/Rpts/QAPP (11/14/03/ms)

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1.0 INTRODUCTION

1.1 OVERVIEW

1. This Quality Assurance Project Plan (QAPP) has been prepared for the Waste Disposal, Inc. (WDI) Superfund Site (Site) Remedial Action Work. The Remedial Action is described in the Remedial Action Workplan (RAWP) (TRC, 2003a). This QAPP presents the field and laboratory procedures to be used to assure that field sampling and monitoring activities provide accurate and representative data and that quality control/quality assurance (QA/QC) activities are appropriately documented and reported. The QAPP will be used in conjunction with the Sampling and Analysis Plan (SAP), Health and Safety Plan (HASP) and the Operations, Maintenance and Monitoring Plan (OMMP). The interrelationship between this QAPP and other workplans for this project is described in the following section.

1.2 INTEGRATION WITH OTHER REPORTS AND PLANS

1. This QAPP will be implemented in conjunction with other plans required by the Statement of Work (SOW), as follows:
   - Remedial Design Report, Plans and Specifications
   - Remedial Action Workplan (RAWP)
   - Health and Safety Plan (HASP)
   - Construction Quality Assurance Plan (CQAP)
   - Sampling and Analysis Plan (SAP)
   - Operations, Maintenance and Monitoring Plan (OMMP)

2. A general description of these documents and how they are integrated with the QAPP is provided in the following sections. Figure 1.1 presents a diagram of how the management plans fit together in the sequence of performing the work.

1.2.1 REMEDIAL DESIGN REPORT, PLANS AND SPECIFICATIONS

1. The Remedial Design Report, Plans and Specifications provides the approved Design, Plans and Specifications, the description and supporting materials for the selected remedial design for the soil, subsurface gas and ground water at the WDI Site.

2. The design in the Remedial Design Report is based on the selected remedy presented in the Amended Record Of Decision ([AROD]; EPA, June 2002), appropriately configured to suit the findings of field studies subsequent to the AROD. The Remedial Design Report, Plans and Specifications have been prepared to fulfill the remedial design requirements of the

Administrative Order (AO) 94-17 and Amended Administrative Order (AAO) 97-09. The approved Plans and Specifications in the Final 100% Remedial Design Report, (TRC, May 2003) addresses comments provided by EPA, and additional comments provided by the various agencies and interested parties that have participated in Technical Exchange Meetings regarding the remedial design.

1.2.2 REMEDIAL ACTION WORKPLAN (RAWP)

1. The RAWP outlines how construction activities will be implemented relative to the Design Plans and Specifications. The RAWP also describes specific QA tasks. The RAWP includes sections discussing the sequencing of construction, project team organization, equipment staging and materials handling, and procedures for addressing QA items identified in this CQAP. Also included in the RAWP are a schedule of activities and a process for making field changes to the design.

1.2.3 HEALTH AND SAFETY PLAN (HASP)

1. The HASP presents the minimum health and safety requirements and procedures that will be used during operations and maintenance at the Site. The HASP will apply to both workers at the WDI Site and public exposure to releases or spills at and from facilities and environmental control systems at the Site. The HASP addresses coordination between the various parties conducting activities at the WDI Site and emergency response agencies and personnel (e.g., police departments, fire department, and other response agencies). Contractor Health and Safety Plans must meet the requirements of this document, but may also include additional health and safety procedures and requirements.

1.2.4 CONSTRUCTION QUALITY ASSURANCE PLAN (CQAP)

1. The CQAP identifies QA/QC procedures to be used in construction management, including monitoring actions, reporting mechanisms, and documentation formats.

2. The CQAP also discusses how construction monitoring will be performed and how modifications to the construction procedures will be directed, as necessary, in response to monitoring actions. Further, it delineates the quality assurance methods and protocols for project personnel to ensure they have a complete understanding of monitoring, feedback, and adjustment mechanisms.

1.2.5 SAMPLING AND ANALYSIS PLAN (SAP)

1. The SAP describes the locations and analytical parameters for sampling activities at the Site. The SAP is used with the SOPs in the QAPP to collect and analyze environmental samples at the Site as part of the monitoring program during construction and as required for construction. The SAP will be amended in the future to address long-term monitoring that will be described in the OMMP.

1.2.6 OPERATIONS, MAINTENANCE AND MONITORING PLAN

1. The Long-Term Ground Water Monitoring Plan, Long-Term Soil Gas and In-Business Air Monitoring Plan, and Operations Maintenance and Monitoring Plan are compiled into the OMMP. The OMMP will provide the procedures and activities necessary to operate and maintain the facilities following the remedial action; and describes the monitoring programs, including locations, frequency, and parameters monitored, procedures for data management, data evaluation, reporting, inspections, contingency plans, procedures for repair or corrective action. The OMMP includes descriptions of various procedures, including:
   - Procedures for verifying and documenting compliance with quality control requirements.
   - Operational procedures (equipment and systems startup and shutdown, normal operational procedures, and procedures for abnormal conditions).
   - Procedures of operational emergency response.
   - Maintenance procedures and schedules.
   - Compliance and process monitoring procedures and schedules.

1.3 ORGANIZATION OF THE QAPP

1. This QAPP was prepared following the guidelines in the Requirements for Quality Assurance Project Plan (EPA, 2001). Table 1.1 shows the crosswalk between this QAPP and the QA/R-5 elements.

2. This document is organized in the following sections:
   - 2.0 - Project Description
   - 3.0 - Project Organization and Responsibility
   - 4.0 - Data Quality Objectives
   - 5.0 - Sampling QA/QC Procedures
   - 6.0 - Sample Handling and Chain-of-Custody Records
   - 7.0 - Calibration Procedures and Frequency
   - 8.0 - Analytical Procedures and Methods
   - 9.0 - Data Review, Validation, Verification and Reporting
   - 10.0 - Quality Control Checks and Requirements
   - 11.0 - Performance and System Audits

- 12.0 - Preventative Maintenance Procedures and Schedules
- 13.0 - Specific Routine Procedures to Assess Quality Assurance Objectives for Measurement Parameters
- 14.0 - Corrective Action
- 15.0 - Quality Assurance Reports to Management
- 16.0 - Documentation and Records Keeping
- 17.0 - References
- Appendix A - Standard Operating Procedures (SOPs)
- Appendix B - Volatile Organic Compounds (VOCs) in Ambient Air Using Summa Canister Sampling and Gas Chromatograhy (GC) Analysis

2.0 PROJECT DESCRIPTION

2.1 BACKGROUND

1. The Site's background is discussed fully in Chapter 2.0 of the RAWP.

2.2 MONITORING PLANS

1. As discussed in the RAWP, there are existing monitoring systems for soil gas (vapor wells), ground water, in-business air and stormwater. Current monitoring plans are presented in detail in the SAP. Additional or revised monitoring programs will be included in the long-term monitoring plans required by the SOW. The QAPP and SAP will be revised or amended to address these long term plans as shown in Figure 1.1. The objectives of the sampling and analysis of the various Site media are as follows:
   - Soil Gas Monitoring
     - Soil gas monitoring is an integral component of the soil gas remedy.
     - Soil gas monitoring will be conducted to assure the current health protective conditions are maintained and that the remedy is performing properly.
     - A subset of the pre-remedial action vapor wells are used to fulfill performance monitoring requirements.
   - In-Business Air Monitoring
     - Indoor air monitoring will be conducted to assure that soil gas is not migrating into the buildings.
     - The monitoring will be used for future decision-making regarding modifications to the buildings. Example decision trees were provided in the RAWP. Final decision trees are included in the OMMP.
   - Ground Water Monitoring
     - Ground water monitoring has been selected in the Amended Record of Decision (AROD) (EPA, 2002) as the remedy for ground water.
     - Ground water monitoring will be conducted to assure current conditions are maintained.
     - A subset of the existing ground water wells will be used to fulfill performance-monitoring requirements.
   - Stormwater Monitoring
     - Stormwater monitoring will be conducted to ascertain that rainwater is not being impacted by the Site.

2. Other sampling activities addressed by this QAPP include imported fill/excavated soil characterization, leachate collection well liquids characterization, and gas collection system emissions monitoring. Imported fill/excavated soil will be sampled and analyzed during remedial

construction as required by the specifications in the 100% Remedial Design Report (TRC, 2003b) to assure it is free of contaminants. Leachate liquids characterization is performed to establish disposal requirements. Monitoring of the reservoir gas collection system is performed to assure compliance with emission criteria and verify system performance.

3.0 PROJECT ORGANIZATION AND RESPONSIBILITY

3.1 PROJECT ORGANIZATION

1. Project organization and roles and responsibilities of the project team during construction is discussed fully in Chapter 3.0 of the RAWP (TRC, 2003a), and are summarized in Table 3.1.

2. In addition to the project construction team described in Table 3.1, the responsibilities for overall sampling and analytical quality assurance, including assuring compliance with this QAPP, belong to the QA Officer. The Selected QA Officer for this project is Tom Patterson of TRC, and the QA Officer reports directly to the WDIG Project Coordinator. The QA Officer roles and responsibilities are as follows:
   - Understands the requirements of the AROD and Consent Decree (CD)/SOW.
   - Administers and verifies compliance with the QAPP.
   - Provides independent QA review.
   - Reviews sampling plans.
   - Coordinates field sampling and laboratory analysis activities, including documentation collection, data validation, and reporting (primarily associated with monitoring activities).
   - Assesses problems of quality or noncompliance with the QAPP.
   - Records problems and corrective measures in writing.
   - Initiates, recommends, or develops solutions for corrective actions.
   - Monitors implementation of corrective actions.

3. The project work for the Operations, Maintenance and Monitoring Plan will be performed by qualified personnel under the direction of the WDIG Coordinator or his designee. These activities will include sampling, field testing, data analyses, interpretations, and reporting. Technical consulting and project support personnel assigned to the project will have the experience and/or training required to complete their project assignment. All field personnel will have the Health and Safety training and certifications, as required by the OM&M HASP. There are no other specialized training or certifications required for the work associated with this QAPP.

4. Project personnel will receive any specific special training that is required to perform their project-related duties. Such training may include but is not limited to:
   - Special health and safety training (see OM&M HASP).
   - Spill control procedures.
   - Operation of field equipment.
   - Use of procedures provided in this QAPP.

- Nuclear density gauge operation (for determining compliance with soil compaction specifications and clay moisture contents).

5. The Project team and responsibilities for the OM&M period is subject to change, at the discretion of the WDIG Project Coordinator, and would be defined in an amendment to the QAPP as necessary.

4.0 DATA QUALITY OBJECTIVES

4.1 DATA QUALITY OBJECTIVE DEVELOPMENT

1. The data quality objective (DQO) process is a strategic planning approach based on scientific methods to prepare data collection activities. It is a systematic approach for defining the pertinent criteria for a sampling program including:

   - Where to collect samples.
   - How to collect samples.
   - Tolerable levels of decision errors.
   - How many samples to collect.

   Thereby, the DQO process assures that the type, quantity and quality of environmental data used to evaluate the attainment of the remediation standards are appropriate for the intended use.

2. The development of the DQOs is based on the intended use of the data. Listed below are the four primary data quality levels and the respective data uses:

   - DQO Level 1 - Initial site characterization and/or monitoring during remedy implementation.
   - DQO Level 2 - Site characterization and evaluation of remedial alternatives, construction QA.
   - DQO Level 3 - Data collection for risk assessment and potentially responsible party (PRP) determination, confirmation of cleanup levels.
   - DQO Level 4 - Data collection for litigation/enforcement activities.

3. The DQO process consists of seven steps with each influencing the subsequent step. The steps are as follows:

   - Step 1: State the problem to be resolved.
   - Step 2: Identify the decision(s) or question(s) that the data will be used to resolve and what actions will result.
   - Step 3: State the inputs or list of variables to be measured and other supporting information needed to answer the questions posed in Step 2.
   - Step 4: Define the boundaries of the study/remediation area including the population of interest, and the spatial and temporal limits.
   - Step 5: Develop the decision rule(s) including test hypothesis and a quantitative statement on how the data will be used to make the decision.
   - Step 6: Develop acceptable uncertainty constraints for the decision process including false positive and false negative decision error rates.
   - Step 7: Optimize the design within the constraints of project goals.

4. Four types of data may be collected during the performance of Work at the Site: (1) Site characterization data, including ground water level and quality data; (2) confirmation samples to measure attainment with cleanup standards or to comply with monitoring requirements; (3) screening samples to evaluate remediation processes; and (4) samples to verify the quality of construction activities conducted. The DQO process has been used to establish the specific locations, frequency and types of analysis for the sampling activities outlined in Section 2.2. The DQO process and sampling plans are presented in detail in the SAP.

5. The DQO process was also conducted to establish quality control limits for the sampling activities indicated in the Workplan. DQOs for laboratory and field measurement data are presented in Table 4.1. Based on these DQOs, the appropriate levels of QC, including accuracy, precision, reproducibility and completeness were determined and are presented in Section 4.2.

4.2 DATA QUALITY OBJECTIVES

4.2.1 GENERAL DATA QUALITY OBJECTIVES

1. QA is applied throughout the entire sampling, monitoring and analysis activities to assure that the data collected are of known and acceptable quality. Analytical laboratories will conform with the most recent version of the Contract Laboratory Program (CLP) Inorganic and Organic Statement of Work (SOW), in performing the analyses. Measurement procedures will be in accordance with United States Environmental Protection Agency (EPA) regulations and guidelines. Deviations from approved plans will be documented and justified. Nonmaterial deviations from the SOPs will be documented on field logs and the reason for the deviation recorded. Adherence to approved procedures will be verified during system audits. Significant deviations from SOPs will be proposed to EPA for approval prior to implementation.

2. The applicable QC procedures and levels of effort in assessing the data quality will be dictated by the intended usage of the data as discussed in Section 4.1. For laboratory analyses under DQO Level 3 or 4, the quantitative QA goals have been established using the EPA's report "Laboratory Documentation Requirements for Data Validation," Document Control No. 9QA-07-90 (EPA, 1997).

3. Methods of analysis for DQO Levels 3 or 4 are performed pursuant to standard EPA methods using equivalent contract laboratory program (CLP) protocols and guidelines for QA/QC and data management. Analyses are performed consistent with the requirements of SW-846

(EPA, 1998). For non-CLP analyses (i.e., TO-15 for VOCs in air), the requirements in applicable EPA Region 9 Data Quality Indicator Tables will be used. The Data Quality Indicator Table for Method TO-15 is provided in Appendix B. Detection limits, accuracy, precision and completeness requirements will be achieved for those compounds listed in the AROD at levels which meet or exceed the DQOs as indicated in Section 4.3.

4. The quality of the measurement data generated will be assessed for precision, accuracy, representativeness, comparability, and completeness based on adherence to the sampling procedures described in the SAP, and available external measures of quality (e.g., standard engineering practice, analysis of trip blanks, duplicates, etc.).

4.3 SPECIFIC DATA QUALITY OBJECTIVES

1. The DQOs, including detection limits, accuracy, precision and completeness are presented in Tables 4.2, 4.3 and 4.4 for each of the analytical methods and media. Section 13.0 discusses the methods of calculation for accuracy, precision and completeness. Data from in-business air, and soil gas analyses (vapor wells) will need to achieve Level 3 QA/QC requirements. All other analyses will need to achieve Level 2 QA/QC. The constituents to be analyzed in samples for the WDI Site are listed in Tables 4.2, 4.3 and 4.4 with their corresponding DQOs.

2. Precision of the data is a measure "spread" of the data when more than one measurement is taken of the same sample. Duplicate samples will be collected at a frequency of 10 percent of the samples, or one duplicate per sampling event. Control limits will be demonstrated by the laboratory and will be included in the reported data. For duplicate measurements, precision will be expressed as the relative percent deviation.

3. Accuracy is an assessment of the closeness of the measured value to the true value. Accuracy of chemical test results is assessed by spiking samples with known standards and establishing the average recovery. Control limits will be demonstrated by the laboratory as part of the reporting process. For analyses where a quantitative accuracy target is desired, accuracy measurements will be carried out at a minimum frequency of either 1 in 20 or 1 per set, whichever is more frequent as indicated in Table 4.5.

4. Representativeness is a measure of how closely the results reflect the actual Site concentration or distribution of the chemical compounds. Sampling techniques and handling protocols (e.g., storage, preservation, and transportation) have been developed and are discussed in

Section 6.0. Documentation will involve the use of field logbooks, sample identification and labeling procedures, and Chain-of-Custody documentation, as indicated throughout this report. These procedures will establish that protocols have been followed and that sample identification and integrity have been assured. Field and transportation blanks and duplicates will be used to assess the potential for field and transport contamination, and method variation. Laboratory sample retrieval, storage and handling procedures will follow standard protocols established by the EPA. Laboratory method blanks will be run at the frequency established by SW-846 laboratory QA protocols (EPA, 1998).

5. Comparability of the data will be maintained by using EPA defined procedures where available. Section 8.0 further describes the analytical procedures. Detection limits for the data obtained will be reported as defined for the specific methods.

6. Completeness is a measure of the amount of valid data obtained from the analytical measurement system. The target completeness objective will be 90 percent; the actual completeness may vary depending on the nature of the samples. The completeness of the data will be assessed during QC reviews.

7. Audits, internal QC checks, preventative maintenance and corrective action, as described herein, will be implemented to maintain QA objectives.

5.0 SAMPLING QA/QC PROCEDURES

5.1 SAMPLE DESIGNATION

1. Each sample collected will be identified as having originated from the Site by prefacing each sample designation with "WDI" (for Waste Disposal, Inc.).

2. Each sample collected will be identified by an alpha and numerical code, corresponding to the sample media and number, as illustrated below:
   - WDI-GMW-01 Existing Ground Water Monitoring Well No. 01.
   - WDI-VW-52 Existing Vapor Monitoring Well No. 52.
   - WDI-IBM-03 Existing In-Business Air Monitoring Location No. 3.

3. Samples will also have a two-digit number appended to the sample identifier which corresponds to the sampling round being performed:
   - WDI-GMW-01-27 (i.e., 27th sampling round for Ground Water Well GW-01, inclusive of previous work).
   - WDI-VW-52-27 (i.e., 27th sampling round for Vapor Well VW-52, inclusive of previous work).
   - WDI-IBM-03-12 (i.e., 12th sampling round for In-Business Monitoring Location IBM-03, inclusive of previous work).

5.2 STANDARD OPERATING PROCEDURES

1. As previously stated, the QAPP focuses on the use of SOPs. A major function of this QAPP is to provide a library of SOPs that are applicable to sampling, monitoring system construction, and QA/QC activities. SOPs have been prepared for all currently anticipated sampling activities. The current list of SOPs is provided in Table 5.1 and the SOPs are provided in Appendix A.

2. The SOPs are comprehensive in that they include a list of the equipment and detailed procedures necessary for performing the activity. The SOPs reference, as appropriate, relevant information provided in other SOPs, and the RAWP, OMMP, SAP, QAPP and HASP rather than repeating such information in the SOP. This will help to maintain consistency among the procedures used and minimize the potential for updates to information not being carried through to all documents.

6.0 SAMPLE HANDLING AND CHAIN–OF–CUSTODY RECORDS

6.1 CHAIN-OF-CUSTODY RECORDS

1. A Chain-of-Custody record (see Figure 6.1) will be used as physical evidence to document sample custody. The Chain-of-Custody record provides the means to identify, track, and monitor each individual sample from the point of collection through final data reporting. A Chain-of-Custody record will be required for each shipment of samples. In addition, the sampler will designate which samples are to be used for laboratory QA/QC purposes. Corrections will consist of line-out deletions that are initialed and dated; erasures or "white-out" will not be permitted. The following information will appear on the Chain-of-Custody record as indicated in SOP I.

   - Project name and identification number.
   - Name of site.
   - Sampling location(s) and identification number(s).
   - Sampling dates and times for samples.
   - Number of samples.
   - Number of sample containers.
   - Field measurements, if applicable.
   - Analyses requested.
   - Name of courier service and air bill number.
   - Name of laboratory.
   - Signatures of sampler.

2. The sampler will complete a Chain-of-Custody record to accompany each sample shipment from the field to the laboratory. After completion of the Chain-of-Custody record, one copy will be placed in a plastic bag and secured in the cooler or shipping container. One copy will be retained by the sampler and one copy will be submitted to the project file. The courier does not need to sign the Chain-of-Custody form if samples are in sealed coolers with custody seals and the Chain-of-Custody form is placed inside the cooler.

3. The laboratory representative who accepts the incoming sample shipment will inspect the samples and documents and immediately report discrepancies or damaged samples, labels, etc. to the Project Manager and will sign and date the Chain-of-Custody record to acknowledge receipt of samples. This signed copy will be returned with the analytical reports.

6.2 SAMPLE HANDLING

6.2.1 SAMPLE CONTAINERS

1. Sample containers will meet or exceed EPA Level 2 or 3 requirements depending on the media and will be certified clean by the supplier prior to use. Sample container types are specified in Tables 4.2, 4.3 and 4.4 for each type of analysis requested.

2. Sampling kits will be provided to the field team leader by the laboratory. The project manager will be responsible for ordering sampling kits for the duration of the project. Sampling kits will be shipped prior to the start of each sampling phase. Additional sampling kits may also be required during the period of sampling.

3. Upon arrival, designated personnel will check each shipment to verify that the correct number and type of containers have been shipped and received. The sample custodian will be notified if discrepancies exist between the sample shipment and sample order. The sampling kits will be enclosed in coolers, and will include the appropriate sample containers, Chain-of-Custody record forms, and appropriate shipping blanks and field blanks (supply of reagent water). Completed sampling kits will be returned to the sample custodian by the field sampler after the samples have been collected.

4. Each sample container will be individually labeled. Clear plastic tape will be placed over each completed label to protect it from damage.

5. The field team leader will assure that each box of sample containers has its appropriate certificate from the supplier.

6.2.2 SAMPLE PRESERVATION

1. Sample preservation requirements are specified in Tables 4.2, 4.3 and 4.4 for each type of analysis requested, and media.

2. The field team leader will assure that the appropriate equipment for sample preservation is available in the field and that proper documentation of their use has been made in the field sampling logbook.

6.2.3 SAMPLE SHIPMENT

1. Samples will be packed in the following manner for shipment as provided in SOP H:
   - Each sample container will be wrapped in bubble pack or other packing material, placed in separate, sealable plastic bags, and then placed in an ice chest precooled to 4 degrees Celsius (°C) with Blue Ice® packages or double-bagged ice packets.
   - The completed Chain-of-Custody record going to the laboratory will be placed in a sealable plastic bag, which will then be placed in the cooler.
   - The cooler lid will then be taped shut with strapping/packaging tape.
   - A custody seal will be completed, signed and attached to the lid and the front of the cooler for hinged coolers. Two custody seals will be attached to coolers with removable lids. One will be attached to the front and one to the back of these coolers. A label will be filled out and attached to each cooler.
   - The coolers will be hand-delivered or shipped via overnight carrier to the laboratory at the end of each day's sampling.

2. The field team leader will check each sample shipment to assure proper labeling, packaging and documentation.

7.0 CALIBRATION PROCEDURES AND FREQUENCY

7.1 FIELD CALIBRATION PROCEDURES

1. Field equipment requiring calibration includes portable Volatile Organic Compound (VOC) monitoring equipment such as the PID/FID methane monitor, and ground water monitoring equipment such as an electrical conductivity (EC) probes and pH meters. These instruments will be calibrated prior to and at the completion of each work day, to standards in accordance with procedures and schedules outlined in SOP W and in the manufacturer's handbook. The calibration standards for these instruments and the suppliers from which standards will be obtained are:
   - FID 100 parts per million (ppm) span gas and 10,000 ppm (methane in air) from Foxboro Company, Foxboro, Massachusetts.
   - EC 223, 1,000 micromhos per centimeter (µmhos/cm) from Fisher Scientific, Tustin, California.
   - pH 4, 6.86, 10 buffers from Fisher Scientific, Tustin, California.

2. Equipment requiring daily calibration will be uniquely identified by using either the manufacturer's trade name, model, and serial number or other means. A label with the identification number and the date when the next calibration is due will be physically attached to the equipment. If this is not possible, records traceable to the equipment will be readily available for field reference. In addition, the results of calibrations and record of repairs will be recorded in the Daily Field Report or appropriate monitoring forms in SOP W.

3. Scheduled routine calibration of testing equipment does not relieve field personnel from the responsibility of employing properly functioning equipment. If an individual suspects an equipment malfunction, the device will be removed from service, tagged so that it is not inadvertently used, and the appropriate personnel notified so that a recalibration can be performed or substitute equipment can be obtained.

4. Equipment that fails calibration or becomes inoperable during use will be removed from service, segregated to prevent inadvertent use, and tagged to indicate that it is out of calibration. Such equipment will be satisfactorily repaired and/or recalibrated before reuse. Equipment that cannot be repaired will be replaced.

5. Results of activities performed using equipment that has failed recalibration will be evaluated. If the activity results are adversely affected, the results of the evaluation will be documented and the appropriate personnel notified.

6. If QC audits result in detection of unacceptable conditions or data, the field activities manager will be responsible for developing and initiating corrective action. The project manager will be notified if nonconformance of the specific program is significant or requires special expertise not readily available to the project team. Corrective action may include:
   - Reanalyzing samples if holding time criteria permits.
   - Resampling and analyzing.
   - Evaluating and amending sampling and analytical procedures.

7.2 LABORATORY CALIBRATION PROCEDURES

1. For analysis of the Site's media samples, the required calibrations will be performed in accordance with EPA established methods. Analyses calibrations will be performed as discussed below. Specific calibration procedures will be incorporated into this document as part of the selected laboratories' QA/QC documentation.

2. Major instrumentation used for analyses include gas chromatograph/mass spectrometers (GC/MS) for organic analyses, electron capture detector (ECD) for pesticide analysis and inductively coupled, argon plasma, and atomic absorption spectrophotometers for inorganic analyses. Pursuant to standard laboratory procedures, continuing calibration will be performed daily prior to analysis. Initial calibration for volatiles and semivolatiles consists of analyzing standard calibration gases containing compounds of interest at five concentration levels. One of the levels is prepared at or near the detection limit. Average response factors (RF) are generated for each compound as follows:

$$RF = (A_x C_{is} / A_{is} C_x)$$

where:

A_x = Area of the characteristic ion for the compound being measured.
A_{is} = Area of the characteristic ion for specific internal standard.
C_x = Concentration of the compound being measured (μg/μL).
C_{is} = Concentration of the specific internal standard (μg/μL).

3. Percent relative standard deviation in the RF for compounds of interest must be less than or equal to 30 percent. Initial calibration for external standards will be performed by preparing a minimum of five concentration levels for each parameter of interest. Each calibration standard is analyzed, and the area response versus the concentration is tabulated. The ratio of response to concentration (calibration factor) is a constant over the working range, less than or equal to a difference of 20 percent. Once the initial calibration criteria are met, a daily point calibration mix is checked. The percent difference must be less than or equal to 15 percent.

4. A calibration-check compound (CCC) mixture will be analyzed by the laboratory at least once per day, or once every 12 hours during the analysis, whichever is more frequent. The CCC mixture will contain each of the target analytes. The percent difference for the CCC mixture should be less than 20 percent for volatiles. The CCC will be used to check the validity of the initial calibration. A system performance-check compound (SPCC) mixture will be analyzed every 12 hours, or once per day, whichever is more frequent. The minimum RF value for a SPCC compound is 0.300 for volatiles. The SPCC is used to check the performance of the GC/MS system. The SPCC mixture will contain each of the target analytes. The above criteria must be met before sample analysis begins. The compounds used in the CCC and SPCC are listed in EPA Method 8260B. Each time the standards are injected, the RF is calculated. These RFs must be within ±20 percent relative standard deviation (RSD).

5. A CCC mixture for semivolatile organic compounds (SVOCs) will be analyzed every 12 hours of continuous operation, or once per day, whichever is more frequent. The percent difference for the CCC mixture should be less than 20 percent for SVOCs. The CCC will be used to check the validity of the initial calibration. An SPCC mixture will be analyzed every 12 hours of continuous operation, or once per day, whichever is more frequent. The minimum RF value for a SPCC compound is 0.250 for SVOCs. The SPCC is used to check the performance of the GC/MS system. The above criteria must be met before sample analysis begins. The compounds used in the CCC and SPCC are listed in EPA Method 8270C. Each time the standards are injected, the RF is calculated. These RFs must be within ±30 percent RSD.

6. Detection limits for analytes (parameters) are listed in Tables 4.2, 4.3 and 4.4.

7. The inorganic instrumentation for analysis of metals includes an inductively coupled, argon plasma simultaneous spectrophotometer (ICAP) and a graphite furnace atomic absorption (GFAA) spectrophotometer. Standards will be prepared by diluting stock solutions. They will be prepared fresh each time an analysis is to be made. At least three concentrations will be prepared in an appropriate range. After initial calibration, a continued calibration verification will be conducted at a frequency of 10 percent, or every two hours. The same continuing calibration standard will be used throughout the analytical run. To verify linearity, an ICAP standard at least two times the detection limit will be analyzed at the beginning and at the end of each sample analysis run. A calibration blank will be analyzed at each wavelength after every initial and continuing calibration verification, at a frequency of 10 percent, or every two hours during a run. Specific instrumentation calibration criteria will be incorporated in this document as part of the selected laboratories' QA/QC documentation.

8. Corrective action will be initiated when the following problems arise with precision and accuracy of the spike data: (1) when a data point falls beyond the established upper or lower control limit, (2) when there are seven consecutive points on the same side of the mean on a control chart, and (3) less than 50 percent of the data points fall within plus or minus one relative standard deviation of the mean. The first step will be to repeat the analysis on the matrix spike/spike duplicate which failed. If this set of data falls within the control limits, the analysis may be treated as a random error. If the repeated analysis continues to show error, a laboratory control spike/spike duplicate will be analyzed. If this analysis is in control, the out of control matrix spike/matrix spike duplicate can be attributed to matrix interference. If the laboratory control spike/spike duplicate is out of control the following measures will be taken:
   - Analysis is stopped.
   - Calculations are checked.
   - Standards are verified.
   - Instruments are checked for proper performance through accuracy and precision testing.

   Additional corrective actions will be included in the selected laboratories' documentation.

9. Laboratory control samples will be analyzed for each sample run or batch. Duplicate samples will be analyzed at a frequency of 10 percent of the samples or a minimum of one per sample run or batch as indicated in Table 4.5.

8.0 ANALYTICAL PROCEDURES AND METHODS

1. A summary of the analytical procedures for ground water, vapor wells, in-business air, biovent wells, gas collection system, reservoir leachate, stormwater samples and import fill/excavated soil samples, the analytical QA control limits, and the detection limits to be used for the listed parameters, are presented in Tables 4.2, 4.3 and 4.4.

2. Analyses for VOCs, SVOCs, PCBs and metals will be conducted pursuant to CLP requirements, including detection limits, accuracy, precision, surrogate recoveries, duplicate samples and matrix spikes as indicated in Tables 8.1, 8.2 and 8.3.

3. To achieve the detection limits required for this project, the selected laboratory will demonstrate analytical capabilities with historical and ongoing minimum detection limit (MDL) studies. Documentation will be provided to support the quality of the data that is reported.

4. The minimum QA/QC deliverables for laboratory analyses are indicated as follows:
   - Case Narrative
   - Sample Analysis Receipt
   - Sample Cross Reference (if required)
   - Chain-of-Custody Records
   - Analysis Report
     - Preparation and Analysis Run Logs
     - Raw Data and Chromatograms
   - QC Summary
     - Minimum Detection Limit Summary
     - Initial Calibration Data
     - Detailed QA/QC Data
     - Corrective Action Reports

8.1 VAPOR WELLS, IN-BUSINESS AIR AND RESERVOIR GAS COLLECTION SYSTEM ANALYTICAL PROCEDURES

1. Table 4.3 lists the specific analyses and EPA methods for soil gas monitoring, as well as the analytical holding times and sample volumes associated with these methods. Complete Chain-of-Custody documentation will be initiated in the field, and will accompany the samples to the State-Certified analytical laboratory. Laboratory QA/QC procedures will be equivalent to those required by CLP laboratories, and will conform with these requirements.

8.2 GROUND WATER ANALYTICAL PROCEDURES

1. Table 4.2 lists the specific analyses and Specific EPA methods for ground water monitoring, as well as the preservatives, analytical holding times and sample volumes associated with these methods. Complete Chain-of-Custody documentation will be initiated in the field, and will accompany the samples to the State-Certified analytical laboratory. Laboratory QA/QC procedures will be equivalent to those required by CLP laboratories.

8.3 SOIL ANALYTICAL PROCEDURES

1. Table 4.4 lists the specific analyses and specific EPA methods for the import fill/excavated soil sampling. Complete Chain-of-Custody documentation will be initiated in the field, and will accompany the samples to the State-Certified analytical laboratory. Laboratory QA/QC procedures will be equivalent to those required by CLP laboratories and will conform with these requirements.

9.0 DATA REVIEW, VALIDATION, VERIFICATION AND REPORTING

1. The first level of review and consequent data reduction, validation and reporting is done at the laboratory. Data reduction, validation and reporting at the laboratory will be implemented in accordance with standard EPA methods for analytical and QA protocols. In general, the laboratory reviews will be performed by the laboratory analyst, the QA Officer and laboratory management pursuant to the procedures summarized in Sections 6.0 and 7.0.

2. The second level of data review is conducted outside the laboratory. The data will be reviewed by the Contractor with respect to its usage for regulatory, health/risk and remedial statements in view of QC parameters, as per SOP L.

3. The Contractor will follow the Sample Management Office (SMO) guidelines as described in the EPA technical directive document (EPA No. HQ8410-01, Contract No. 68-01-6699). Ten percent of the soil gas and in-business air samples will be validated pursuant to EPA guidelines and reported with documentation complete enough for independent review.

4. For nonroutine analysis service measurements, the data validation, reduction and reporting will be done at the laboratory level. At this time, no requirements for nonroutine analysis are anticipated. The data reviewers include analysts, QA Officer, and management. The data are reduced and validated by the laboratory in accordance with the individual analysis methodology, QC procedures, the use of appropriate standards and correct transcription. Data will be reviewed outside the laboratory for project usability by the Contractor. The review will include the following:
   - Instrument Calibrations.
   - Standards.
   - Analytical Methodology.
   - Detection Limits.
   - Blanks for Contamination.
   - Accuracy and Precision.
   - Data Reduction, Validation and Reporting.

5. Where the data does not meet QC requirements specified in this document for the items indicated above, the data will be flagged with qualifiers. Commonly used qualifiers include:
   - J - Estimated, usable for limited purposes. The data are qualitatively acceptable, but not quantitatively acceptable.
   - R - Rejected, unusable. The data are qualitatively and quantitatively unacceptable.

- [ ] - The result is between the Instrument Detection Limit (IDL) and the Contract Required Detection Level (CRDL) and is subject to inaccuracies common to the lower end of the instruments' linearity.
- No qualifier - Data are acceptable.

6. Field data validation will be based on field logbooks and field audits with regard to proper calibration and procedures as summarized in Section 11.0. Field data will be validated by the Contractor.

7. Management of the data generated by the investigations will be handled as follows:
   - Laboratory data (or field data) is received.
   - Laboratory data reviewed for completeness and accuracy by QA/QC Manager.
   - Errors or corrections are made by the laboratory (or field engineer for field data).
   - Original data reports and corrected data reports are filed by data coordinator.
   - Copies of original or corrected data are distributed by the WDI Coordinator to the appropriate organization.

10.0 QUALITY CONTROL CHECKS AND REQUIREMENTS

10.1 GROUND WATER SAMPLE QUALITY CONTROL

1. Table 4.2 outlines the basic field QC requirements for water samples. Ground water sampling requires trip blanks (only for VOCs), equipment rinsates, field blanks and field duplicates. The following information defines and explains the required field QC samples. Filtration blanks will also be collected.

   - Trip Blanks - Trip blanks are analyte-free water taken from the laboratory to the sampling site and returned to the laboratory with the VOC samples. One trip blank will accompany each cooler containing VOC samples. Each will be stored at the laboratory with the samples and analyzed by the laboratory. Trip blanks will be analyzed only for VOC water samples.
   - Equipment Rinsates - Equipment rinsates are the final, analyte-free water rinse from equipment cleaning. If equipment rinsates are generated (i.e., if disposable bailers are not used), they will be collected daily during a sample event. Initially, only samples collected every other day will be analyzed. If analytes pertinent to the project are found in the rinsate, the remaining samples will be analyzed. The results from the blanks will be used to flag or assess the levels of analytes in the samples. This comparison is made during data validation. The rinsates will be analyzed for the same parameters as the related samples. Equipment rinsate samples will be collected from sampling equipment such as reusable Teflon® stainless steel bailers and trowels.
   - Field Blanks - Field blanks consist of the source water used in decontamination and steam cleaning. At a minimum, one field blank from each event and each source of water will be collected and analyzed for the same parameters as the related samples.
   - Field Duplicates/Splits - The duplicates for water samples will be collected simultaneously. Field duplicates will be collected at a frequency of 10 percent of the total number of sampling points. Duplicates will be sent to the primary laboratory for analysis.
   - Filtration Blanks - Ground water monitoring well samples scheduled for analysis of dissolved metals will be filtered through a 0.45-micrometer (μm) filter during collection. The cleaning procedures of the filtration apparatus, the potential for cross-contamination, and the potential contribution to the sample from the filter itself will be assessed and a filtration blank will be collected for approximately every 15 samples filtered. The filtration blank will be prepared by passing reagent water through a freshly cleaned filtration apparatus, then preserving the sample (if required) for the analyses planned. This sample may also be prepared by filtration of the sample blank aliquot scheduled for inorganic analysis. If a Laboratory Filtration procedure is selected, then these approximate procedures will be accomplished by the laboratory.

10.2 VAPOR WELLS, IN-BUSINESS AIR AND RESERVOIR GAS COLLECTION SYSTEM SAMPLE QUALITY CONTROL

1. Table 4.5 outlines the basic field QC requirements for vapor wells, in-business air and reservoir gas collection system samples. These samples will require the use of field duplicates. Trip blanks and field blanks will not be required since stainless steel Summa canisters will be used. Summa canisters are batch certified by the laboratory prior to delivery to the site. The batch certification serves as a trip blank since there is no way for the sample to become contaminated during transport (as long as the canister pressures stay constant). Past experience on this project indicates that field blanks are not necessary and the field procedures used for sample collection havwe been effective in providing representative samples. In addition, the ambient air samples partially serve the purpose of field blank. The following information defines and explains the required field QC samples:
   - Field Duplicates/Splits - Field duplicates will be collected using a splitter attached to two Summa canisters. Field duplicates will be collected at a frequency of 10 percent of the total number of sampling points or a minimum of at least one field duplicate per day. Duplicate samples will be sent to the primary laboratory for analysis.

10.3 LABORATORY QUALITY CONTROL PROCEDURES

1. Laboratory QC procedures will be consistent with EPA Level 2 and Level 3 QC guidelines, as indicated in SW-846 (EPA, 1998).

2. Laboratory QC procedures will include the following:
   - Instrument calibrations and standards as defined in Section 7.0.
   - Analytical methodology according to methods defined in Tables 4.2, 4.3 and 4.4.
   - Laboratory blank measurements will be performed at a minimum of 1 per day or 1 per 20 samples.
   - Data reduction and reporting will proceed as described in Section 8.0.
   - Accuracy and precision measurements will be performed as defined in Section 13.0, at a minimum of 1 in 20, or 1 per sample group.
   - A minimum of one laboratory control sample will be analyzed with each sample run.

3. The laboratory will report all results, even those below established action levels when feasible.

11.0 PERFORMANCE AND SYSTEM AUDITS

11.1 PERFORMANCE AUDITS

1. The Project Manager will monitor and audit the performance of the QA procedures. Audits may be scheduled to evaluate the execution of sample identification, sample control, Chain-of-Custody procedures, field notebooks, sampling procedures and field measurements.

2. The Field Activities Manager will review work product quality to evaluate whether the project is performed in accordance with approved QA procedures.

3. The Project Manager will request confirmation of audits performed by personnel from the selected laboratory.

4. The Project Manager will coordinate the activities of the review team.

5. Laboratory and system audits are also addressed in SOP M (Appendix A).

11.2 FIELD AUDITS

1. The auditor will prepare a checklist and use it to conduct the audit. The checklist will be developed to accomplish the review of required and necessary items and to document the results of the audit. The elements of the checklist will include the following:
   - Conformance to Procedures.
   - Documentation of Activities.
   - Recordkeeping.

2. Records of field operations will be reviewed to verify that field-related activities were performed in accordance with appropriate project procedures. Items reviewed will include, but will not be limited to, sample log sheets, the calibration records, data resulting from field measurements and Chain-of-Custody documentation.

3. During an audit, and upon its completion, the auditor will discuss the findings with the individuals audited and cite corrective actions to be initiated.

4. Minor administrative findings which can be resolved to the satisfaction of the auditor during an audit need not be reported as items requiring corrective action. Findings that are not resolved during the course of the audit and findings affecting the overall quality of the project, regardless of when they are resolved, will be noted on the audit checklist and in the audit report.

11.3 LABORATORY AUDITS

1. Laboratory audits will be performed by laboratory internal staff in a similar fashion as field audits. These audits will include:
   - Monthly systems audits conducted by the division QA Director.
   - Quarterly audits conducted by the corporate vice president of QA.
   - Special audits by the divisional QA Director or Corporate Vice President of QA when a problem is suspected.

2. The laboratory will also routinely analyze internal check samples such as laboratory QC check samples at a frequency of 10 percent of the total number of samples analyzed, as well as QC "double blind" samples, which will be submitted prior to the analysis of project samples and monthly thereafter by the QA department.

3. The project QA staff or designated personnel may perform audits of any phase of this project at any time during the project. A special audit checklist will be prepared from the requirements stated in the QA Plan, as well as the analytical methods referenced. Titles and specific responsibilities will be included as part of the selected analytical laboratories' QA/QC documentation. Example laboratory audit checklist items are presented in Table 11.1.

12.0 PREVENTATIVE MAINTENANCE PROCEDURES AND SCHEDULES

1. Instrument maintenance logbooks are maintained in the laboratory at all times. The logbooks generally contain a schedule of maintenance, as well as a complete history of past maintenance, both routine and nonroutine.

2. Preventative maintenance such as lubrication, source cleaning, detector cleaning, and the frequency of such maintenance is performed according to the procedures delineated in the manufacturer's instrument manual. Chromatographic carrier gas purification traps, injector liners, and injector septa are cleaned or replaced on a regular basis. Precision and accuracy data are examined for trends and excursions beyond control limits to determine evidence of instrument malfunction. Maintenance will be performed when an instrument begins to degrade as evidenced by the degradation of peak resolution, shift in calibration curves, decrease in sensitivity or failure to meet the QC criteria.

3. Instrument downtime is minimized by keeping adequate supplies of expendable items (i.e., items with an expected lifetime of less than one year). These items include gas tanks, gas line filters, syringes, septa, gas chromatograph columns and packing, ferrules, printer paper and ribbons, pump oil, jet separators, open-split interfaces, and MS filaments.

4. For field equipment (electrical conductivity/pH meter), preventative maintenance will be implemented in accordance with procedures and schedules outlined in the appropriate model's handbook. To minimize downtime, backup equipment such as an extra pH probe will be included in the equipment taken to the field.

13.0 SPECIFIC ROUTINE PROCEDURES TO ASSESS QUALITY ASSURANCE OBJECTIVES MEASUREMENT PARAMETERS

1. Data assessment will follow the in-depth data review and validation procedures described in Section 8.0. An assessment report will summarize the findings of the data review/validation procedures as relevant to project usage. Data accuracy, precision and completeness values will be summarized in the assessment report according to control limits specified in the QAPP. The following section is the quantitative definition of accuracy, precision and completeness.

13.1 ACCURACY

1. For spiked samples, the recovery (r) can be defined as a measure of accuracy:

$$r = (c_1 - c_0)/(c_s \times v_s \times 10^{-3}) \text{ or, on a percentage basis,}$$
$$\%r = (c_1 - c_0)\ 100/(c_s \times v_s \times 10^{-3})$$

where:

c_1 = Measured concentration analyzed in the sample after adding the spike (milligrams per liter [mg/L]).

c_0 = Measured concentration analyzed in the sample without the addition of a spike (mg/L).

c_s = Concentration of standard added to the sample (mg/L).

v_s = Volume of standard added to the sample (L).

13.2 PRECISION

1. This section provides the basis for the quantitative limits used to control data precision. The primary measurement of data precision will be the relative percent difference (RPD) between a duplicate pair of data points:

$$\text{Percent RPD} = \frac{X_2 - X_1}{(X_1 + X_2)/2} \times 100$$

where:

X_1 = first duplicate point value.

X_2 = second duplicate point value.

13.3 COMPLETENESS

1. Measurement completeness (C) can be described as the ratio of acceptable measurements obtained to the total number of planned measurements for an activity. This is defined as:

$$C = 1 - \frac{\text{number of defective items}}{\text{total number of items}} \times 100$$

13.4 REPRESENTATIVENESS

1. Representativeness is a qualitative assessment of whether data represent the media measured. Representativeness should be considered in development of data collection schemes (e.g., sampling locations, frequency, completeness and laboratory analytical scheme). The SOP requirements are designed to maintain consistent sample collection, handling and documentation and assure representative samples. Verification of implementation of the SOPs through audit and validation procedures will assure that the representativeness requirements are being met as provided in SOP M.

13.5 COMPARABILITY

1. Comparability is a qualitative parameter expressing the confidence with which one data set can be compared to another data set. Comparability is dependent upon consistency in sample collection procedures, sample preservation methods, analytical methods and units of data expression. Verification of implementation of the SOPs through audit and validation procedures will assure that the comparability requirements are being met as indicated in SOP M.

14.0 CORRECTIVE ACTION

1. Whenever quality deficiencies for field or laboratory activities are observed that warrant management attention, the QA Officer will issue a formal corrective action request, with multicopy forms to the Project Manager. The Project Manager will complete the form and sign it when corrective action has been implemented. The original will be returned to the QA Officer "to close the loop." The QA Officer maintains a record of corrective action requests.

2. Items that require immediate correction by the operator or analyst will not use the formal corrective action request system. These kinds of corrective actions are required whenever an out-of-control event or potential out-of-control event is noted. The investigative action must be taken promptly, the event should be reported to the Project Manager and, if appropriate, laboratory management.

3. Immediate corrective action may be necessary if:
   - QC data are outside the warning or acceptable windows for precision and accuracy.
   - Blanks contain target analytes above the acceptable levels.
   - Undesirable trends are detected in spike recoveries or RPD between duplicates.
   - There are unusual changes in detection limits.

4. The CLP Scope of Work (SOW) has specific requirements for corrective actions being performed in certain situations. These corrective actions will be performed as stated in the CLP SOW. Corrective actions to be taken for the Non-CLP parameters will be similar to those in CLP, including reextraction and reanalysis as necessary. Laboratory-derived control limits for precision and accuracy or limits specified in this plan will be used to assess performance.

14.1 FIELD CORRECTIVE ACTIONS

1. Field corrective actions are based on the comparability of field measurement data such as pH, specific conductance, temperature, water level height and well depth, etc. It can also include comparability of laboratory analytical results (such as site qualifiers if this is not possible). Laboratory personnel are alerted that corrective actions may be necessary if:
   - QA data are outside the warning or acceptable windows for precision and accuracy established for laboratory control samples.
   - Blanks contain contaminants at concentrations above the levels specified in the laboratory quality management plan for a target compound.
   - Undesirable trends are detected in matrix spike recoveries or relative percentage difference between matrix spike duplicates or surrogates.
   - Unusual changes in detection limits.

- Deficiencies are detected during audits, or from the results of performance evaluation samples.

14.2 LABORATORY CORRECTIVE ACTIONS

1. If nonconformances in analytical methodologies, QA sample results, etc., are identified by the bench analyst, corrective actions will be implemented immediately. Corrective action procedures will be handled initially at the bench level by the analyst, who will review the preparation or extraction procedure for possible errors and check the instrument calibration, spike and calibration mixes, instrument sensitivity, etc. The analyst will immediately notify his/her supervisor as to problems that are identified and the investigation which is being conducted. If the problem persists or cannot be identified, the matter will be referred to the laboratory supervisor and the laboratory Project Manager for further investigation. Once resolved, full documentation of the corrective action procedure is filed by the Project Manager for the contracted laboratory, and the Project QA Officer is provided a corrective action memorandum for inclusion into the project file if data are affected.

2. Data deemed unacceptable following the implementation of the required corrective action measures will not be accepted, and follow-up corrective action measures will be explored.

15.0 QUALITY ASSURANCE REPORTS TO MANAGEMENT

1. The Project Manager may request that a report be made on the performance of sample collection and data quality, calculations or drawings. The report may include:
   - Assessment of measurement data accuracy, precision and completeness.
   - Results of performance audits.
   - Results of systems audits.
   - Identification of significant QA problems and recommended solutions.

2. Alternatively, in lieu of a separate QA Report, sampling and field measurement data quality information may be summarized and included with the raw data as appropriate.

3. The Project Manager will prepare and issue a QA summary report within 30 days of the completion of a sampling event.

16.0 DOCUMENTATION AND RECORDS KEEPING

1. Documentation and records keeping will be performed as indicated in SOP N. These document control procedures apply to project documents that specify quality requirements or prescribe how project activities affecting quality will be conducted. The purpose of these procedures is to present protocol for document control. These procedures include the management of project files, computer files, drawings and document review.

2. The following project personnel are responsible for document control procedures:
   - WDIG Project Coordinator - Responsible for controlling and reviewing the document control procedure.
   - Project Manager - Assists the Project Coordinator with implementation of these procedures.
   - Design Engineer/Technical Personnel - Assists the WDIG Project Coordinator, as requested.
   - Project QA Officer - Responsible for the maintenance and distribution of the QAPP and for verifying compliance with the QA program. The Project QA Officers will manage the QAPP in accordance with this project.

3. The QAPP will be maintained by the Project QA Officer. Copies of the QAPP will be provided to the appropriate QA Officers, WDIG Project Coordinator, and Project Manager. Changes to the QAPP, whether originated by the appropriate QA Officers or other project team members, will be made by the Project QA Officer. Revisions to the QAPP will be designated by marginal notations which indicate the changes. The author or source of the revisions will be indicated clearly by each notation or by a notation convention, such as color-coding, keyed to an explanation included at the beginning of the document. Each version of the QAPP will be identified with a revision number and the date of the revision. A revision document form will be kept by the Project QA Officer in the project files.

17.0 REFERENCES

Environmental Protection Agency (EPA), 2002. *Amended Record of Decision (AROD) - Oils and Subsurface Gas Operable Unit.* June 2002.

EPA, 2001. *EPA Requirements for Quality Assurance Project Plans.* EPA QA/R-5. March 2001.

EPA, 1998. *Test Methods for Evaluating Solid Wastes Physical and Chemical Methods Revision 5 (SW-846).* 1998.

EPA, 1997. *Laboratory Documentation Requirements for Data Validation (9QA-07-97).* July 1997.

TRC, 2003a. *Remedial Action Workplan*, Waste Disposal, Inc. Superfund Site. October 2003.

TRC, 2003b. *Final (100%) Design Report*, Waste Disposal, Inc. Superfund Site. March 2003.

TRC, 2003. Health and Safety Plan (HASP) (Prefinal, October 2003).

TRC, 2003. Sampling and Analysis Plan (SAP) (Final, November 2003).

TABLE 1.1

CROSSWALK BETWEEN EPA QA/R-5 AND THE QAPP WASTE DISPOSAL, INC. SUPEFUND SITE

QA/R-5 ELEMENTS		QAPP ELEMENTS
A1	Title and Approval Sheet	Title Page and Approval Page
A2	Table of Contents	Table of Contents
A3	Distribution List	Distribution List
A4	Project Task/Organization	3.0 Project Organization and Responsibility and refer to Remedial Action Workplan (RAWP)
A5	Problem Definition/Background	2.0 Project Description
A6	Project Task/Description	2.0 Project Description and refer to Sampling Analysis Plan (SAP), RAWP, 100% Design Report
A7	Quality Objectives and Criteria	4.0 Data Quality Objectives
A8	Special Training/Certification	3.0 Project Organization and Responsibility and refer to RAWP
A9	Documents and Records	16.0 Documentation and Records Keeping
B1	Sampling Process Design	Refer to SAP, RAWP and 100% Design Report
B2	Sampling Methods	5.0 Sampling QA/QC Procedures
B3	Sample Handling and Custody	6.0 Sample Handling and Chain-of-Custody Records
B4	Analytical Methods	8.0 Analytical Procedures and Methods
B5	Quality Control	10.0 Quality Control Checks and Requirements
B6	Instrument/Equipment Testing, Inspection and Maintenance	12.0 Preventative Maintenance Procedures and Schedules
B7	Instrument/Equipment Calibration and Frequency	7.0 Calibration Procedures and Frequency
B8	Inspection/Acceptance of Supplies and Consumables	Standard Operating Procedures in Appendix A
B9	Non-Direct Measurements	Not Applicable—Requirement Applies in Particular to Investigation Data
B10	Data Management	16.0 Documentation and Records Keeping
C1	Assessments and Response Actions	11.0 Performance and System Audits 14.0 Corrective Actions
C2	Reports to Management	15.0 Quality Assurance Reports to Management
D1	Data Review, Verification and Validation	9.0 Data Review, Validation, Verification and Reporting
D2	Verification and Validation Methods	9.0 Data Review, Validation, Verification and Reporting
D3	Reconciliation with User Requirements	13.0 Specific Routine Procedures to Assess Quality Assurance Objectives Measurement Procedures

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TABLE 3.1

SUMMARY – KEY POSITION RESPONSIBILITIES
WASTE DISPOSAL, INC. SUPERFUND SITE

POSITION	RESPONSIBILITIES
WDIG Project Coordinator **Roberto Puga,** **(Project Navigator, Ltd.)**	• Overall project management. • Overall RA work confirms to AROD, CD, SOW, RAWP and related Site Management Plans, and Remedial Design Plans. • Coordinates implementation of the Institutional Controls Monitoring and Enforcement Work Plan (to be implemented by WDIG Trustee) and Community Relations Participation Plan. • Understands applicable requirements of the CD, AROD, SOW and the Remedial Design Plans. • Fulfills the duties and requirements for the Project Coordinator as described in Section XIII of the Consent Decree. • Serves as the focal point for communication between the EPA, WDIG, IAC and the technical consultants. • Technical and managerial responsibility for the project, including assisting with contract negotiations and authorization and accounting for the following: - Analytical laboratories. - Technical consultants. - Construction contractors/subcontractors and suppliers. • Provides overall management and implementation of project-wide QA. • Provides Site implementation of OMMP and project management for OM&M activities. • Reviews applications for payment with Design Engineer, the CQA Contractor, OM&M Supervising Contractor, subcontractors, technical consultants and vendors. • Monitors performance with respect to project schedules, budgets and objectives.

TABLE 3.1

SUMMARY – KEY POSITION RESPONSIBILITIES WASTE DISPOSAL, INC. SUPERFUND SITE (Continued)

POSITION	RESPONSIBILITIES
Design Engineer: **Ken Floom, P.E.** **(Project Navigator, Ltd.)**	• Understands the requirements of the CD, AROD, SOW and the Remedial Design Plans. • Professional Engineer in responsible charge of the project as defined by the Professional Engineers Act (Business and Professions Code Section 6700 et seq.) • Acts as technical liaison for the WDIG Coordinator and EPA for engineering design concerns, as directed by the WDIG Coordinator. • Provides and/or interprets drawings or other engineering information for the WDIG Coordinator or his designate. • Reviews and evaluates construction and OM&M contractor's suggestions for modifications in engineering design plans. Reports the results of the review or evaluation, and suggestions and modifications to the WDIG Coordinator. • Implements changes to Remedial Design Plan Engineering Drawings and other engineering information as directed by the WDIG Coordinator. • Prepares, reviews, and submits As-Built Drawings and/or reports required for this project, ensuring the technical quality of reports and submissions are acceptable and that procedures used to develop conclusions and recommendations are appropriate and correctly applied. • Assures that the statistical analysis requirements for evaluating monitoring data are performed by qualified personnel who demonstrate experience in statistical analysis procedures includes the use of DUMPStat.
OM&M Supervising Contractor (Remedial Construction Services, L.P.)	• Understands the requirements of the Remedial Design Plans. • Understands requirements of the AROD, CD, SOW, RAWP, OMMP, and Remedial Design Plans. • Performs OM&M as authorized by the WDIG. • Understands the Remedial Design construction specifications and plans. • Manages the day-to-day activities of the subcontractors and project support services with respect to schedules, budgets and objectives. • Prepares project summary and status reports. • Reviews inspection and correction action reports with respect to the work efforts of the subcontractors and technical consultants. • Provides construction and project management for construction and OM&M activities. • Serves as the WDIG Coordinator's liaison with subcontractors and Design Engineer for construction and OM&M related tasks.

TABLE 3.1

SUMMARY – KEY POSITION RESPONSIBILITIES
WASTE DISPOSAL, INC. SUPERFUND SITE
(Continued)

POSITION	RESPONSIBILITIES
Field Engineer	• Supervises/oversees implementation of field elements of the OMMP, QAPP and SAP under the direction of the OM&M Supervising Contractor. • Coordinates with Field Technicians, Sampling Teams,, subcontractors, Design Engineer and CQA Contractor to address technical questions, issues, modifications and problems. • Coordinates the approval and implementation of field OMMP and engineering changes. • Prepares activity logs. • Provides general support to Field Technicians.
OM&M QA Officer (TRC)	• Assures that performance standards will be attained and OM&M activities meet the OMMP requirements. • The OM&M QA Officer must be independent from the OM&M contractors and subcontractors. • Has authority to stop OM&M activities. • Understands the requirements of agreements/contracts with contractors, subcontractors, and material equipment and instrumentation suppliers/vendors used for OM&M activities. • Administers and verifies compliance with QAPP and SAP. • Trains support personnel, if necessary, for OM&M oversight activities.
OM&M QA Officer (TRC) (Continued)	• Monitors implementation of corrective actions and modifications. • Verifies that system or component tests, equipment and system start-ups, are conducted in the presence of appropriate personnel, and documenting and maintaining records thereof. • Accompanies visiting inspectors representing public, regulatory, or other agencies having jurisdiction over the project. Reports results of these inspections to the WDIG Coordinator, and documents and maintains records thereof. • Reviews and evaluates contractor's suggestions/requests for modifications in Drawings or Specifications. Evaluates, reports and documents suggestions and modifications with the WDIG Coordinator and the Design Engineer.

TABLE 3.1

SUMMARY – KEY POSITION RESPONSIBILITIES WASTE DISPOSAL, INC. SUPERFUND SITE (Continued)

POSITION	RESPONSIBILITIES
Technical Consulting and Project Support Services Personnel	• Reports to the WDIG Coordinator or OM&M Supervising Contractor. • Understands applicable requirements of the CD, AROD, SOW and Remedial Design Plans. • Administers and verifies compliance with QAPP. • Understands and performs project activities according to scope, schedule, and budget. • Understands and performs OM&M activities in accordance with accepted technical and safety procedures. • Performs corrective actions as requested by the WDIG Coordinator and/or OM&M Supervising Contractor. • Prepares and reviews reports required for this project, ensuring technical quality. • Conducts field activities including training of field personnel, sample collection, field measurements and quality control. • Performs data validation procedures (as necessary).
Project Analytical Laboratories	• Performs all analyses in accordance with requirements of the OMMP, QAPP and SAP for AROD contaminant constituents according to accepted EPA methods as indicated in the CD, which include methods documented in 40 CFR Part 136 and *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (SW-846) and any additions or revisions to these requirements. • Capable of producing submittals of sufficient quality to meet the current requirements for the Contract Laboratory Program Statement of Work for Inorganic Analysis and for Organic Analysis. • Participate in an EPA or EPA-equivalent QA/QC program.

TABLE 4.1

DATA QUALITY OBJECTIVE DEVELOPMENT PROCESS
WASTE DISPOSAL, INC.

ACTIVITY	SOIL GAS MONITORING				GROUND WATER MONITORING	LEACHATE COLLECTION WELLS	STORMWATER MONITORING	IMPORTED FILL
	Vapor Wells	Biovent Wells	In-Business Air	Reservoir Gas Collection System				
Objectives	To fulfill monitoring requirements and identify changes in soil gas conditions.	To verify effectiveness of Biovent Well operation.	To fulfill monitoring requirements and identify changes in soil gas conditions.	To fulfill monitoring requirements and identify changes in soil gas conditions.	To fulfill monitoring requirements and identify changes in ground water conditions.	Waste characterization for disposal.	To fulfill monitoring requirements and identify changes in surface water quality conditions.	To assure that the imported fill is free from contamination.
Intended Data Use	Confirm that soil gas in Compliance Vapor Wells is meeting Soil Gas Performance Standards listed in the Amended Record of Decision (AROD) and Table 4.1A and evaluate changes in soil gas conditions in Compliance and Non-Compliance Vapor Wells.	Confirm that wells are operating properly.	Confirm the soil gas is not migrating into buildings.	Confirm that soil gas is meeting AROD requirements. SCAQMD rules and ARARs.	Confirm that current ground water conditions are being maintained or improve.	Compare with limits allowed by intended disposal facility.	Confirm that stormwater runoff water quality does not indicate the presence of site or tenant COCs.	Comparison with risk-based screening levels, such as Region IX Industrial Preliminary Remediation Goals.
Required Analytical Methods of DQO Levels	VOCs (TO-15) Methane (25C) Total Gaseous Nonmethane Organics (TGNMO) (25C) Fixed Gases (3C)	None. Monitor to confirm air flow only.	VOCs (TO-15) Methane (25C) TGNMOs (25C)	VOCs (TO-15) Methane (25C) TGNMO (25C) Fixed Gases (3C)	VOCs (8260B) Dissolved Metals (6010B/7471B) General Parameters[1] SVOCs (8270C)	VOCs (8260B) Dissolved Metals (6010B/7471B) SVOCs 8270(C) PCBs (8082)	VOCs (8260B) Total Suspended Solids (TSS) (160.2) Oil & Grease (413.2) CAM Metals (6010B/7471B) SVOCs 8270(C)	CAM Metals (6010B/7471A) TPH (8015D) VOCs (8260B) PCBs (8081) Pesticides (8082)
	DQO Level 3		DQO Level 3	DQO Level 2	DQO Level 2	DQO Level 2	DQO Level 2	DQO Level 2
Contaminants of Concern	VOCs[2] Methane[2] TGNMOs[2]	None. Monitor to confirm air flow only.	VOCs[2] Methane[2] TGNMOs[2]	VOCs[2] Methane[2] TGNMOs[2]	VOCs Metals SVOCs	VOCs Metals SVOCs PCBs	Oil & Grease Metals TSS VOCs SVOCs	Metals BTEX Petroleum Hydrocarbons Chlorinated VOCs PCBs and Pesticides
Required Detection Levels	Required detection limits are provided in Table 4.3 of the QAPP	None. Monitor to confirm air flow only.	Required detection limits are provided in Table 4.3 of the QAPP	Required detection limits are provided in Table 4.3 of the QAPP	Required detection limits are provided in Table 4.2 of the QAPP	Required detection limits are provided in Table 4.2 of the QAPP	Required detection limits are provided in Table 4.2 of the QAPP	Required detection limits are provided in Table 4.4 of the QAPP
Regulatory Standards	Soil Gas Performance Standards[2]	None. Monitor to confirm air flow only.	Indoor Air Threshold Levels[2]	SCAQMD Emissions Limits	None	None	MCLs[3]	None[4]
Sampling Location	See Figure 5.0 of the OMMP.	See Figure 4.1 of the OMMP.	See Figure 5.0 of the OMMP.	See Figure 5.0 of the OMMP.	See Figure 5.0 of the OMMP.	See Figure 4.1 of the OMMP.	See Figure 5.6 of the OMMP.	One sample per borrow source

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(1) General parameters include pH (SM4500 H, B), Chloride (300.0), sulfate (300.0) and total dissolved solids (160.1).

(2) Soil Gas Performance Standards from EPA Amended Record of Decision (AROD), Waste Disposal, Inc., June 2002, and Table 4.1A.

(3) MCLs are not Performance Standards. There are no Performance Standards in the AROD for this media.

(4) Results should be compared to risk-based screening levels, such as the Region IX Industrial Preliminary Remediation Goals.

TABLE 4.1A

SOIL GAS PERFORMANCE STANDARDS AND INDOOR AIR THRESHOLD LEVELS WASTE DISPOSAL, INC. SUPERFUND SITE

COMPOUND	SOIL GAS PERFORMANCE STANDARD(1) (ppbv)	INDOOR AIR THRESHOLD LEVEL(2) (ppbv)(3)
Benzene	10	2.0
Carbon Tetrachloride	21	0.68
Chloroform	20	3.4
1,2-Dibromoethane	1	0.06
1,2-Dichloroethane	20	3.6
cis-1,2-Dichloroethene	180	18.6
1,1-Dichloroethene	100	53(4)
1,2-Dichloropropane	20	1.86
trans-1,2-Dichloroethene	400	36.8
Ethylbenzene	5,000	490
Tetrachloroethene	500	10.6
Toluene	2,000	212.0
1,1,1-Trichloroethane	3,600	368.0
Trichloroethene	200	3.0 $\mu g/m^3$ (5)
Vinyl Chloride	10	0.25
m,p-Xylene	4,000	142.8
o-Xylene	4,000	142.8
Methane	1.25% (near buildings) 5.0% (site perimeter)	1.25%

(1) EPA, Amended Record of Decision, Waste Disposal, Inc. June 2002.
(2) CDM Federal Programs Corporation, Subsurface Gas Contingency Plan, Waste Disposal, Inc. Superfund Site, July 1997.
(3) Indoor Air Threshold Levels are expressed in part per billion volume (ppbv), except for Trichloroethene (TCE) that is expressed in $\mu g/m^3$.
(4) Developed separately by EPA (i.e., subsequent to the *Subsurface Gas Contingency Plan* [see footnote (2)]).
(5) Pursuant to EPA policy requirements, the indoor air *interim* threshold level for Trichloroethene (TCE) has been revised to 3.0 $\mu g/m^3$ (0.56 ppbv at 25 °C and 1 atm) for the in-business ambient air monitoring program. Please note that this value may be subject to future revision.

TABLE 4.2

GROUND WATER AND RESERVOIR LIQUIDS ANALYSES[1] AND QUALITY CONTROL OBJECTIVES WASTE DISPOSAL, INC.

PARAMETERS	ANALYTICAL PROCEDURE (EPA METHOD NO.)	LABORATORY SPECIFIC MEASUREMENT QUALITY OBJECTIVES (MQOs)				TYPE OF CONTAINER	PRESERVATIVE	ANALYTICAL HOLDING TIMES	REMARKS
		Reporting[10] Limit (µg/L)	Accuracy[2] (%)	Precision[3] (%)	Completeness (%)				
METALS						One 500 mL Bottle Unfiltered/One 500 mL Bottle filtered	Acidified to pH <2 with Nitric Acid After Filtration	6 Months (28 days for mercury)	
• Aluminum	6010B	50	75 - 125	± 20	90				
• Antimony	6010B	10[9]	75 - 125	± 20	90				
• Arsenic	6010B	5.0	75 - 125	± 20	90				
• Barium	6010B	10.0	75 - 125	± 20	90				
• Beryllium	6010B	4.0	75 - 125	± 20	90				
• Cadmium	6010B	5.0	75 - 125	± 20	90				
• Calcium	6010B	100	75 - 125	± 20	90				
• Cobalt	6010B	10	75 - 125	± 20	90				
• Chromium	6010B	5	75 - 125	± 20	90				
• Iron	6010B	40	75 - 125	± 20	90				
• Lead	6010B	5	75 - 125	± 20	90				
• Magnesium	6010B	20	75 - 125	± 20	90				
• Manganese	6010B	20	75 - 125	± 20	90				
• Mercury	7470A	0.2	75 - 125	± 20	90				
• Nickel	6010B	10	75 - 125	± 20	90				
• Selenium	6010B	5	75 - 125	± 20	90				
• Sodium	6010B	500	75 - 125	± 20	90				
• Thallium	6010B	5	75 - 125	± 20	90				
• Vanadium	6010B	10.0	75 - 125	± 20	90				
• Zinc	6010B	20	75 - 125	± 20	90				
VOLATILE ORGANIC COMPOUNDS						Three 40 mL VOA Vials	Acidified to pH <2 with Hydrochloric Acid Cool to 4°C	14 Days	
• 1,1,1-Trichloroethane	8260B	2	N/A	N/A	90				
• 1,1,2,2-Tetrachloroethane	8260B	2	N/A	N/A	90				
• 1,1,2-Trichloroethane	8260B	2	N/A	N/A	90				
• 1,1-Dichloroethane	8260B	2	65 - 135	± 20	90				
• 1,1-Dichloroethene	8260B	5	60 - 135	± 20	90				
• 1,2-Dichloroethane	8260B	2	60 - 150	± 20	90				
• 1,2-Dichloropropane	8260B	2	N/A	N/A	90				
• 2-Butanone	8260B	10	N/A	N/A	90				
• 2-Chloroethyl Vinyl Ether[4]	8260B	5	N/A	N/A	90				
• 2-Hexanone	8260B	10	N/A	N/A	90				
• 4-Methyl-2pentanone	8260B	5	N/A	N/A	90				
• Acetone	8260B	10	N/A	N/A	90				
• Benzene	8260B	2	60 - 125	± 20	90				
• Bromodichloromethane	8260B	2	70 - 140	± 20	90				
• Bromoform	8260B	5	50 - 140	± 25	90				
• Bromomethane	8260B	5	N/A	N/A	90				
• Carbon Disulfide	8260B	5	N/A	N/A	90				
• Carbon Tetrachloride	8260B	5	N/A	N/A	90				
• Chloroethane	8260B	5	N/A	N/A	90				

(1) Includes reservoir liquids sampling and analyses.
(2) Based on Matrix Spike Percent Recovery, if based on Laboratory Control Samples recovery, accuracy ±20% for metals; varies for 8260.
(3) Based on Duplicate Samples.
(4) Zone is a separate run from an unpreserved vial.
(5) Not calibrated. Open scan only.
(6) Ground water samples will not be analyzed for pesticides/PCBs.
(7) Normally 1.0 µg/L each PCB, but can meet 0.5 if requested on COC.
(8) Aroclor-1016, 45-120%, ±20%; Aroclor-1260 55-120%, ±25%; other PCBs – N/A.
(9) Reporting limit exceeds California or Federal Maximum Contaminant Levels (MCLs) due to laboratory limitations. However, MCLs are greater than the laboratory method detection limit, so estimated values will be provided for comparison with MCLs. The EPA may require follow-up actions for estimated values.
(10) Reporting limits for reservoir liquids are 100 times the listed reporting limits, which are for ground water.

TA[illegible].2

GROUND WATER AND RESERVOIR LIQUIDS ANALYSES[1] AND QUALITY CONTROL OBJECTIVES
WASTE DISPOSAL, INC.
(Continued)

PARAMETERS	ANALYTICAL PROCEDURE (EPA METHOD NO.)	LABORATORY SPECIFIC MEASUREMENT QUALITY OBJECTIVES (MQOs)				TYPE OF CONTAINER	PRESERVATIVE	ANALYTICAL HOLDING TIMES	REMARKS
		Reporting[10] Limit (µg/L)	Accuracy[2] (%)	Precision[3] (%)	Completeness (%)				
VOLATILE ORGANIC COMPOUNDS (Cont'd)									
• Chloroform	8260B	2	70 - 130	20	90				
• Chloromethane	8260B	5	N/A	N/A	90				
• cis-1,3-Dichloropropene	8260B	2[9]	N/A	N/A	90				
• 1,2, Dibromoethane	8260B	2	N/A	N/A	90				
• Ethylbenzene	8260B	2	N/A	N/A	90				
• Methylene Chloride	8260B	2	N/A	N/A	90				
• Tetrachloroethene	8260B	2	70 - 130	20	90				
• Toluene	8260B	2	N/A	N/A	90				
• trans-1,2-Dichloroethene	8260B	2	N/A	N/A	90				
• trans-1,3-Dichloropropene	8260B	2	N/A	N/A	90				
• Trichloroethene	8260B	2	70 - 125	20	90				
• Vinyl Acetate	8260B	5	N/A	N/A	90				
• Vinyl Chloride	8260B	2[9]	40 - 135	25	90				
• Xylenes	8260B	2	N/A	N/A	90				
SEMIVOLATILE ORGANIC COMPOUNDS						Two 1-Liter Amber Glass Bottle with Teflon® Seal.	None. Cool to 4°C.	7 Days to Extract. 40 Days after Extraction	
• Acenaphthene	8270C	10	50 - 120	20	90				
• Acenaphylene	8270C	10	N/A	N/A	90				
• Anthracene	8270C	10	N/A	N/A	90				
• Benzo(a)anthracene	8270C	10	60 - 120	20	90				
• Benzo(b)fluoranthene	8270C	10	N/A	N/A	90				
• Benzo(k)fluoranthene	8270C	10	N/A	N/A	90				
• Benzo(g,h,i)perylene	8270C	10	N/A	N/A	90				
• Benzo(a)pyrene	8270C	10	N/A	N/A	90				
• bis(2-Chloroethyl)ether	8270C	10	N/A	N/A	90				
• bis(2-Chloroisopropyl)ether	8270C	10	N/A	N/A	90				
• bis(2-Ethylhexyl)phthalate	8270C	50	N/A	N/A	90				
• 4-Bromophenyl-phenylether	8270C	10	N/A	N/A	90				
• Butylbenzylphthalate	8270C	20	N/A	N/A	90				
• 4-Chloroaniline	8270C	10	N/A	N/A	90				
• 4-Chloro-3-methylphenol	8270C	20	55 - 120	25	90				
• 2-Chloronaphthalene	8270C	10	N/A	N/A	90				
• 4-Chlorophenyl-phenylether	8270C	10	N/A	N/A	90				
• Chrysene	8270C	10	N/A	N/A	90				
• Dibenz(a,h)anthracene	8270C	20	35 - 160	25	90				
• Dibenz(a,h)acridine[5]	8270C	–	–	–	–				
• Dibenzofuran	8270C	10	N/A	N/A	90				
• Di-n-butylphthalate	8270C	20	N/A	N/A	90				
• 1,2-Dichlorobenzene	8270C	10	N/A	N/A	90				
• 1,3-Dichlorobenzene	8270C	10	N/A	N/A	90				
• 1,4-Dichlorobenzene	8270C	10	40 - 120	25	90				
• 3,3-Dichlorobenzidine	8270C	40	N/A	N/A	90				
• 2,4-Dichlorophenol	8270C	10	N/A	N/A	90				
• Dimethylphthalate	8270C	10	N/A	N/A	90				
• 4,6-Dinitro-2-methylphenol	8270C	40	N/A	N/A	90				
• 2,4-Dinitrophenol	8270C	100	N/A	N/A	90				
• 2,4-Dinitrotoluene	8270C	10	60 - 140	20	90				
• 2,6-Dinitrotoluene	8270C	10	N/A	N/A	90				
• Di-n-octylphthalate	8270C	40	N/A	N/A	90				
• Fluoranthene	8270C	10	N/A	N/A	90				

(1) Includes reservoir liquids sampling and analyses.
(2) Based on Matrix Spike Percent Recovery, if based on Laboratory Control Samples recovery, accuracy ±20% for metals; varies for 8260.
(3) Based on Duplicate Samples.
(4) Zone is a separate run from an unpreserved vial.
(5) Not calibrated. Open scan only.
(6) Ground water samples will not be analyzed for pesticides/PCBs.
(7) Normally 1.0 µg/L each PCB, but can meet 0.5 if requested on COC.
(8) Aroclor-1016, 45-120%, ±20%; Aroclor-1260 55-120%, ±25%; other PCBs – N/A.
(9) Reporting limit exceeds California or Federal Maximum Contaminant Levels (MCLs) due to laboratory limitations. However, MCLs are greater than the laboratory method detection limit, so estimated values will be provided for comparison with MCLs. The EPA may require follow-up actions for estimated values.
(10) Reporting limits for reservoir liquids are 100 times the listed reporting limits, which are for ground water.

TABLE 4.2

GROUND WATER AND RESERVOIR LIQUIDS ANALYSES[1] AND QUALITY CONTROL OBJECTIVES
WASTE DISPOSAL, INC.
(Continued)

PARAMETERS	ANALYTICAL PROCEDURE (EPA METHOD NO.)	LABORATORY SPECIFIC MEASUREMENT QUALITY OBJECTIVES (MQOs)				TYPE OF CONTAINER	PRESERVATIVE	ANALYTICAL HOLDING TIMES	REMARKS
		Reporting[10] Limit (µg/L)	Accuracy[2] (%)	Precision[3] (%)	Completeness (%)				
SEMIVOLATILE ORGANIC COMPOUNDS (Continued)									
• Fluorene	8270C	10	N/A	N/A	90				
• Indeno(1,2,3-cd)pyrene	8270C	20	N/A	N/A	90				
• Isophorone	8270C	10	N/A	N/A	90				
• 2-Methylnaphthalene	8270C	10	N/A	N/A	90				
• 2-Methylphenol	8270C	10	N/A	N/A	90				
• 4-Methylphenol	8270C	10	N/A	N/A	90				
• 2-Nitroaniline	8270C	20	N/A	N/A	90				
• 4-Nitroaniline	8270C	100	N/A	N/A	90				
• 2-Nitrophenol	8270C	10	N/A	N/A	90				
• N-Nitrosophenylamine	8270C	10	N/A	N/A	90				
• N-Nitroso-di-n-propylanine	8270C	10	45 - 120	± 25	90				
• Naphthalene	8270C	10	45 - 120	± 20	90				
• Nitrobenzene	8270C	40	N/A	± 30	90				
• Pentachlorophenol	8270C	40	50 - 125	± 25	90				
• Phenanthrene	8270C	10	N/A	± 30	90				
• Phenol	8270C	10	40 - 120	± 25	90				
• Pyrene	8270C	10	50 - 120	± 20	90				
• 1,2,4-Trichlorobenzene	8270C	10	45 - 120	± 25	90				
• 2,4,5-Trichlorophenol	8270C	20	N/A	± 30	90				
• 2,4,6-Trichlorophenol	8270C	20	N/A	± 30	90				
PESTICIDES/POLYCHLORINATED BIPHENYLS[6]						Two 1 Liter Amber Glass Bottle With Teflon Seam	None. Cool to 4°C.	7 Days to Extract. 40 Days after Extraction.	
• 4,4'-DDD	8081	0.10	55 - 115	20	90				
• 4,4'-DDE	8081	0.10	55 - 115	20	90				
• 4,4'-DDT	8081	0.10	55 - 145	20	90				
• Aldrin	8081	0.10	35 - 115	20	90				
• Alpha-BHC	8081	0.10	N/A	N/A	90				
• Beta-BHC	8081	0.10	N/A	N/A	90				
• Delta-BHC	8081	0.20	N/A	N/A	90				
• Gamma-BHC	8081	0.10	35 - 125	20	90				
• Chlordane	8081	1.0	N/A	N/A	90				
• Dieldrin	8081	0.10	50 - 115	20	90				
• Endosulfan I	8081	0.10	45 - 115	20	90				
• Endosulfan II	8081	0.10	N/A	N/A	90				
• Endosulfan Sulfate	8081	0.20	N/A	N/A	90				
• Endrin	8081	0.10	60 - 115	20	90				
• Endrin Aldehyde	8081	0.10	N/A	N/A	90				
• Endrin Ketone	8081	0.10	N/A	N/A	90				
• Heptachlor	8081	0.10	35 - 125	20	90				
• Heptachlorepoxide	8081	0.10	N/A	N/A	90				
• Methoxychlor	8081	0.10	35 - 125	25	90				
• Toxaphene	8081	5.0	N/A	N/A	90				
• Polychlorinated Biphenyls	8082	0.50[7]	(8)		90				

(1) Includes reservoir liquids sampling and analyses.
(2) Based on Matrix Spike Percent Recovery, if based on Laboratory Control Samples recovery, accuracy ±20% for metals; varies for 8260.
(3) Based on Duplicate Samples.
(4) Zone is a separate run from an unpreserved vial.
(5) Not calibrated. Open scan only.
(6) Ground water samples will not be analyzed for pesticides/PCBs.
(7) Normally 1.0 µg/L each PCB, but can meet 0.5 if requested on COC.
(8) Aroclor-1016, 45-120%, ±20%; Aroclor-1260 55-120%, ±25%; other PCBs – N/A.
(9) Reporting limit exceeds California or Federal Maximum Contaminant Levels (MCLs) due to laboratory limitations. However, MCLs are greater than the laboratory method detection limit, so estimated values will be provided for comparison with MCLs. The EPA may require follow-up actions for estimated values.
(10) Reporting limits for reservoir liquids are 100 times the listed reporting limits, which are for ground water.

TABLE 4.3

SOIL GAS AND IN-BUSINESS AIR ANALYSES AND QUALITY CONTROL OBJECTIVES
WASTE DISPOSAL, INC.

PARAMETERS	ANALYTICAL PROCEDURE (EPA METHOD NUMBER)	LABORATORY SPECIFIC MEASUREMENT QUALITY OBJECTIVES (MQOs)				TYPE OF CONTAINER	PRESERVATIVE	ANALYTICAL HOLDING TIMES	REMARKS
		Reporting Limit (ppbv)	Accuracy(1) (%)	Precision(2) (%)	Completeness (%)				
VOLATILE ORGANIC COMPOUNDS	TO-15(4)					6-Liter Summa Canister	None	14 days	
• 1,1,1-Trichloroethane(3)		0.18	66 - 125	± 25	90				
• 1,1,2,2-Tetrachloroethane		0.15	64 - 128	± 25	90				
• 1,1,2-Trichloroethane		0.18	68 - 134	± 25	90				
• 1,1-Dichloroethane		0.25	66 - 120	± 25	90				
• 1,1-Dichloroethene		0.25	60 - 120	± 25	90				
• 1,2-Dichloroethane(3)		0.25	64 - 132	± 25	90				
• 1,2-Dichloropropane		0.22	66 - 123	± 25	90				
• 2-Butanone		0.34	63 - 131	± 25	90				
• 2-Hexanone		0.24	53 - 132	± 25	90				
• 4-Methyl-2-pentanone		0.24	62 - 130	± 25	90				
• Acetone		0.42	50 - 131	± 25	90				
• Benzene(3)		0.31	71 - 120	± 25	90				
• Bromodichloromethane		0.15	69 - 131	± 25	90				
• Bromoform		0.097	60 - 158	± 25	90				
• Bromomethane		0.26	73 - 135	± 25	90				
• Carbon Disulfide		0.32	60 - 126	± 25	90				
• Carbon Tetrachloride(3)		0.16	61 - 140	± 25	90				
• Chloroethane		0.38	64 - 134	± 25	90				
• Chloroform(3)		0.20	67 - 129	± 25	90				
• Chloromethane		0.48	70 - 122	± 25	90				
• cis-1,2-Dichloroethene		0.25	71 - 129	± 25	90				
• cis-1,3-Dichloropropene		0.22	69 - 128	± 25	90				
• 1,2-Dibromoethane (3)(4)		0.13(4)	50 - 150	± 25	90				
• Ethylbenzene		0.23	71 - 120	± 25	90				
• Methylene Chloride(3)		0.29	64 - 115	± 25	90				
• Toluene		0.27	71 - 120	± 25	90				
• Tetrachloroethene		0.15	66 - 144	± 25	90				
• trans-1,2-Dichloroethene		0.25	71 - 129	± 25	90				
• trans-1,3-Dichloropropene		0.22	56 - 118	± 25	90				
• Trichloroethene(3)		0.19	68 - 121	± 25	90				
• Vinyl Acetate		0.28	49 - 150	± 25	90				
• Vinyl Chloride(3)(4)		0.39	70 - 133	± 25	90				
• Xylenes		0.23	71 - 120	± 25	90				
• Total Nonmethane Organic Carbon	Modified EPA Method 25C	1,000	90 - 100(5)	± 10	90				
• Methane	Modified EPA Method 3C or 25C	500	90 - 100 (5)	± 10	90				

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(1) Based on laboratory duplicate analyses recovery and calibration.
(2) Based on duplicate samples.
(3) Calderon list constituents will be used as performance indicators.
(4) Selective Ion Monitoring (SIM) method will be required for 1,2-Dibromoethane and vinyl chloride for indoor air analyses that are nondetect for using standard TO-15 scan method. The SIM reporting limit for 1,2-Diobromethane is 0.0065 ppbv, and for vinyl chloride is 0.0098 ppbv.
(5) Based on calibration of mid-level and low-level gases.

TABLE 4.4

SOIL ANALYSES AND QUALITY CONTROL OBJECTIVES
WASTE DISPOSAL, INC.

PARAMETERS	ANALYTICAL PROCEDURE (EPA METHOD NO.)	LABORATORY SPECIFIC MEASUREMENT QUALITY OBJECTIVES (MQOs)				TYPE OF CONTAINER	PRESERVATIVE	ANALYTICAL HOLDING TIMES	REMARKS
		Detection Limit (µg/Kg)	Accuracy(1) (%)	Precision(2) (%)	Completeness (%)				
METALS									
• Aluminum	6010B	10,000	75 - 125	±20	90	One 8-Ounce Amber Jar or 1.5-inch x 6-inch Tube	None, Cool to 4°C	6 Months (28 days for Mercury)	
• Antimony	6010B	10,000	75 - 125	±20	90				
• Arsenic	6010B	2,000	75 - 125	±20	90				
• Barium	6010B	1,000	75 - 125	±20	90				
• Beryllium	6010B	500	75 - 125	±20	90				
• Cadmium	6010B	500	75 - 125	±20	90				
• Calcium	6010B	15,000	75 - 125	±20	90				
• Cobalt	6010B	1,000	75 - 125	±20	90				
• Chromium	6010B	1,000	75 - 125	±20	90				
• Iron	6010B	5,000	75 - 125	±20	90				
• Lead	6010B	2,000	75 - 125	±20	90				
• Magnesium	6010B	10,000	75 - 125	±20	90				
• Manganese	6010B	1,000	75 - 125	±20	90				
• Mercury	7471A	20	75 - 125	±20	90				
• Nickel	6010B	2,000	75 - 125	±20	90				
• Selenium	6010B	2,000	75 - 125	±20	90				
• Sodium	6010B	50,000	75 - 125	±20	90				
• Thallium	6010B	10,000	75 - 125	±20	90				
• Vanadium	6010B	1,000	75 - 125	±20	90				
• Zinc	6010B	5,000	75 - 125	±20	90				
VOLATILE ORGANIC COMPOUNDS									
• 1,1,1-Trichloroethane	8260B	2.0	N/A	N/A	90	3 Encores	Sodium Bisulfate and 10 mL Methanol	7 Days (freeze or extract within 48 hours)	Sampling Using EPA Method 5035 (Encores)
• 1,1,2,2-Tetrachloroethane	8260B	2.0	N/A	N/A	90				
• 1,1,2-Trichloroethane	8260B	2.0	N/A	N/A	90				
• 1,1-Dichloroethane	8260B	2.0	70 - 135	±20	90				
• 1,1-Dichloroethene	8260B	5.0	65 - 140	±20	90				
• 1,2-Dibromoethane	8260B	2.0	N/A	N/A	90				
• 1,2-Dichloroethane	8260B	2.0	58 - 150	±25	90				
• 1,2-Dichloropropane	8260B	2.0	N/A	N/A	90				
• 2-Butanone	8260B	10	N/A	N/A	90				
• 2-Hexanone	8260B	10	N/A	N/A	90				
• 4-Methyl-2pentanone	8260B	5.0	N/A	N/A	90				
• Acetone	8260B	10	N/A	N/A	90				
• Benzene	8260B	2.0	75 - 120	±20	90				
• Bromodichloromethane	8260B	2.0	65 - 140	±20	90				
• Bromoform	8260B	5	50 - 130	±40	90				
• Bromomethane	8260B	5	N/A	N/A	90				
• Carbon Disulfide	8260B	5.0	N/A	N/A	90				
• Carbon Tetrachloride	8260B	5	N/A	N/A	90				
• Chlorobenzene	8260B	2.0	75 - 125	±20	90				
• Chloroethane	8260B	5	N/A	N/A	90				
• Chloroform	8260B	2.0	70 - 130	±20	90				
• Chloromethane(2)	8260B	5	40 - 145	±20	90				
• cis-1,2-Dichloroethene	8260B	2.0	N/A	N/A	90				
• cis-1,3-Dichloropropene	8260B	2.0	N/A	N/A	90				
• Dibromochloromethane	8260B	2.0	60 - 145	±30	90				
• Ethylbenzene	8260B	2.0	70 - 120	±20	90				
• Methylene Chloride	8260B	2.0	N/A	N/A	90				

(1) Based on Matrix Spike Percent Recovery.
(2) Based on Duplicate Analysis.
N/A = Not Applicable

TABLE 4.4

SOIL ANALYSES AND QUALITY CONTROL OBJECTIVES
WASTE DISPOSAL, INC.
(Continued)

PARAMETERS	ANALYTICAL PROCEDURE (EPA METHOD NO.)	LABORATORY SPECIFIC MEASUREMENT QUALITY OBJECTIVES (MQOs)				TYPE OF CONTAINER	PRESERVATIVE	ANALYTICAL HOLDING TIMES	REMARKS
		Detection Limit (µg/Kg)	Accuracy(1) (%)	Precision(2) (%)	Completeness (%)				
VOLATILE ORGANIC COMPOUNDS (Continued)									
• Styrene	8260B	2.0	N/A	N/A	90				
• Tetrachloroethene	8260B	2.0	70 - 130	±20	90				
• Toluene	8260B	2.0	70 - 120	±20	90				
• trans-1,2-Dichloroethene	8260B	2.0	N/A	N/A	90				
• trans-1,3-Dichloropropene	8260B	2.0	N/A	N/A	90				
• Trichloroethene	8260B	2.0	70 - 130	±20	90				
• Vinyl Acetate	8260B	5.0	N/A	N/A	90				
• Vinyl Chloride	8260B	5.0	40 - 135	±30	90				
• Xylenes	8260B	2.0	70 - 120	±20	90				
PESTICIDES/POLYCHLORINATED BIPHENYLS									
• 4,4'-DDD	8081	5.0	30 - 140	±25	90	One 8-Ounce Amber Jar or 1.5-inch x 6-inch Tube	None, Cool to 4°C	14 Days to Extract; 40 Days After Extraction	
• 4,4'-DDE	8081	5.0	45 - 120	±20	90				
• 4,4'-DDT	8081	5.0	60 - 125	±25	90				
• Aldrin	8081	5.0	45 - 115	±25	90				
• Alpha-BHC	8081	5.0	N/A	N/A	90				
• Beta-BHC	8081	5.0	N/A	N/A	90				
• Delta-BHC	8081	10	N/A	N/A	90				
• Gamma-BHC (Lindane)	8081	5.0	45 - 115	±25	90				
• Chlordane	8081	50	N/A	N/A	90				
• Dieldrin	8081	5.0	45 - 130	±20	90				
• Endosulfan I	8081	5.0	45 - 120	±25	90				
• Endosulfan II	8081	5.0	N/A	N/A	90				
• Endosulfan Sulfate	8081	10	N/A	N/A	90				
• Endrin	8081	5.0	40 - 130	±25	90				
• Endrin Aldehyde	8081	5.0	N/A	±20	90				
• Endrin Ketone	8081	5.0	N/A	N/A	90				
• Heptachlor	8081	5.0	40 - 125	±25	90				
• Heptachlorepoxide	8081	5.0	N/A	N/A	90				
• Methoxychlor	8081	5.0	35 - 150	±25	90				
• Toxaphene	8081	200	N/A	N/A	90				
• Polychlorinated Biphenyls(3)	8082	50			90				
PETROLEUM HYDROCARBONS									
• C:8 - C:40	8015D	5,000	35 - 120	±30	90	One 8-Ounce Amber Jar or 1.5-inch x 6-inch Tube	None, Cool to 4°C	14 Days to Extract; 40 Days After Extraction	

(1) Based on Matrix Spike Percent Recovery.
(2) Based on Duplicate Analysis.
(3) Aroclor 1016 Accuracy – 45 to 120%, Precision ±20; Aroclor 1260 Accuracy 55-120%, Precision ±25.
N/A = Not Applicable

TABLE 4.5

FIELD COLLECTION QUALITY CONTROL REQUIREMENTS
WASTE DISPOSAL, INC.

ANALYSIS	TRIP BLANK	FIELD BLANK(1)	FIELD DUPLICATE(2)	MATRIX SPIKE AND MATRIX SPIKE DUPLICATES(3)
Ground Water/Liquid Samples(4)				
Organics(5)	1 per 20 samples or 1 per sampling event, whichever is greater	1 per 20 samples or 1 per sampling event, whichever is greater	1 per 10 samples or 1 per sampling event, whichever is greater	1 per 20 samples or 1 per sampling event, whichever is greater
Inorganics(6)	None	1 per 20 samples or 1 per sampling event, whichever is greater	1 per 10 samples or 1 per sampling event, whichever is greater	1 per 20 samples or 1 per sampling event, whichever is greater
Vapor Wells				
Organics(7)	1 per 20 samples or 1 per sampling event, whichever is greater. Also, summa canisters are certified clean (one per batch) prior to shipping.	None. However, two ambient air samples are collected for each event.	1 per 10 samples or 1 per sampling event, whichever is greater	None
In-Business Air				
Organics(7)	None. However, summa canisters are certified clean (one per batch) prior to shipping.	None. However, two ambient air samples are collected for each event.	1 per 10 samples or 1 per sampling event, whichever is greater	None.
Imported Fill				
Organics(5) Inorganics(6)	None	None	1 per 10 samples or 1 per sampling event, whichever is greater	None

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(1) Field blanks will be collected during ground water and surface water sampling procedures only when non-dedicated sampling equipment is used. Field blanks require an additional sample volume (see Tables 4.2 and 4.3). Note that field blanks will be labeled so the laboratory cannot determine that the sample is a field blank.

(2) Field duplicates require an additional sample volume (see Tables 4.2 and 4.3). Note that field duplicates will be labeled so the laboratory cannot determine that the sample is a field duplicate. Field duplicates will be collected as split samples from the actual sample collected.

(3) Matrix Spike/Matrix Spike Duplicate samples require two additional sample volumes for organic analysis. Matrix spike samples require an additional sample volume for inorganic analyses (see Table 4.2).

(4) Equipment Rinsates: Equipment rinsates are the final analyte-free water rinse from non-disposable equipment decontamination. If equipment rinsates are generated, they will be collected daily during the sampling event. Initially, only samples collected every other day will be analyzed. If analytes pertinent to the project are found in the rinsate, the remaining samples will be analyzed.

(5) Includes volatile organic compounds, semivolatile organic compounds and pesticides/polychlorinated biphenyls.

(6) Includes metals.

(7) Includes VOCs and methane.

TABLE 5.1

STANDARD OPERATING PROCEDURES
QUALITY ASSURANCE PROJECT PLAN
WASTE DISPOSAL, INC.

SOP NO.	TITLE
A	Vapor Well Installation Activities
B	Soil Gas Collection, Venting and Treatment
C	Shallow Gas Probe Installation Activities
D	Ground Water Monitoring Well Installation Activities
E	Ground Water Well Liquid Sampling Activities
F	Ground Water Well Liquid Level Sounding Activities
G	Field Sampling Equipment Decontamination Procedures
H	Sample Packaging and Transportation Procedures
I	Sample Chain-of-Custody
J	Field Activity Documentation
K	Soil Vapor Extraction System Installation and Monitoring Activities
L	Data Reduction and Validation Procedures
M	Field and Laboratory Performance and System Audits
N	Document Control Procedures
0	Tank and/or Drum Liquid Sampling Activities
P	Monitoring Wells and Piezometers Abandonment Activities
Q	Reservoir Liquids Monitoring Activities
R	Indoor Geoprobe Activities
S	Vapor Well Sampling Activities
T	In-Business Air Monitoring and Sampling Activities
U	Biovent Well Monitoring and Sampling
V	Leachate Collection Well Installation and Removal Activities
W	Field Equipment Calibration
X	Import Fill Sampling
Y	Stormwater Monitoring and Sampling Activities
Z	Waste Disposal Procedures
AA	Borehole Logging Procedures

TABLE 8.1

LABORATORY QUALITY ASSURANCE REQUIREMENTS GROUND WATER AND RESERVOIR LEACHATE ANALYSIS WASTE DISPOSAL, INC.

PARAMETER GROUP	CALIBRATION METHOD	CALIBRATION/QC SAMPLING FREQUENCY	ACCEPTANCE CRITERIA
Metals (Method 6010B, 7470A)	Calibration Curve	At start of analysis or when continuing calibration verification standard is out of control.	Per instrument operating manual
	Initial Calibration Verification Standard	After calibration and before sample analysis	±10 percent of true value
	Calibration Blank	Every 10 samples	<Method reporting limit
	Continuing Calibration Verification Standard	Every 10 samples	±10 percent of expected value
	Instrument Blank	1 every 10 samples	<Method reporting limit
	Method Blank	1 every 20 samples	<Method reporting limit
	Laboratory Duplicate	1 every 20 samples	Precision (%) See Table 4.2 Accuracy (%) See Table 4.2 Completeness (%) . See Table 4.2
	MS/MSD	1 every 20 samples	75 to 125 percent recovery
	Laboratory Control Sample	1 every 20 samples	75 to 125 percent recovery
Volatile Organic Compounds (Method 8260B)	Calibration Curve	At start of analysis or when continuing calibration verification standard is out of control	20 percent relative standard deviation if average response factor is used.
	Initial Calibration Verification Standard	After calibration and before sample analysis	±15 percent of true value
	Calibration Blank	Every 10 samples	<Method reporting limit
	Continuing Calibration Verification Standard	Every 10 samples	±15 percent of true value
	Instrument Blank	1 every 10 samples	<Method reporting limit
	Method Blank	1 every 20 samples	<Method reporting limit
	MS/MSD and LCS	1 every 20 samples	Precision (%) 20 RPD Accuracy (%) 50 to 140 percent recovery Completeness (%) 90 percent recovery
	Surrogate Compound	Every sample	4-bromofluorobenzene 86 to 115 percent recovery α, α, α-trifluorotoluene 86 to 115 percent recovery Dibromofluoromethane 86 to 115 percent recovery

NOTE: MS = Matrix Spike; MSD = Matrix Spike Duplicate; LCS = Laboratory Control Sample.
RPD = Relative Percent Difference.
QC = Quality Control

TRC
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TABLE 8.1

LABORATORY QUALITY ASSURANCE REQUIREMENTS
GROUND WATER AND RESERVOIR LEACHATE ANALYSIS
WASTE DISPOSAL, INC.
(Continued)

PARAMETER GROUP	CALIBRATION METHOD	CALIBRATION/QC SAMPLING FREQUENCY	ACCEPTANCE CRITERIA
Semivolatile Organic Compounds (Method 8270C)	Calibration Curve (5 point)	At start of analysis or when continuing calibration verification standard is out of control	Per method
	Initial Calibration Verification Standard	After preparation of new calibration verification standards. Standard is from an independent.	±15 percent of expected value or within limits set by method
	Calibration Blank	Every 10 samples	<Method reporting limit
	Continuing Calibration Verification Standard	Every 10 samples	±15 percent of expected value or within limits set by method
	Method Blank	1 every 20 samples	<Method reporting limit
	MS/MSD and LCS	1 every 20 samples	Precision (%) 20 to 25 RPD Accuracy (%) 30 to 160 percent recovery Completeness (%) 90 percent recovery
	Surrogate Compound	Every sample	p-Terphenyl 33 to 141 percent recovery 2,4,6-Tribromophenol 10 to 123 percent recovery Nitrobenzene-d_5 35 to 114 percent recovery 2-Fluorobiphenyl 43 to 116 percent recovery Phenol-d_6 10 to 94 percent recovery 2-Fluorophenol 21 to 100 percent recovery
Polychlorinated Biphenyls (Method 8082)	Calibration Curve (5 point)	At start of analysis or when continuing calibration verification standard is out of control	Per method
	Initial Calibration Verification Standard	After preparation of new calibration verification standards. Standard is from an independent.	±15 percent of expected value or within limits set by method
	Calibration Blank	Every 10 samples	<Method reporting limit
	Continuing Calibration Verification Standard	Every 10 samples	±15 percent of expected value or within limits set by method
	Method Blank	1 every 20 samples	<Method reporting limit
	MS/MSD and LCS	1 every 20 samples	Precision (%) 25 RPD Accuracy (%) 40 to 120 percent recovery Completeness (%) 90 percent recovery
	Surrogate Compound	Every sample	Tetrachloro-m-xylene or decachlorobiphenyl 26 to 121 percent recovery

NOTE: MS = Matrix Spike; MSD = Matrix Spike Duplicate; LCS = Laboratory Control Sample.
RPD = Relative Percent Difference.
QC = Quality Control.

TABLE 8.2

LABORATORY QUALITY ASSURANCE REQUIREMENTS
SOIL GAS, IN-BUSINESS AIR, AND RESERVOIR GAS COLLECTION SYSTEM
WASTE DISPOSAL, INC.

PARAMETER GROUP	CALIBRATION METHOD	CALIBRATION/QC SAMPLING FREQUENCY	ACCEPTANCE CRITERIA
Volatile Organic Compounds (TO-15)	Calibration Curve	At start of analysis or when continuing calibration verification standard is out of control	20 percent relative standard deviation if average response factor is used.
	Initial Calibration Verification Standard	After calibration and before sample analysis	±15 percent of true value
	Calibration Blank	Every 10 samples	<Method reporting limit
	Continuing Calibration Verification Standard	Every 10 samples	±15 percent of true value
	Instrument Blank	1 every 10 samples	<Method reporting limit
	Method Blank	1 every 20 samples	<Method reporting limit
	MS/MSD and LCS	None	Precision (%): 25 percent recovery Accuracy (%): 49 to 158 percent recovery Completeness (%): 90 percent recovery
	Surrogate Compound	Every sample	4-bromofluorobenzene: laboratory-specific limits Toluene-d8 laboratory-specific limits 1,2-dichloroethane-d4 laboratory-specific limits
	Canister Preparation/Certification	One per batch or per twenty canisters being prepared by laboratory	<Method reporting limit

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NOTE: MS = Matrix Spike; MSD = Matrix Spike Duplicate; LCS = Laboratory Control Sample.
QC = Quality Control.

TABLE 8.3

LABORATORY QUALITY ASSURANCE REQUIREMENTS
SOIL ANALYSES
WASTE DISPOSAL, INC.

PARAMETER GROUP	CALIBRATION METHOD	CALIBRATION/QC SAMPLING FREQUENCY	ACCEPTANCE CRITERIA
Metals (Method 6010B, 7470A)	Calibration Curve	At start of analysis or when continuing calibration verification standard is out of control.	Per instrument operating manual
	Initial Calibration Verification Standard	After calibration and before sample analysis	±10 percent of true value
	Calibration Blank	Every 10 samples	<Method reporting limit
	Continuing Calibration Verification Standard	Every 10 samples	±10 percent of expected value
	Instrument Blank	1 every 10 samples	<Method reporting limit
	Method Blank	1 every 20 samples	<Method reporting limit
	Laboratory Duplicate	1 every 20 samples	Precision (%) See Table 4.4 Accuracy (%) See Table 4.4 Completeness (%) See Table 4.4
	MS/MSD	1 every 20 samples	80 to 120 percent recovery
	Laboratory Control Sample	1 every 20 samples	80 to 120 percent recovery
Volatile Organic Compounds (Method 8260B)	Calibration Curve	At start of analysis or when continuing calibration verification standard is out of control	20 percent relative standard deviation if average response factor is used.
	Initial Calibration Verification Standard	After calibration and before sample analysis	±15 percent of true value
	Calibration Blank	Every 10 samples	<Method reporting limit
	Continuing Calibration Verification Standard	Every 10 samples	±15 percent of true value
	Instrument Blank	1 every 10 samples	<Method reporting limit

NOTE: MS = Matrix Spike; MSD = Matrix Spike Duplicate; LCS = Laboratory Control Sample.
RPD = Relative Percent Difference.

TABLE 8.3

LABORATORY QUALITY ASSURANCE REQUIREMENTS
SOIL ANALYSES
WASTE DISPOSAL, INC.
(Continued)

PARAMETER GROUP	CALIBRATION METHOD	CALIBRATION/QC SAMPLING FREQUENCY	ACCEPTANCE CRITERIA
(Method 8260B) (Cont'd)	Method Blank	1 every 20 samples	<Method reporting limit
	MS/MSD and LCS	1 every 20 samples	Precision (%) 20 to 40 RPD Accuracy (%) 40 to 150 percent recovery Completeness (%) 90 percent recovery
	Surrogate Compound	Every sample	4-bromofluorobenzene laboratory-specific limits α,α,α-trifluorotoluene laboratory-specific limits
Pesticides/Polychlorinated Biphenyls (Method 8081/8082)	Calibration Curve (5 point)	At start of analysis or when continuing calibration verification standard is out of control	Per method
	Initial Calibration Verification Standard	After preparation of new calibration verification standards. Standard is from an independent.	±15 percent of expected value or within limits set by method
	Calibration Blank	Every 10 samples	<Method reporting limit
	Continuing Calibration Verification Standard	Every 10 samples	±15 percent of expected value or within limits set by method
	Method Blank	1 every 20 samples	<Method reporting limit
	MS/MSD and LCS	1 every 20 samples	Precision (%) 20 to 25 RPD Accuracy (%) 30 to 150 percent recovery Completeness (%) 90 percent recovery
	Surrogate Compound	Every sample	Tetrachloro-m-xylene or 30 – 115 percent recovery Decachlorobiphenyl (8081) 40 to 125 percent recovery Decachlorobiphenyl (8082) 45 – 135 percent recovery

NOTE: MS = Matrix Spike; MSD = Matrix Spike Duplicate; LCS = Laboratory Control Sample.
RPD = Relative Percent Difference.

TABLE 8.3

LABORATORY QUALITY ASSURANCE REQUIREMENTS
SOIL ANALYSES
WASTE DISPOSAL, INC.
(Continued)

PARAMETER GROUP	CALIBRATION METHOD	CALIBRATION/QC SAMPLING FREQUENCY	ACCEPTANCE CRITERIA
Petroleum Hydrocarbons (8015D $C_8 - C_{40}$)	Calibration Curve (5 point)	At start of analysis or when continuing calibration verification standard is out of control	Per method
	Initial Calibration Verification Standard	After preparation of new calibration verification standards. Standard is from an independent.	±15 percent of expected value or within limits set by method
	Calibration Blank	Every 10 samples	<Method reporting limit
	Continuing Calibration Verification Standard	Every 10 samples	±15 percent of expected value or within limits set by method
	Method Blank	1 every 20 samples	<Method reporting limit
	MS/MSD and LCS	1 every 20 samples	Precision (%) 30 RPD Accuracy (%) 35 to 120 percent recovery Completeness (%) 90 percent recovery
	Surrogates Compound	Every sample	n-Octacosane 40 to 140 percent recovery

30747/Rpts/QAPP/11/12/03/rm)

NOTE: MS = Matrix Spike; MSD = Matrix Spike Duplicate; LCS = Laboratory Control Sample.
RPD = Relative Percent Difference.

TABLE 11.1

EXAMPLE CHECKLIST TOPICS FOR PERFORMING AN EXTERNAL AUDIT OF PROJECT ANALYICAL LABORATORIES WASTE DISPOSAL, INC.

LABORATORY CHECKLIST ITEMS
• Review of PE Sample Results • QA Plan Review • Use of EPA-approved Methods(1) • Monthly Internal Audit Results Review • Review of Personnel Training and Qualifications (including interviews as appropriate)

29022401/Reports/QAPP(Nov03) (11/14/03/ms)

(1) Includes methods from SW-846.
QA = Quality Assurance
PE = Performance Evaluation.

PHASE 1
Remedial Design

Amended Administrative Order No. 97-09
Order covered site investigation and remedial design only.

Remedial Design Work Plan
Plan covered supplemental site investigation activities and preparation of Remedial Design.

Health and Safety Plan (HASP)
Plan covered site investigation and monitoring activities.

Quality Assurance Project Plan (QAPP)
Plan covered site investigation and monitoring activities.

Sampling and Analysis Plan (SAP)
Plan covered site investigation and monitoring activities.

Site Access and Security Plan
Plan describes site security and access.

Remedial Design Report
Documented engineering rationale and presented Remedial Design drawings and specifications.

Community Contingency Plan
Plan covered site investigation and monitoring activities.

Consent Decree Civil Action No. 03-1593
Covers Remedial Action and O&M.

Amended Record of Decision (AROD)
Selected Remedy Alternative No. 2 - RCRA-equivalent cap, monofill cap, reservoir leachate collection point, soil-gas engineering controls, groundwater and soil vapor monitoring, and institutional controls.

Health and Safety Plan (HASP)
Updated to include Remedial Action construction and O&M.

Quality Assurance Project Plan (QAPP)
Updated to include Remedial Action construction and O&M.

Sampling and Analysis Plan (SAP)
Updated to include Remedial Action construction and O&M.

Site Access and Security Plan
Plan describes site security and access.

Remedial Action Work Plan (RAWP)
Plan summarizing activities to be performed to construct all remedy systems and components for the Remedial Action for the Site.

Construction As-Built Reports

Construction Quality Assurance Plan (CQAP)
Assures that the remedy is built according to specifications

Community Relations Participation Plan (CRPP)
Delineates how settling defendants will assist EPA with public participation activities during Remedial Action construction and O&M.

Annual Work Status Reports
The one report under this category (RA < 6 months) will describe work completed and the ability of the remedy to meet performance standards.

PHASE 3
Operations, Maintenance and Monitoring

Health and Safety Plan (HASP)
Updated to include OM&M Activities.

Long-term Groundwater Monitoring Plan
Plan describing the groundwater detection monitoring program to be implemented pursuant to the Consent Decree.

Long-term Soil Gas and In-business Ambient Air Monitoring Plan
Plan describing the soil gas and in-business ambient air detection monitoring program.

Site Access and Security Plan
Plan describes site access and security.

Operations and Maintenance Plan (O&M Plan)
Plan for operations, maintenance, and monitoring activities.

OMMP (1)

Institutional Controls Monitoring and Enforcement Work Plan (ICMEWP)
Describes monitoring and enforcement of institutional controls.

Community Relations Participation Plan (CRPP)
Delineates how settling defendants will assist EPA with public participation activities during Remedial Action activities during O&M.

Annual Work Status Reports
Reports on performance of remedy and makes recommendations for modifications.

5-Year Status Reports
Plan reports on O&M data and systems and any recommendations to modify systems or data collection protocols.

LEGEND

- Outdated, no longer enforced
- Current plans
- Plans enforceable during O&M period

NOTE:
(1) The Project QAPP and SAP are included as appendices in the OMMP.

REPORTS AND DOCUMENTS SUMMARY

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC | FIGL 1.1

30747SG-34 REV.08/14/03

Ship To: _____
Attn: _____

Page _____ of _____
Project Name: _____
Project No.: _____
Site Location: _____
Date: _____ / _____ / _____

CHAIN OF CUSTODY RECORD

Analysis

Boring/Well No.	Sample No.	Depth	Date	Time	Sample Type			Comp.	Grab	Sample Containers				Remarks
					Water	Solid	Other			Vol.	No.	Type	Pres.	

Total Number of Samples Shipped: Shipper's Signature:

	Signature	Company	Date	Time
Relinquished by:				
Received by:				
Relinquished by:				
Received by:				
Relinquished by:				
Received by:				

Special Instructions / Shipment / Handling/ Storage Requirements:

The material(s) listed are received for analysis and/or treatability evaluation and remai property of the client and not TRC. At the conclusion of the test work, all remaining material(s) will be returned to the client for eventual disposal at a licensed facility.

☐ TRC
21 Technology Drive
Irvine, California 92618
(949) 727-9336

☐ TRC
2815 Mitchell Drive, Suite 103
Walnut Creek, California 94598
(925) 935-3294

CHAIN-OF-CUSTODY RECORD

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 6.1

APPENDIX A

STANDARD OPERATING PROCEDURES

STANDARD OPERATING PROCEDURE A
VAPOR WELL INSTALLATION ACTIVITIES
WASTE DISPOSAL, INC. SUPERFUND SITE

1.0 GENERAL

1. Vapor monitoring wells (interior and perimeter) may be installed to supplement existing subsurface gas data and to determine the extent of subsurface gas generation and/or migration.

2. Appropriate health and safety procedures and emergency response procedures are provided in the Health and Safety Plan (HASP). Quality Assurance/Quality Control (QA/QC) procedures are provided in the Quality Assurance Project Plan (QAPP).

3. Vapor well design will be performed in accordance with the approved design (see in particular Sheet 13 of the Design Drawings [Appendix G of the Final (100%) Remedial Design Report (TRC, May 2003)]) and under the supervision of a California Registered Geologist.

2.0 TASK DESCRIPTION

1. The monitoring wells will herein be referred to as "wells" for the remainder of this Standard Operating Procedure (SOP).

3.0 REQUIRED MATERIALS

1. The following materials are required to perform this procedure:
   - Twelve-inch hollow-stem auger.
   - One-inch-diameter Blank Schedule 40 polyvinyl chloride (PVC) casing.
   - One-inch-diameter Slotted Schedule 40 PVC casing with 0.02-inch slots.
   - No. 3 Monterey Sand (or equivalent).
   - Volclay grout (or equivalent) for backfill.
   - Well casing cap locks.
   - Concrete.
   - Buckets and intermediate containers.
   - Concrete mixing barrel and shovel.
   - Personal protective equipment (PPE) as described in the HASP.
   - Measuring tape.
   - Daily Field Report forms and/or appropriate monitoring data sheets.
   - Timepiece.
   - Pen with indelible ink.

4.0 TASK PERFORMANCE

4.1 WELL BOREHOLE

1. Each well borehole will be drilled using a 12-inch hollow-stem auger to the design depth. Measuring tape will be used to determine the depth.

2. The borehole cuttings will be field analyzed and disposed of as described in SOP Z (Waste Disposal). The borehole cuttings will be shoveled into separate open-top 55-gallon U.S. Department of Transportation (DOT) approved drums. Each drum will be sealed and labeled with a borehole identification number, sampling depth, and date of storage. The soil in the drums will be managed based upon results from prior soils investigation. Soil in drums determined to be uncontaminated may be consolidated into larger volume roll-off boxes for eventual disposal, or may be emptied onsite at a designated location.

4.2 WELL INSTALLATION

1. After the borehole is drilled to the proper depth, the wells will be installed in accordance with the specifications on Drawing 13 of the Final (100%) Design Report.

2. For each nested screen interval, the annular space will be backfilled from the screen bottom to approximately 1-foot above the screen top using No. 3 Monterey Sand. The sand will be poured slowly into the annular space to assure it is optimally packed. Bentonite pellets (hydrated) and Volclay grout (or neat cement) will be placed into annular space between screen intervals and the uppermost annular space around the casing extending to the surface.

3. A protective locking cover and traffic box will be installed on each well.

4. Cement mix and water will be mixed in a cement mixing barrel using a shovel. The cement will be used to construct a 3-foot pad around the well. The pad will be shaped to direct surface run-off from the casing.

5. The installation procedures in this SOP will not generate samples. However, soil cuttings will be field analyzed using direct-read instruments as described in other SOPs.

6. For drill cutting management procedures, refer to SOP Z on Waste Disposal.

STANDARD OPERATING PROCEDURE B
SOIL GAS COLLECTION, VENTING AND TREATMENT SYSTEM MONITORING AND SAMPLING
WASTE DISPOSAL, INC. SUPERFUND SITE

1.0 GENERAL

1. To prevent the migration of gas from the Waste Disposal, Inc (WDI) Site, a Reservoir Gas Collection System will be constructed beneath the containment portion of the Resource Conservation and Recovery Act (RCRA) Subtitle C-Equivalent Cap. The system includes 2-inch-diameter perforated pipe under a geomembrane that will trap migrating gases. The pipes carry the gas to a central vent riser, treatment system and attached blower. The flow rate and gas composition of this system will be monitored to assess the benefits of the system and mitigate the potential of soil gas migrating offsite.

2. Appropriate health and safety procedures and emergency response procedures are provided in the Health and Safety Plan (HASP). Quality Assurance/Quality Control (QA/QC) procedures are provided in the Quality Assurance Project Plan (QAPP).

2.0 TASK DESCRIPTION

1. General system readings and operational information will be recorded. The flow rate and gas composition will be monitored. Air samples will be taken using Summa canisters and analyzed for methane, oxygen, total gaseous non-methane organics (TGNMO) and volatile organic compounds (VOCs).

3.0 REQUIRED MATERIALS

1. The following materials are required for this procedure:
   - Foxboro TVA-1000 Combination Photoionization Detector/Flame Ionization Detector (PID/FID) or equivalent.
   - LANDTEC GA-90 landfill gas monitor or equivalent.
   - 0.25-inch inner diameter vinyl tubing.
   - Daily Field Report Form(s) and/or monitoring data sheets.
   - Barometer.

- Hand held thermometer.
- Timepiece.
- Pen with indelible ink.
- Six-liter Summa canisters with pre-set flow control values (recommended flow of 200 ml/min).
- Pressure gauge.
- Stainless Steel T-Fitting.
- Disposable Nitrile Gloves.
- Chain-of-Custody form(s).
- Custody seal(s).
- Personal Protection Equipment as designated in the HASP.

4.0 TASK PERFORMANCE

4.1 SYSTEM INSPECTIONS AND MONITORING

1. Record the inline system pressure, flow rate, and vacuum before and after the blower motor as needed.

2. Drain the condensate from the blower motor knockout pot.

3. Inspect the systems piping for leaks and integrity.

4. Record all readings on the monitoring data sheet.

4.2 SYSTEM GAS COMPOSITION MONITORING

1. Follow all warm up recommendations and calibration directions for the Foxboro TVA-1000 and LANDTEC GA-90 as described in their respective Operations Manuals and as outlined in SOP W or for equivalent instruments.

2. Attach a clean piece of vinyl tubing to the system inlet sample port and connect it to the inlet port on the LANDTEC GA-90. Record the gas composition on the monitoring data sheets in percent.

3. Repeat the above procedure for the Foxboro TVA-1000 and record the gas composition in parts per million (ppm).

4. Repeat the above procedures at the system outlet downstream of the carbon absorber vessels.

5. The subsurface gas conditions will be monitored by analyzing the initial gas concentrations of Methane (CH_4), Carbon Dioxide (CO_2), and Oxygen (O_2) as measured using the LANDTEC GA-90 and recorded on the data sheet.

4.3 GAS COLLECTION SYSTEM SAMPLING AMBIENT CONDITIONS

1. Read the barometric pressure with a portable barometer and record it on the monitoring data sheet in units of inches of mercury. Care should be taken that the reading has stabilized prior to recording.

2. Read the ambient air temperature with a portable thermometer and record it on the monitoring data sheet in units of degrees Fahrenheit (°F). Care should be taken that the thermometer is not placed in direct sunlight and the reading has stabilized prior to recording.

3. Record the general weather conditions daily on the monitoring data sheet. Recorded conditions to include local data available from public sources, as well as field observations of approximate wind direction and velocity.

4.4 GAS SAMPLING PROCEDURES

1. Attach the pressure gauge to the Summa canister and open the valve. Record the initial vacuum in the canister on the monitoring data sheet.

2. The difference in the recorded vacuum recorded versus the vacuum reported by the laboratory should be within ten percent. If the difference is greater than ten percent, label the Summa canister as leaking, return it to the lab and use an alternate Summa canister. Since the Summa canister's pressure will be influenced by the ambient temperature, attempt to measure the Summa canisters pressure at room temperature.

3. Connect the Summa canister to the system's inlet sampling valve, upstream of the carbon canisters, with a clean piece of vinyl tubing and open the Summa canister's valve.

4. Allow the Summa canister's pressure to nearly equilibrate and close the valve.

5. Use the pressure gauge to assess the final pressure in the Summa canister and record on the monitoring data sheet. The final pressure in the canister will be below ambient pressure at the completion of sampling.

6. If duplicate samples or split samples are required for the oversight agency, add a stainless steel T-fitting to the vinyl tubing and connect Summa canister to each opening of the stainless steel T-fitting. Sample both Summa canisters simultaneously.

7. Repeat the above sampling procedures at the system outlet downstream of the carbon absorbers.

4.5 SAMPLE IDENTIFICATION PROCEDURES

1. Each sample will be identified as originating from the Site by prefacing each sample designation with "WDI", (for Waste Disposal, Inc.) an alpha and numerical code, sampling event number, sample type (IN = inlet or OUT = outlet) and the sample date. The sample identifier is illustrated below:
   - WDI-GTS-IN-1-1-04 (For the Gas Treatment System [GTS] inlet sampled on January 1, 2004)

4.6 ANALYTICAL PARAMETERS, METHODS AND SAMPLE PRESERVATION REQUIREMENTS

1. Analytical parameters, methods and sample preservation requirements are provided in Table 4.3 of the QAPP.

4.7 SAMPLE CONTAINER REQUIREMENTS

1. Sample containers will be sent by the laboratory that have been certified clean.

4.8 BLANKS AND DUPLICATE SAMPLES REQUIREMENTS

1. Due to the low number of samples collected during this sampling, duplicates and blanks will not be collected.

4.9 SAMPLE PACKAGING AND TRANSPORTATION PROCEDURES

1. Samples will be packed in the following manner for shipment. Detailed transportation procedures are outlined in SOP H.
   - Each Summa canister will be returned to its shipping container and sealed with tape.
   - Custody seals will be attached to the box.
   - A copy of the Chain-of-Custody will be placed in the box.

4.10 PROCEDURES TO AVOID SAMPLE CONTAMINATION

1. Use disposable nitrile gloves when handling Summa canisters and vinyl tubing before sampling.

2. Only use sample canisters, which show no loss of vacuum pressure upon delivery from the selected laboratory.

3. Allow equipment to stabilize before recording readings.

4.11 SAMPLE DOCUMENTATION AND LABELING PROCEDURES

1. Perform sample documentation as outlined in SOP J. All data should be included on the appropriate data sheet or other form.

4.12 CHAIN-OF-CUSTODY PROCEDURES

1. Samples will be shipped under the Chain-of-Custody in the following manner. Detailed Chain-of-Custody procedures are outlined in SOP I.
   - Chain-of-Custody records will be initiated at the time of sampling and include sample number, date, time, samplers name and dated signature of the person taking the samples.
   - Sample transfers will be noted on the form for each sample.
   - One copy of each form will be retained by field personnel prior to the shipment of the samples to the selected laboratory.
   - A copy of the completed Chain-of-Custody form will be returned with the results of laboratory results.

TABLE B.2

DATA QUALITY INDICATORS FOR METHANE AND TGNMO ANALYSES

PARAMETER	CRITERIA
Method 25C	
Holding Time	30 days
Method Blank	<Reporting Limit
Calibration	
- Initial	RSD ≤15%; Relative percent difference of triplicate calibration conversion 2%
- Continuing	Percent Difference ≤10%
Laboratory Control sample	% R ≤10%
Duplicate Sample	Relative percent difference ≤20%
Method 3C(1)	
Holding Time	30 days
Method Blank	<Reporting Limit
Calibration	
- Initial	RSD ≤15%
- Continuing	Percent Difference ≤10%
Laboratory Control Sample	% R ≤10%
Duplicate Sample	Relative percent difference ≤20%

29022401/Reports/QAPP(Jan 04) (1/27/04/ms)

(1) Method 3C run for methane only when outside the calibration control range for Method 25C.

STANDARD OPERATING PROCEDURE C
SHALLOW GAS PROBE INSTALLATION ACTIVITIES
WASTE DISPOSAL, INC. SUPERFUND SITE

1.0 GENERAL

1. Based on results from subsurface gas monitoring, shallow soil gas probes may be installed to supplement existing subsurface gas data and to determine the extent of subsurface gas generation and/or migration.

2. Appropriate health and safety procedures and emergency response procedures are provided in the Health and Safety Plan (HASP). Quality Assurance/Quality Control (QA/QC) procedures are provided in the Quality Assurance Project Plan (QAPP).

2.0 TASK DESCRIPTION

1. Shallow soil gas probes may be installed to supplement existing subsurface gas data and to determine the extent of subsurface gas generation and/or migration. The monitoring wells will herein be referred to as "wells" for the remainder of this Standard Operating Procedure (SOP).

3.0 REQUIRED MATERIALS

1. The following materials are required to perform this procedure:
   - Four-inch-diameter hand auger.
   - Blank Schedule 40 polyvinyl chloride (PVC) casing.
   - Slotted Schedule 40 PVC casing with 0.02-inch slots.
   - No. 3 Monterey Sand (or equivalent).
   - Volclay grout (or equivalent) for backfill.
   - Well casing cap locks.
   - Concrete.
   - Buckets and intermediate containers.
   - Concrete mixing barrel and shovel.
   - Personal protective equipment (PPE) as described in the HASP.
   - Measuring tape.
   - Daily Field Report forms and/or appropriate monitoring data sheets.
   - Timepiece.
   - Pen with indelible ink.

4.0 TASK PERFORMANCE

4.1 WELL BOREHOLE

1. Each well borehole will be drilled using a 4-inch-diameter auger to a default depth of 4 feet below ground surface (bgs). Measuring tape will be used to determine the depth.

2. The borehole cuttings will be field analyzed and disposed of as described in SOP Z for Waste Disposal. The borehole cuttings will be shoveled into separate open-top 55-gallon U.S. Department of Transportation (DOT) approved drums. Each drum will be sealed and labeled with a borehole identification number, sampling depth, and date of storage. The soil in the drums will be managed based upon the field analysis results. Soil in drums determined to be uncontaminated may be consolidated into larger volume roll-off boxes for eventual disposal, or may be emptied onsite at a designated location.

4.2 WELL INSTALLATION

1. After the borehole is drilled to the proper depth, approximately 1-foot of one-half-inch-diameter Schedule 40 PVC with 0.02-inch slot openings casing (screen) will be flush threaded and securely attached to 3 feet of flush threaded 2-inch-diameter Schedule 40 PVC blank casing. The blank casing will extend to approximately 3 feet bgs.

2. The annular space will be backfilled from the well bottom to approximately 1/2-foot above the screen top using No. 3 Monterey Sand. The sand will be poured slowly into the annular space to assure it is optimally packed. Volclay grout will be placed into the remaining annular space around the casing.

3. A protective locking cover and traffic box will be installed on each well.

4. For wells in areas of high traffic, cement mix and water will be mixed in a cement mixing barrel using a shovel. The cement will be used to construct a 3-foot pad around the well. The pad will be shaped to direct surface run-off from the casing.

5. Soil cuttings will be field analyzed using direct-read instruments as described in the SAP.

STANDARD OPERATING PROCEDURE D
GROUND WATER MONITORING WELL INSTALLATION ACTIVITIES
WASTE DISPOSAL, INC. SUPERFUND SITE

1.0 GENERAL

1. Ground water monitoring well may be installed to supplement existing ground water monitoring wells.

2. Appropriate health and safety procedures and emergency response procedures are provided in the Health and Safety Plan (HASP). Quality Assurance/Quality Control (QA/QC) procedures are provided in the Quality Assurance Project Plan (QAPP).

3. Monitoring well design will be performed by a California Registered Geologist, and will conform to the approved design (see in particular Sheet 13 of the Design Drawings [Appendix G of the Final (100%) Remedial Design Report (TRC, May 2003)]).

2.0 TASK DESCRIPTION

1. Ground water monitoring wells may be installed to supplement existing ground water monitoring wells. The monitoring wells will herein be referred to as "wells" for the remainder of this Standard Operating Procedure (SOP).

3.0 REQUIRED MATERIALS

1. The following materials are required to perform this procedure:
   - Ten-inch hollow-stem auger.
   - Four-inch-diameter Blank Schedule 40 polyvinyl chloride (PVC) casing.
   - Four-inch-diameter Slotted Schedule 40 PVC casing with 0.02-inch slots.
   - No. 3 Monterey Sand filter pack (or equivalent).
   - No. 30 Filter Sand (or equivalent).
   - Volclay grout (or equivalent) for backfill.
   - Well casing cap locks.
   - Concrete.
   - Buckets and intermediate containers.
   - Concrete mixing barrel and shovel.
   - Personal protective equipment (PPE) as described in the HASP.
   - Measuring tape.

- Daily Field Report forms and/or appropriate monitoring data sheets.
- Timepiece.
- Pen with indelible ink.

4.0 TASK PERFORMANCE

4.1 WELL BOREHOLE

1. The well borehole will be drilled using a 10-inch hollow-stem auger to a depth 10 feet beyond the level where ground water is first reached. This will be evident by examining the moisture of the borehole cuttings. Once the water table is reached, allow the borehole to set open for fifteen minutes before taking a depth to water measurement. Follow the procedures in SOP F for detailed procedures on measuring water levels.

2. The borehole cuttings will be field analyzed and disposed of as described in SOP Z for Waste Disposal. The borehole cuttings will be shoveled into separate open-top 55-gallon U.S. Department of Transportation (DOT) approved drums. Each drum will be sealed and labeled with a borehole identification number, sampling depth, and date of storage. The soil in the drums will be managed based upon the field analysis results. Soil in drums determined to be uncontaminated may be consolidated into larger volume roll-off boxes for eventual disposal, or may be emptied onsite at a designated location.

4.2 WELL INSTALLATION

1. After the borehole is drilled to the proper depth, approximately 15 feet of 4-inch-diameter Schedule 40 PVC with 0.02-inch slot openings casing (screen) will be carefully installed below the ground. The screen will be flush threaded on the end closest to the ground surface and capped on the bottom. While the screen is still slightly above ground, flush threaded 2-inch-diameter Schedule 40 PVC blank casing will be securely attached to the screen.

2. The annular space will be backfilled from the well bottom to approximately 1-foot above the screen top using No. 3 Monterey Sand. The sand will be poured slowly into the annular space to assure it is optimally packed. One-foot of No. 30 Filter Sand will be placed on top of the sand pack. Volclay grout will be placed into the remaining annular space around the casing. During placement of the backfill materials the annulus will be continuously sounded to prevent bridging.

3. Soil cuttings will be field analyzed using direct-read instruments, as described in the SAP.

4. if additional wells are to be installed, decontaminate the drill rig and related equipment prior to beginning further installations as per the procedure described in SOP G.

STANDARD OPERATING PROCEDURE E
GROUND WATER WELL LIQUID SAMPLING ACTIVITIES
WASTE DISPOSAL, INC. SUPERFUND SITE

1.0 GENERAL

1. Ground water monitoring wells will be purged and sampled to supplement existing ground water quality data. This information will be used to fulfill performance monitoring requirements.

2. Appropriate health and safety procedures and emergency response procedures are provided in the Health and Safety Plan (HASP). Quality Assurance/Quality Control (QA/QC) procedures are provided in the Quality Assurance Project Plan (QAPP).

2.0 TASK DESCRIPTION

1. Ground water monitoring wells will be purged and sampled to supplement existing ground water quality data. These various measurement points are hereinafter called "wells" in this Standard Operating Procedure (SOP).

3.0 REQUIRED MATERIALS

1. The following materials are required for this procedure:
   - One-half-inch inside diameter vinyl tubing in 100-foot lengths.
   - Centrifugal, submersible, peristaltic pump or bailer for purging and sample collection.
   - pH and temperature meter.
   - Specific conductance meter.
   - Bailers.
   - Sample containers (provided by selected laboratory, or equivalent, with appropriate preservatives as outlined in the QAPP).
   - Buckets and intermediate containers.
   - Coolers and ice.
   - Bailer cord.
   - Disposable (Nitrile) gloves.
   - Chemical-free paper towels.
   - Plastic sheets.
   - Sample bottle labels.
   - Daily Field Report forms and/or appropriate monitoring data sheets (see SOP J).
   - Ground Water Sampling Field Notes (Table E.1).
   - Timepiece.
   - Pen with indelible ink.

4.0 TASK PERFORMANCE

4.1 WELL PURGING PROCEDURES

1. Each well will be purged prior to sample collection. If practical, three well volumes of ground water will be withdrawn prior to sample collection; however, if the well can be purged dry, only one volume will be withdrawn. The volume of water present in each well will be computed based on the length of the water column and the well casing diameter. The volume of water required to be purged from the well will be calculated using the following:[1]

$$V = 0.0408 \times H \times D^2$$

where:
V = Well volume to be pumped (gallons).
D = Diameter of well casing (in inches).
H = Height of water column (in feet).

2. Water will be purged from the bottom of the well screened interval. At the start of purging and after every well volume withdrawn, the temperature, conductivity, and pH of the purge water will be measured. A conventional pH meter with a combination gel-filled electrode, or equivalent, will be used for pH determinations. A combination electrical conductivity-temperature-salinity meter, or equivalent measuring device, will be used for determining conductivity and temperature. Samples will be collected after the removal of three well volumes and when measurements do not vary by more than 10 percent over two consecutive measurements. As described in the QAPP and SOP W, these instruments will be calibrated daily to maintain accuracy. Field parameter values will be recorded on the ground water sample collection record, along with the corresponding purge volume. If the well has been purged dry, samples will be collected after the well returns to 80 percent of its original volume but not to exceed 2 hours.

3. Purging will normally be accomplished with the use of a submersible pump or a bailer. The submersible pumps will not be used for the collection of Total Organic Carbon (TOC), Volatile Organic Compounds (VOCs) or Semi-Volatile Organic Compounds (SVOCs) samples for analyses. These samples will be collected upon completion of well purging, using the procedures outlined below.

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(1) USGS, National Field Manual for the Collection of Water Quality Data. Book 9 Handbooks for Water-Resources Investigation. September 1999.

4.2 WELL SAMPLING PROCEDURES

1. A low flow sampling pump may be used, in accordance with EPA guidance for ground water sampling of metals and general parameters. TOC, VOC and SVOC samples will be collected using a clean, decontaminated Teflon®, stainless steel, or disposable bailer and a spool of new, clean polypropylene rope, or equivalent bailer cord. The bailer will be fitted with a petcock valve or volatile organic analysis (VOA) tip to facilitate controlled filling of sample containers. Using the rope at the end of the spool, a bowline (or equivalent) secure knot will be tied through the bailer loop. The knot and the bailer will be inspected visually for security to assure that the parts are intact prior to inserting the bailer into the well.

2. The bailer will be lowered into the monitoring well. The bailer and bailer rope will touch only clean surfaces, and handling of the bailer or rope will be done by individuals wearing disposable nitrile gloves. The bailer will not touch the ground surface during the bailing routine. Water samples will be obtained from midpoint or lower within the water column; this will be accomplished by lowering the bailer to the midpoint or lower before retrieving it from the well.

3. When removing the sample from its container to the sample bottle, the mixing of air will be minimized by tilting the sample bottle and allowing the water to run down the inside wall of the bottle. A gentle stream of water should exit the bailer valve. High velocities will cause oxygen uptake and loss of volatiles.

4. When sampling for VOCs, the 40 milliliter (mL) VOAs will be completely filled and will have no headspace. To avoid aeration, the VOA will be held at an angle so that the stream of water flows down the side.

5. The VOA will be turned upside-down and tapped to check for air bubbles. If bubbles are present, the VOA will be disposed of, and a new VOA filled.

6. Dissolved metal samples should be field filtered by attaching a disposable, 0.45 micrometer filter to the discharge tubing upon the completion of well purging.

7. Plastic bottles without preservatives will be completely filled to minimize air contact; however, 1-liter glass bottles will be filled 90 percent full to allow room for expansion and contraction of liquid.

4.3 SAMPLE IDENTIFICATION PROCEDURES

1. Each sample collected will be identified as having originated from the site by prefacing each sample designation with "WDI" (for Waste Disposal, Inc.), identified by an alpha and numerical code, and have an additional two-digit number as the last component of the sample identifier. The two-digit number will correspond to the ground water sampling round being performed. The sample identifier is illustrated below:
   - WDI-GMW-01-27 Existing Ground Water Monitoring Well No. 01, 27th sampling round for this well.

4.4 ANALYTICAL PARAMETERS, METHODS AND SAMPLE PRESERVATION REQUIREMENTS

1. Information on analytical parameters, sample containers, methods of preservation, and holding times are specified in the QAPP.

4.5 SAMPLE CONTAINER REQUIREMENTS

1. Each sample container will be provided by the laboratory with the appropriate preservatives according to Table 4.2 of the QAPP.

4.6 BLANKS AND DUPLICATE SAMPLES PROCEDURES

1. Ground water sampling requires the use of trip blanks, equipment rinsates, field blanks, field duplicates, and background samples for QC purposes. These QC procedures are discussed in the QAPP.

2. Field ground water QC samples will be initially identified in the same manner as field samples and have the following suffix designation:
   - TB - Trip Blank
   - FR - Field Equipment Rinsate
   - FB - Field Blank
   - FD - Field Duplicate
   - FBM - Filtration Blank Metals

   An example of each is presented below:
   - WDI-GMWTB-01
   - WDI-GMWFR-01
   - WDI-GMWFB-01
   - WDI-GMWFD-01
   - WDI-GMWFBM-01

   The final number for the FD Sample is the designation of the specific well being sampled.

4.7 SAMPLE PACKAGING AND TRANSPORTATION PROCEDURES

1. Samples will be packed in the following manner for shipment. Detailed transportation procedures are provided in SOP H.
   - Each sample container will be wrapped in bubble pack or other packing material, placed in separate, sealable plastic bags, and then placed in an ice chest precooled to 4 degrees Celsius (°C) with Blue Ice® packages or double-bagged ice packets.
   - The completed Chain-of-Custody record going to the laboratory will be placed in a sealable plastic bag, which will then be placed in the cooler.
   - The cooler lid will then be taped shut with strapping/packaging tape.
   - A custody seal will be completed, signed and attached to the lid and the front of the cooler for hinged coolers. Two custody seals will be attached to coolers with removable lids. One will be attached to the front and one to the back of these coolers.
   - The coolers will be hand-delivered or shipped via overnight carrier to the laboratory at the end of each day's sampling. Samples will be shipped in a manner such that the laboratory will receive them within 24 hours or less from the actual sampling times, depending on the holding times.

4.8 PROCEDURES TO AVOID SAMPLE CONTAMINATION

1. Precautions will be taken to limit the contamination of samples from outside sources. Hands will be washed frequently and nitrile gloves will be worn. The order of sampling will be from the least contaminated well to the most contaminated well.

2. Clean, decontaminated Teflon® or stainless steel bailers, or new disposable bailers and new clean bailer cords will be used to collect the TOC, VOCs and SVOCs samples. The bailer and bailer rope will touch only clean surfaces, and handling of the bailer or rope will be done by individuals wearing nitrile gloves. The bailer will not touch the ground surface during the bailing routine.

3. The pump used for purging and sampling of metals and general parameters will be decontaminated after each use following procedures provided in SOP G.

4. Replace vinyl tubing discharge tubing in between each well.

4.9 SAMPLE DOCUMENTATION AND LABELING PROCEDURES

1. Each sample container will be labeled with the name of the person taking the sample, date and time, identification code, type, preservation method, and analyses to be performed. The label

will also indicate if the sample is to be held in appropriate storage by the laboratory until the geologist/engineer determines if analyses are to be performed based on initial analytical results for representative samples.

2. Perform sample documentation in accordance with the procedures in the SAP and SOP J. In addition, immediately record monitoring and measurement data in the Daily Field Report and/or an appropriate monitoring data sheet.

4.10 CHAIN-OF-CUSTODY PROCEDURES

1. Chain-of-Custody procedures which are provided in SOP I and discussed in the QAPP will be used to maintain and document sample possessions. The Chain-of-Custody record will be initiated at the time of sampling and will contain the sample number, date and time, name and dated signature of the person taking the sample, as well as the methods by which each sample will be analyzed, and other pertinent information.

2. Sample transfers will be noted on the record sheet for each sample. Standardized Chain-of-Custody forms will be used for tracking samples for the point of origin in the field through laboratory processing and disposal.

3. More than one sample may appear on a Chain-of-Custody form. The form will accompany the samples, attached within the ice chest. One copy of each form will be retained by field personnel prior to shipment of the samples to the laboratory. Copies of the Chain-of-Custody records completed by the laboratory will be returned with the results of laboratory analyses.

TABLE E.1
GROUND WATER SAMPLING FIELD NOTES

Well No.:_____ Site: _____

Purge Method:_____ Project No.:_____

Depth to Water (feet):_____ Depth to Product: _____

Total Well Depth (feet): _____ LPH & Water Recovered (gallons):_____

Height of Water Column (feet): _____ Well Casing Diameter (inches): _____

80% Recharge Depth (feet): _____ Well Casing Volume[1] (gallons): _____

Start Time	Stop Time	Depth to Water (feet)	Volume Purged (gallons)	Specific Conductivity (µS/cm)	Temperature (°F)	pH

Static Water Level at Time Sampled	Total Volume Purged	Time Sampled

Comments:

[1]Well casing volume is calculated using one of the following:

$V = 0.0408 \times H \times D^2$

H = Height of water column (in feet)

D = Diameter of well casing (in inches)

OR

$V = H \times CF$

H = Height of Water Column (in feet)

CF = number associated with corresponding well casing diameter using the following conversion table:

Well Casing Diameter (inches)	Conversion Factor (Gallons per foot of well casing)
1.0	0.04
2.0	0.16
3.0	0.37
4.0	0.65
5.0	1.02
6.0	1.47
8.0	2.61
10.0	4.08
12.0	5.88

STANDARD OPERATING PROCEDURE F
GROUND WATER WELL LIQUID LEVEL SOUNDING ACTIVITIES
WASTE DISPOSAL, INC. SUPERFUND SITE

1.0 GENERAL

1. Ground water monitoring wells and other liquid collectors will be sounded to augment, supplement and confirm existing data related to liquids distribution.

2. Appropriate health and safety procedures and emergency response procedures are provided in the Health and Safety Plan (HASP). Quality Assurance/Quality Control (QA/QC) procedures are provided in the Quality Assurance Project Plan (QAPP).

2.0 TASK DESCRIPTION

1. Ground water monitoring wells and other liquid collectors will be sounded to determine liquid level. These various measurement points are hereinafter called "wells" in this Standard Operating Procedure (SOP).

3.0 REQUIRED MATERIALS

1. The following materials are required for this procedure:
   - Solinst water level meter with 200 feet of sounding line and a Type P.4 probe (or similar).
   - One 9-volt alkaline battery for power backup.
   - Daily Field Report forms and/or appropriate monitoring data sheets.
   - Timepiece.
   - Pen with indelible ink.

4.0 TASK PERFORMANCE

4.1 SOUNDING PROCEDURES

1. Well sounding is conducted using a Solinst water level meter or similar device, which consists of a monitoring circuit for liquid level detection and a length of calibrated, coated wire. The other end of the line is secured to a spool, so that the line may be easily rolled.

2. To sound the monitoring well or liquid collection point, remove the cap (if any) on top of the well, and lower the weighted end of the sounder into the well. If the well does not have a cap, remove a sampling port cap or unscrew the sample port labcock to insert the sounder. Lower the sounder until the buzzer on the sounder spool activates ("buzzes"), indicating liquids are at the sounder end. Measure the depth to water (DTW) to the top of the casing at the surveyors v-notch or otherwise marked location on the top of the casing. If no marking is evident, measure the DTW on the north side of the casing. Because the sounder may give a false positive reading as it picks up moisture on the side of the well, bounce the sounder cable to shake off liquids. If the buzzer stays activated, note the depth as "depth to liquid." Record the depth in the Daily Field Report and/or an appropriate monitoring data sheet. Raise the probe above the liquid level and resubmerge two or three times to confirm an accurate reading of liquid level.

3. To sound total well depth, lower the sounder until it is felt to hit the bottom of the well (tension on the line will reduce). To assure that the sounder is not "hung up" inside the well, shake the sounder cable and continue to lower the sounder, if possible. If not, record the reading as "total depth" on the Daily Field Report or an appropriate monitoring data sheet.

4. Note that there may be a correction factor which is applicable to the particular sounder, often indicated as inches of correction per 100 feet of measured sounding depth. Incorporate the correction factor in the sounding activities and document it in the Daily Field Report and/or appropriate monitoring data sheet.

5. Field equipment must be decontaminated between wells. Decontamination procedures are described in SOP G.

STANDARD OPERATING PROCEDURE G
FIELD SAMPLING EQUIPMENT DECONTAMINATION PROCEDURES
WASTE DISPOSAL, INC. SUPERFUND SITE

1.0 GENERAL

1. Field sampling equipment will be decontaminated prior to and between uses at each individual site location using these decontamination procedures to avoid cross contamination and to maintain the integrity of the samples. These procedures do not apply to disposable equipment.

2. Appropriate health and safety procedures and emergency response procedures are provided in the Health and Safety Plan (HASP). Quality Assurance/Quality Control (QA/QC) procedures are provided in the Quality Assurance Project Plan (QAPP).

2.0 TASK DESCRIPTION

1. Field sampling equipment will be decontaminated according to the following procedures to avoid cross contamination and to maintain the integrity of the samples.

3.0 REQUIRED MATERIALS

1. The following materials are required for this procedure:
   - Steam cleaner or high pressure hot water cleaner.
   - Nonphosphate detergent.
   - Tap water.
   - 0.1N nitric acid rinse solution.
   - Deionized/distilled water.
   - Pesticide Grade Isopropyl alcohol.
   - Three buckets.
   - Brushes.
   - Paper towels.
   - Disposable (Nitrile) gloves.

4.0 TASK PERFORMANCE

4.1 EQUIPMENT DECONTAMINATION PROCEDURES

1. Augers (including hand augers and hydraulically pushed sampler units) will be decontaminated prior to and between drilling at each borehole site by steam cleaning or high pressure hot water cleaning.

2. The drilling rig may be decontaminated at anytime during the drilling program, if the field geologist or engineer believes the integrity of monitoring wells may be affected by contaminated conditions on the rig. Decontamination will consist of steam cleaning or high-pressure washing of truck wheels, chassis, or other rig components affected.

3. Non-disposable sampling equipment (e.g., stainless steel bailers) will be decontaminated at the location where it was used.

4. The following is the general decontamination procedure for field equipment used in the subsurface investigation:
   - Washing and scrubbing with nonphosphate detergent.
   - Tap water rinse.
   - 0.1N nitric acid rinse.
   - Deionized/distilled water rinse.
   - Isopropyl alcohol rinse.
   - Deionized/distilled water rinse.
   - Air dry.

5. Waste generated through decontamination will be disposed of using the procedures in SOP Z for Waste Disposal.

STANDARD OPERATING PROCEDURE H
SAMPLE PACKAGING AND TRANSPORTATION PROCEDURES
WASTE DISPOSAL, INC. SUPERFUND SITE

1.0 GENERAL

1. Samples collected pursuant to Waste Disposal, Inc. (WDI) activities are required to be packaged and transported using this Standard Operations Procedure (SOP). This procedure does not apply to samples processed solely by direct-read filed instruments, including, but not limited to the following instruments: (1) Photoionization Detector/Flame Ionization Detector (PID/FID); (2) GA-90 or GEM-500; (3) thermometer; (4) barometer; and water level sounder.

2. Appropriate health and safety procedures and emergency response procedures are provided in the Health and Safety Plan (HASP). Quality Assurance/Quality Control (QA/QC) procedures are provided in the Quality Assurance Project Plan (QAPP).

2.0 TASK DESCRIPTION

1. Collected soil, ground water and air samples will be packaged and transported using this SOP.

3.0 REQUIRED MATERIALS

1. The following materials are required for this procedure:
   - Bubble pack or equivalent packing material.
   - Plastic, sealable bags.
   - Precooled ice chest.
   - Blue Ice® packages or double-bagged ice packets.
   - Completed Chain-of-Custody record(s).
   - Packaging tape.
   - Custody seal(s).
   - Disposable (nitrile) gloves.

2. For Summa canister (air) samples, the required materials are:
   - Packaging provided with the canisters.
   - Completed Chain-of-Custody record(s).
   - Packaging tape.
   - Custody seal(s).

- Disposable (nitrile) gloves.

4.0 TASK PERFORMANCE

4.1 SAMPLE PACKAGING PROCEDURES

1. Samples will be packed in the following manner for shipment:
   - Each labeled ground water or soil sample container will be wrapped in bubble pack or other packing material, placed in separate, sealable plastic bags, and then placed in an ice chest precooled to 4 degrees Celsius (°C) with Blue Ice® packages or double-bagged ice packets.
   - For summa canisters, the sample container is replaced in the packaging provided by the laboratory.
   - The completed Chain-of-Custody record going to the laboratory will be placed in a sealable plastic bag, which will then be placed in the cooler.
   - The cooler lid or package will then be taped shut with strapping/packaging tape.
   - A custody seal will be completed, signed and attached to the lid and the front of the cooler for hinged coolers. Two custody seals will be attached to coolers with removable lids. One will be attached to the front and one to the back of these coolers. Similar sealing procedures are used as for air samples.

4.2 SAMPLE TRANSPORTATION PROCEDURES

1. The coolers will be hand-delivered, picked up by courier or shipped via overnight carrier to the laboratory at the end of each day's sampling. Samples will be transported in a manner such that the laboratory will receive them within 24 hours or less from the actual sampling times, depending on holding times.

2. If the coolers are shipped overnight, a tracking number will be provided by the overnight carrier so that the shipment may be easily tracked.

STANDARD OPERATING PROCEDURE I
SAMPLE CHAIN-OF-CUSTODY
WASTE DISPOSAL, INC. SUPERFUND SITE

1.0 GENERAL

1. Samples collected pursuant to Waste Disposal, Inc. (WDI) activities are required to be documented using this Chain-of-Custody procedure as physical evidence of sample custody.

2. Appropriate health and safety procedures and emergency response procedures are provided in the Health and Safety Plan (HASP). Quality Assurance/Quality Control (QA/QC) procedures are provided in the Quality Assurance Project Plan (QAPP).

2.0 TASK DESCRIPTION

1. Collected samples will be documented using this Standard Operating Procedure (SOP), which provides the means to identify, track and monitor the Chain-of-Custody of each individual sample from the point of collection through data analysis.

3.0 REQUIRED MATERIALS

1. The following materials are required for this procedure:
   - Chain-of-Custody record(s), of sufficient quantity for the planned sampling activity (see Figure I.1).
   - Custody seal(s), of sufficient quantity for the planned sampling activity.
   - Pen with indelible ink.

4.0 TASK PERFORMANCE

4.1 CHAIN-OF-CUSTODY PROCEDURES

1. A Chain-of-Custody record is required for each shipment of samples and will be completed with applicable information for each sample in the shipment. The record is completed in indelible ink. Changes or corrections to the record consist of line-out deletions (e.g., no "white-out" correction fluid) which are initialed and dated by the author of the change or correction.

2. The Chain-of-Custody record is completed by a field technician who performed and/or witnessed the sample collection activity(ies). After completion of the record down through the initial "Relinquished by:" row, a copy is made of the record for retention by the originating field technician or designee. The original record is then sealed in a plastic bag and secured in the shipping container. The shipping container is then closed and sealed.

3. The person relinquishing the samples places completed custody seals on the shipping container. Custody seals are gummed paper seals or similar devices which contain the signature and date of the relinquishing person. Custody seals are affixed in such a way that the shipping containers cannot be opened without breaking the seal. When samples are shipped, a minimum of two custody seals are affixed to each shipping container in such a way which would indicate if the container was opened in transit.

4. The shipping container is not opened and the custody seals are not broken or otherwise tampered with until the shipping container is received at the analytical laboratory. If this is not the case, the intermediate person(s) taking temporary custody of the samples must acknowledge his/her formal custody by completing the first incomplete "Received by:" row and then later the subsequent "Relinquished by:" row on the enclosed Chain-of-Custody record, and placing fresh custody seals with the current signature and date on the shipping container (as described in Item 3 above). This process is repeated as necessary to reflect other intermediate custody of the samples. Note that the preference is that neither the courier nor other intermediate party open the shipping container and thereby take formal custody of the samples. Intermediate custody should solely be "superficial" custody of the closed and sealed shipping container, which does not warrant documentation on the Chain-of-Custody record.

5. If the field technician or designee relinquishes the samples to a courier a copy of the Chain-of-Custody will be retained.

6. The laboratory representative who accepts the incoming sample shipment at the receiving laboratory will complete the first incomplete "Received by:" row on the Chain-of-Custody record to acknowledge receipt of the samples. This signed original (or a copy) will then be returned with the analytical reports.

7. The laboratory representative who accepts the incoming sample shipment at the receiving laboratory will inspect the samples. If the custody seals or sample containers are broken or

have been tampered with, if the signature and date on the shipping container custody seals does not match that of the last "Relinquished by:" information on the Chain-of-Custody record, if there is a discrepancy between the actual sample identification numbers and those noted on the Chain-of-Custody record or if there is other apparent discrepancy or potential anomaly, the samples will not be analyzed until the issue is resolved through contact with the originating field technician or his/her designee. The laboratory will provide such notification by the most expedient method (e.g., e-mail, telephone and/or facsimile), followed by a written notification. A complete copy of the documentation of the issue and its resolution will be provided by the laboratory with the analytical reports.

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Ship To: _____
Attn: _____

Page ____ of ____
Project Name: _____
Project No.: _____
Site Location: _____
Date: ____/____/____

CHAIN OF CUSTODY RECORD

Boring/Well No.	Sample No.	Depth	Date	Time	Sample Type			Comp.	Grab	Sample Containers				Analysis									Remarks
					Water	Solid	Other			Vol.	No.	Type	Pres.										

Total Number of Samples Shipped: Shipper's Signature:

	Signature	Company	Date	Time
Relinquished by:				
Received by:				
Relinquished by:				
Received by:				
Relinquished by:				
Received by:				

Special Instructions / Shipment / Handling/ Storage Requirements:

The material(s) listed are received for analysis and/or treatability evaluation and remain property of the client and not TRC. At the conclusion of the test work, all remaining material(s) will be returned to the client for eventual disposal at a licensed facility.

☐ TRC
21 Technology Drive
Irvine, California 92618
(949) 727-9336

☐ TRC
2815 Mitchell Drive, Suite 103
Walnut Creek, California 94598
(925) 935-3294

CHAIN-OF-CUSTODY RECORD

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC | FIGU I.1

STANDARD OPERATING PROCEDURE J
FIELD ACTIVITY DOCUMENTATION
WASTE DISPOSAL, INC. SUPERFUND SITE

1.0 GENERAL

1. Monitoring and sampling activities conducted at the Waste Disposal, Inc.(WDI) site require standardized documentation.

2. Appropriate health and safety procedures and emergency response procedures are provided in the Health and Safety Plan (HASP). Quality Assurance/Quality Control (QA/QC) procedures are provided in the Quality Assurance Project Plan (QAPP).

2.0 TASK DESCRIPTION

1. Documentation of monitoring and sample collection activities utilizes standard forms and format.

3.0 REQUIRED MATERIALS

1. The following forms are required for this procedure:
   - Daily Field Report (Figure J.1).
   - Appropriate monitoring data sheets as indicated by particular activity documents. The monitoring data sheets are included in the following Standard Operating Procedures (SOPs):
     - Ground Water Sampling Field Notes (SOP E)
     - Vapor Well Monitoring Field Notes (SOP S)
     - Field Boring Log (SOP AA)

   These examples are for certain routine monitoring events. Other forms may be used. The Daily Field Report and/or appropriate monitoring data sheets are determined on an event-specific basis.

4.0 TASK PERFORMANCE

4.1 SAMPLE DOCUMENTATION PROCEDURES

1. Monitoring and sample collection activities are documented with thorough and accurate record keeping on Daily Field Report forms and/or appropriate monitoring data sheets. Entries on those forms include the following information, as applicable:
   - Name of sampler.
   - Sample identification number(s).
   - Physical conditions during sampling.
   - Climatic conditions.
   - Date and time of collection.
   - Sample collection procedure/equipment.
   - Sample identification and volume of sample(s).
   - Types of sample containers collected.
   - Parameters requested for analysis.
   - Duplicates collected and identification numbers.
   - Type and number of blanks collected and identification numbers.
   - Field observations.
   - Decontamination procedures.
   - Name of courier and laboratory.

2. Documentation will provide sufficient information to reconstruct the monitoring or sampling event without relying on the field technician's memory. Daily Field Reports and/or appropriate monitoring data sheets will be completed at the time of the activity or immediately thereafter.

3. See also SOP I addressing Chain-of-Custody Procedures.

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DAILY FIELD REPORT

JOB NAME:	PROJECT NUMBER:	DATE:
LOCATION:	WEATHER:	DAY:
CONTRACTOR:	FOREMAN:	
FIELD TECHNICIAN:	INSPECTION/TESTING OF:	

SUMMARY OF OPERATIONS:

TRC
Customer-Focused Solutions

DAILY FIELD REPORT

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC | **FIGURE J.1**

STANDARD OPERATING PROCEDURE K
SOIL VAPOR EXTRACTION SYSTEM
INSTALLATION AND MONITORING ACTIVITIES
WASTE DISPOSAL, INC. SUPERFUND SITE

1.0 GENERAL

1. Temporary soil vapor extraction (SVE) systems, including the vapor extraction wells, blower, gas treatment system (carbon canisters), and flow and pressure controls, may be installed and monitored to verify that the observed conditions are local and readily remediated, and to determine whether additional investigations are required to resolve the related issues.

2. Appropriate health and safety procedures and emergency response procedures are provided in the Health and Safety Plan (HASP). Quality Assurance/Quality Control (QA/QC) procedures are provided in the Quality Assurance Project Plan (QAPP).

3. The remedial design (Final [100%] Remedial Design Report, TRC, May 2003) presents typical designs for subsurface vapor extraction (i.e., under buildings). The design of vapor extraction systems must be in conformance with this general design and performed by a California Professional Engineer.

2.0 TASK DESCRIPTION

1. Temporary SVE systems, including the vapor extraction wells, blower, gas treatment system (carbon canisters), and flow and pressure controls, may be installed and monitored to verify that the observed conditions are local and readily remediated, and to determine whether additional investigations are required to resolve the related issues.

3.0 REQUIRED MATERIALS

1. The following materials are required to perform this procedure:
   - Six-inch hollow-stem auger.
   - Two-inch-diameter Blank Schedule 40 polyvinyl chloride (PVC) casing.
   - Two-inch-diameter Perforated Schedule 40 PVC casing with 0.02-inch slots.
   - Pea gravel filter pack (or equivalent).
   - Bentonite pellets (or equivalent) for impermeable seal.

- Volclay grout (or equivalent) for backfill.
- Well casing cap locks.
- Concrete.
- Buckets and intermediate containers.
- Concrete mixing barrel and shovel.
- SVE system components - blower, gas treatment system (carbon canisters) flow and pressure controls.
- Thermometrics Model TA-1000 Combination Photoionization Detector/Flame Ionization Detector (PID/FID) or equivalent. Analyzer with data logger.
- Personal protective equipment (PPE) as described in the HASP.
- Measuring tape.
- Daily Field Report forms and/or appropriate monitoring data sheets.
- Timepiece.
- Pen with indelible ink.

4.0 TASK PERFORMANCE

4.1 VAPOR EXTRACTION WELL BOREHOLE

1. Each well borehole will be drilled using a 6-inch hollow-stem auger to a default depth of 35 feet below ground surface (bgs). Measuring tape will be used to determine the depth.

2. The borehole cuttings will be field analyzed and disposed of as described in SOP Z for Waste Disposal. The borehole cuttings will be placed into 55-gallon U.S. Department of Transportation (DOT) approved drums. Each drum will be sealed and labeled with a borehole identification number, sampling depth, and date of storage. The soil in the drums will be managed based upon the field analysis results. Soil in drums determined to be uncontaminated may be consolidated into larger volume roll-off boxes for eventual disposal, or may be emptied onsite at a designated location.

4.2 VAPOR EXTRACTION WELL INSTALLATION AND MONITORING

1. After the borehole is drilled to the proper depth, approximately 30 feet of 2-inch-diameter Schedule 40 PVC with 0.02-inch slot openings casing (screen) will be attached to the drill rig and carefully installed below the ground. The screen will be flush threaded on the end closest to the ground surface and capped on the bottom. While the screen is still slightly above ground, flush threaded 2-inch-diameter Schedule 40 PVC blank casing will be securely attached to the screen. The blank casing will extend to approximately 1-foot bgs.

2. The annular space will be backfilled from the well bottom to approximately 2 feet above the screen top using 5/16-inch-diameter pea gravel. The pea gravel will be poured slowly into the annular space to assure it is optimally packed. A 2- to 5-foot bentonite seal will be placed on top of the pea gravel. Volclay grout will be placed into the remaining annular space around the casing.

3. A protective locking cover and traffic box will be installed on each well.

4. Cement mix and water will be mixed in a cement mixing barrel using a shovel. The cement will be used to construct a 3-foot pad around the well. The pad will be shaped to direct surface runoff from the casing.

4.3 SOIL VAPOR EXTRACTION SYSTEM INSTALLATION AND MONITORING

1. The SVE gas treatment system will be specifically designed based on the results of the vapor well monitoring results. The following is an overall description of the general equipment to be used for the SVE system.

4.3.1 BLOWER, AND FLOW/PRESSURE CONTROLS

1. A blower will be plumbed into the assigned extraction wells with 2-inch-diameter Blank Schedule 40 PVC piping.

2. The blower will be equipped with flow and pressure controls to determine the extraction rate of the vapor.

3. The blower will be checked for flow and pressure to determine the extraction rate and efficiency of the system. The flow and pressure readings will be recorded on the Field Activity Report forms.

4.3.2 SOIL VAPOR EXTRACTION MONITORING

1. The extracted gas will flow through a Thermometrics model TVA-1000 combined PID/FID analyzer with data logging system. The FID will be calibrated to methane and determine the

concentration of volatile organic compounds (VOCs) in the gas stream; the PID will estimate the nonmethane VOC concentration. These readings will be recorded on the strip chart data logging system.

STANDARD OPERATING PROCEDURE L
DATA REDUCTION AND VALIDATION PROCEDURES
WASTE DISPOSAL, INC. SUPERFUND SITE

1.0 INTRODUCTION

1. This Standard Operating Procedure (SOP) provides a description of the data reduction and validation procedures to assure the data quality objectives (DQOs) of the project have been met. Laboratory data reduction procedures will be those specified in the respective U.S. Environmental Protection Agency (EPA) SW 846 methods, and those described in the laboratory Quality Assurance (QA) plans.

2.0 GENERAL REQUIREMENTS

1. The laboratory will prepare and retain full analytical and QA documentation. For EPA SW 846 analyses, reporting will be in accordance with the requirements in *The CLP Statement of Work Methods for Organic and Inorganic Compounds* (EPA, 1990a; EPA, 1990b). The following reporting requirements shall be met. The laboratory will report the data as a group of 20 samples or less, along with QA supporting data. The laboratory will provide the following hard copy information in each analytical data package submitted:
   - Original Chain-of-Custody Record.
   - Cover sheet listing the samples included in the report and narrative comments describing problems encountered in the analysis.
   - Tabulated results of inorganic and organic compounds identified and quantified and reporting limits for analytes.
   - Analytical results for QA sample spikes, sample duplicates, initial and continuous calibration verifications of standards and blanks, standard procedural blanks, laboratory control samples, and inductively coupled plasma (ICP) interference check samples (ICS).
   - Surrogates and internal standard results.
   - Tabulation of reporting limits related to the sample.

2. Ten percent of the samples collected from vapor monitoring wells and in-business air monitoring will be subjected to data validation in accordance with EPA functional guidelines for data validation and review[1]. The data validation process will be overseen by a Project QA

(1) Current Contract Laboratory Program National Functional Guidelines for Low Concentration Organic Data Review; EPA-540-R-00-006, June 2001. Contract Laboratory Program National Functional Guidelines for Organic Data Review; EPA-540/R-99-008 (PB99-963506) October 1999; and Contract Laboratory Program National Functional Guidelines for Inorganic Data Review; EPA-540-R-01-008; July 2002.

Officer. A summary of the elements to be checked in the validation process is presented in the following sections.

3. The impact of a few rejected samples will not have a significant impact on the overall quality of the data. Therefore, only a small subsampling (i.e., 10 percent of the data) will undergo a detailed validation process. In the event that one or more of the data points are rejected or there are suspected problems with the data, a more extensive data validation will be conducted by the following procedure:
   - Validate 10 percent of the analytical data.
   - If the samples are accepted (i.e., no rejected data), then the entire data set will be deemed usable for the intended purpose.
   - If data are rejected, the associated sample data groups with the rejected data will undergo complete validation to identify if the problem persists through the entire data package.
   - If the problem persists throughout the sample group, 100 percent validation of sample data groups will be conducted to assess if the problem is persistent throughout data groups for the specific item in question.
   - If the problem was limited to a subset of the sample data group, the associated data will be rejected or appropriately qualified. The remaining data will be considered usable for the intended purpose.
   - A corrective action plan will be completed to identify the problem, define an acceptable resolution, and verify that the problem has been properly corrected.

4. Organic analytical data for critical samples will undergo validation of all of the following requirements in accordance with EPA Functional Guidelines for Data Validation and Review:
   - Holding times.
   - Initial calibration.
   - Continuing calibration.
   - Blanks.
   - Surrogate spikes.
   - Matrix Spikes and Matrix Spike Duplicates (MS/MSD).
   - Internal standards.
   - Target compound identification.
   - Compound Quantitation and Reported Contract Required Quantitation Limits (CRQLs).
   - System performance.
   - Overall assessment of data.

5. Field duplicates will also be identified and evaluated. The precision of duplicate pairs will be compared as a measure of how representative the analytical results are of the matrix sampled. Duplicate samples will be spread out across the site and collected at a regular interval (one per ten sample or a minimum of one per week during sampling activities). The duplicates will be

collected, numbered, and sealed in the same manner as other samples. A duplicate sample pair will be assigned two unique sample numbers and submitted blind to the laboratory.

6. Review of air sampling data will include checks on the canister certification results, the field data forms for beginning and ending pressures (and comparison with the "sent" and "received" pressures, respectively, recorded by the laboratory), in addition to the analytical data quality review (including consideration of the data quality indicator tables in Appendix B of the QAPP) according to the appropriate functional guidelines.

STANDARD OPERATING PROCEDURE M
FIELD AND LABORATORY PERFORMANCE AND SYSTEM AUDITS
WASTE DISPOSAL, INC. SUPERFUND SITE

1.0 INTRODUCTION

1. An audit assesses the capability and performance of a measurement system, or its components, and identifies problems which warrant corrective actions. A system audit or field audit verifies adherence to other Standard Operating Procedures (SOPs) and Quality Assurance (QA) policies. The performance audit or laboratory audit measures the ability to achieve measurements which are comparable to a standard or reference.

2.0 FIELD PERFORMANCE AND SYSTEM AUDIT

1. A system audit consists of onsite assessment to evaluate if the required equipment and personnel are collecting data/measurements, to evaluate if the selection of equipment and personnel are appropriate for the data collection/measurement procedure, and to evaluate if the proper Quality Control (QC) and documentation procedures are being used. Field audits will be conducted by the Project QA Officer or his designee one month after implementation and annually thereafter. Field audits will include review of the following procedures:
   - Use of Daily Field Reports by technical consultant and site personnel.
   - Completion of Daily Field Report entries using indelible ink, single line cross-outs and military time recordation.
   - Implementation of proper sample collection, handling and Chain-of-Custody procedures.
   - Collection of representative samples, as indicated in the Sampling and Analysis Plan (SAP).
   - Maintenance and calibration of field equipment in accordance with the manufacturer's procedures and procedures specified in SOP W.
   - Performance of field activities by technical consultant and site personnel for which they are properly trained.

   A write-up of the system audit will be prepared by the Project QA Officer or his designee and submitted with the monthly report. If deficiencies are noted by the Project QA Officer or his designee, a follow-up audit will be performed to assure that the deficiencies are corrected.

3.0 LABORATORY PERFORMANCE AND SYSTEM AUDIT

1. Laboratory performance and system audits will be conducted by the Laboratory QA Officer or his designee in accordance with the procedures outlined below.

3.1 AUDIT NOTIFICATION

1. The Project QA Officer, Project Manager, and if appropriate, other audited entity (e.g., field team leader, laboratory supervisor) will be notified by the Laboratory QA Officer of an audit at a reasonable time before the audit is performed. This notification will be in writing and include information such as the general scope and schedule of the audit and the name of the audit team leader.

3.2 PREAUDIT CONFERENCE

1. A preaudit conference shall be conducted at the audit site with the appropriate manager or designated representative (e.g., field team leader, laboratory supervisor). The purpose of the conference will be to confirm the audit scope, present the audit plan, discuss the audit sequence and plan for the postaudit conference.

3.3 AUDIT

1. The audit is then implemented by the audit team. Checklists prepared by the audit team and approved by the Laboratory QA Officer will be sufficiently detailed to document major audit components. Selected elements of the QAPP will be audited to the depth necessary to evaluate the effectiveness of implementation. Conditions requiring immediate corrective action shall be reported immediately to the Project QA Officer.

3.4 POSTAUDIT CONFERENCE

1. At the conclusion of the audit, a postaudit conference will be held with the field team leader or laboratory supervisor, or their designated representative to present audit findings and clarify misunderstandings. Audit findings will be concisely stated by the audit team leader on a list of findings. The findings will be acknowledged by signature of the Project Manager, Project QA Officer or designated representative upon completion of the postaudit conferences.

3.5 AUDIT REPORT

1. An audit report will be prepared by the audit team leader and signed by the Laboratory QA Officer. The report will include the following:
   - Description of the audit scope.
   - Identification of the audit team.
   - Persons contacted during preaudit, audit and postaudit activities.
   - A summary of audit results, including an evaluation statement regarding the effectiveness of the QAPP elements which were audited.
   - Details of findings and program deficiencies.
   - Recommendations for correcting the findings to the Laboratory QA Officer, with a copy to the Project Manager and others as appropriate.

3.6 AUDIT RESPONSE

1. The Project Manager, Project QA Officer or a designated representative will respond to the audit report within two days of receipt. The response will clearly state the corrective actions for each finding, including action to prevent recurrence and the date the corrective actions will be completed.

3.7 FOLLOW-UP ACTION

1. Follow-up action shall be performed by the Laboratory QA Officer or designated representative to:
   - Evaluate the adequacy of the response.
   - Assess that corrective action is identified and scheduled for each finding.
   - Confirm that corrective action is accomplished as scheduled.

   Follow-up action may be accomplished through written communications, reaudit or other appropriate means. When corrective actions have been verified, a memo shall be sent to the Project Manager signifying the satisfactory close-out of the audit, with copies to the appropriate personnel.

3.8 AUDIT RECORDS

1. Original records generated for audits shall be retained within the central project files. Records shall include audit reports, written replies, the record of completion of corrective actions, and documents associated with the conduct of audits which support audits findings and corrective actions as appropriate.

STANDARD OPERATING PROCEDURE N
DOCUMENT CONTROL PROCEDURES
WASTE DISPOSAL, INC. SUPERFUND SITE

1.0 INTRODUCTION

1. These document control procedures apply to project documents that specify quality requirements or prescribe how project activities affecting quality will be conducted. The purpose of these procedures is to present protocol for document control. These procedures include the management of project files, computer files, drawings and document review.

2. The following project personnel are responsible for document control procedures:
   - Project Coordinator - Responsible for controlling and reviewing the document control procedure.
   - Project Manager - Assists the Project Coordinator with implementation of these procedures.
   - Design Engineer/Technical Personnel - Assists the Project Coordinator, as requested.
   - Project Quality Assurance (QA) Officer - Responsible for the maintenance and distribution of the Quality Assurance Project Plan (QAPP) and for verifying compliance with the QA program. The Project QA Officers will manage the QAPP in accordance with this project.

2.0 QUALITY ASSURANCE DOCUMENTS

1. The QAPP will be maintained by the Project QA Officer. Copies of the QAPP will be assigned to the Project QA Officer and Project Manager. Changes to the QAPP, whether originated by the appropriate QA Officers or other project team members, will be made by the Project QA Officer. Revisions to the QAPP will be designated by marginal notations which indicate the changes. The author or source of the revisions will be indicated clearly by each notation or by a notation convention, such as color-coding, keyed to an explanation included at the beginning of the document. Each version of the QAPP will be identified with a revision number and the date of the revision. A revision document form will be kept by the Project QA Officer in the project QA files.

2. Other QA documents, including audit documents, corrective action documents, and documents verifying that corrective action has been completed will be maintained by the Project QA Officer in the project QA files. QA-related correspondence will be filed with the general project correspondence.

3. Issuance of copies of the QAPP will be limited to the Project QA Officer, Project Manager, task managers (as determined by the Project Manager), client representatives, contractors and regulatory agency representatives. Each QAPP will be assigned a unique control number. The control number and the identity and location of the copy holder will be recorded in the project QA files. Transmittal of the QAPP will be made using a transmittal form. Transmittal forms will be signed by the recipient and will be returned to the Project QA Officer.

3.0 PROJECT FILES

3.1 PROJECT FILES MANAGEMENT

1. The Project Coordinator is responsible for maintenance of the active project files during the project. Contractor Project Managers may be designated as caretakers of the project files for specific Elements or Components of work. Files not in active use will be kept in a secured file storage area. Files in active use will be checked out by replacing the file with a checkout card marked with the individual's name, date and the name of the file checked out.

2. Working files will be maintained by the Contractor Project Manager until such time as that document becomes final. The Project Coordinator will maintain a library of final Scope of Work (SOW) deliverables.

3.2 PROJECT FILES CATEGORIES

1. Project files will be maintained in folders labeled with the main project file categories listed below:

   - Proposal and Authorization
   - Correspondence
   - Project Management
   - QA
   - Data
   - Calculations
   - Notes
   - Review Draft
   - Report

   Several files in some categories will be required. Each file will be labeled with the main file category and the appropriate task or activity number.

2. The types of materials which will be included in each of the main file categories are noted below:

   - Proposal and Authorization - This file will contain a copy of the proposal and proposed SOW, the original client authorization or contract for the project and information used in the development of the proposal.
   - Correspondence - Project-related correspondence will be filed in chronological order in this file. Letters, telephone call confirmations, memos, meeting notes and third-party correspondence related to the project will be included in the correspondence file.
   - Project Management - Project billing summaries, as needed by the Project Manager, data used in the development of progress reports, and other project-management information will be filed under this category. Subcontracts with other firms or suppliers will be filed in this category.
   - Quality Assurance - Project QA records, including the QAPP originals, training records, audit records, and records relating to nonconformance and corrective actions required as a result of audits will be filed in this category. Procedures approved for project use will be filed in this category.
   - Data - Data includes data provided by the client, third parties or collected by the company for the project. The source of data contained in the files will be noted. When data are in the form of published references, the references will be included in the file or will be incorporated into the company library.
   - Calculations - Calculations include data manipulations that can be checked. These can include mathematical equations solved, input for computer programs, cross sections drawn, and contour maps. Calculations also can include the process of reasoning used to develop a conclusion used or presented in the report. Calculations will be marked with the project number, task or activity number, date and the name of the individual who made or checked the calculation. A calculation summary sheet will be attached to each calculation to identify the purpose of the calculation, references used (including page or equation number), and to show that the calculation has been checked.
   - Notes - Notes include project-related notations that are not filed elsewhere in the project files, but for which later retrieval might be useful. Notes will be marked with the project and task or activity number, the date and the name of the individual who made the notes. The possible significance to the project should be obvious, either in the content of the notes or in a separate notation added by the originator.
   - Review Draft - Review draft copies of project reports will include notations of the comments of the internal reviewer and outside reviewers, such as client representatives or a regulatory agency. If practical, a single master review copy will be assembled that clearly identifies each revision to the document and identifies, by color code, the name or other means the

source and date of the review. Each page of the review draft, including text, tables, figures, drawings and other attachments will be marked with the project number and the origination date.

- Report - The report file includes the reproducibles for the report text, tables and figures, except where the reproducibles are too large. Each page of the report, including text, tables, figures and other attachments will be marked with the project number and the origination date.

3.3 PROJECT COMPUTER FILES

1. Many project documents are computer-generated. The computer files will be maintained in computer storage while the project is active and in archived storage after the project has been completed. The following sections describe management of project computer files in additional detail.

3.3.1 FILE DIRECTORIES

1. Project files maintained on computer will be kept on one computer designated for this purpose. The project computer files will be organized in separate, identifiable directories on computer hard disks. The project number will be used as the main directory name. Subdirectory names will be assigned which represent the task or activity numbers. Subdirectories will be used, as necessary, and will indicate clearly the type of files included. Files from more than one task or activity can be kept in a single subdirectory.

3.3.2 PROJECT FILE GENERATION AND REVISION

1. Project files generated on a computer other than the project computer will be transferred to the project computer as soon as possible after generation of the file.

2. Project files can be transferred from the project computer to another computer for use. As soon as possible, when a revision to the original file is made, the revised file will be transferred back to the project computer and written over the original file. Where the likelihood exists that the same project file might be used by more than one individual, the project computer file will be checked out to the first user. The project computer file will be renamed with an ".LOK" extension when in use by the first user. The ".LOK" file will be erased when the revised file is returned. Two separate users cannot use and revise the same file at the same time. Original versions of the revised files will not be maintained.

3.3.3 COMPUTER FILE NAMES

1. Computer file names will be composed of an eight-character name and a three-character extension in the form "nnnnnnnn.eee". The eight-character computer file names ("nnnnnnnn") used for the project files should be as self-explanatory as possible. The file name extension ("eee"), where not set automatically by the program, should identify similar file types. For example, .DOC could be used for text files, and .DAT could be used for data files.

3.3.4 COMPUTER FILE BACKUPS

1. Data backups will be made on a regular basis. Two sets of backups will be made.

2. The older backup will be kept at the office and the more recent backup will be kept at a separate secure location. Each Friday, the newer backup will be returned to the office and the older backup overwritten and removed to the separate secure location.

3.3.5 COMPUTER FILE ERASURE

1. Project computer files stored in the project computer will not be erased without approval from the Project Manager or Task Manager.

4.0 DRAWINGS MANAGEMENT

1. Project-related drawings, including drawings from the final report and other drawings generated for the project, will be kept in either the project files ("REPORT" file for report drawings) or, in the case of oversize drawings, in labeled flat files. Where flat file storage is required, the drawings will be kept in folders labeled with the project number.

2. Each project-related drawing will be marked with the project number, drawing number (if appropriate) and the date of drawing generation. The date of generation, in the case of report drawings, will be the report date. Drawings revised after the original submittal will be marked with the revision date.

STANDARD OPERATING PROCEDURE O
TANK AND/OR DRUM LIQUIDS SAMPLING ACTIVITIES
WASTE DISPOSAL, INC. SUPERFUND SITE

1.0 GENERAL

1. Baker tanks and 55-gallon drums may be sampled to supplement characterization of stored liquids on site. The analytical data obtained from these samples will be evaluated and used to select the appropriate final Treatment, Storage and Disposal (TSD) facility.

2. Appropriate health and safety procedures and emergency response procedures are provided in the Health and Safety Plan (HASP). Quality Assurance/Quality Control (QA/QC) procedures are provided in the Quality Assurance Project Plan (QAPP).

2.0 TASK DESCRIPTION

1. Sample collection of liquids produced during site activities will be sampled using a Coliwasa sampler or equivalent.

3.0 REQUIRED MATERIALS

1. The following materials are required for this procedure:
   - Coliwasa sampler or equivalent.
   - Sample containers (provided by the selected laboratory, or equivalent, with appropriate preservations as outlined in the QAPP.
   - Cooler and ice.
   - Disposable (Nitrile) gloves.
   - Sample bottle labels.
   - Daily Field Report and/or sample log book.
   - Timepiece.
   - Pen with indelible ink.

4.0 TASK PERFORMANCE

4.1 SAMPLE COLLECTION PROCEDURES

1. Lower the Coliwasa sampler into the container and pull up the plunger to allow liquids to flow into the sampler. Each sample should be a composite collected from the top 1/3, midpoint and bottom 1/3 of the liquid column. The sampler should only be handled by individuals wearing nitrile gloves and should not touch the sides or bottom of the container.

2. Transfer the sample from its container to a sample bottle. Tilt the bottle to allow the water to run down the inside wall of the bottle to prevent mixing the sample with air. A gentle stream of water should exit the sampler. High velocities can cause oxygen uptake and loss of volatile organic compounds (VOCs).

3. The 40-milliliter (ml) vials will be turned upside down and taped to check for air bubbles. All vials must have no headspace. If bubbles are present, the vial will be disposed of and a new sample vial filled.

4. Plastic bottles without preservative will be filled completely to minimize air contact. Glass bottles will be filled 90 percent to allow room for expansion and contraction of the liquid.

5. Dissolved metals samples need to be field filtered prior to filling a preserved containers. Bailed liquids will be transferred to a "Norton-Norwell" pressurized bailing system, or equivalent, for filtration through a 0.45 micron disposable filter.

6. While drawing samples from a sample port, the flow should be controlled by positioning the valve on the port such that a continuous, low-flow condition is established. If the flow from the port is turbulent, causing air bubbles in the stream, a vinyl tubing should be attached to the port to direct the stream into a more laminar flow condition, thereby decreasing the incidence of air bubbles. A stopcock will be placed at the end of the tubing; samples will be drawn as the tubing fills with liquid. Clean stopcocks and tubing will be used at each sampling location. Tubing will not be reused, and must be disposed.

7. Sample bottles will be kept at 4 degrees Celsius (°C) in an iced cooler/chest so they remain cool prior to sampling. Filled sample bottles will be packaged and placed directly into an iced cooler/chest.

4.2 SAMPLER DECONTAMINATION

1. Decontamination of the Coliswasa sampler will be performed as described in SOP G.

4.3 SAMPLE IDENTIFICATION PROCEDURES

1. Each sample collected will be identified as having originated from the site by prefacing each sample designation with "WDI" (for Waste Disposal, Inc.) followed by an alpha and numerical code. The sample identifier is illustrated below:
   - WDI-BT 1000-01-01-99 as Baker Tank (BT) #1000 sampled January 1, 1999
   - WDI-PD 001-01-01-99 as Product Drum #1 generated January 1, 1999

4.4 ANALYTICAL PARAMETERS, METHODS AND SAMPLE PRESERVATION REQUIREMENTS

1. Information on analytical parameters, sample containers, methods of preservation, and holding times are specified in the QAPP.

4.5 SAMPLE CONTAINER REQUIREMENTS

1. Each sample container will be labeled with the name of the person taking the sample, date and time, identification code, type, preservation method, and analyses to be performed. The label will also indicate if the sample is to be held in appropriate storage by the laboratory until the geologist/engineer determines if analyses are to be performed based on initial analytical results for representative samples.

4.6 BLANKS AND DUPLICATE SAMPLES PROCEDURES

1. Blanks and duplicate samples will not be collected, due to the low number samples to be collected.

4.7 SAMPLE PACKAGING AND TRANSPORTATION PROCEDURES

1. Samples will be packaged and transported using the procedures provided in SOP H.

4.8 PROCEDURES TO AVOID SAMPLE CONTAMINATION

1. Precautions will be taken to limit the contamination of samples from outside sources. Hands will be washed frequently and nitrile gloves will be worn. The order of sampling will be from the least suspected contaminated source to the most contaminated source.

4.9 SAMPLE DOCUMENTATION AND LABELING PROCEDURES

1. Perform sample documentation in accordance with the procedures in the Sampling and Analysis Plan (SAP) and SOP J. Record sampling data in the Daily Field Report.

4.10 CHAIN-OF-CUSTODY PROCEDURES

1. Chain-of-Custody procedures which are discussed in the QAPP and in SOP I will be used to maintain and document sample possessions. The Chain-of-Custody record will be initiated at the time of sampling and will contain the sample number, date and time, name and dated signature of the person taking the sample, as well as the methods by which each sample will be analyzed, and other pertinent information.

2. Sample transfers will be noted on the record sheet for each sample. Standardized Chain-of-Custody forms will be used for tracking samples from the point of origin in the field through laboratory processing and disposal.

3. More than one sample may appear on a Chain-of-Custody form. The form will accompany the samples and enclosed within the ice chest. One copy of each form will be retained by field personnel prior to shipment of the samples to the laboratory. Copies of the Chain-of-Custody records completed by the laboratory will be returned with the results of laboratory analyses.

STANDARD OPERATING PROCEDURE P
MONITORING WELLS AND PIEZOMETERS
ABANDONMENT ACTIVITIES
WASTE DISPOSAL, INC. SUPERFUND SITE

1.0 GENERAL

1. Monitoring wells and piezometers may be abandoned for the following reasons:
   - Well has met objectives in terms of data collection and site characterization.
   - Remove unnecessary conduits for surface water infiltration.
   - Remove well prior to remedial action activities.

2. Appropriate health and safety procedures and emergency response procedures are provided in the Health and Safety Plan (HASP). Quality Assurance/Quality Control (QA/QC) procedures are provided in the Quality Assurance Project Plan (QAPP).

2.0 TASK DESCRIPTION

1. Selected monitoring wells and piezometers will be abandoned by removing the concrete surface completion, removing (e.g., cutting) the top 2 to 3 feet of polyvinyl chloride (PVC) casing, grouting the well and replacing the surface with similar existing material (e.g., soil, asphalt, concrete). The monitoring wells and piezometers will herein be referred to as "wells" for the remainder of this Standard Operating Procedure (SOP).

3.0 REQUIRED MATERIALS

1. The following materials are required to perform this procedure:
   - Drill rig.
   - Volclay grout (or equivalent) for backfill.
   - Buckets, shovel and intermediate containers.
   - Casing saw.
   - Personal protective equipment (PPE) as described in the HASP.
   - Measuring tape.
   - Daily Field Report forms and/or appropriate monitoring data sheets.
   - Pen with indelible ink.

4.0 TASK PERFORMANCE

4.1 WELL ABANDONMENT

1. Well abandonment activities will be conducted in accordance with County of Los Angeles, Environmental Health permit requirements. Permits will be obtained for the abandonment activities prior to implementation.

2. Each well will be abandoned by first removing the concrete surface completion. The concrete surface completions will be stockpiled onsite at a designated location. Soil around the PVC casing will be removed to a depth of approximately 2 to 3 feet below ground surface (bgs). A measuring tape will be used to determine the depth.

3. After the soil has been removed to the proper depth, the well casing will be removed (e.g., cut) to a depth of 2 to 3 feet bgs. The well will then be backfilled from the well bottom to the surface using volclay grout pumped from the drill rig. Volclay grout will be placed to 1-foot bgs.

4. The surface will be replaced with similar existing surface material (e.g., soil, asphalt, concrete).

STANDARD OPERATING PROCEDURE Q
RESERVOIR LIQUIDS MONITORING ACTIVITIES
WASTE DISPOSAL, INC. SUPERFUND SITE

1.0 GENERAL

1. This Standard Operating Procedure (SOP) has been prepared to guide the reservoir liquids monitoring activities for the Waste Disposal, Inc. (WDI) Superfund Site in Santa Fe Springs, California.

2. Appropriate health and safety procedures and emergency response procedures are provided in the Health and Safety Plan (HASP). Quality Assurance/Quality Control (QA/QC) procedures are provided in the Quality Assurance Project Plan (QAPP).

2.0 TASK DESCRIPTION

1. Reservoir monitoring wells will be sounded with a water level meter to obtain liquid levels and the levels will be recorded using procedures listed in SOP F.

2. If a well contains more than 12 inches of liquid, it will be pumped/bailed until the level is less than 12 inches or to a maximum of 50 gallons.

3. Liquids will be transferred into a portable Baker tank prior to being placed into the oil/water separator.

4. Liquids will be placed in the oil/water separator for treatment.

3.0 REQUIRED MATERIALS

1. The following materials are required to perform this procedure:
   - Solonist oil/water interface meter or equivalent.
   - Portable battery operated submersible pump capable of pumping to less than 12 inches (Timco Bladder Pump or equivalent).
   - Extra AV battery for backup.
   - Portable Baker Tank for transferring liquids to oil/water separator.

- Disposal Bailers.
- Bailer Cord.
- Personal protective equipment (PPE) as described in the HASP.
- Daily Field Report forms and/or appropriate monitoring data sheets.
- Pen with indelible ink.

4.0 TASK PERFORMANCE

4.1 MONITOR LIQUID LEVELS

1. Liquid levels in Well LC-1 through LC-4 will be measured as detailed in SOP F.

4.2 PUMPING/BAILING WELLS

1. If a well contains more than 12 inches of liquid, it will be pumped/bailed to a level below 12 inches or for fast recovering wells, a maximum of 50 gallons.

2. The liquid will be collected in a portable tank and the volume of the liquids shall be recorded.

4.3 TRANSFER LIQUIDS TO OIL/WATER SEPARATOR

1. The treatment system will be monitored to ascertain system is working properly.

2. Baker Tank levels will be recorded prior to and subsequent to transferring liquids to the oil/water separator.

3. The collected liquids will be transferred to the oil/water separator for treatment.

4.4 SAMPLE COLLECTION

1. Liquids in the Baker tanks will be sampled prior to disposal following procedures detailed in SOP O.

4.5 SAMPLE IDENTIFICATION PROCEDURES

1. The monitoring procedures in this SOP will result in samples that will be collected prior to liquids disposal.

2. Each sample collected will be identified as having originated from the site by prefacing each sample designation with "WDI" (for Waste Disposal, Inc.) followed by an alpha and numerical code. The sample identifier is illustrated below:
   - WDI-BT-P7493-01-01-04 (as Baker Tank [BT] Number P7493, sampled January 1, 2004).

4.6 ANALYTICAL PARAMETERS, METHODS AND SAMPLE PRESERVATION REQUIREMENTS

1. Information on analytical parameters, sample containers, methods of preservation and holding times are specified in the QAPP.

4.7 SAMPLE CONTAINER REQUIREMENTS

1. Each sample container will be labeled with the name of the person taking the sample, date and time, identification code, type, preservation method and analysis to be performed. The label will also indicate if the sample is to be held in appropriate storage until the geologist/engineer determines if analysis are to be performed based on initial analytical result for representation samples.

4.8 BLANKS AND DUPLICATE SAMPLES PROCEDURES

1. Due to the low number of samples, blanks and field duplicates will not be collected.

4.9 SAMPLE PACKAGING AND TRANSPORTATION PROCEDURES

1. Details of sample packaging and transportation requirements are outlined in SOP H.

4.10 PROCEDURES TO AVOID SAMPLE CONTAMINATION

1. Precautions will be taken to limit the contamination of samples by outside areas. Hands will be washed frequently and disposable nitrile gloves will be changed in between each sampling point.

2. Only clean, disposable bailers and bailer cord will be used.

3. Field equipment must be decontaminated between monitoring locations. Decontamination procedures are presented in SOP G.

4.11 SAMPLE DOCUMENTATION AND LABELING PROCEDURES

1. Sample documentation and labeling will be performed in accordance with the procedures outlined in the Sampling and Analysis Plan (SAP) and SOP J.

2. Record all sampling data on the Daily Field Report.

4.12 CHAIN-OF-CUSTODY PROCEDURES

1. Chain-of-Custody procedures will be performed in accordance with the procedures outlined in the QAPP and SOP I.

STANDARD OPERATING PROCEDURE R
INDOOR GEOPROBE ACTIVITIES
WASTE DISPOSAL, INC. SUPERFUND SITE

1.0 GENERAL

1. Geoprobe borings may be completed within existing buildings at the Site in Areas 1 and 8 to supplement existing subsurface soil data and to determine the extent of buried waste beneath the buildings. Geoprobe services will be provided by a licensed driller under subcontract to TRC. As much as possible, borings shall be located to cause the least amount of impact to the building owner and/or tenant.

2. Appropriate health and safety procedures and emergency response procedures are provided in the Health and Safety Plan (HASP). Quality Assurance/Quality Control (QA/QC) procedures are provided in the Quality Assurance Project Plan (QAPP).

2.0 TASK DESCRIPTION

1. Geoprobe borings may be completed within existing buildings at the Site in Areas 1 and 8 to supplement existing subsurface soil data and to determine extent of buried waste beneath the buildings. The geoprobe borings will herein be referred to as "borings" for the remainder of this Standard Operating Procedure (SOP).

3.0 REQUIRED MATERIALS

1. The field team will consist of a representative of TRC and the geoprobe crew.

2. The subcontract driller will be responsible for providing all drilling equipment and materials.

3. The following materials are required from TRC to perform this procedure:
   - Personal protective equipment (PPE) as described in the HASP.
   - 100-foot measuring tape or measuring wheel.
   - Daily Field Report forms and/or appropriate monitoring data sheets.
   - Timepiece.
   - Pen with indelible ink.
   - Ziploc bags.
   - Any monitoring equipment, e.g., photoionization detector, Organic Vapor Analysis (OVA)- meter, (Equipment referred to in the Workplan).

- Sampling equipment, containers and labels.
- Decontamination materials, e. g., tap water, deionized water, laboratory-grade detergent, three bottle brushes and three 5-gallon buckets.
- An accurate plan of the Site (if available), drawn to scale and including:
  - A north arrow.
  - Locations of exploration sites.
  - Existing structures.
  - Property lines.
  - Adjacent streets.
  - Established benchmarks or permanent landmarks.
- Black permanent marker (e.g., Sharpie Fine Point Marker) for labeling boring locations.
- White surveyor's spray paint for marking exploration locations covered with floor slabs.
- Engineer's scale.
- High-Strength Concrete grout.
- Premixed grout.

4.0 TASK PERFORMANCE

4.1 SITE UTILITY CLEARANCE

1. Procedures for providing for clearance of existing Site utilities are described in this section. To protect the safety of field personnel and existing utilities and to prevent property damage, no borings will be started until proper Site utility clearance has been performed to assure that existing utilities and/or structures will not be impacted.

2. The property owner and/or tenant will be contacted to obtain information on existing utilities and structures located at the Site. If Utility or Site Plans exist from either the property owner or the tenant, copies will be obtained and reviewed by TRC.

3. A visit will be made to the Site to mark the location of each proposed boring. In the field, each proposed boring location will be checked against Utility or Site Plans provided by the property owner and/or tenant to assess that the proposed boring locations are not situated where they might contact an underground utility or structure. The proposed boring locating must also be located far enough away from any at-grade or overhead utility or structure such that there are no safety or equipment access concerns. If any proposed boring locations are in conflict with existing utilities or structures, the location will be shifted as pre-agreed with the Project or Task Manager, or the Project or Task Manager will be called to obtain a decision as to where the proposed boring location is to be moved.

4. The boring location is to be marked and labeled on the floor slab with white surveyor's spray paint.

5. After marking the boring locations in the field, Underground Service Alert (USA) will be contacted at 1-800-422-4133 on Monday through Friday between 7:00 a.m. and 5:00 p.m. Provide USA the following information:
   - Name and e-mail address and TRC's name, address, telephone number, and fax number.
   - The client's name (i.e., the Waste Disposal, Inc. Group).
   - The date and time for which the exploration work is planned. **Give USA a minimum of 2 working days notice and, if the exploration work will extend for over 14 days, renew the notice before continuing beyond the 14th day.**
   - The Site address and location including the Thomas Brother's map book page and grids for the project Site and the nearest cross-street.
   - A description of the type of work planned.
   - Any applicable permit numbers.
   - Any special instructions you want conveyed to the utility locators.

6. If requested by USA or one of the utility locators, another visit will be made to the Site to meet with the utility locators to discuss the proposed boring locations.

7. Before the proposed boring activities are started, each location will be reviewed in light of the utility location indications marked in the field by the utility locators. If any proposed exploration location appears to be located over an underground utility or structure, it shall be shifted to a clear area as agreed with the Project or Task Manager.

8. Existing maps of underground utilities and structures should never be considered to be completely accurate. If after following the above procedures, there is any uncertainty that a proposed exploration location is clear of underground utilities and structures, the specific location(s) should be checked by a licensed geophysical exploration firm. In addition, the first 5 feet of the borings will be made using hand auger techniques.

4.2 VENTILATION

1. If drill rigs powered by internal combustion engines are used, a hose will be connected to the exhaust pipe and extended outside the building.

2. Doors and windows of the building will be kept open while drilling equipment is operating.

3. The breathing zone will be monitored by TRC while drilling and sampling work is being performed. If the air monitoring indicates unsafe levels of contaminants in the work area, drilling will be stopped and ventilation fans will be set up and operated. Work will not resume until safe levels are established.

4.3 FLOOR SLAB PENETRATIONS

1. If possible, floor coverings (e.g., carpeting) will be removed from boring locations prior to the start of work. Removed floor coverings and furniture or material belonging to the building owner and/or tenant will be put back in place upon completion of the exploration work. Floor coverings, furniture and materials that have been damaged by the exploration activities will be repaired or replaced.

2. An access hole for the geoprobe will be cut in the floor slab. This hole will be approximately 4-inches in diameter. It will be cut using a concrete cove drill or a jack hammer.

3. Following completion of drilling and sampling activities, the access hole cut in the floor slab will be repaired using high-strength concrete grout.

4.4 PROBE BOREHOLE

1. Each boring will be drilled vertically using a direct push geoprobe. Each boring will be continuously sampled.

2. An exclusion zone will be set up around the borings. If a hot gas pocket is hit, a bucket of premixed grout will be used to drown the hole.

3. The samples will be field analyzed as described in the Sampling and Analysis Plan (SAP).

4. The subsurface conditions encountered during drilling will be recorded on a boring log form. Observations to be recorded include:
   - Soil type.
   - Sample depths and numbers.
   - The depth of any buried waste encountered.
   - Moisture conditions.
   - Gas conditions.
   - Method of drilling.
   - Total depth of boring.
   - Method of backfilling completed borehole.

5. Completed boreholes will be backfilled with bentonite chips which will be hydrated with potable water.

4.5 PROBE SAMPLING PROCEDURES

1. Each boring will be continuously sampled to the termination depth.

2. Samples will be examined for lithologic descriptions and observations will be recorded on the boring log.

3. Soil samples from two depths, one from the fill above the waste and one from native Site soil beneath the waste, will be retained from each boring for possible laboratory analysis.

4. Soil samples not retained for possible laboratory analysis will be placed into 55-gallon Department of Transportation (DOT)-approved drums and stored in Area 2. Ultimately these drummed cuttings will be placed into the engineered disposal trench over the reservoir in Area 2.

4.6 SAMPLE IDENTIFICATION PROCEDURES

1. Each sample retained for possible laboratory analysis will receive a label. Sample labels identify the sample by documenting the unique sample identification number, the sample type, the client, the sampler's name(s), and the date and time collected. Samples will be identified as having originated from the Site by prefacing each sample designation with "WDI" (for Waste Disposal, Inc.), will be identified by an alpha and numerical code, and will have an additional two-digit number as the last component of the sample identifier. The two-digit number will correspond to the sample depth. The sample identifier is illustrated below:
   - WDI-SBIDP-01-05: (Supplemental Boring Indoor Direct Push No. 01), sample depth 5 feet.

2. Once prepared, the label will be affixed to the sample container. Clear plastic tape will be used to cover the label to prevent loss of the label and to prevent the label contents from becoming illegible.

3. Sample numbers will be recorded on the boring log.

4.7 ANALYTICAL PARAMETERS, METHODS AND SAMPLE PRESERVATION REQUIREMENTS

1. Information on analytical parameters, sample containers, methods of preservation, and holding times are specified in the QAPP.

4.8 SAMPLE CONTAINER REQUIREMENTS

1. Samples will be collected in the appropriate containers listed in Table 4.4 of the QAPP.

4.9 BLANKS AND DUPLICATE SAMPLES PROCEDURES

1. Soil sampling requires trip blanks (VOCs), equipment rinsates and field duplicates for Quality Control (QC) purposes. Further information is outlined in QAPP Table 4.5.

4.10 SAMPLE PACKAGING AND TRANSPORTATION PROCEDURES

1. Samples will be packed in the following manner for shipment. Detailed transportation procedures are provided in SOP H.
   - Each sample container will then be wrapped in bubble pack or other packing material, placed in separate, sealable plastic bags, and then placed in an ice chest precooled to 4 degrees Celsius (°C) with Blue Ice® packages or double-bagged ice packets.
   - The completed Chain-of-Custody record going to the laboratory will be placed in a sealable plastic bag, which will then be placed in the cooler.
   - The cooler lid will then be taped shut with strapping/packaging tape.
   - A custody seal will be completed, signed and attached to the lid and the front of the cooler for hinged coolers. Two custody seals will be attached to coolers with removable lids. One will be attached to the front and one to the back of these coolers.
   - The coolers will be hand-delivered or shipped via overnight carrier to the laboratory at the end of each day's sampling. Samples will be shipped in a manner such that the laboratory will receive them within 24 hours or less from the actual sampling times, depending on the holding times.

4.11 PROCEDURES TO AVOID SAMPLE CONTAMINATION

1. Precautions will be taken to limit the contamination of samples from outside sources. Hands will be washed with distilled water, and rubber surgical gloves will be worn.

4.12 SAMPLE DOCUMENTATION AND LABELING PROCEDURES

1. Perform sample documentation in accordance with the procedures in SOP J. In addition, immediately record monitoring and measurement data in the Field Activity Report and/or an appropriate monitoring data sheet.

4.13 CHAIN-OF-CUSTODY PROCEDURES

1. Chain-of-Custody procedures which are discussed in the QAPP and in SOP I will be used to maintain and document sample possessions. The Chain-of-Custody record will be initiated at the time of sampling and will contain the sample number, date and time, name and dated signature of the person taking the sample, as well as the methods by which each sample will be analyzed, and other pertinent information.

2. Sample transfers will be noted on the record sheet for each sample. Standardized Chain-of-Custody forms will be used for tracking samples for the point of origin in the field through laboratory processing and disposal.

3. More than one sample may appear on a Chain-of-Custody form. The form will accompany the samples, attached within the ice chest. One copy of each form will be retained by field personnel prior to shipment of the samples to the laboratory. Copies of the Chain-of-Custody records completed by the laboratory will be returned with the results of laboratory analyses.

4. For specific Chain-of-Custody procedures, refer to SOP I.

STANDARD OPERATING PROCEDURE S
VAPOR WELL SAMPLING ACTIVITIES
WASTE DISPOSAL, INC. SUPERFUND SITE

1.0 GENERAL

1. Vapor wells will be purged and sampled to supplement and confirm existing data relating to the presence of soil gas onsite. This information will be used to fulfill performance monitoring requirements and monitor changes in soil gas conditions. The data from the sampling will then be used to confirm that the soil gas is meeting the Soil Gas Performance Standards listed in the Amended Record of Decision (AROD).

2. Appropriate health and safety procedures and emergency response procedures are provided with Health and Safety Plan (HASP). Quality Assurance/Quality Control (QA/QC) procedures are provided in the Quality Assurance Project Plan (QAPP).

2.0 TASK DESCRIPTION

1. Vapor wells will be purged and sampled to determine the extent of soil gas generation and/or migration. The monitoring well will herein be referred to as wells for the remainder of this Standard Operating Procedure (SOP).

3.0 REQUIRED MATERIALS

1. The following materials are required for this procedure;
   - Foxboro TVA-1000 Combination Photoionization Detector/Flame Ionization Detector (PID/FID) or equivalent.
   - LANDTEC GA-90 landfill gas monitor or equivalent.
   - Dwyer Magnehelic pressure gauges with appropriate pressure ranges for the wells to be monitored.
   - One Thomas vacuum pump (Model 107 COC 18-TFE) or equivalent.
   - Generator.
   - Barometer
   - Hand held thermometer
   - Timepiece

- Pen with indelible ink
- Six-liter Summa canister(s) with pre-set flow control valve
- Ten feet Tygon® tubing or equivalent
- Thermometer inserted through a center drilled stainless steel tee
- Generator
- Vapor well gas reading data sheets (Table S.1)
- Vapor well monitoring data sheets (Table S.2)
- Pressure gauge
- 1-10 liters per minute (LPM) flow meter
- Twenty feet of various 1/4- and 1/2-inch-diameter Tygon® tubing lengths

4.0 TASK PERFORMANCE

4.1 SAMPLE DOCUMENTATION PROCEDURES

1. The initial pressure or vacuum in the well will be measured by attaching the appropriate range Magnehelic gauge to the well using a short piece of tubing. Open the valve on the wellhead and record the initial pressure on the vapor well monitoring data sheet.

4.2 WELL GAS COMPOSITION MONITORING

1. Follow all warm up recommendations and calibration directions for the Foxboro TVA-1000 as described in the Operations Manual or for an equivalent instrument and as provided in SOP W.

2. Attach a clean piece of tubing to the wellhead valve and connect it to the inlet port on the LANDTEC GA-90.

3. The soil gas conditions will be monitored by analyzing the initial gas concentrations of Methane (CH_4), Carbon Dioxide (CO_2), and Oxygen (O_2) as measured using the LANDTEC GA-90 and recorded on the vapor well monitoring data sheet.

4.3 VAPOR WELL SAMPLING AMBIENT CONDITIONS

1. Read the barometric pressure with a portable barometer and record it on the monitoring data sheet in units of inches of mercury. Care should be taken that the reading has stabilized prior to recording.

2. Read the ambient air temperature with a portable thermometer and record it on the vapor well monitoring data sheet in units of degrees Fahrenheit (°F). Care should be taken that the thermometer is not placed in direct sunlight and the reading has stabilized prior to recording.

3. Record the general weather conditions on the vapor well monitoring data sheet. Recorded conditions to include local data available from public sources, as well as field observations of approximate wind direction and velocity.

4.4 WELL PURGING PROCEDURES

1. Each well will be purged prior to sample collection. Three well volumes of air will be withdrawn using the Thomas vacuum pump by connecting it to the well with tubing. The volume of air required to purge three well volumes will be calculated as follows:

$$V = 28.317\ [\ N(\pi r2d)]$$

For N = 3, the equation becomes

$$V = 28.317\ [\ 3\pi r2d]$$

where:

V = Volume of air to be purged (liters).

N = Number of well volumes to be removed.

π= 3.14159

r= Radius of well casing (in feet).

d= Total depth of well belowground surface ([bgs] in feet).

2. A flow meter and thermometer will be placed inline between the well head and vacuum pump and used to record the purged gas temperature during purging and the amount of time needed to purge three well volumes of air. The thermometer should be placed as close to the wellhead as possible to minimize the effects of ambient conditions. The total time (T) required to purge three well volumes will be calculated as follows:

$$T = V/\ (FR)$$

Where:

T = Total time required to purge three well volumes (in minutes).

V= Total volume required to remove three well volumes from well.

FR = flow rate (in liters per minute).

4.5 POST-PURGE WELL GAS COMPOSITION MONITORING

1. Follow the procedures as noted in Section 4.2 then close the valve and disconnect the tubing to the well.

4.6 WELL GAS STATIC PRESSURE MEASUREMENT POST PURGING

1. Measure the well pressure as described in Section 4.1.

4.7 VAPOR WELL SAMPLING PROCEDURES

1. Attach the pressure gauge to the Summa canister and open the valve. Record the initial vacuum in the canister on the vapor well monitoring data sheet.

2. The difference in the recorded vacuum versus the vacuum reported by the laboratory should be within ten percent. If the difference is greater than ten percent, label the canister as leaking, return it to the laboratory and use an alternate canister. Since the pressure in the canister will be influenced by the ambient temperature, attempt to measure the pressure in the canister at room temperature.

3. Connect the canister to the wellhead valve with a clean piece of tubing and open the canister's valve.

4. Allow the pressure in the canister to nearly equilibrate and close the valve.

5. Use the pressure gauge to assess the final pressure in the canister and record on the data sheet. The final pressure needs to be below ambient atmospheric pressure.

6. If duplicate samples or split samples are required for the oversight agency, add a stainless steel T-fitting to the tubing and connect Summa canister to each opening of the T-fitting. Fill both canisters simultaneously.

4.8 SAMPLE IDENTIFICATION

1. Each sample collected will be identified as originated from the site by prefacing each sample designation with "WDI", (for Waste Disposal, Inc.) identified by an alpha and numerical code

and have an additional two-digit number. The two-digit number will correspond to the vapor well sampling round being performed. The sample identifier is illustrated below:

- WDI-VW-01-23 Existing Vapor Monitoring Well No. 01, 23rd sampling round for this well.

4.9 DUPLICATE SAMPLE PROCEDURES

1. Duplicates for Summa canister samples will be collected as indicated in Table 4.5 of the Quality Assurance Project Plan (QAPP). Field and trip blanks will not be required.

4.10 ANALYTICAL PARAMETERS, METHODS AND SAMPLE PRESENTATION REQUIREMENTS

1. Analytical parameters and methods are provided in Table 4.3 of the QAPP. Sample preservation is not required for air samples.

4.11 SAMPLE CONTAINER REQUIREMENTS

1. Summa canisters will be provided by the selected laboratory.

4.12 PROCEDURES TO AVOID SAMPLE CONTAMINATION

1. Procedures to avoid sample contamination are as follows:
   - Allow an adequate purge (generally 60 seconds with fresh air) of the instrument subsequent to its use for a prior measurement. The instruments may additionally be purged with pure nitrogen, if warranted.
   - Allow the instrument reading to stabilize prior to recording.
   - Do not allow running pickup trucks, generators or other potential organic sources to be located upwind in the general area of the monitoring and/or sampling activity.
   - Protect samples from excessive heat and light.

4.13 SAMPLE DOCUMENTATION AND LABELING PROCEDURES

1. Immediately record monitoring and measurement data in the Daily Field Report and/or an appropriate monitoring data sheet.

2. For Summa canister samples, perform sample documentation in accordance with the procedures outlined in the Sampling and Analyses Plan (SAP) and in SOP J.

4.14 SAMPLE PACKAGING AND TRANSPORTATION

1. For Summa canister samples, perform sample packaging and transportation in accordance with the procedures outlined in SOP H.

4.15 CHAIN-OF-CUSTODY PROCEDURES

1. For Summa canister samples, perform Chain-of-Custody procedures in accordance with the procedures outlined in SOP I.

TABLE S.1

VAPOR WELL GAS READING DATA SHEET
WASTE DISPOSAL, INC. SUPERFUND SITE

DATE: _____ TESTED BY: _____

INSTRUMENT MODEL/SERIAL NO.: _____

Page __ of __

WELL ID	DEPTH (feet)	STATIC PRESSURE (in. H_2O)	INITIAL GAS READING			PURGE TIME @__ LPM	PURGED GAS READING		
			CH_4 (%)	CO_2 (%)	O_2 (%)		CH_4 (%)	CO_2 (%)	O_2 (%)

94-256 (Rpts/QAPP-SOPS (11/12/03/rm)

Notes: _____

_____

_____

_____

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TABLE S.2

VAPOR WELL MONITORING DATA SHEET
WASTE DISPOSAL, INC. SUPERFUND SITE

DATE: TECHNICIAN: INSTRUMENT - SERIAL NO.:
INSTRUMENT - MODEL NO.:

AMBIENT AIR TEMPERATURE @ START: _____ BAROMETRIC PRESSURE @ START: _____ WEATHER:

AMBIENT AIR TEMPERATURE @ STOP: _____ BAROMETRIC PRESSURE @ STOP: _____

WELL ID	TIME	GAS TEMPERATURE (°F)	WELL HEAD STATIC PRESSURE (in. H_2O)	PURGED GAS READINGS		SUMMA CAN DATA			WELL PRESSURE AT SAMPLE FINAL (in. H_2O)	VACUUM PUMP GAUGE READING AT END OF PURGE (in. Hg)
				METHANE (%)	VOC (ppm)	CAN NO.	INITIAL PRESSURE (in. Hg)	FINAL PRESSURE (in. Hg)		

30747 (Kpts:QAPP (11/12/04-rm)

Notes: _____

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STANDARD OPERATING PROCEDURE T
IN-BUSINESS AIR MONTORING AND SAMPLING ACTIVITIES
WASTE DISPOSAL, INC. SUPERFUND SITE

1.0 GENERAL

1. The monitoring of various commercial buildings surrounding the Site will be implemented as part of the overall Site monitoring. The objective of in-business monitoring is to assure that soil gas from the Site is not infiltrating into onsite buildings adjacent to buried waste. Twenty-four hour air samples will be collected in Summa canisters and analyzed for Volatile Organic Compounds (VOCs). This information will be evaluated and used to optimize the location and design of present and future site monitoring and collection systems.

2. Appropriate health and safety procedures and emergency response procedures are provided with the Health and Safety Plan (HASP). Quality Assurance/Quality Control (QA/QC) procedures are provided in the Quality Assurance Project Plan (QAPP).

2.0 TASK DESCRIPTION

1. Summa canisters will be placed inside the targeted buildings and an air sample collected over a twenty-four hour period will be analyzed by an approved laboratory.

3.0 REQUIRED MATERIALS

1. The following materials are required for this procedure:
   - Foxboro TVA-1000 Combination Photoinization Detector/Flame Ionization Detector (PID/FID) or equivalent.
   - 6-liter Summa canisters.
   - Regulator set to collect a 24 hour sample (i.e., average flow rate of approximately 4 ml/min).
   - Pressure gauge.
   - Thermometer.
   - Tamper evident tape.
   - Daily Field Report.

4.0 TASK PERFORMANCE

4.1 BUILDING LOCATIONS

1. The building should be vacant during sample collection and all windows closed. A suitable location inside of each target building should be away from stored chemicals, cleaners or other sources of VOCs.

4.2 AMBIENT CONDITIONS

1. Follow all warm up recommendations and calibration directions for the Foxboro TVA-1000 as described in the Operations Manual or for an equivalent instrument.

2. Using the hand held thermometer, measure the ambient air temperature and record it on the data sheet in units of degrees Fahrenheit (°F) along with the general weather conditions.

3. Read the barometric pressure with a portable barometer and record it on the monitoring data sheets in units of inches of mercury. Record field observations and approximate wind direction and speed, as well as local weather conditions from public sources, as needed if background ambient sampling is performed.

4. Record the VOC readings using the PID/FID detectors on the Foxboro TVA-1000 outside of the target building and inside at the actual sampling location in parts per million (ppm).

5. Care should be taken to assure all equipment has stabilized prior to recording data.

4.3 IN-BUSINESS MONITORING SAMPLING PROCEDRURES

1. Attach the pressure gauge to the inlet side of the Summa canister and record the Initial Vacuum pressure of the Summa canister on the monitoring sheet in inches of Mercury.

2. Attach the pressure regulator to the Summa canister and open the valve. The flow rate is typically set by the laboratory supplying the Summa canister.

3. Place the Summa canister in the appropriate location inside the building and affix a Tamper Proof seal to the valve.

4. Record the start time on the Monitoring Data Sheet.

5. Note any odors or chemical storage visible inside the building on the Monitoring Data Sheet.

6. Care should be taken to secure the buildings windows.

7. Samples should be collected during any twenty-four hour period when the building is typically closed (e.g., on weekends).

4.4 POST-SAMPLE COLLECTION

1. Follow the procedures outlined in Section 4.2 and record the ambient conditions on the Monitoring Data Sheet.

2. Inspect the condition of the Tamper Proof seal and record it's condition on the Monitoring Data Sheet.

3. Close the valve on the Summa canister and remove the regulator.

4. Record the stop time on the Monitoring Data Sheet.

5. Attach the pressure gauge to the Summa canister and record the final pressure on the Monitoring Data Sheet. The final pressure needs to be below ambient atmospheric pressure at the end of sampling.

6. If duplicate or split samples are required for the oversight agency, place additional Summa canisters at the same location as the original sample.

4.5 SAMPLE IDENTIFICATION PROCEDURES

1. Each sample will be identified as originating from the Site dry prefacing each sampler with "WD1" (for Waste Disposal, Inc.), an alpha and numerical code and have an additional two-digit number. The two-digit number will correspond to the sampling round being performed. The sample identifier is illustrated below:
   - WDI-IBM-41-20 In-Business Monitoring of parcel 41, 20th sampling round for this location.

4.6 ANALYTICAL PARAMETERS, METHODS AND SAMPLE PRESERVATION REQUIREMENTS

1. Analytical parameters and methods are provided in Table 4.3 of the QAPP sample preservation is not required for air samples.

4.7 SAMPLE CONTAINER REQUIREMENTS

1. Summa canisters will be provided by the selected laboratory.

4.8 BLANKS AND DUPLICATE SAMPLES PROCEDURES

1. Blanks and duplicate samples are not applicable to direct-read field instruments. Such equipment is calibrated and receives preventative maintenance.

2. Blanks and duplicates for Summa canister samples will be collected as indicated in the QAPP.

4.9 SAMPLE PACKAGING AND TRANSPORTATION PROCEDURES

1. The monitoring and measurement procedures in this SOP are performed with direct-read instruments. Sample packaging and transportation is not required.

2. For Summa canister samples, perform sample packaging and transportation in accordance with the procedures outlined in SOP H.

4.10 PROCEDURES TO AVOID SAMPLE CONTAMINATION

1. Procedures to avoid sample contamination are as follows:
   - Allow an adequate purge (generally 60 seconds with fresh air) of the instrument subsequent to its use for a prior measurement. The instruments may additionally be purged with pure nitrogen, if warranted.
   - Allow the instrument reading to stabilize prior to recording.
   - Do not allow running pickup trucks, generators or other potential organic sources to be located upwind in the general area of the monitoring and/or sampling activity.
   - Protect samples from excessive heat and light.

4.11 SAMPLE DOCUMENTATION AND LABELING PROCEDURES

1. Immediately record monitoring and measurement data in the Daily Field Report and/or an appropriate monitoring data sheet. As the monitoring and measurement procedures in these Standard Operating Procedures (SOP) are performed with direct-read instruments: Sample labeling is not required.

2. For Summa canister samples, perform sample documentation in accordance with the procedures outlined in the Sampling and Analyses Plan (SAP) and in SOP J.

4.12 CHAIN-OF-CUSTODY PROCEDURES

1. . The monitoring and measurement procedures in this SOP are performed with direct-read instruments. Chain-of-Custody documentation is not required.

2. For Summa canister samples, perform Chain-of-Custody procedures in accordance with the procedures outlined in SOP I.

STANDARD OPERATING PROCEDURE U
BIOVENT WELL INSPECTION AND OPERATIONAL TESTING
WASTE DISPOSAL, INC. SUPERFUND SITE

1.0 GENERAL

1. The Sentinel Biovent System is a secondary gas control system for the Site, and there are no specific performance goals for the system. As such, the Biovent wells do not have data quality objectives for compliance monitoring. Also, the wells are not constructed as monitoring systems and are not configured to be sampled. The 24 Biovent wells provide passive remediation and are an enhancement to the natural degradation around the edges or areas of non-compliance with Soil Gas Performance Standards. The wells will be inspected to verify they are in operating order. If necessary, the wells will be tested for operational performance.

2. Appropriate health and safety procedures and emergency response procedures are provided in the Health and Safety Plan (HASP). Quality Assurance/Quality Control (QA/QC) procedures are provided in the Quality Assurance Project Plan (QAPP).

2.0 TASK DESCRIPTION

1. The Biovent wells will be installed using the procedures detailed in Sections 4.1 and 4.2.

2. The Biovent wells will be inspected using the procedures detailed in Section 4.3. If necessary, the wells will be tested for operational performance using the procedures detailed in Section 4.4.

3.0 REQUIRED MATERIALS

1. The following materials are required to perform the well installation procedure:
   - Ten-inch hollow-stem auger.
   - Four-inch-diameter Blank Schedule 40 polyvinyl chloride (PVC) casing.
   - Four-inch-diameter Slotted Schedule 40 PVC casing with 0.02-inch slots.
   - Stainless steel centralizers.

- End caps.
- Ten-inch-diameter, 0.25-inch gauge vented steel enclosure.
- One-way biovent valve, air injection type, Baro-ball™ valve by Durham Geo Enterprises (or equivalent).
- Traffic bollards.
- No. 2/12 Sand (or equivalent).
- 0.25-inch Bentonite Pellets.
- Volclay grout (or equivalent) for backfill.
- Concrete.
- Buckets and intermediate containers.
- Concrete mixing barrel and shovel.
- Personal protection equipment (PPE) as described in the HASP.
- Measuring tape.
- Daily Field Report forms and/or appropriate monitoring data sheets.
- Timepiece.
- Pen with indelible ink.

2. The following materials are required for the inspection procedures:

- Timepiece
- Pen with indelible ink
- Sentinel Biovent Well Inspection Sheets
- Daily Field Report

3. The following materials are required for the operational performance testing procedures:

- Timepiece
- Pen with indelible ink
- Sentinel Biovent Well Inspection Sheets
- Daily Field Report
- Two 2-inch In-Situ MiniTroll, battery powered, pressure transducers with integral data logger and support cables. The pressure transducers include internal data logging circuitry;
- One 4-inch-diameter PVC fitting (wye, couplings, compression fittings, etc.)
- Lap-top computer
- No-hub pipe couplings (rubber pipe coupling with hose clamps)
- Duct tape
- PPE as described in the HASP
- Troll Set-Up Log

4.0 TASK PERFORMANCE

4.1 WELL BOREHOLE

1. Each well borehole will be drilled using a 10-inch hollow-stem auger to the depths listed in the 100% Design Report. Measuring tape will be used to determine the depth.

2. The borehole cuttings will be field analyzed and disposed of as described in the Sampling and Analysis Plan (SAP). The borehole cuttings will be placed into 55-gallon U.S. Department of Transportation (DOT) approved drums. Each drum will be sealed and labeled with a borehole identification number, sampling depth, and date of storage. The soil in the drums will be incorporated into the reservoir area subgrade during final remedy construction.

4.2 WELL INSTALLATION

1. After the borehole is drilled to the proper depth, the appropriate length as detailed on Drawing 13 of the 100% Design Report 4-inch-diameter Schedule 40 PVC with 0.02-inch slot openings casing (screen) will be attached to the drill rig and carefully installed below the ground. The screen will be flush threaded on the end closest to the ground surface and capped on the bottom. While the screen is still slightly above ground, flush threaded 4-inch-diameter Schedule 40 PVC blank casing will be securely attached to the screen. The blank casing will extend to a minimum of 12 inches above the surface to accommodate the one-way biovent valve.

2. The annular space will be backfilled from the well bottom to approximately 2-feet above the screen top using No. 2/12 sand. The sand will be poured slowly into the annular space to assure it is optimally packed. Three feet of bentonite pellets will be added to the annular space and hydrated. Volclay grout will be placed into the top annular space around the casing.

3. A protective locking vented steel enclosure will be installed on each well. Wells located in parking or traffic areas or subject to damage in anyway shall have bollards installed as necessary to protect the well.

4. Cement mix and water will be mixed in a cement mixing barrel using a shovel. The cement will be used to construct a 3-foot pad around the well. The pad will be shaped to direct surface run-off from the casing.

4.3 BIOVENT WELL INSPECTION PROCEDURES

1. Visually inspect the wellhead vented steel enclosure/cover, cover lock, Baro-ball™ valve, and concrete for any signs of damage, corrosion or fouling. Fill out the Sentinel Biovent Well Inspection Sheet accordingly and note any comments or problems.

2. Read the ambient air temperature with a portable thermometer and record it on the Daily Field Report in units of degrees Fahrenheit (°F). Care should be taken that the thermometer is not placed in direct sunlight and the reading has stabilized prior to recording.

3. Record the general weather conditions on the Daily Field Report. Recorded conditions to included local data from public sources, as well as field observations of approximate wind direction and velocity.

4.4 BIOVENT WELL OPERATIONAL PERFORMANCE TESTING

1. The operational effectiveness of a Biovent well can be evaluated by verifying air flow into the well according to the procedures outlined herein. Pressure inside a Sentinel Biovent well can be monitored by installing a sensitive pressure transducer with a data logger. Pressure in the well is to be measured over a period of one week. Simultaneously, a sensitive pressure transducer with data logger is used to track ambient air pressure outside of the Biovent well. An additional test can also be performed by pressurizing the well to a few inches of water column and recording the response of the well compared to the ambient air pressure.

2. Select the Biovent well on which to perform operational effectiveness testing. Record the selected well information on the Daily Field Report.

3. Read the ambient air temperature with a portable thermometer and record it on the Daily Field Report in units of degrees Fahrenheit (°F). Care should be taken that the thermometer is not placed in direct sunlight and the reading has stabilized prior to recording. Record the general weather conditions on the Daily Field Report. Conditions to be recorded shall

include local data from public sources (e.g., barometric pressure, temperature, wind speed, weather forecast, etc.) as well as field observations of approximate wind direction and velocity.

4. As part of the initial setup for the week long monitoring event, test the two pressure transducers simultaneously to measuring atmospheric pressure and verify the measurement precision difference between the two units. This pressure head precision difference is used as a correction factor to normalize the transducer outputs (i.e., the difference is added or subtracted from one of the transducers such that the outputs of both would provide the same result under the same conditions). Also, make sure the pressure transducer internal batteries are fully charged prior to initiating a testing event.

5. To allow installation of the pressure transducer, modifications are made to the well head. First, remove the Baro-ball™ valve and its reducer bushing from the PVC casing of the Biovent well. Add a 4-inch PVC wye fitting to the well casing with the wye pointing up. Seal the PVC wye fitting to the casing with rubber no-hub couplings. Reconnect the Baro-ball™ valve and reducer bushing to the vertical leg of the wye fitting. Add a PVC reducer bushing to the angled leg of the wye fitting and insert one of the pressure transducers into the well through the reducer bushing opening. Seal the pressure transducer data and support cables into the reducer bushing by using a rubber compression fittings. Make sure that all connections are tight and secure with no leaks. Suspend the second pressure transducer outside the PVC well casing but inside the 10-inch-diameter vented steel well enclosure.

6. After the pressure transducers are installed, connect the inner transducer data logger to a laptop computer for programming. Program the transducer data logger with the correct time, the event start time, the selected sampling rate (1 measurement per minute) and units of measurement (absolute pressure in feet of water and temperature in degrees Fahrenheit). Program the outer transducer data logger similarly to the inner transducer logger. Start both units at the same start point. Record activities and information on a Troll Setup Log.

7. Monitor the equipment setup every other day during the testing period to verify it is operating properly. After the week testing period, download the data from both pressure transducer data loggers to a laptop computer. Transmit the downloaded data electronically or by transport of the laptop to the TRC Irvine, California office for review and evaluation. Document activities performed on the Troll Setup Log.

8. If a pressure spike test is desired or necessary, modify the wellhead configuration again to include a pressure gauge, valve and fitting to permit the injection of air into the well for performance of a pressure spike test and response evaluation. With the Baro-ball™ valve in-place, pressurize the well to approximately 4 inches of water column using a small handheld air pump. Check the well head assembly for air leaks in the well casing and fittings. Record pressure readings inside and outside of the well by use of the transducer data loggers until the pressure stabilizes inside the well. Repeat the spike test as necessary or desired. To evaluate the pressure decay in the formation and the performance of the Baro-ball™ valve, remove the valve and install an airtight cap. Conduct the pressure test again with the cap in place. Download the data from both pressure transducer data loggers to a laptop computer. Transmit the downloaded data electronically or by transport of the laptop to the TRC Irvine, California office for review and evaluation. Similar results should be observed for both setups; with the Baro-ball™ valve and the well cap installed. Document activities performed on the Troll Setup Log.

9. After the well performance and/or pressure spike testing are completed, remove all test fittings from the casing and reinstall the Baro-ball™ valve with its reducer bushing in the "as constructed" configuration. Document activities performed on the Troll Setup Log.

STANDARD OPERATING PROCEDURE V
LEACHATE COLLECTION WELL INSTALLATION AND REMOVAL ACTIVITIES
WASTE DISPOSAL, INC. SUPERFUND SITE

1.0 GENERAL

1. Four Leachate Collection (LC) Wells were installed within the boundary of the reservoir using the procedures described in this Standard Operating Procedure (SOP). These wells will be used to monitor the accumulation of free liquids above the concrete bottom of the reservoir. The sampling and removal procedures are also provided in this SOP.

2. Appropriate health and safety procedures and emergency response procedures are provided in the Health and Safety Plan (HASP). Quality Assurance/Quality Control (QA/QC) procedures are provided in the Quality Assurance Project Plan (QAPP).

3. Leachate collection well design will be performed by a California Registered Geologist, and will conform to the approved design (see in particular Sheet 13 of the Design Drawings [Appendix G of the Final (100%) Remedial Design Report TRC, May 2003]).

2.0 TASK DESCRIPTION

1. Four LC wells were installed within the reservoir boundary using the procedures listed in Section 4.1.

2. After installation of the LC wells, the liquid level in each LC well will be monitored. If the level in any of the LC well is greater than 12 inches, the liquid will be sampled before removal and disposal offsite.

3.0 REQUIRED MATERIALS

1. The following materials are required to perform the well installation:
   - Ten-inch hollow-stem auger.

- Four-inch-diameter Blank Schedule 80 polyvinyl chloride (PVC) casing.
- Four-inch-diameter Slotted Schedule 80 PVC casing with 0.02-inch slots.
- No. 2/12 Sand (or equivalent).
- 0.25-inch Bentonite pellets.
- Volclay grout (or equivalent) for backfill.
- Well casing cap locks.
- Twelve-inch-diameter, 3 feet long, 0.25-inch gauge steel standpipes.
- 1.5-inch-wide stainless steel ring clamps.
- Concrete.
- Buckets and intermediate containers.
- Concrete mixing barrel and shovel.
- Personal protective equipment (PPE) as described in the HASP.
- Measuring tape.
- Daily Field Report forms and/or appropriate monitoring data sheets.
- Timepiece.
- Pen with indelible ink.

2. The following materials are required for the LC well sampling procedure:
   - Solinst water level sounder or equivalent.
   - Disposal PVC bailer or air-lift pump.
   - Bailer string.
   - Disposable nitrile gloves.
   - Buckets and/or intermediate containers.
   - Leachate collection points monitoring forms.
   - Pen with indelible ink.
   - Timepiece.
   - Ice chests and ice.
   - Sample containers (as provided by the selected lab or equivalent with appropriate preservatives).
   - LC well monitoring form (see OMMP).

4.0 TASK PERFORMANCE

4.1 WELL BOREHOLE

1. Each well borehole will be drilled using a 10-inch hollow-stem auger to the bottom of the concrete reservoir. Measuring tape will be used to determine the depth.

2. The borehole cuttings will be field analyzed and disposed of as described in SOP Z for Waste Disposal. The borehole cuttings will be shoveled into separate open-top 55-gallon U.S. Department of Transportation (DOT) approved drums. Each drum will be sealed and labeled with a borehole identification number, sampling depth, and date of storage. The soil

in the drums will be managed based upon results from prior soils investigation. Soil in drums determined to be uncontaminated may be consolidated into larger volume roll-off boxes for eventual disposal, or may be emptied onsite at a designated location.

4.2 WELL INSTALLATION

1. After the borehole is drilled to the proper depth, approximately 2 feet of 4-inch-diameter Schedule 80 PVC with 0.020-inch slot openings casing (screen) will be attached to the drill rig and carefully installed below the ground. The screen will be flush threaded on the end closest to the ground surface and capped on the bottom. While the screen is still slightly above ground, flush threaded 4-inch-diameter Schedule 80 PVC blank casing will be securely attached to the screen. The blank casing will extend to the top of the liner system.

2. The annular space will be backfilled from the well bottom to approximately 2 feet above the screen top using No. 2/12 Sand. The sand will be poured slowly into the annular space to assure it is optimally packed. Three feet of bentonite chips will be placed into the annular space and hydrated. Volclay grout will be placed into the annular space around the casing to just below the liner system.

3. The liner system will be attached to the casing using a 1.5-inch-wide stainless steel ring clamp.

4. A protective locking cover and 12-inch-diameter steel standpipe will be installed at each well. The standpipe will be approximately 6 inches above the liner system.

5. Cement mix and water will be mixed in a cement mixing barrel using a shovel. The cement will be used to construct a 3-foot pad around the well. The pad will be shaped to direct surface run-off away from the casing.

4.3 LCP LIQUID LEVEL

1. The procedures outlined in SOP F will be used to check the liquid level in the collection point.

2. Monitoring and removal of leachate is described in SOP Q.

STANDARD OPERATING PROCEDURE W
FIELD EQUIPMENT CALIBRATION
WASTE DISPOSAL, INC. SUPERFUND SITE

1.0 GENERAL

1. The use of field instruments is routinely used to evaluate vapor monitoring well, ambient air, and ground water conditions as well as assess general site conditions. All field equipment used should be calibrated according to the manufacturers individual operational manual. This Standard Operating Procedure (SOP) will describe the general calibration procedures for the typical instruments used at the site but are not meant to supercede the manufacturers recommendations.

2.0 TASK DESCRIPTION

1. The field instruments will be calibrated daily as required by the manufacturers specifications unless otherwise specified by the manufacturer.

3.0 REQUIRED MATERIALS

1. The following materials are required for this procedure:
   - Foxoboro TVA-1000 Combination Photoionization Detector/Flame Ionization Detector (PID/FID) or equivalent.
   - LANDTEC GA-90 landfill gas monitor or equivalent.
   - Hydac pH/Temperature/Conductivity meter or equivalent.
   - One ~1000 Parts Per Million (ppm) Methane calibration gas cylinder.
   - One ~100 ppm Methane calibration gas cylinder.
   - One~100 ppm Isobutylene calibration gas cylinder.
   - One cylinder of Zero Air calibration gas cylinder.
   - One ~4% Oxygen with the balance Nitrogen calibration gas cylinder.
   - One ~15% Methane, ~15% Carbon Dioxide, and the balance Nitrogen calibration gas cylinder.
   - Gas cylinder regulators.
   - One dedicated Tedlar bag per gas cylinder type.
   - Various lengths and sizes of Tygon® tubing.
   - Buffered pH 4.0, 7.0 and 10.0 calibration solutions.

- Distilled water bottle.
- One high range (>1000 micro seimens) and one low range (<10 micro seimens) conductivity calibration solutions.
- Instrument calibration check list(s) (Table W.1 and Table W.2).

4.0 TASK PERFORMANCE

4.1 PREPARATION

1. Check the battery strength of the instrument to assure proper charging.

2. All instruments should be turned on for 20-30 minutes to allow the instrument to stabilize before use or calibration or as required by the Operations Manual.

3. Inspect the calibration gas cylinders for expiration dates and replace any expired cylinders.

4. Inspect the cylinder regulators, tedlar bags, and tubing for leaks and integrity.

5. Each instrument should be calibrated at room temperature.

4.2 PID/FID CALIBRATION

1. Turn instrument on and open the hydrogen supply valve. Allow the unit to purge and ignite the FID's flame using the keypad.

2. Fill the designated tedlar bags with zero air, 100 ppm Isobutylene, 100 ppm Methane and 1000 ppm Methane.

3. Attach the zero air tedlar bag to the inlet of the unit with a clean piece of tubing, set the zero reading to zero for both detectors.

4. Attach the 100 ppm Isobutylene to the inlet and set the PID detector to 100 ppm.

5. Attach the 100 ppm Methane tedlar bag to the inlet and set FID reading to 100 ppm.

6. Attach the 1000 ppm Methane tedlar bag to the inlet and set FID reading to 1000 ppm.

4.3 LANDFILL GAS MONITOR CALIBRATION

1. Turn on the instrument and allow unit to warm up.

2. Fill the designated tedlar bags with 4 percent Oxygen balance Nitrogen and 15 percent Carbon Dioxide, 15 percent Methane balance Nitrogen.

3. Attach the Oxygen tedlar bag to the inlet of the unit and set the Oxygen reading to 4 percent. With the same bag attached, set the Methane concentration to zero.

4. Attach the Carbon Dioxide and Methane bag to the inlet of the unit and set the Methane and Carbon Dioxide readings to 15 percent. With the same bag attached, set the Oxygen reading to zero.

5. Remove the bag and set the Oxygen reading to normal ambient conditions (20.9 percent).

4.4 HYDAC CALIBRATION

1. Attach the pH probe to the unit and rinse any storage solution from the electrode with distilled water.

2. Place the electrode in the pH 7.0 solution and use the "zero" calibration-adjusting knob on the face of the unit to set the pH to 7.0.

3. Place the electrode in the pH 4.0 solution and use the "slope" calibration-adjusting knob on the face of the unit to set the pH to 4.0. Repeat the procedure for the pH 10.0 solution.

4. Pour the lower conductivity calibration solution into the Hydac's attached cup and adjust the temperature knob on the face of the unit to agree with the solutions temperature.

5. Using a small screwdriver, adjust the conductivity trim pot, (located under the black protective cap on the end of the unit), to read the same conductivity as stated on the solutions bottle.

6. Repeat the above steps using the higher conductivity calibration solution.

4.5 SAMPLE IDENTIFICATION PROCEDURES

1. The calibration procedures will not generate samples. Sample identification is not required.

4.6 ANALYTICAL PARAMETERS, METHODS AND SAMPLE PRESERVATION REQUIREMENTS

1. The calibration procedures will not generate samples. Analytical parameters, methods and sample preservation are not required.

4.7 SAMPLE CONTAINER REQUIREMENTS

1. The calibration procedures will not generate samples. Sample containers are not required.

4.8 BLANKS AND DUPLICATE SAMPLES PROCEDURES

1. The calibration procedures in this SOP will not generate samples. Blanks and duplicates are not required.

4.9 SAMPLE PACKAGING AND TRANSPORTATION PROCEDURES

1. The calibration procedures in this SOP will not generate samples. Packaging and transportation is not required.

4.10 PROCEDURES TO AVOID CALIBRATION ERRORS

1. Allow equipment and solutions to stabilize before calibration.

2. Use clean tubing to attach the Tedlar bag to the unit's inlet.

3. Use dedicated Tedlar bags for each gas and inspect them for leaks.

4. Allow sufficient purge time in between different calibration gases.

5. Use dedicated cylinder regulators for each gas.

6. Rinse the pH electrode with distilled water in-between each solution.

4.11 SAMPLE DOCUMENTATION AND LABELING PROCEDURES

1. Record the calibration data on the data sheet.

2. The calibration procedures in this SOP will not generate samples. Labeling is not required.

4.12 CHAIN-OF-CUSTODY PROCEDURES

1. The calibration procedures in this SOP will not generate samples. Use of Chain-of-Custody forms is not required.

TABLE W.1
INSTRUMENT CALIBRATION CHECKLIST

DATE	INSTRUMENT	SERIAL NO.	CALIBRATION GAS USED	FINAL CALIBRATION READING	BATTERY CHECK	CALIBRATED BY

TRC
Customer-Focused Solutions

TABLE W.2
INSTRUMENT CALIBRATION CHECKLIST

METER CALIBRATION LOG

CLIENT _____

SITE # _____ CALIBRATED BY _____

LOCATION _____ DATE _____

METER BRAND NAME _____ METER BRAND NAME _____

METER SERIAL # _____ METER SERIAL # _____

CALIBRATION STANDARD EXP. DATE _____ CALIBRATION STANDARD EXP. DATE _____

INITIAL CALIBRATION			POST SAMPLING MEASUREMENTS		
	STANDARD	FINAL CALIBRATED VALUES		STANDARD	MEASURED VALUES
pH	4.00		pH	4.00	
pH	7.00		pH	7.00	
pH	10.00		pH	10.00	
Conductivity	1,000		Conductivity	1,000	
Conductivity	10,000		Conductivity	10,000	

REMARKS:

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STANDARD OPERATING PROCEDURE X
IMPORT FILL SAMPLING
WASTE DISPOSAL, INC. SUPERFUND SITE

1.0 GENERAL

1. The purpose of this standard operation procedure (SOP) is to describe the procedures for the collection of import fill samples. Analysis of the import fill may determine whether concentrations of specific analytes exceed established criteria.

2. Appropriate health and safety procedures and emergency responses procedures are provided in the Health and Safety Plan (HASP). Quality Assurance/Quality Control (QA/QC) procedures are provided in the Quality Assurance Project Plan (QAPP).

2.0 TASK DESCRIPTION

1. One import fill sample will be collected from the import fill source and analyzed for total petroleum hydrocarbons (TPH) (8015D), volatile organic compounds (VOCs) which include chlorinated VOCs and benzene, toluene, ethylbenzene and xylenes (BTEX) (8260B), metals (6010B and 7471A), pesticides (8081)and polychlorinated biphenyls (PCBs) (8082).

3.0 REQUIRED MATERIALS

1. The following materials are required for this procedure:
   - Safety equipment as specified in the HASP.
   - Trowel, spatula or scoop.
   - Three 5-gram Encore samplers or equivalent.
   - Encore T-handle.
   - Ice chests and ice.
   - Sample containers (one 8-ounce jar or one 1.5-inch by 6-inch tube with end caps).
   - Daily Field Report and/or appropriate monitoring data sheets.
   - Chain-of-Custody record(s).
   - Self-adhesive labels.

- Pen with indelible ink.
- Disposal (nitrile) gloves.

4.0 TASK PERFORMANCE

4.1 IMPORT FILL SAMPLING

1. Material that is imported must be tested prior to being placed at the Site. The following procedures are used to collect the import fill samples.
   - Observe the fill for discoloration.
   - Soil should be free of organics, roots, wood, peat, cinders, deleterious matter or other rubbish.
   - Soil should meet the following specifications:
     - Unified Soil Classification System (USCS) classification: CL, ML, SC, SM, GC or GM.
     - Maximum particle size of 2 inches.
     - Between 12 and 70 percent of soil passing No. 200 sieve.
     - Plasticity index ≤ 15.
   - Randomly select a portion of the import fill to be sampled.
   - Using a pre-clean, stainless steel scoop or trowel, collect the sample.
   - For VOC analysis, collect three Encore samples using T-handle.
   - For the other analyses, collect the sample in the appropriate sample container.

4.2 SAMPLE IDENTIFICATION PROCEDURES

1. Each sample will be identified as having originated from the Site by prefacing each sample designation with "WDI" (for Waste Disposal, Inc.), by an alpha and numerical code and the date. The sample identifier is illustrated below:
   - WDI-IF-01-1-1-04 (For Import Fill sample number 1, sampled January 1, 2004).

4.3 ANALYTICAL PARAMETERS, METHODS AND SAMPLE PRESERVATION REQUIREMENTS

1. Information on analytical parameters, sample containers, methods of preservation and holding times are specified in Table 4.4 of the QAPP.

4.4 SAMPLE CONTAINER REQUIREMENTS

1. Samples for VOC analysis will be collected with an Encore T-handle and three 5-gram Encore samplers. Samples for the other analyses will be collected in an 8-ounce jar with lid or a 1.5-inch by 6-inch tube with end caps.

4.5 BLANKS AND DUPLICATE SAMPLES PROCEDURES

1. As only one sample will be collected from the import fill source, sample duplicates and blanks are not required.

4.6 SAMPLE PACKAGING AND TRANSPORTATION PROCEDURES

1. Details of sample packaging and transportation are outlined in SOP H.

4.7 PROCEDURES TO AVOID SAMPLE CONTAMINATION

1. Precautions will be taken to limit the contamination of samples by outside sources. Hands will be washed frequently and disposal nitrile gloves will be worn during the sampling.

2. Sampling equipment must be decontaminated before use and between sampling locations. Procedures for decontamination are presented in SOP G.

4.8 SAMPLE DOCUMENTATION AND LABELING PROCEDURES

1. Monitoring and sampling activities are documented on the import fill data sheet and/or other appropriate forms and should include the following information as applicable:
   - Name of sampler
   - Sample identification number(s) and volumes
   - Date and time of collection
   - Sample collection procedure/equipment
   - Types of sample containers used
   - Field observations (climatic/physical conditions of wells and equipment)

4.9 CHAIN-OF-CUSTODY PROCEDURES

1. Chain-of-Custody procedures are outlined in SOP I.

STANDARD OPERATING PROCEDURE Y
STORMWATER MONITORING AND SAMPLING ACTIVITIES
WASTE DISPOSAL, INC. SUPERFUND SITE

1.0 GENERAL

1. The Remedial Action Workplan (RAWP) design includes activities for the construction of a stormwater catch basin and french drain to control surface water run-off at the Waste Disposal, Inc. (WDI) Site. Other than these two improvements, the Site's surface drainage system is similar to the improvements constructed during the 1998 regrading of the Site. The two new locations for the collection of surface run-off will be added to the current locations for stormwater monitoring. Stormwater monitoring includes annual sampling of run-off from the first significant precipitation event of the rainy season and one additional event.

2.0 TASK DESCRIPTION

1. Surface water run-off will be accumulated and sampled to determine surface water run-off water quality. Samples will be analyzed for pH, total suspended solids (TSS), specific conductivity, oil and grease and metals.

3.0 REQUIRED MATERIALS

1. The following materials are required for this procedure:
   - Sandbags.
   - Disposable nitrile gloves.
   - Stainless steel cup or glass beaker.
   - Sample containers (provided by the selected laboratory).
   - Disposable polyvinyl chloride (PVC) bailer.
   - Ice chest with ice.
   - Stormwater data sheets and/or Daily Field Report.
   - Chain-of-Custody form(s).
   - Timepiece.
   - Pen with indelible ink.

4.0 TASK PERFORMANCE

4.1 SITE INSPECTION

1. The site will be inspected yearly prior to the start of the rainy season to assess the overall preparedness of the site, limit the possibility of contaminants or top soil leaving the site and assure all stormwater run-off drainage systems are in good working order.

2. During the first significant rainfall of the rainy season, all discharge sampling points will be observed and a decision made if sufficient amounts of run-off are available for sampling.

3. The discharge sampling point locations are shown in the SAP.

4.2 SAMPLING PROCEDURES

1. Sandbags will be positioned at each collection point in such a way to accumulate enough water for sample collection. This may include temporarily blocking the catch basin pipe and the french drain outlet or blocking the normal sheet flow of run-off from the site.

2. Once sufficient run-off has collected behind the sandbags, each sample bottle will be filled using a clean glass beaker or stainless steel cup to transfer the water to the appropriate bottle. A disposable bailer can be used if enough water collects behind the sandbags to allow the bailer to be tilted, filled, and used as the transfer container.

3. A new, clean transfer cup will be used at each sampling point or the transfer cup will be decontaminated between each sampling point using the procedures outlined in SOP G.

4. Plastic bottles will be filled completely. Glass bottles will be filled to 90 percent of capacity to allow for expansion and contraction during shipment.

5. Sample bottles will be kept in a chilled ice chest before sampling and replaced after filling.

4.3 SAMPLE IDENTIFICATION PROCEDURES

1. Each sample collected will be identified as originated from the site by the prefacing each sample designation with "WDI" (for Waste Disposal, Inc.), an alpha and numerical code and the date. The sample identifier is illustrated below:
   - WDI-SDP-01-1-1-04 (For stormwater discharge point [SDP] 01, sampled on January 1, 2004)

4.4 ANALYTICAL PARAMETERS, METHODS AND SAMPLE PRESERVATION REQUIREMENTS

1. Information on analytical parameters, analytical methods and sample preservation are specified in Table 4.2 of the QAPP.

4.5 SAMPLE CONTAINER REQUIREMENTS

1. Each sample container will be provided by the laboratory with the appropriate preservative according to Table 4.2 of the QAPP.

4.6 BLANKS AND DUPLICATE SAMPLES PROCEDURES

1. Duplicate samples will be collected depending on the number and quantity of water available at the designated discharge point locations. Since the regrading of the site in 1998, only one discharge point has produced sufficient quantities of water for sampling. Due to the low number of anticipated samples, blank samples will not be collected.

4.7 SAMPLE PACKAGING AND TRANSPORTATION PROCEDURES

1. Samples will be packed in the following manner for shipment. Detailed transportation procedures are outlined in SOP H.
   - Each glass sample container will be wrapped in bubble wrap or placed in the ice chest in a way to prevent breakage during shipment.
   - The ice chest will be pre-cooled to 4 degrees Celsius (°C) with double-bagged ice packets.
   - A copy of the completed Chain-of-Custody form(s) will be placed in a sealable plastic bag and placed in the ice chest.
   - The ice chest will be taped closed and custody seals attached to the lid.

- The ice chests will be hand-delivered or shipped via courier or overnight carrier to the laboratory such that the samples arrive less than 24 hours from the actual sampling time.

4.8 PROCEDURES TO AVOID SAMPLE CONTAMINATION

1. Precautions will be taken to limit the contamination of samples from outside sources. The sampler's hands will be washed frequently and gloves changed between each sampling point. Equipment decontamination procedures are presented in SOP G.

2. Only disposable, new or decontaminated transfer containers will be used for sampling.

3. Precautions will be made to limit the amount of active rainfall infiltrating into sample bottles.

4.9 SAMPLE DOCUMENTATION AND LABELING PROCEDURES

1. Perform sample documentation as outlined in SOP J. All data should be included on a field activity report or other appropriate form.

2. Each sample label will include the date, sample time, sample ID and name/initials of sampler.

4.10 CHAIN-OF-CUSTODY PROCEDURES

1. Samples will be shipped under the Chain-of Custody in the following manner. Detailed Chain-of Custody procedures are outlined in SOP I.
   - Chain-of Custody records will be initiated at the time of sampling and include sample number, date, time, samplers name and dated signature of the person taking the samples.
   - Sample transfers will be noted on the form for each sample.
   - One copy of each form will be retained by field personnel prior to the shipment of the samples to the selected laboratory.
   - A copy of the completed Chain-of Custody form will be returned with the results of laboratory results.

STANDARD OPERATING PROCEDURE Z
WASTE DISPOSAL PROCEDURES
WASTE DISPOSAL, INC. SUPERFUND SITE

1.0 GENERAL

1. The Remedial Action Workplan (RAWP) design includes activities for the removal and disposal of waste at the Site.

2. Health and safety procedures and emergency response procedures are provided in the Health and Safety Plan (HASP). Quality Assurance/Quality Control (QA/QC) procedures are provided in the Quality Assurance Project Plan (QAPP).

2.0 TASK DESCRIPTION

1. Drummed liquids, investigation wastes, impacted soil, demolition and construction debris will need to be managed and removed during the construction of the remedial design as outlined in the RAWP.

3.0 REQUIRED MATERIALS

The following materials are required for this procedure:

- Containers for offsite waste disposal.
- Sample containers provided by laboratory.
- Organic Vapor Analyzer (OVA).
- Pocket Penetrometer.
- Steam cleaner.
- Drum-handling equipment.
- Daily Field Reports and/or other appropriate monitoring forms.
- Personal Protection Equipment (PPE) as outlined in the HASP.
- Disposable (nitrile) gloves.

4.0 TASK PERFORMANCE

4.1 CONTAINERIZED WASTES

1. The containerized waste will be inspected and the contents of the drums determined and sampled using procedures outlined in SOP O.

2. It is anticipated that the drums located on the Campbell property which contain material abandoned by a former property owner will be overpacked and hauled to an appropriate disposal facility.

3. The drummed investigation wastes located in Area 2 will likely be disposed of at the Site (i.e., ground water will be discharged and soil cuttings will be consolidated beneath the covers).

4. Once the drummed material has been disposed of, the empty drums will be decontaminated using steam cleaners in a designated Site decontamination area. The rinsate will be collected and disposed with other liquids from the Site.

5. The drums will be crushed and disposed of after analysis of the rinsate water for volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs). Samples will be collected at a rate of one composite rinsate sample per 50 drums.

4.2 EXCAVATED WASTES

1. During construction, excavated soil will be stockpiled. During stockpiling, debris, rubble and large oversize material will be removed from the excavated soils to make the soils suitable for use as backfill.

2. The excavated soils will be tested on a selected frequency for indication of waste material. The parameters to be monitored include organic vapors measured by an OVA, visual appearance and consistency as measured in situ with a pocket penetrometer. See Section 4.3 for monitoring procedures.

3. If waste is encountered during excavation or foundation preparation, the waste will be reconsolidated in a designated area of the reservoir.

4. If free liquids are encountered during excavation, the free liquids must be removed (i.e., collected in appropriate container or stabilized using soil or other granular material before disposal).

5. The stockpiled waste will be staged temporarily on a geomembrane, if necessary.

4.3 EXCAVATED SOIL MONITORING PROCEDURES

1. Excavated soil will be monitored for VOCs using an OVA calibrated for methane. One test per 500 cubic yards shall be taken by measuring the concentrations of vapors 10 centimeters above the surface. Soils measured in excess of 50 parts per million (ppm) may not be used for backfill or cover material and will be disposed as described in this SOP and the Waste Materials Disposal Plan (WMDP). Record quantities and approximate locations of high VOC soils on the Daily Field Report.

2. Excavated soils will also be tested every 500 cubic yards prior to excavation with a pocket penetrometer. Soils measured for bearing capacity of less than 0.5 tons per square foot shall be considered unsuitable for backfilling or Site grading. Record data on Daily Field Report.

4.4 SAMPLE IDENTIFICATION PROCEDURES

1. Each sample collected will be identified as originated from the Site by the prefacing each sample designation with "WDI" (for Waste Disposal, Inc.), an alpha and numerical code and the date. The sample identifier is illustrated below: WDI-DR-01-1-1-04 (For drum rinsate [DR] 01, sampled on January 1, 2004).

4.5 ANALYTICAL PARAMETERS, METHODS, AND SAMPLE PRESERVATION REQUIREMENTS

1. Information on analytical parameters, analytical methods and sample preservation are specified in Tables 4.2 and 4.4 of the QAPP.

4.6 SAMPLE CONTAINER REQUIREMENTS

1. Each sample container will be provided for by the laboratory with the appropriate preservatives as listed in Tables 4.2 and 4.4 of the QAPP.

4.7 BLANKS AND DUPLICATE SAMPLES PROCEDURES

1. Due to the low number of anticipated samples, blank and duplicate samples will not be collected.

4.8 SAMPLE PACKAGING AND TRANSPORTATION PROCEDURES

1. Detailed packaging and transportation procedures are outlined in SOP H.

4.9 PROCEDURES TO AVOID SAMPLE CONTAMINATION PROCEDURES

1. Precautions will be taken to limit the contamination of samples from outside sources. The sampler's hands will be washed frequently and disposable nitrile gloves changed between each sampling point. Only disposable, new or decontaminated transfer containers will be used for sampling.

4.10 SAMPLE DOCUMENTATION AND LABELING PROCEDURES

1. Perform sample documentation as outlined in SOP J. All data should be included on a Daily Field Report or other appropriate form.

2. Each sample label will include the date, sample time, sample ID and name/initials of sampler.

4.11 CHAIN-OF-CUSTODY PROCEDURES

1. Samples will be shipped under the Chain-of-Custody procedures are outlined in SOP I.

STANDARD OPERATING PROCEDURE AA
BOREHOLE LOGGING PROCEDURES
WASTE DISPOSAL, INC. SUPERFUND SITE

1.0 GENERAL

1. This Standard Operating Procedure (SOP) describes the process for field logging of materials encountered during borehole, geoprobe, and monitoring well installation.

2. Health and safety procedures and emergency response procedures are provided in the Health and Safety Plan (HASP). Quality Assurance/Quality Control (QA/QC) procedures are provided in the Quality Assurance Project Plan (QAPP).

2.0 TASK DESCRIPTION

1. During drilling, characterization of the materials encountered will be accomplished by inspecting the material and recording information on field boring log sheets.

3.0 REQUIRED MATERIALS

1. The following materials are required for this procedure:
   - Field Boring Log Sheets (Figure AA.1).
   - Key to Boring Log (Figure AA.2).
   - Organic Vapor Analyzer (OVA).
   - Ziploc bags.
   - Daily Field Reports and/or other appropriate monitoring forms.
   - Personal Protective Equipment (PPE) as outlined in the HASP.
   - Disposable (nitrile) gloves.

4.0 TASK PERFORMANCE

4.1 BORING LOGS

1. To ensure consistent descriptions of soil or rock material from borings, the major components will be recorded in the field boring log sheets (Figure AA.1) by the onsite field geologist, working under the supervision of a California Registered Geologist, or a field geotechnical engineer, working under the supervision of a California Registered Professional Geotechnical Engineer. The description will include the following:
   - Soil material or rock type.
   - Color.
   - Density.
   - Moisture.
   - Grain size.
   - Grading.
   - Minor Constituent(s).
   - Depth ranges, recorded in feet.
   - Degree of contamination.
   - Odor.
   - Volatile organic vapor readings in parts per million (ppm)

2. Examples of soil types would be gravel, sand, silt or clay. Soil types should be based on the Unified Soil Classification (USCS) (Figure AA.2). Soil/rock classification determined in the field may be subject to change based upon laboratory tests.

3. Other pertinent information to be placed on the logs as appropriate is:
   - Boring Identification Number.
   - Project Number.
   - Location of Project.
   - Name of Person performing the logging.
   - Name of Person checking the logging.
   - Sample depth locations.
   - Headspace analysis (see Section 4.2 for procedures).
   - Appearance of contamination.
   - Blow counts (see Section 4.3 for procedures).
   - Degree of fracturing or cementation in the rock.
   - Drilling equipment used (Rig manufacturer, auger size and model).
   - Date for start and completion of borings.
   - Well completion data.
   - Depth of first encountered free water.
   - Definitions of any special abbreviations used on the log.

4.2 HEADSPACE ANALYSIS PROCEDURES

1. For the California split-spoon sampler, half of the soil volume in the middle or bottom stainless steel or brass sleeve will be removed and placed inside a small Ziploc bag.

2. For geoprobe samplers, material from either end of the clear polyacrylate sleeve will be removed and placed inside a small Ziploc bag.

3. The bags will be left in the sunlight for approximately 15 to 30 minutes, after which the head space will be analyzed using an OVA meter to measure potential volatile contamination.

4. The results will be recorded on the field boring log sheets.

4.3 BLOW COUNTS PROCEDURES

1. When obtaining samples with a split-barrel sampler, blow counts will be recorded for every 0.5-foot penetration (i.e., three blow counts per 1.5-foot sampler), with a specified weight hammer falling a specified and consistent distance.

2. The blow counts as well as the hammer weight and falling distance will be recorded on the field boring log sheets.

4.4 SAMPLE IDENTIFICATION PROCEDURES

1. If samples are collected, they will be identified as originated from the Site by the prefacing each sample designation with "WDI" (for Waste Disposal, Inc.), an alpha and numerical code and the date. The sample identifier is illustrated below: WDI-SB-01-05 (For soil boring [SB] 01, 5-foot depth sample).

4.5 ANALYTICAL PARAMETERS, METHODS, AND SAMPLE PRESERVATION REQUIREMENTS

1. If samples are collected, information on analytical parameters, analytical methods and sample preservation for soil samples are specified in Table 4.4 of the QAPP.

4.6 SAMPLE CONTAINER REQUIREMENTS

1. If necessary, each sample container will be provided for by the laboratory or equivalent with the appropriate preservatives as listed in Table 4.4 of the QAPP.

4.7 BLANKS AND DUPLICATE SAMPLES PROCEDURES

1. If the number of samples collected are greater than 10, then blank and duplicate samples will be collected as outlined in Table 4.5 of the QAPP.

4.8 SAMPLE PACKAGING AND TRANSPORTATION PROCEDURES

1. If samples are collected, detailed packaging and transportation procedures are outlined in SOP H.

4.9 PROCEDURES TO AVOID SAMPLE CONTAMINATION

1. Precautions will be taken to limit the contamination of samples from outside sources. The sampler's hands will be washed frequently and disposable nitrile gloves changed between each sampling point. Only disposable, new or decontaminated containers will be used for sampling.

2. Field equipment decontamination procedures to be used are presented in SOP G.

4.10 SAMPLE DOCUMENTATION AND LABELING PROCEDURES

1. If samples are collected, each sample label will include the date, sample time, sample ID and name/initials of sampler.

2. Perform field documentation as outlined in SOP J. All data should be included on a Daily Field Report or other appropriate form.

4.11 CHAIN-OF-CUSTODY PROCEDURES

1. If samples are collected, they will be shipped under the Chain-of-Custody. Detailed procedures are outlined in SOP I.

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PROJECT NO.:	DATE DRILLED:
LOCATION:	LOGGED BY:
STREET:	APPROVED BY:
CITY:	DRILLING CO./RIG:

DRILLING METHOD:
SAMPLER TYPE:
TOTAL DEPTH: DEPTH TO WATER:

SCREEN SLOT SIZE:
TYPE OF SANDPACK:

BLOWS PER 6 INCHES	PID ☐ — ☐	SAMPLE	DEPTH (feet below grade)	DESCRIPTION	USCS	DEPTH	WELL CONSTRUC.
			0	HAND AUGERED/AIR KNIFE EXCAVATIONS TO: FEET		0	
			1			1	
			2			2	
			3			3	
			4			4	
			5			5	
			6			6	
			7			7	
			8			8	
			9			9	
			10			10	
			0			0	
			1			1	
			2			2	
			3			3	
			4			4	
			5			5	
			6			6	
			7			7	
			8			8	
			9			9	
			10			10	
			0			0	
			1			1	
			2			2	
			3			3	
			4			4	
			5			5	
			6			6	
			7			7	
			8			8	
			9			9	
			10			10	
			0			0	
			1			1	
			2			2	
			3			3	
			4			4	
			5			5	
			6			6	
			7			7	
			8			8	
			9			9	
			10			10	

TRC	FIELD LOG OF EXPLORATORY BORING	WELL BORING NO. _____ Page ____ of ____

ORDER: MATERIAL, COLOR DENSITY, MOISTURE, GRAIN SIZE, GRADING, MINOR CONSTITUENT(S)

FIELD BORING LOG

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC | FIGURE AA.1

REV.08/22/03

LITHOLOGY
(UNIFIED SOIL CLASSIFICATION SYSTEM)

MAJOR DIVISIONS				TYPICAL NAMES
COARSE-GRAINED SOILS MORE THAN HALF IS LARGER THAN No. 200 SIEVE	GRAVELS MORE THAN HALF COARSE FRACTION IS LARGER THAN No. 4 SIEVE SIZE	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
			GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES
		GRAVELS WITH OVER 12% FINES	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
			GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SANDS MORE THAN HALF COARSE FRACTION IS SMALLER THAN No. 4 SIEVE SIZE	CLEAN SANDS WITH LITTLE OR NO FINES	SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
			SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		SANDS WITH OVER 12% FINES	SM	SILTY SANDS, SAND-SILT MIXTURES
			SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE-GRAINED SOILS MORE THAN HALF IS SMALLER THAN No. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW- TO MEDIUM-PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM- TO HIGH-PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			Pt	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

SYMBOLS AND NOTES

- SAMPLE INTERVAL
- SAMPLE NOT RECOVERED
- CONCRETE
- BENTONITE CHIPS
- COATED BENTONITE PELLETS
- VOLCLAY or BENTONITE GROUT
- FILTER SAND PACK
- WATER LEVEL ENCOUNTERED WHEN DRILLING
- STATIC WATER LEVEL

CLAST SIZE (Field Classification)

Gravel = > 0.2 inches
Sand = 0.003 - 0.2 inches
Silt = < 0.003 (not plastic)
Clay = < 0.003 (plastic)

DESCRIPTORS

Trace = 1% - 5%
Some = 6% -10%
With = 11% -25%
-ly = 26% -40%
And = >40%

SANDS

4 - 10 blows per foot = Loose
10 - 30 blows per foot = Medium Dense
30 -50 blows per foot = Dense
>50 blows per foot = Very Dense

SILTS & CLAYS

2 - 4 blows per foot = Soft
4 - 8 blows per foot = Medium Stiff
8 -15 blows per foot = Stiff
15 -30 blows per foot = Very Stiff
> 30 blows per foot = Hard

USCS = Unified Soil Classification System
ppm = Parts Per Million (mg/Kg)
PID = Photoionization Detector
CGI = Combustible Gas Indicator

TRC

KEY TO BORING LOG

BOR KEY 1.6 (Sivic Manual 1.3) 11/9/00 pw

KEY TO BORING LOG

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC | FIGURE AA.2

APPENDIX B

VOLATILE ORGANIC COMPOUNDS (VOCs) IN AMBIENT AIR USING SUMMA CANISTER SAMPLING AND GAS CHROMATOGRAPHY (GC) ANALYSIS

VOLATILE ORGANIC COMPOUNDS (VOCs) in Ambient Air
Using Summa Canister Sampling and Gas Chromatography (GC) Analysis

Table 1A. Summary of Holding Times and Preservation

Analytical Parameter [a]	Technical and Contract Holding Times	Preservation
Volatile Organic Compounds (VOCs) in SUMMA® canisters [b]	Technical: 14 days from collection; Contract: 12 days from receipt at laboratory	Ambient temperature; near atmospheric pres
VOCs in tedlar bags	Technical: 48 hours from collection; Contract: 36 hours from receipt at laboratory	Ambient temperature; near atmospheric pres

[a] Individual target compounds are listed in Table 1B.

[b] The laboratory must provide clean and certified 6-liter SUMMA® canisters with the manufacturer's serial number, or a unique permanent identification number attached. For cleaning and certification of SUMMA® canisters, follow the requirements specified in Sections 7.3 and 11 of EPA Method TO-14. After cleaning and certification, the SUMMA canisters will be shipped to the field with a vacuum of < 50 mm TORR. One canister shall be designated as the trip blank for each SDG.

Data Calculations and Reporting Units:

Calculate and report the sample results as specified in the EPA Method TO-14. Perform sample quantitation using the response factor (RF) from the average response factors of the calibrated range. Report results for all target analytes in concentration units of parts per billion by volume (ppbv).

Report tentatively identified compounds (TICs) with a response of <10% of the nearest internal standard.

TIC values should be estimated in ppbv based on the response of the corresponding internal standard.

Table 1B. Target Compound List and Contract Required Quantitation Limits for VOCs by EPA Method TO-14

Analyte	CAS Numbers	CRQL(ppbv)
Acetone	67-64-1	5
Acetonitrile	27521	5
Acrolein	39120	5
Acrylonitrile	39447	5
Benzene	71-73-2	2
Benzyl chloride	100-44-7	5
Bromodichloromethane	75-27-4	2
Bromomethane	74-83-9	5
1,3-Butadiene	106-99-0	5
2-Butanone	78-87-5	5
Carbon tetrachloride	56-32-5	2
Chlorobenzene	108-90-7	2
Chlorodifluoromethane		2
Chloroethane	0	2
Chloroform	67-66-3	2
Chloromethane	74-87-3	2
3-Chloro-1-propene		2
Cyclohexane	110-82-7	2
Dibromochloromethane	124-48-1	2
1,2-Dibromoethane	106-93-4	2
1,2-Dichlorobenzene	95-50-1	2
1,3-Dichlorobenzene	541-73-1	5
1,4-Dichlorobenzene	106-46-7	5
Dichlorodifluoromethane	75-71-8	2
1,1-Dichloroethane	75-34-3	2
1,2-Dichloroethane	39234	2
1,1-Dichloroethene	75-35-4	5
cis-1,2-Dichloroethene	156-59-2	2

trans-1,2-Dichloroethene	156-60-5	2
1,2-Dichloropropane	78-87-5	2
Dichlorofluoromethane	75-43-4	2
t-1,2-Dichloropropene		2
cis-1,2-Dichloropropene		5
1,2-Dichloro-1,1,2,2-tetra-fluoroethane		2
Ethylbenzene	100-41-4	2
Heptane	142-82-5	2
Hexachlorobutadiene	87-68-3	5
Hexane	110-54-3	2
Methanol	67-56-1	5
Methylene chloride	27638	5
Methyl methacrylate		2
4-Methyl-2-pentanone	39721	5
alpha-Methyl styrene		5
Octane	111-65-9	5
n-Pentane	109-66-0	2
Propylene	42185	5
Styrene	100-42-5	5
1,2,4-Trichlorobenzene	120-82-1	2
1,1,1-Trichloroethane	71-55-6	5
1,1,2-Trichloroethane	0	5
1,1,2,2-Tetrachloroethane	79-34-5	2
Tetrachloroethene	127-18-4	5
Toluene	108-88-3	5
Trichloroethene	28860	2
Trichlorofluoromethane	75-69-4	2
1,1,2-Trichloro-1,2,2-trifluoroethane		2
1,2,4-Trimethylbenzene	95-63-6	2
1,3,5-Trimethylbenzene	108-67-8	2
Vinyl acetate	39571	5
Vinyl chloride	27397	2

Xylenes (m- and p-)		5
Xylene (o-)		5

Table 2. Summary of Calibration Procedures

Calibration Element	Frequency	Acceptance Criteria	Correctiv
GC/MS Tuning with 4-bromofluorobenzene (BFB)	Beginning of each 12 hour period during which standards and samples are analyzed	Ion abundance criteria in Table 4 of Method TO-14	1. Identi 2. MS tur met befor
Initial Calibration (minimum blank + 3 to 5 points for each analyte) (ICAL) [a, b, c]	Initially; whenever required, due to failure of CCV	RSD for RFs ≤25%	1. Termir 2. Recali before sa
Continuing Calibration Verification (CCV) (middle of the calibration range)	Following ICV, after every 10 samples, and end of run	%D between RF of CCV and avg. RRFs from ICAL ≤25%	1. Recali 2. Reanal last good

[a] The ICAL low standard must be at concentrations equivalent to the CRQL.

[b] ICAL and CCV standards must contain all target analytes listed in Table 1B.

[c] Report the retention time (RT) window for each analyte. Determine RT windows as ±3 x the standard deviation (SD) of the average initial calibration RT for each analyte.

Follow the tuning and calibration procedures in Section 10.2.2 and 10.2.3 of EPA Method TO-14 and in SOP #1705, Section 3.7.1 and 3.7.2 of OSWER Directive 9360.4-05, May 1992.

The standards must be traceable to a known certified source.

Table 3. Summary of Internal Quality Control Procedures

QC Element	Frequency	Acceptance Criteria	Corrective
Method Blank (MB)	One for each day, minimum of one per SDG	< CRQL for each compound	1. Investig contaminati 2. Reanalyz processed w out of cont
Performance Evaluation (PE) sample [a]	One per day or for each SDG batch	80-120% of expected value	1. Reanalyz associated compliant P
Surrogate Spikes [b]	Every sample, standard and method blank	70-130% of expected value	1. Reanalyz non-complia recoveries.
Laboratory Duplicates	One of every 10 samples or one per day, whichever is greater	RPD ≤20 between duplicate results ≥5 times CRQL; ±CRQL for duplicate results ≤5 times CRQL	1. Reanalyz non-complia

[a] PE samples - The National Institute of Standards and Technology (NIST) standard reference materials (SRM) that are traceable to known concentrations.

[b] Surrogates - The laboratory must demonstrate that the selected three surrogates do not interfere with any target analytes.

Dilute and reanalyze samples which contain one or more target analytes at concentrations above the initial calibration range. Results for such reanalyses should fall within the mid-range of the calibration curve. Report results and submit documentation for both analyses.

VOLATILE ORGANIC COMPOUNDS (VOCs) in Air (Ambient Air/Soil Vapor/Stack Gas) Samples Collected in Specially-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS)

Table 1A. Summary of Holding Times and Preservation

Analytical Parameter [a]	Technical and Contract Holding Times	Preservation
Volatile Organic Compounds (VOCs) in SUMMA® canisters [b]	Technical: 14 days from collection; Contract: 10 days from receipt at laboratory	Ambient tempera
VOCs in tedlar bags	Technical: 48 hours from collection; Contract: 36 hours from receipt at laboratory	Ambient tempera

[a] Individual target compounds are listed in Table 1B.

[b] The laboratory must provide the following equipment certified as clean:

Cleaned and evacuated 6-liter SUMMA® canisters with the manufacturer's serial number, or a unique permanent identification number attached. For cleaning and certification of SUMMA® canisters, follow the requirements specified in Section 8.4 of EPA Method TO-15 (January 1999).

Cleaned and preset ultra-low flow orifices for each ambient air sample preset by the laboratory at a flow rate of 3.2 mL/min ±10% and digital flow meters capable of accurate measurements in the 3.2 mL/min range.

Leak test all canisters prior to sample collection according to Section 8.4 of Method TO-15 (January 1999).

Data Calculations and Reporting Units:

Calculate and report the sample results as specified in Section 10.8.4 of EPA Method TO-15 (January 1999).

Perform sample quantitation using the relative response factor (RRF) from the daily continuing calibration standard. Report results for all target analytes in concentration units of parts per billion by volume (ppbv). Report tentatively identified compounds(TICs) with a response of <10% of the nearest internal standard. TIC values should be estimated in ppbv based on the response of the corresponding internal standard.

Table 1B. Target Compound List, CAS Numbers, and Contract Required Quantitation Limits

Analyte	CAS Number	CRQL ppbv	CRQL ug/M3	CRQL ug/L	MDL ppbv
Benzene	71-43-2	1.0	3.5	0.0035	0.2
Bromomethane	74-83-9	1.0	4.2	0.0042	0.2
Carbon Tetrachloride	56-23-5	1.0	6.9	0.0069	0.2
Chlorobenzene	108-90-7	1.0	5.0	0.0050	0.2
Chloroethane	75-00-3	1.0	2.9	0.0029	0.2
Chloroform	67-66-3	1	5.3	0.0053	0.2
Chloromethane	74-87-3	1	2.3	0.0023	0.2
1,1-Dichloroethane	75-34-3	1	4.4	0.0044	0.2
1,2-Dichloroethane	107-06-2	1	4.4	0.0044	0.2
1,1-Dichloroethene	75-35-4	1.0	4.3	0.0043	0.2
cis-1,2-Dichloroethene	156-59-2	1.0	4.3	0.0043	0.2
trans-1,2-Dichloroethene	156-60-5	1.0	4.3	0.0043	0.2
1,2-Dichloropropane	78-87-5	1.0	5.0	0.0050	0.2
cis-1,3-Dichloropropene	10061-01-5	1.0	5.0	0.0050	0.2
trans-1,3-Dichloropropene	10061-02-6	1.0	5.0	0.0050	0.2
Ethylbenzene	100-41-4	1.0	4.7	0.0047	0.2
Methylene Chloride	75-09-2	1.0	3.8	0.0038	0.2
Styrene	100-42-5	1.0	4.6	0.0046	0.2
1,1,2,2-Tetrachloroethane	79-34-5	1.0	7.5	0.0075	0.2
Tetrachloroethene	127-18-4	1.0	7.4	0.0074	0.2
Toluene	108-88-3	1.0	4.1	0.0041	0.2
1,1,1-Trichloroethane (TCA)	71-55-6	1	6.0	0.0060	0.2
1,1,2-Trichloroethane	79-00-5	1	6	0.0060	0.2
Trichloroethene (TCE)	79-01-6	1.0	5.9	0.0059	0.2
Vinyl Chloride	75-01-4	1.0	2.8	0.0028	0.2
p-Xylene & m- Xylene	106-42-3 & 108-38-3	2.0	9.5	0.0095	0.4
o-Xylene	95-47-6	1.0	4.7	0.0047	0.2

Table 2. Summary of Calibration Procedures

Calibration Element	Frequency	Acceptance Criteria	Correctiv
GC/MS Tuning with 4-bromofluorobenzene (BFB)	Beginning of each 12 hour period during which standards and samples are analyzed	Ion abundance criteria in Table 3 of Method TO-15	1. Identi 2. MS tur met befor
Initial Calibration (minimum blank + 5 points for each analyte) (ICAL) [a, b, c]	Initially; whenever required, due to failure of CCV	RRFs ≥0.05 for each analyte; RSD for RRFs ≤30%	1. Termir 2. Recali before sa

Continuing Calibration Verification (CCV) (middle of the calibration range)	Following ICV, every 12-hour, and end of run	RRFs ≥0.05 for each analyte; %D between RRF of CCV and avg. RRFs from ICAL ≤30%	1. Recali 2. Reanal last gooc
CRQL standard	Every 12 hour	65-135% of the expected value	1. Recali 2. Reanal last gooc
Internal Standards [d]	Every standard, sample, blank, and QC sample	IS area within ±40% of the IS area in the associated CCV	1. Invest 2. Re-ana analyzed malfuncti
Retention time evaluation	Each analysis	±0.50 minute of the IS retention time in the associated CCV	1. Re-cal 2. Re-ana to last c

[a] The ICAL low standard must be at concentrations equivalent to the CRQL.

[b] ICAL and CCV standards must contain all target analytes listed in Table 1B.

[c] Report the retention time (RT) window for each analyte. Determine RT windows as ±3 x the standard deviation (SD) of the average initial calibration RT for each analyte.

[d] Internal standards: Bromochloromethane, 1,4-Difluorobenzene, and Chlorobenzene-d5. The standards must be traceable to known certified source. Humidify calibration standards when used.

EPA Method TO-15 (January 1999)

Table 3. Summary of Internal Quality Control Procedures

QC Element	Frequency	Acceptance Criteria	Corrective
Method Blank (MB)	Each 12-hour time period, minimum of one per SDG	< CRQL for each compound	1. Investig contaminati 2. Reanalyz processed w out of cont
Blank Spike Blank Spike Duplicate (BS/BSD)	One BS/BSD set per batch or SDG (1 MS/MSD set per 20 samples minimum)	65-135% of expected value; ≤35% RPD between BS and BSD	1. Report i
Surrogate Spikes [a]	Every sample, standard and method blank	80-120% of expected value	1. Reanalyz non-complia recoveries
Laboratory Duplicates	One per SDG	RPD ≤20 between duplicate results ≥5 times CRQL; ±CRQL for duplicate results ≤5 times CRQL	1. Reanalyz non-complia

[a] 1,2-dichloroethane-d_4, Toluene-d_8, and 4-Bromofluorobenzene. If other surrogates are used the laboratory must demonstrate that the surrogates do not interfere with any target analytes. The laboratory must also notify the Region in advance.

Reanalyze samples containing target analytes at concentrations greater than the initial calibration range. Analyze a smaller aliquot of sample from the SUMMA® canister. If after analyzing a smaller aliquot, the concentration is still greater than the initial calibration range, then dilute the sample and reanalyze according to

procedures outlined in EPA Method TO-15. If sample dilution is necessary, the dilution must be adjusted so that the target analyte is quantitated at a level in the upper half of the calibration range. Report the results and submit documentation for the analysis of both the diluted and undiluted sample.

Both the primary ions and the secondary ions must be present in the spectra. The acceptance level for relative abundance of the appropriate ions in all standards, method blanks, QC samples, laboratory duplicates and field samples is determined to be ±20% of the expected abundance observed in the most recent continuing calibration standard. All ions greater than 15% in the standard spectrum must be present in the sample spectrum.

APPENDIX A.2

SAMPLING AND ANALYSIS PLAN

TRC
Customer-Focused Solutions

TRC

SAMPLING AND ANALYSIS PLAN

WASTE DISPOSAL, INC.
SUPERFUND SITE
SANTA FE SPRINGS, CALIFORNIA

Prepared for

United States Environmental Protection Agency

Prepared by

TRC

On Behalf of

Waste Disposal Inc., Group (WDIG)

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Project No. 29022401
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1.0 INTRODUCTION

1.1 INTRODUCTION

1. This Sampling and Analysis Plan (SAP) has been revised to support sampling activities of the Operations, Maintenance and Monitoring Plan (OMMP) for the Waste Disposal, Inc. (WDI) Superfund Site (Site) in Santa Fe Springs, California.

2. A Quality Assurance Project Plan (QAPP) has been prepared separately. The QAPP and SAP are designed to be used together. The SAP describes the objectives, locations, frequency, and parameters for sampling activities associated with site remediation and monitoring, and the QAPP provides procedures and Quality Assurance/Quality Control (QA/QC) measures that will be used to collect and analyze samples of the various Site media. Data collected from the SAP procedures will be used to assess the operational performance of the cap and containment remedy.

3. The scope and objectives of the SAP are discussed below. The SAP and QAPP and other plans provide the necessary guidance to complete the work required by the Consent Degree (CD) and associated Statement of Work (SOW) negotiated by the United States Environmental Protection Agency (EPA) and the Waste Disposal, Inc. Group (WDIG) (EPA, 2002a). The interrelationship of this SAP with the other workplans for this project is described in the following section.

1.2 INTEGRATION WITH OTHER REPORTS AND PLANS

1. This SAP will be implemented in conjunction with other plans required by the SOW, as follows:
   - Remedial Design Report, Plans and Specifications
   - Remedial Action Workplan (RAWP)
   - Health and Safety Plan (HASP)
   - Quality Assurance Project Plan (QAPP)
   - Construction Quality Assurance Plan (CQAP)
   - Operations, Maintenance and Monitoring Plan (OMMP)

2. A general description of these documents and how they are integrated with the SAP is provided in the following sections. Figure 1.1 presents a diagram of how the management plans fit together in the sequence of performing the work.

1.2.1 REMEDIAL DESIGN REPORT, PLANS AND SPECIFICATIONS

1. The Remedial Design Report, Plans and Specifications provides the approved Design, Plans and Specifications, the description and supporting materials for the selected remedial design for the soil, subsurface gas and ground water at the WDI Site.

2. The design in the Remedial Design Report is based on the selected remedy presented in the Amended Record Of Decision ([AROD]; EPA, June 2002), appropriately configured to suit the findings of field studies subsequent to the AROD. The Remedial Design Report, Plans and Specifications have been prepared to fulfill the remedial design requirements of the Administrative Order (AO) 94-17 and Amended Administrative Order (AAO) 97-09. The approved Plans and Specifications in the Final 100% Remedial Design Report, (TRC, May 2003) addresses comments provided by EPA, and additional comments provided by the various agencies and interested parties that have participated in Technical Exchange Meetings regarding the remedial design.

1.2.2 REMEDIAL ACTION WORKPLAN (RAWP)

1. The RAWP outlines how construction activities will be implemented relative to the Design Plans and Specifications. The RAWP also describes specific QA tasks. The RAWP includes sections discussing the sequencing of construction, project team organization, equipment staging and materials handling, and procedures for addressing QA items identified in this CQAP. Also included in the RAWP are a schedule of activities and a process for making field changes to the design.

1.2.3 HEALTH AND SAFETY PLAN (HASP)

1. The HASP presents the minimum health and safety requirements and procedures that will be used during operations and maintenance at the Site. The HASP will apply to both workers at the WDI Site and public exposure to releases or spills at and from facilities and environmental control systems at the Site. The HASP addresses coordination between the various parties conducting activities at the WDI Site and emergency response agencies and personnel (e.g., police departments, fire department, and other response agencies). Contractor Health and Safety Plans must meet the requirements of this document, but may also include additional health and safety procedures and requirements.

1.2.4 QUALITY ASSURANCE PROJECT PLAN (QAPP)

1. The QAPP describes quality assurance procedures and requirements for aspects of the work other than construction. This includes the laboratory procedures to be utilized, the calibration of field and laboratory equipment, QA/QC of laboratory procedures, data evaluation procedures, performance and system audits, precision and accuracy performance standards, analytical methods/control procedures, and procedures for data handling, analysis, and reporting. The QAPP also contains Standard Operating Procedures (SOPs) for performing sampling and analysis associated with the Site, including sample handling and preservation.

2. In addition, the QAPP is used together with the SAP (described below) to implement the monitoring and measurement programs, including those that will be described in the OMMP, and to assure that quality control is documented for any chemical measurements made during construction.

1.2.5 CONSTRUCTION QUALITY ASSURANCE PLAN (CQAP)

1. The CQAP identifies QA/QC procedures to be used in construction management, including monitoring actions, reporting mechanisms, and documentation formats.

2. The CQAP also discusses how construction monitoring will be performed and how modifications to the construction procedures will be directed, as necessary, in response to monitoring actions. Further, it delineates the quality assurance methods and protocols for project personnel to ensure they have a complete understanding of monitoring, feedback, and adjustment mechanisms.

1.2.6 OPERATIONS, MAINTENANCE AND MONITORING PLAN

1. The Long-Term Ground Water Monitoring Plan, Long-Term Soil Gas and In-Business Air Monitoring Plan, and Operations, Maintenance and Monitoring Plan are compiled into the OMMP. The OMMP provides the procedures and activities necessary to operate and maintain the facilities following the remedial action and describes the monitoring programs, including locations, frequency, and parameters monitored, procedures for data management, data evaluation, reporting, inspections, contingency plans, procedures for repair or corrective action. The OMMP includes descriptions of various procedures, including:
   - Procedures for verifying and documenting compliance with quality control requirements.

- Operational procedures (equipment and systems startup and shutdown, normal operational procedures, and procedures for abnormal conditions).
- Procedures of operational emergency response.
- Maintenance procedures and schedules.
- Compliance and process monitoring procedures and schedules.

1.3 ORGANIZATION OF SAP

1. The remainder of this plan is organized as follows:
   - Section 2.0 - Sampling and Monitoring Objectives
   - Section 3.0 - Sampling Plans
   - Section 4.0 - Methods and Procedures
   - Section 5.0 - References

2.0 SAMPLING AND MONITORING OBJECTIVES

1. The sampling and monitoring activities described herein are to implement the plans presented in the Final (100%) Remedial Design Report (TRC, May 2003). The objectives of the sampling and monitoring are described in detail in that report and are briefly summarized below.

2. Soil gas monitoring is an integral component of the soil gas remedy. Ground water monitoring has been selected in the Amended Record of Decision (AROD) (EPA, 2002b) as the remedy for ground water. Soil gas and ground water monitoring will be conducted to assure current conditions are maintained and that the remedy is performing properly. A subset of the current networks of soil gas and ground water monitoring points will be used to fulfill performance-monitoring requirements. Performance monitoring will not be conducted in the reservoir area, and all existing soil gas and ground water monitoring wells in this area has been abandoned. Existing soil gas and ground water monitoring wells not selected for use in the postclosure monitoring systems that are located in areas outside the reservoir remain in place. However, it is recommended that the following wells outside of the reservoir area be abandoned after the initial year of postclosure monitoring is completed:

• GW-06	• VW-10	• VW-21	• VW-47
• GW-07	• VW-11	• VW-22	• VW-50
• GW-09	• VW-12	• VW-23	• VW-52
• GW-13	• VW-13	• VW-24	• VW-53

- GW-14
- GW-18
- GW-19
- GW-21
- GW-28
- VW-06
- VW-14
- VW-16
- VW-17
- VW-18
- VW-19
- VW-20
- VW-26
- VW-27
- VW-28
- VW-40
- VW-43
- VW-44
- VW-54
- VW-57
- VW-59
- VW-60
- VW-63

One year of data obtained during the postclosure period will be sufficient to provide a snapshot of initial/baseline conditions outside the reservoir area, after which the selected subset of monitoring wells described in Section 3.0 will suffice for performance monitoring purposes.

3. The specific Site media to be sampled and analyzed include:
   - Soil Gas (Vapor Wells)
   - In-Business Air
   - Reservoir Gas Collection System
   - Ground Water
   - Leachate Monitoring/Control System
   - Stormwater
   - Imported fill

4. Table 2.1 summarizes the Data Quality Objectives (DQOs) for sampling the Site media listed above. The DQO process and various DQO levels are discussed in more detail in Section 4.0 of the QAPP.

3.0 SAMPLING PLANS

1. The proposed sampling plans for the various Site media are summarized in Table 2.2. Sampling locations for the various Site media (except for the imported fill) are shown in Figures 2.1 through 2.3. The imported soil sample locations will be determined on a case by case basis. The sampling plans are discussed more fully in the following subsections, and would be implemented and supersede the existing monitoring program upon approval of the QAPP and this SAP.

2. The sampling efforts to be used in support of these field activities will incorporate the following strategies:
   - Follow appropriate protocols in the OM&M Health and Safety Plan (HASP) to minimize exposure to potentially contaminated media.

- Follow labeling protocols for each sample collected. Detailed protocols are provided in the QAPP.
- Place samples in laboratory-certified clean receptacles.
- Adhere to field sample collection and handling procedures as described herein, and supported by QA/QC measures provided in the QAPP.
- Follow sample packaging and Chain-of-Custody protocols to assure that samples which may be analyzed are delivered to the laboratory and stored appropriately. Detailed protocols are provided in the QAPP.

3.1 VAPOR WELLS MONITORING PLAN

1. The proposed vapor wells monitoring plan is based on providing representative and adequate areal coverage, based on existing site data and known conditions, for establishing compliance with performance standards, and for assessing changes in or near known noncompliance areas that may be indicative of vapor migration from these areas (see Final [100%] Design Report, TRC, May 2003).
   - Vapor Wells VW-25, -29 through -39, -41, -42 and -56 will be sampled and analyzed for Volatile Organic Compounds (VOCs) using EPA Method TO-15, Methane and Total Gaseous Nonmethane Organics (TGNMO) using EPA Method 25C and Fixed Gases using EPA Method 3C. This is part of the soil gas monitoring program approved by the EPA in February 2001.
   - Vapor Wells VW-46, -49, -51, -55, -58, -61 and -62 will be sampled and analyzed for VOCs, Methane, TGNMO and Fixed Gases using the EPA Methods mentioned above.

2. Vapor monitoring wells VW-29 through -39, -41 and -42 are located at the perimeter of the Site and were selected to monitor migration of soil vapor offsite as well as towards nearby buildings, and will be used to determine compliance with Soil Gas Performance Standards listed in Table 3.1. These Vapor Wells are designated as "Compliance Vapor Wells" as indicated in Figures 2.1 and 2.2.

3. Vapor monitoring wells VW-25, -46, -49, -51, -55, -56, -58, -61 and -62 are located in or near historic areas of soil vapor noncompliance. These wells were selected to monitor for occurrence and/or migration from these noncompliance areas and will not be used to determine compliance with Soil Gas Performance Standards; and therefore, are designated as "Non-Compliance Vapor Wells" (see Figures 2.1 and 2.2).

4. Postclosure vapor monitoring wells are not located within the reservoir area or in locations where waste is present. Soil gas composition is not expected to change significantly as a result of remedy implementation in these areas. In addition, vapor extraction tests (TRC, 2001) indicated that the low permeability of the buried wastes (i.e., drilling muds) causes significant resistance to gas flow, making monitoring difficult.

5. Although it is anticipated that the subsurface distribution of soil gas will not change, decision making criteria regarding existing fill cover soil gas monitoring locations and soil gas controls (i.e., based on trends and/or compliance with Soil Gas Performance Standards) is proposed. Example decision criteria are presented in Figure 3.1.

6. Procedures for sampling and analysis of the vapor wells are provided in the OMMP and QAPP.

3.2 IN-BUSINESS AIR MONITORING PLAN

1. The proposed In-Business Air Monitoring Plan is generally the same as the program that has been used prior to the remedial action. The following In-Business Air Monitoring Program was approved by the EPA on February 9, 2001:
   - Sampling locations:
     - 12635E Los Nietos Road (IBM-03).
     - 12811E Los Nietos Road (IBM-41).
     - 9843 S. Greenleaf Avenue (IBM-50).
     - 12633 Los Nietos Road (IBM-03B).
     - 12637A Los Nietos Road (IBM-24B).
     - 12803 Los Nietos Road (IBM-37).

2. There are also two ambient air sampling stations monitored during alternating sampling events (one in June, one in December):
   - Outside the building at 126370 Los Nietos Road (IBM-24 [AMB])
   - Southeast corner of Los Nietos Road and Greenleaf Avenue (IBM-49 [AMB])

3. Sampling points at the following additional locations are proposed, as the buildings are over waste (see Figure 2.2):
   - 9620 Santa Fe Springs Road (IBM-21)
   - 9630 Santa Fe Springs Road (IBM-22)
   - 9640 Santa Fe Springs Road (IBM-28)
   - 12747 Los Nietos Road (IBM-32)

4. Figure 3.2 provides example criteria that will be used to determine the frequency of in-business monitoring and to establish the need for additional potential building modifications that may be needed based on results of monitoring.

5. Procedures for sampling and analysis of the in-business air samples are provided in the OMMP and QAPP.

3.3 RESERVOIR GAS COLLECTION SYSTEM MONITORING PLAN

1. The reservoir gas collection system in the reservoir area (see Figures 2.1 and 2.2) will be monitored for influent and effluent gas composition. The objective of the monitoring is to establish the composition of the soil gas being collected and determine if a permit for emissions is required. If compliance testing during startup indicates emission rates of total nonmethane organic carbon greater than 116 lb/day, additional monitoring may be required for compliance with a South Coast Air Quality Management District permit to operate.

2. Flow rate and composition will be monitored periodically (i.e., monthly) during active operation. Flow rate measurement equipment is included in the design of the reservoir gas collection system. Procedures for sampling and analysis of the reservoir gas collection system emissions are provided in the OMMP and QAPP.

3.4 GROUND WATER MONITORING PLAN

1. In accordance with Title 22 California Code of Regulations (CCR) §66265.97, requirements for a ground water detection monitoring program include background wells, point of compliance wells, and other wells suitable for early detection of a release from a waste unit. The basis and scope of the ground water monitoring program described herein were provided in the Final (100%) Design report (TRC, May 2003), which has been reviewed and approved by EPA and DTSC. The following monitoring system is based on ground water flow conditions and the results of ground water quality evaluations performed during the investigation phase of the project:

   - **Background Wells**: A minimum of one upgradient monitoring well screened within the uppermost aquifer is needed to monitor and document the quality of ground water that has not been affected by an onsite release. Selected upgradient background wells are GW-01,

GW-02 and GW-32 (see Figures 2.1 and 2.2). In addition, well GW-11 will be used to monitor the deep background cross-gradient ground water quality.

- **Point of Compliance (POC) Wells**: A sufficient number of monitoring wells located at the POC (downgradient edge of the waste unit) and screened within the uppermost aquifer are monitored to detect potential releases and impacts to ground water from onsite waste sources. Given the hydrogeologic conditions at the Site, shallow aquifer POC wells spaced approximately 200 feet apart would be appropriate for long-term detection monitoring. The following existing downgradient monitoring wells have been selected as POC detection wells: GW-22, -23 and -26 (see Figures 2.1 and 2.2).
- **Near-Source Detection Wells**: Depending on the location and nature of contaminant sources, detection wells near potential onsite sources of contaminants are appropriate for inclusion in the long-term monitoring program. Wells GW-10 and -33 (see Figures 2.1 and 2.2) are the near-source detection wells.
- **Verification Wells or Guard Wells**: Monitoring of downgradient property-line verification wells or "guard" wells is warranted to assure that Site contaminants (if present in ground water) do not migrate offsite to potentially impact private or municipal water supply wells. The following existing downgradient monitoring wells will serve as verification wells: GW-27, -29 and -30 (see Figures 2.1 and 2.2).

2. Samples collected from the Site ground water monitoring wells will be collected quarterly and analyzed for VOCs, and general chemistry ground water quality parameters (i.e., chloride, sulfate, total organic carbon, pH, and total dissolved solids).

3. Semi-Volatile Organic Compounds (SVOCs) have not been detected since 1997, and metal concentrations are stable and reflect a regional background condition. Hence, SVOCs and priority pollutant metals will be analyzed every 5 years.

4. Ground water monitoring procedures are provided in the OMMP and QAPP. In addition to sampling data, management and reporting, the procedures will address evaluation of the data. In particular, responses to changes in concentration due to, for example, migration of constituents from offsite areas or changes in Site ground water quality conditions will be addressed. Responses may include confirmatory monitoring or installation of additional monitoring systems.

3.5 LEACHATE MONITORING/CONTROL SYSTEM MONITORING PLAN

1. Four leachate collection (LC) wells are installed within the boundary of the reservoir (see Figure 2.1) to monitor free liquids within the zone immediately above the concrete bottom of the reservoir. The number and location of the LC wells were established based on the results on Technical Memo No. 13 (TRC, 2000).

2. The leachate levels in each well will be monitored periodically to determine the level of leachate present in the reservoir. When the level in any well reaches 12 inches or more the leachate will be removed and sent to an offsite disposal facility or treated onsite. Testing may be performed on the aqueous leachate, and periodically on NAPL that is present, to determine what, if any, constituents are present and their concentrations. This would be done to determine if the leachate must go to a disposal facility or if it can be treated onsite (i.e., granular activated carbon) and discharged. Liquid level monitoring and procedures for removing excessive liquids will be provided in the OMMP and QAPP.

3.6 STORMWATER MONITORING PLAN

1. Continued stormwater monitoring will be performed at the Site. The proposed monitoring is in compliance with the General Stormwater Permit for the City of Santa Fe Springs. Stormwater monitoring will include annual sampling of run-off from the first significant precipitation event and one additional event. Stormwater monitoring locations are indicated in Figure 2.3. Contingency plans will be described in the OMMP in case site-related constituents are detected above levels of concern. In addition, the stormwater monitoring plan will include routine inspection and maintenance of run-off control systems.

2. Procedures for sampling and analysis of the stormwater samples are provided in the QAPP.

3.7 IMPORTED FILL

1. Imported fill is tested primarily to assure it is free of contaminants, but also to confirm physical properties required in the specifications. One representative sample will be collected from each borrow source for analysis. The sampling location(s) may be a stockpile or a multi-point composite from the area(s) where the fill will be excavated. Additional samples may also be collected at the discretion of EPA or the WDIG Project Manager based on professional judgment.

2. The samples will be tested for Title 22 CCR Metals, Total Petroleum Hydrocarbons (TPH), VOCs, Polychlorinated Biphenyls (PCBs) and pesticides. Data from the owner of the borrow source may also be used in lieu of project-specific data as determined by the CQA Officer.

4.0 METHODS AND PROCEDURES

4.1 SAMPLE COLLECTION

1. Sample collection procedures are described in detail in the SOPs included in the QAPP. The following sections briefly describe the sample handling and analysis methods and procedures that will be implemented during the monitoring at the Site.

2. Table 4.4 of the QAPP presents the requirements for Quality Control Samples to be collected including the frequency for each of these samples.

4.2 SAMPLE CONTAINERS

1. Tables 4.2, 4.3 and 4.4 of the QAPP lists the sample container requirements appropriate for the analytical procedures. According to these procedures, each sample container will be labeled with the name of the person taking the sample, sample date and time, sample identification code, sample type, preservation method and analyses to be performed. The label will also indicate if the sample is to be held in appropriate storage by the laboratory until the geologist/engineer determines if analyses are to be performed based on initial analytical results for representative samples.

4.3 SAMPLE PRESERVATION

1. Appropriate sample containers and preservatives for the samples will be supplied by the analytical laboratory or equivalent reputable source. A listing of these containers, preservation methods, and associated holding times are presented in Tables 4.2, 4.3 and 4.4 of the QAPP.

4.4 SAMPLE SHIPMENT

1. The samples will be packed and shipped according to the detailed sample transportation procedures in SOP H provided in the QAPP.

4.5 SAMPLE DOCUMENTATION

4.5.1 SAMPLE IDENTIFICATION

1. Each sample collected will be identified as having originated from the Site by prefacing each sample designation with "WDI" (for Waste Disposal, Inc.).

4.5.2 SAMPLE LOCATION, DEPTH AND IDENTIFICATION

1. Each sample collected will be identified by an alpha and numerical code, corresponding to the sample media and location, as illustrated below:
   - WDI GW-01 - This designation refers to Well GW-01.

4.5.3 CHAIN-OF-CUSTODY

1. Chain-of-Custody procedures are discussed in Section 4.0 of the QAPP which will be used to maintain and document sample possession.

2. Detailed Chain-of-Custody procedures are presented in SOP I provided in the QAPP.

4.5.4 FIELD NOTEBOOK

1. In the field, the Field Engineer/Geologist collecting the samples will record the appropriate portions of the following information for each sample collected, as appropriate for the sample type, using indelible ink, in a field logbook or on a field data sheet.

2. Detailed field documentation procedures are presented in SOP J provided in the QAPP.

4.6 ANALYTICAL PROCEDURES

1. Procedures and methods for analyses of the samples are presented in the QAPP. A summary of the methods to be used is provided in Table 2.1.

5.0 REFERENCES

Environmental Protection Agency (EPA) *Consent Decree: USA vs. Archer Daniels Midland et al.* September 2002a.

EPA. *Amended Record of Decision (AROD) - Soils and Subsurface Gas Operable Unit.* June 2002b.

TRC. *Prefinal Remedial Action Workplan (RAWP),* Waste Disposal, Inc. Superfund Site. July 2003.

TRC. *Remedial Design Investigate Activities Summary Report (Revision 2.0).* May 2001.

TRC. *Draft TM No. 13 Reservoir Liquids Closeout Report and Addendum No. 1 Comprehensive Ground Water Quality Monitoring Plan (Revision 2.0).* Waste Disposal, Inc. Superfund Site. August 2000.

TABLE 2.1

DATA QUALITY OBJECTIVE DEVELOPMENT PROCESS
WASTE DISPOSAL, INC.

ACTIVITY	SOIL GAS MONITORING				GROUND WATER MONITORING	LEACHATE COLLECTION WELLS	STORMWATER MONITORING	IMPORTED FILL
	Vapor Wells	Biovent Wells	In-Business Air	Reservoir Gas Collection System				
Objectives	To fulfill monitoring requirements and identify changes in soil gas conditions.	To verify effectiveness of Biovent Well operation.	To fulfill monitoring requirements and identify changes in soil gas conditions.	To fulfill monitoring requirements and identify changes in soil gas conditions.	To fulfill monitoring requirements and identify changes in ground water conditions.	Waste characterization for disposal.	To fulfill monitoring requirements and identify changes in surface water quality conditions.	To assure that the imported fill is free from contamination.
Intended Data Use	Confirm that soil gas in Compliance Vapor Wells is meeting Soil Gas Performance Standards listed in the Amended Record of Decision (AROD) and Table 3.1 and evaluate changes in soil gas conditions in Compliance and Non-Compliance Vapor Wells.	Confirm that wells are operating properly.	Confirm the soil gas is not migrating into buildings.	Confirm that soil gas is meeting AROD requirements. SCAQMD rules and ARARs.	Confirm that current ground water conditions are being maintained or improve.	Compare with limits allowed by intended disposal facility.	Confirm that stormwater runoff water quality does not indicate the presence of site or tenant COCs.	Comparison with risk-based screening levels, such as Region IX Industrial Preliminary Remediation Goals.
Required Analytical Methods of DQO Levels	VOCs (TO-15) Methane (25C) Total Gaseous Nonmethane Organics (TGNMO) (25C) Fixed Gases (3C)	None. Monitor to confirm air flow only.	VOCs (TO-15) Methane (25C) TGNMOs (25C)	VOCs (TO-15) Methane (25C) TGNMO (25C) Fixed Gases (3C)	VOCs (8260B) Dissolved Metals (6010B/7471B) General Parameters[1] SVOCs (8270C)	VOCs (8260B) Dissolved Metals (6010B/7471B) SVOCs 8270(C) PCBs (8082)	VOCs (8260B) Total Suspended Solids (TSS) (160.2) Oil & Grease (413.2) CAM Metals (6010B/7471B) SVOCs 8270(C)	CAM Metals (6010B/7471A) TPH (8015D) VOCs (8260B) PCBs (8081) Pesticides (8082)
	DQO Level 3		DQO Level 3	DQO Level 2	DQO Level 2	DQO Level 2	DQO Level 2	DQO Level 2
Contaminants of Concern	VOCs[2] Methane[2] TGNMOs[2]	None. Monitor to confirm air flow only.	VOCs[2] Methane[2] TGNMOs[2]	VOCs[2] Methane[2] TGNMOs[2]	VOCs Metals SVOCs	VOCs Metals SVOCs PCBs	Oil & Grease Metals TSS VOCs SVOCs	Metals BTEX Petroleum Hydrocarbons Chlorinated VOCs PCBs and Pesticides
Required Detection Levels	Required detection limits are provided in Table 4.3 of the QAPP	None. Monitor to confirm air flow only.	Required detection limits are provided in Table 4.3 of the QAPP	Required detection limits are provided in Table 4.3 of the QAPP	Required detection limits are provided in Table 4.2 of the QAPP	Required detection limits are provided in Table 4.2 of the QAPP	Required detection limits are provided in Table 4.2 of the QAPP	Required detection limits are provided in Table 4.4 of the QAPP
Regulatory Standards	Soil Gas Performance Standards[2]	None. Monitor to confirm air flow only.	Indoor Air Threshold Levels[2]	SCAQMD Emissions Limits	None	None	MCLs[3]	None[4]
Sampling Location	See Figure 2.2	See Figure 2.1	See Figure 2.2	See Figure 2.2	See Figure 2.2	See Figure 2.1	See Figure 2.3	One sample per borrow source

30747/Reports/QAPP (9/6/06/MS)

(1) General parameters include pH (SM4500 H, B), Chloride (300.0), sulfate (300.0) and total dissolved solids (160.1).

(2) Soil Gas Performance Standards from EPA Amended Record of Decision (AROD), Waste Disposal, Inc., June 2002, and Table 3.1.

(3) MCLs are not Performance Standards. There are no Performance Standards in the AROD for this media.

(4) Results should be compared to risk-based screening levels, such as the Region IX Industrial Preliminary Remediation Goals.

TABLE 2.2

SUMMARY OF SAMPLING PLANS FOR THE VARIOUS SITE MEDIA
WASTE DISPOSAL SUPERFUND SITE

SITE MEDIA	SAMPLING AND ANALYSIS PLANS
Vapor Wells	• Vapor well locations are shown in Figures 2.1 and 2.2. • Samples will be analyzed for methane, total gaseous non-methane organics (TGNMO), Volatile Organic Compounds (VOCs) and Fixed Gases.
In-Business Air	• Sampling locations (see Figure 2.2): - 12635E Los Nietos Road (IBM-03) - 12633 Los Nietos Road (IBM-03B) - 9620 Santa Fe Springs Road (IBM-21) - 9630 Santa Fe Springs Road (IBM-22) - 12637A Los Nietos Road (IBM-24B) - 9640 Santa Fe Springs Road (IBM-28) - 12747 Los Nietos Road (IBM-32) - 12803 Los Nietos Road (IBM-37) - 12811E Los Nietos Road (IBM-41) - 9843 S. Greenleaf Avenue (IBM-50) • Sample frequency is initially quarterly, then according to the decision matrix in Figure 3.2. • Samples will be analyzed for methane, TGNMO and VOCs.
Reservoir Gas Collection System	• Flow rate and composition will be monitored monthly while the system is actively operating. • Samples will be analyzed for methane, TGNMO, VOCs and Fixed Gases.
Ground Water	• Ground Water wells: GW-01, GW-02, GW-10, GW-11, GW-22, GW-23, GW-26, GW-27, GW-29, GW-30, GW-32 and GW-33 will be sampled (see Figures 2.1 and 2.2). • Wells will be sampled quarterly until at least 1 year after completion of construction. Afterwards sampling frequency will be reduced. • Quarterly samples will be analyzed for volatile organic compounds (VOCs) and general chemistry parameters (i.e., chloride, sulfate, total organic carbon, pH, and total dissolved solids). • Semi-volatile organic compounds (SVOCs) and metals will be analyzed every 5 years.

TABLE 2.2

SUMMARY OF SAMPLING PLANS FOR THE VARIOUS SITE MEDIA WASTE DISPOSAL SUPERFUND SITE (Continued)

SITE MEDIA	SAMPLING AND ANALYSIS PLANS
Leachate Monitoring/ Control System	• Monitoring locations are shown in Figure 2.1. • The collected leachate from all four LC wells will be analyzed for VOCs, SVOCs, polychlorinated biphenyls (PCBs) and Metals to determine the disposal criteria.
Stormwater	• Stormwater sampling locations are shown on Figure 2.3. • Stormwater monitoring includes annual sampling of run-off from first significant precipitation event of the rainy season and one additional event. • Samples will be analyzed for total suspended solids (TSS), oil & grease and metals.
Imported Fill	• A single representative sample will be collected from each borrow source for imported fill. • Imported soil will be examined and will meet the following criteria(1): - Free of chemical contaminants including Title 22 metals, petroleum hydrocarbons, benzene, toluene, xylene, ethyl benzene, PCBs, pesticides, herbicides, and chlorinated VOCs. - United Soil Classification System (USCS) classification CL, ML, SC, SM, GC, GM. - Maximum particle size of 2 inches. - Between 12 and 70 percent passing No. 200 sieve. - Plasticity Index ±15. - Free of organics, roots, wood, peat, cinders, deleterious matter or other rubbish.

30747/Reports/SAP (8/26/03/rm)

(1) Testing data provided by the prospective borrow source(s) may be used in lieu of project specific samples on approval by the CQA officer.

TABLE 3.1

SOIL GAS PERFORMANCE STANDARDS AND INDOOR AIR THRESHOLD LEVELS WASTE DISPOSAL, INC. SUPERFUND SITE

COMPOUND	SOIL GAS PERFORMANCE STANDARD[1] (ppbv)	INDOOR AIR THRESHOLD LEVEL[2] (ppbv)[3]
Benzene	10	2.0
Carbon Tetrachloride	21	0.68
Chloroform	20	3.4
1,2-Dibromoethane	1	0.06
1,2-Dichloroethane	20	3.6
cis-1,2-Dichloroethene	180	18.6
1,1-Dichloroethene	100	53[4]
1,2-Dichloropropane	20	1.86
trans-1,2-Dichloroethene	400	36.8
Ethylbenzene	5,000	490
Tetrachloroethene	500	10.6
Toluene	2,000	212.0
1,1,1-Trichloroethane	3,600	368.0
Trichloroethene	200	3.0 $\mu g/m^3$ [5]
Vinyl Chloride	10	0.25
m,p-Xylene	4,000	142.8
o-Xylene	4,000	142.8
Methane	1.25% (near buildings) 5.0% (site perimeter)	1.25%

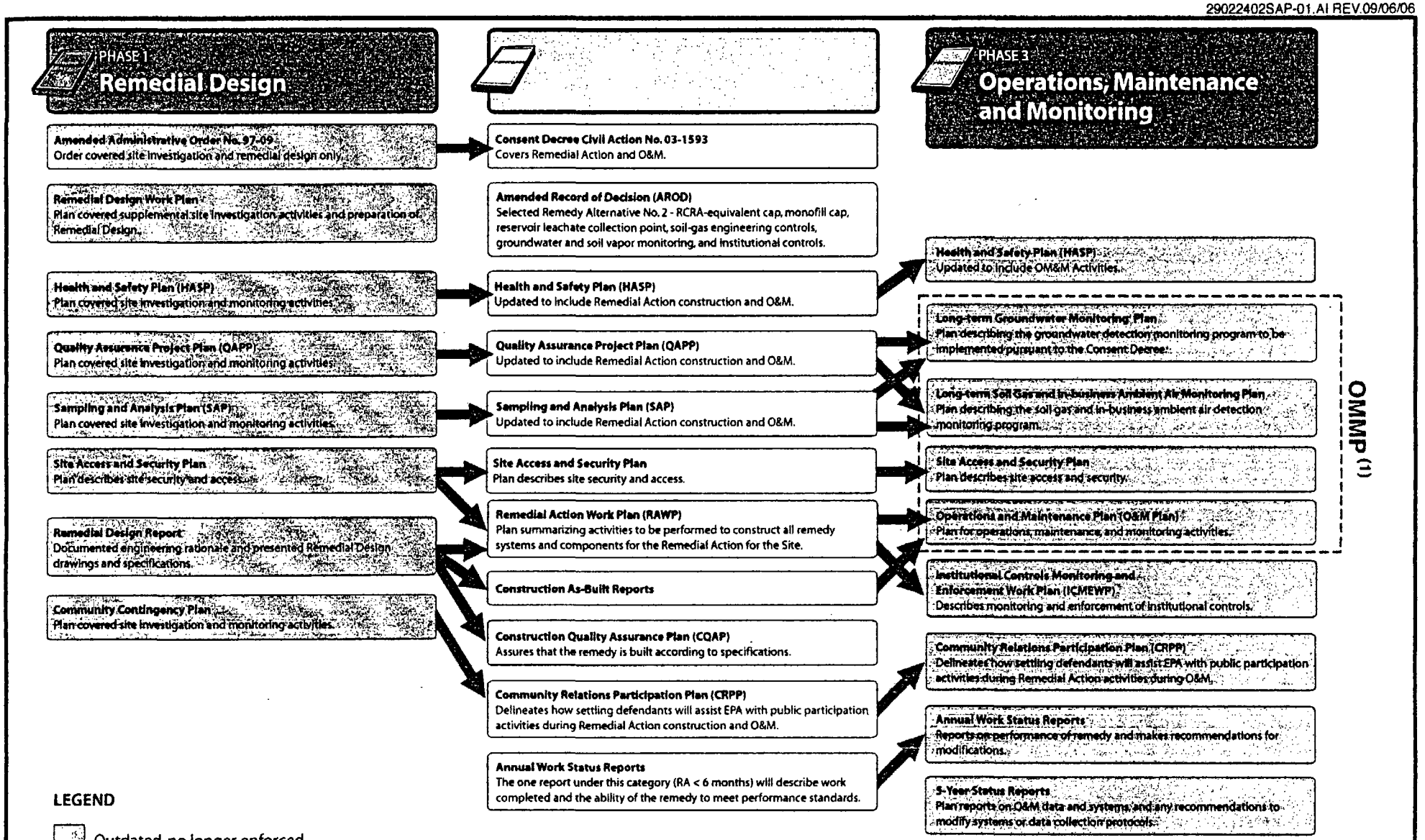
(1) EPA, Amended Record of Decision, Waste Disposal, Inc. June 2002.

(2) CDM Federal Programs Corporation, Subsurface Gas Contingency Plan, Waste Disposal, Inc. Superfund Site, July 1997.

(3) Indoor Air Threshold Levels are expressed in part per billion volume (ppbv), except for Trichloroethene (TCE) that is expressed in $\mu g/m^3$.

(4) Developed separately by EPA (i.e., subsequent to the *Subsurface Gas Contingency Plan* [see footnote (2)]).

(5) Pursuant to EPA policy requirements, the indoor air *interim* threshold level for Trichloroethene (TCE) has been revised to 3.0 $\mu g/m^3$ (0.56 ppbv at 25 °C and 1 atm) for the in-business ambient air monitoring program. Please note that this value may be subject to future revision.



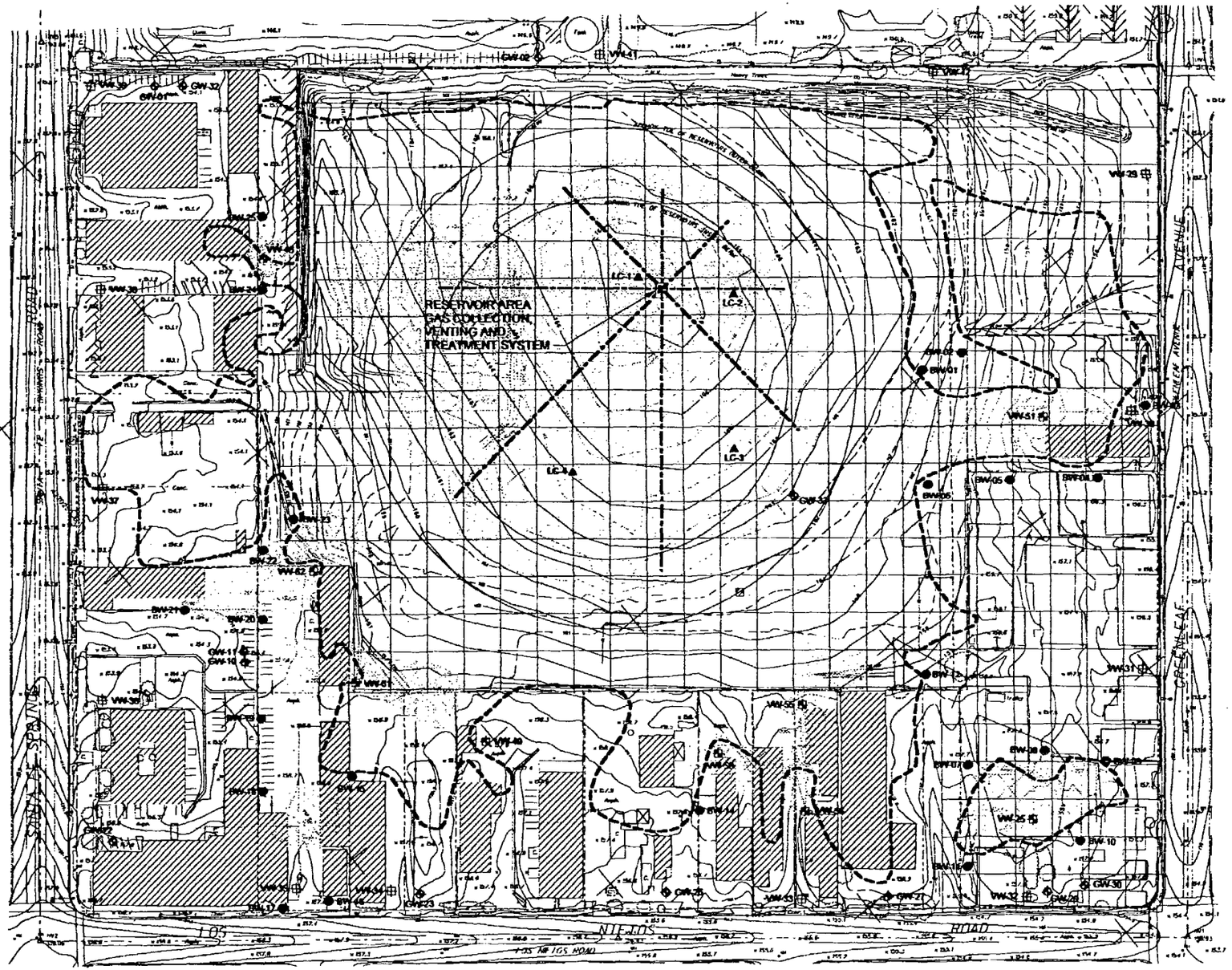
NOTE:
(1) The Project QAPP and SAP are included as appendices in the OMMP.

REPORTS AND DOCUMENTS SUMMARY

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 1.1



LEGEND

- VW-29 COMPLIANCE/PERIMETER VAPOR WELL
- VW-25 NON-COMPLIANCE VAPOR WELL
- BW-01 BIOVENT WELL
- GW-01 GROUND WATER WELL
- LC-1 LEACHATE COLLECTION WELL
- SOIL GAS NON-COMPLIANCE AREA (LATERAL EXTENT IS APPROXIMATE)
- EXISTING BUILDING SLAB
- LIMIT OF WASTE
- GAS COLLECTION PIPE

0 150 300 FEET
SCALE

REFERENCE: TOPOGRAPHY BY NUNEZ ENGINEERING (DECEMBER 1998)

LOCATION OF OPERATION AND MAINTENANCE SYSTEMS

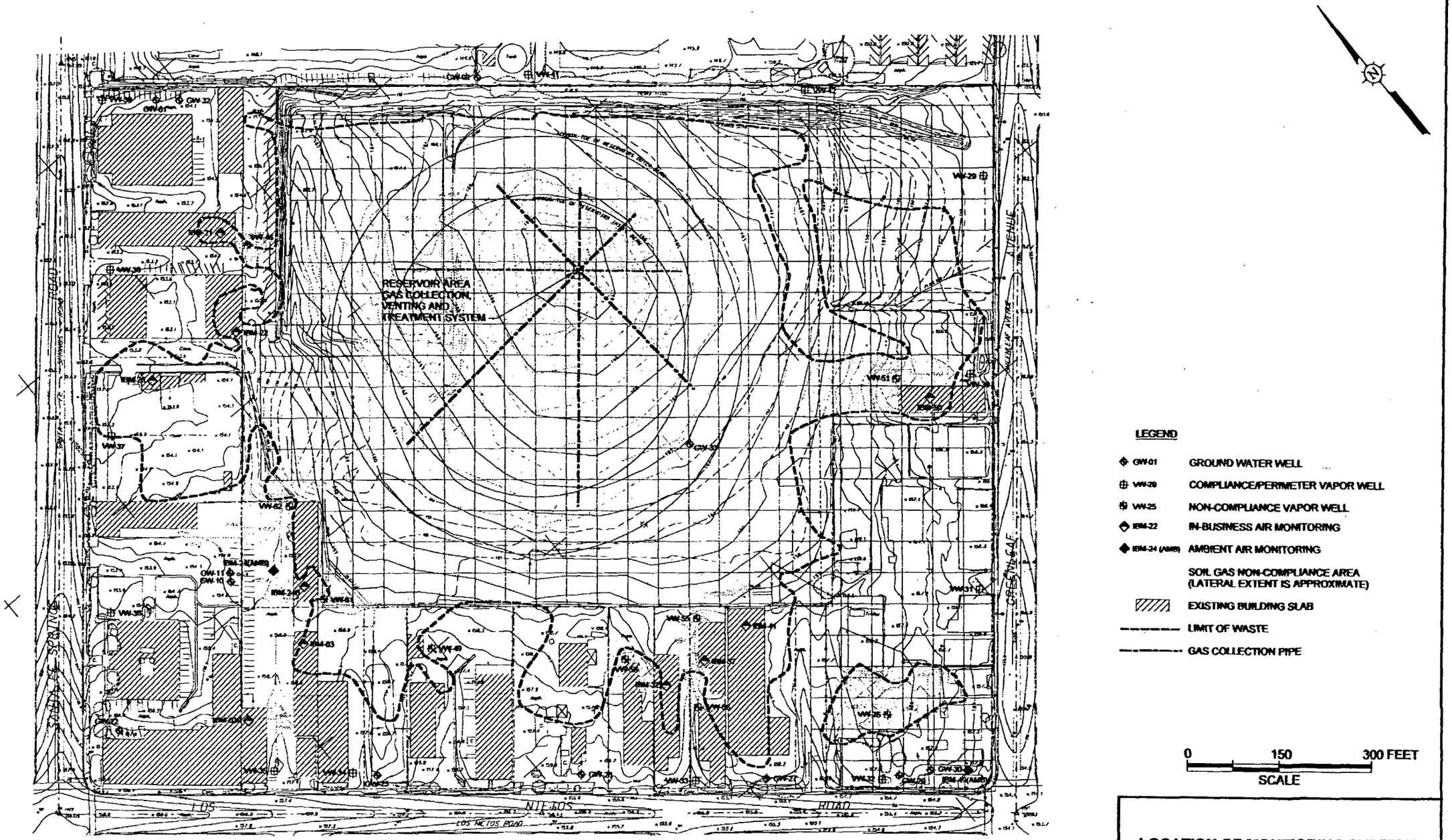
WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 2.1

290224025...1 REV.09/08/08

29022402_ .2 REV. 09/06/06



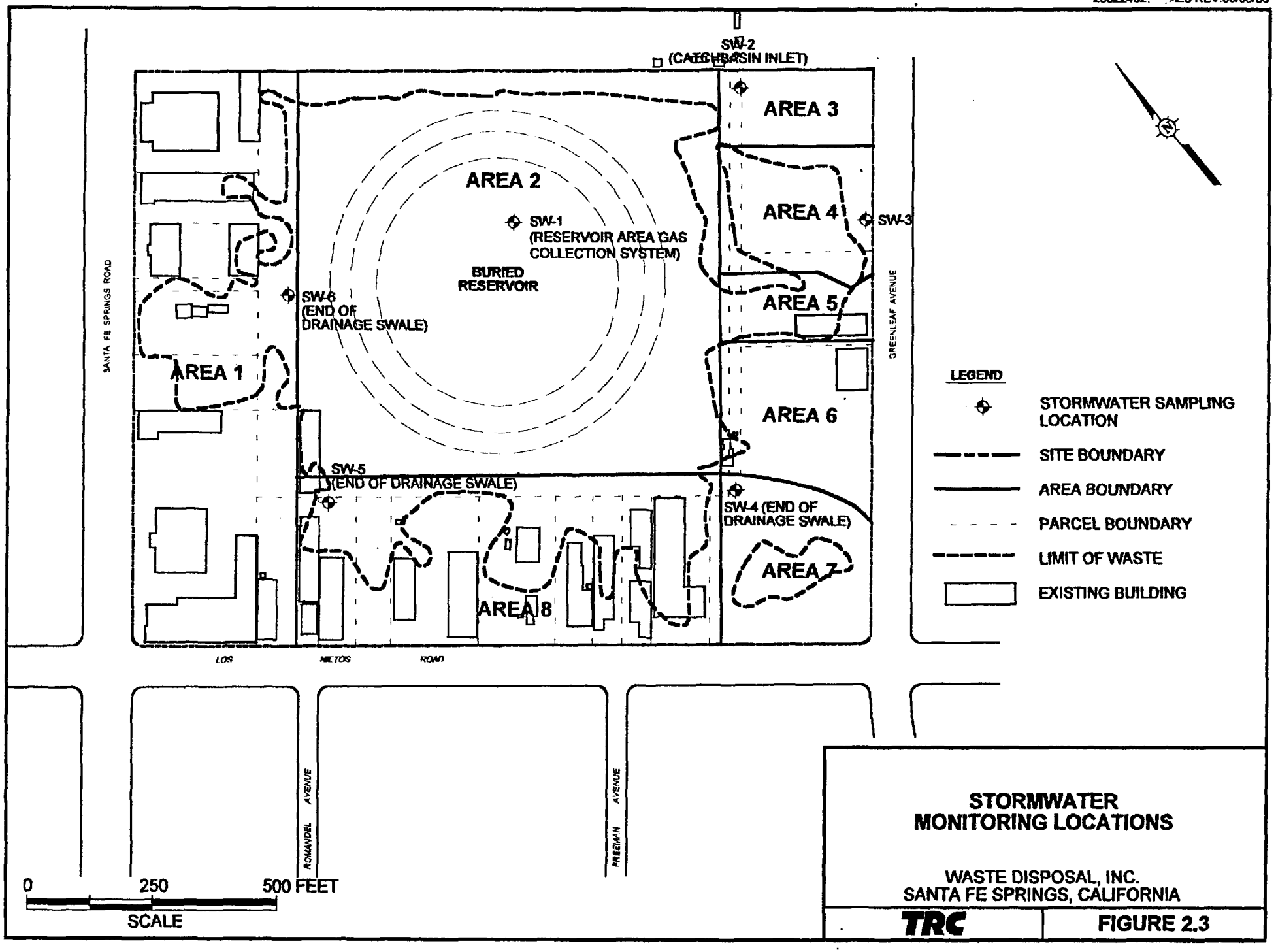
REFERENCE: TOPOGRAPHY BY NUNEZ ENGINEERING (DECEMBER 1998)

LOCATION OF MONITORING SYSTEMS

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 2.2

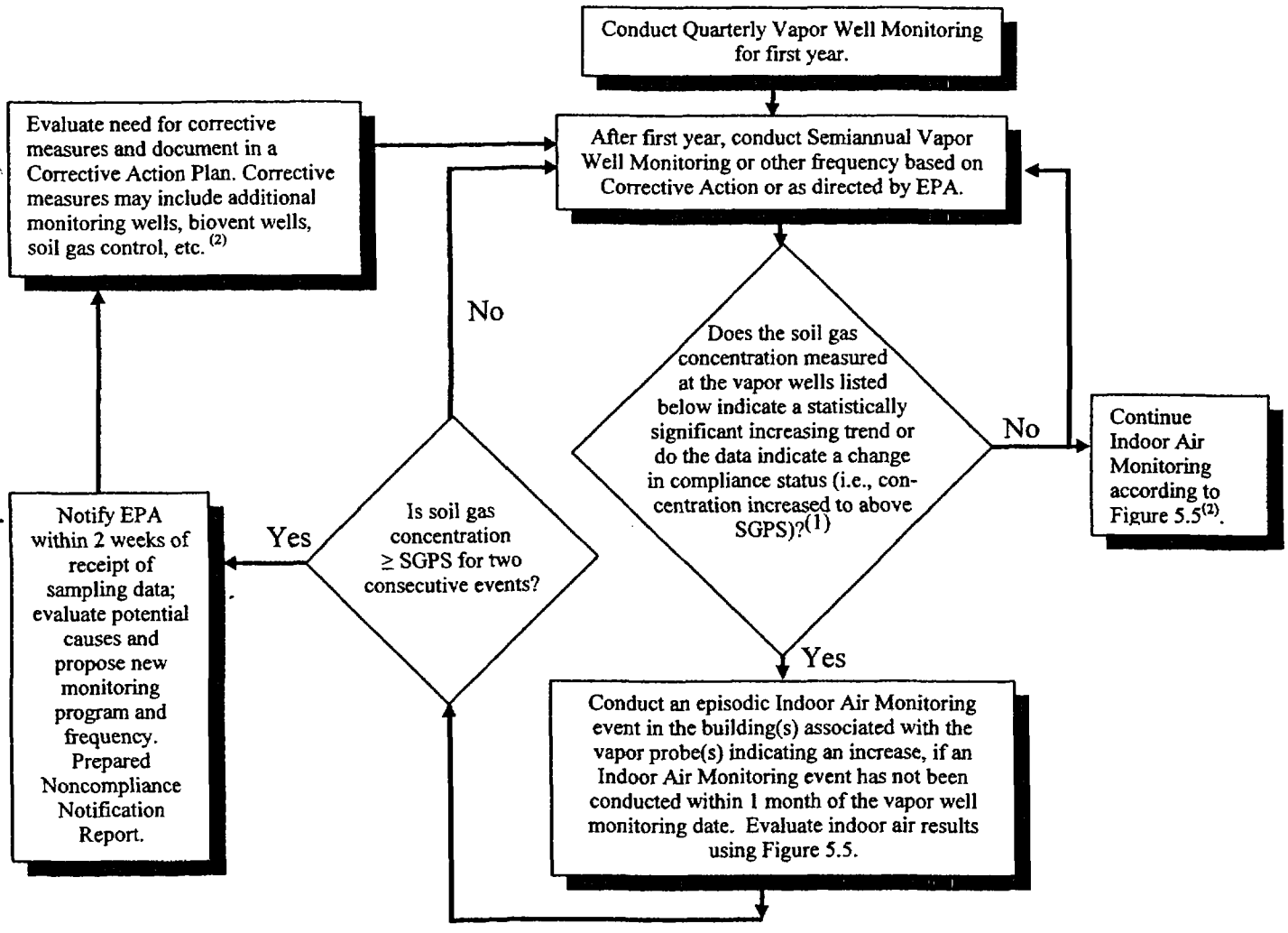


STORMWATER MONITORING LOCATIONS

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 2.3



PARCEL NO.	PARCEL ADDRESS	VAPOR WELL NUMBER
021	9620 Santa Fe Springs Road	VW-46
022	9630 Santa Fe Springs Road	VW-46
024	12637 Los Nietos Road	VW-61 and VW-62
003	12635 Los Nietos Road	VW-61
012	12639 Los Nietos Road	VW-61
044	12715-17 Los Nietos Road	VW-49
043	12723 Los Nietos Road	VW-58
042	12741 Los Nietos Road	VW-58
032	12747 Los Nietos Road	VW-55 and -56
037	12801 Los Nietos Road; 12803 Los Nietos Road	VW-55 and -56
041	12807B, 12807A, 12809, 12811, and 12813 Los Nietos Road	VW-55 and -56
050	9843 Greenleaf Avenue	VW-30 and -51

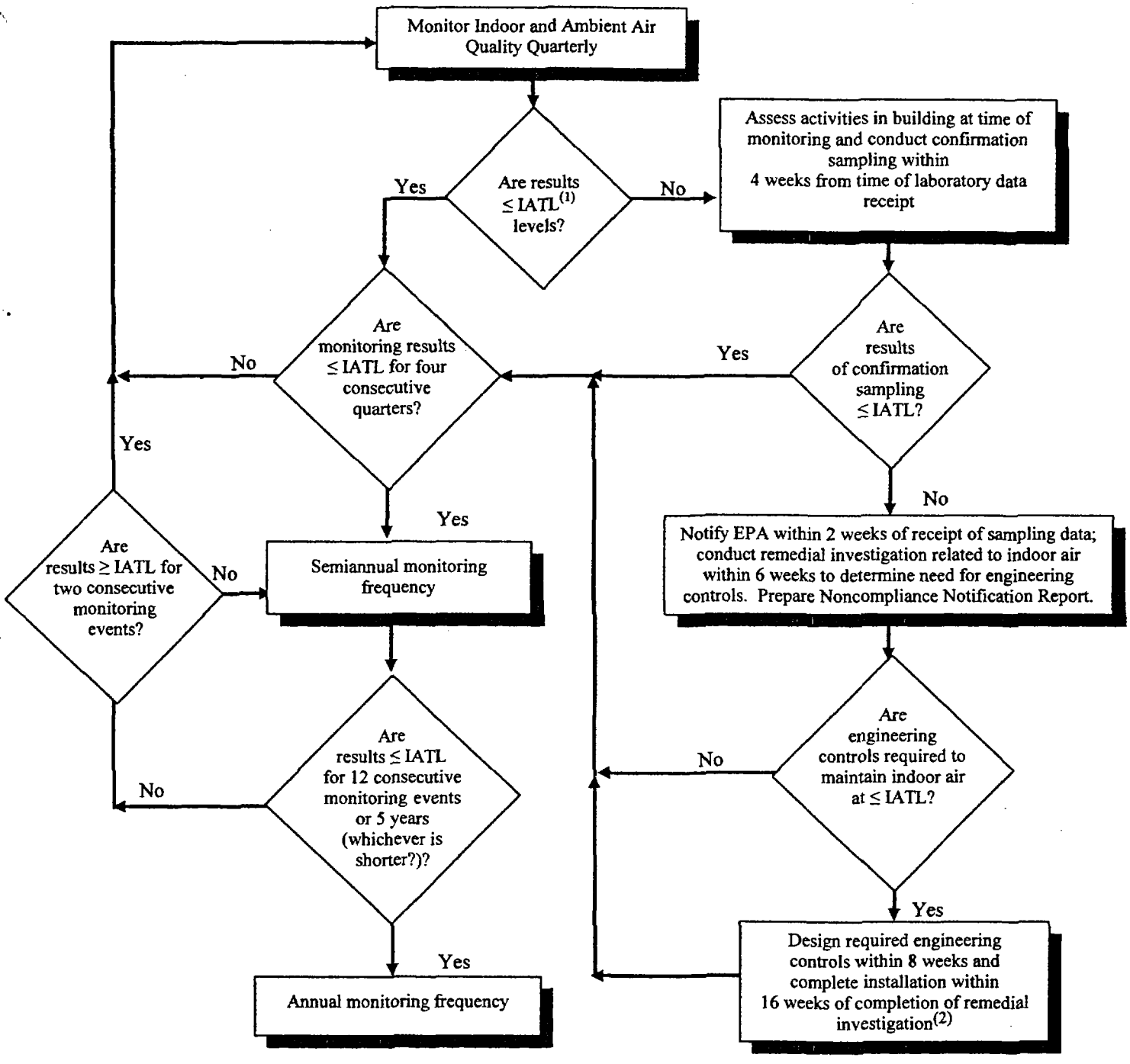
(1) SGPS = Soil Gas Performance Standard. See Table 5.2.

(2) Any changes to monitoring program and corrective actions due to soil gas concentrations ≥ SGPS for two consecutive events will be discussed with and approved by the EPA and DTSC prior to implementation

DECISION MATRIX CRITERIA FOR SOIL GAS MONITORING DATA

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC | FIGURE 3.1



(1) IATL = Indoor Air Threshold Levels (see Table 5.2).

(2) Required engineering controls may include but are not limited to soil vapor extraction system outside building, passive or active foundation vent system, or HVAC system improvements. Any corrective measures will be discussed with and approved by EPA and DTSC prior to implementation.

(3) Decision matrix may be revised to include additional actions based on the concentration of the exceedance, e.g., as discussed in the Subsurface Gas Contingency Plan, CDM Federal Programs Corporation, July 17, 1997.

C:\Documents and Settings\rumsey\Desktop\RM_-07-22-05_WDI_FinalSAP_Fig 3.3-DeMa.doc(7/22/05\rm)

DECISION MATRIX FOR IN-BUSINESS AND AMBIENT AIR MONITORING
(See Footnote 3)

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE 3.2

APPENDIX A.3

SITE ACCESS AND SECURITY PLAN

TRC
Customer-Focused Solutions

APPENDIX A.3
SITE ACCESS AND SECURITY PLAN

A.3.1 INTRODUCTION

1. The Site Access and Security Plan (Plan) was submitted and approved as Appendix B.4 of the Remedial Action Workplan (RAWP) (TRC, 2004a). The Plan is updated for submittal as Appendix A.3 of the Operations Maintenance Monitoring Plan (OMMP). This Plan is specified under Section 5.11 of the Statement of Work (SOW) for the Consent Decree (EPA, 2003).

2. The purpose of this Plan is to limit and control Site access during the implementation of OMMP and other SOW activities, inclusive of activities performed by EPA, other regulatory agencies and their Contractors. This Plan will be implemented by Site access control and Site security measures. These measures are discussed in the following sections.

A.3.2 SITE ACCESS

1. The Waste Disposal, Inc. Superfund Site is located in the City of Santa Fe Springs, Los Angeles County, California on an approximate 40-acre parcel of land (Figure A.3.1). The Site is bordered on the northwest by Santa Fe Springs Road, on the northeast by a Distribution Center and St. Paul High School, on the southwest by Los Nietos Road, and on the southeast by Greenleaf Avenue. Areas of the Site along Los Nietos Road and Santa Fe Springs Road are occupied by industrial complexes, while the Site property along Greenleaf Avenue, which is the closest property boundary to residential areas (approximately 50 feet), has one remaining structure (Area 5) and a few remaining foundations from previous structures (Areas 6 and 7).

2. Currently the portions of the Site without operating businesses are enclosed by a chain-link fence with chain-locked gates at different locations. At intervals around the perimeter of the Site are warning signs. Figure A.3.1 shows the security fence and access gates after Remedial Action construction, along with the locations of signs. Figure A.3.2 shows the sign in English and Figure A.3.3 shows the sign in Spanish. An inspection will be performed quarterly by the OM&M Contractor to verify the fences and gates are intact, signs are in place, and replace any missing signs.

3. Access will be controlled by having only the access gate on Greenleaf Avenue routinely being opened during OM&M activities. This gate is located near the Site office trailer and other onsite facilities so that it can be watched by site personnel. Other gates may be opened periodically to facilitate OM&M specific work activities, and personnel involved with the specific activity will watch for unauthorized entrance. The gates will be kept locked during nonentrance OM&M operating hours (hours are expected to be 7 a.m. to 6 p.m.). Keys to the locks will be controlled by the Site Superintendent for the Supervising Contractor.

4. In the areas of the operating businesses, access is controlled by the tenant or owner. Measures used include locking gates, fences and guard dogs. During OM&M activities in these areas, access to areas where work is being performed will be controlled using the procedures in the Health and Safety Program, primarily to mitigate physical hazards. In addition, security during OM&M in these areas will be coordinated with the tenants and owners as part of planning. Measures to be implemented include keeping gates locked during nonoperational hours, temporary fencing when a fence must be removed, keeping all doors and facilities locked if work is performed after business hours and use of a guard or security service as necessary.

A.3.3 SITE SECURITY

A.3.3.1 RESPONSIBILITIES

1. During OM&M activities, the Supervising Contractor will be responsible for Site Security. The duties will include maintaining fences, providing access control, assuring the gates are closed and locked during nonworking hours, and periodic inspection for vandalism and trespass.

2. The Site Security duties will also include managing a sign-in and sign-out log of authorized Site visitors, communication, coordination, and integration with other entities (in particular the onsite businesses and emergency services) regarding security, emergencies, and security during storm events.

A.3.3.2 SECURITY SERVICES

1. If necessary, the Supervising Contractor may contract with a security service to provide additional Site security. This may include periodic drive-by surveillance or a guard. If a guard is used, the guard shall be appropriately trained, including 40-hour occupational Safety and Health Administration (OSHA) training per 29 CFR Part 1910.120.

2. If theft or vandalism occurs, or if required due to unauthorized access or trespass, the police would be contacted and a report would be filed. The phone number for the police is presented in Table A.3.1. The WDIG Project Coordinator and EPA would also be notified in the event of theft, vandalism or trespass.

A.3.3.3 SECURITY DURING STORM EVENTS

1. A security issue during storm events is flooding and stormwater control. Regrading was performed at the Site in 2004-2005 as part of the Remedial Action construction, which mitigates threats from flooding. The final grades are similar to earlier grading and designed to prevent flooding. However, during OM&M, coordination with emergency services and local businesses will be performed to assure that access can be provided for emergencies to further mitigate threats of damage from floods. Coordination would principally include exchange of contact information to facilitate rapid communication.

2. In addition, stormwater controls are included as part of the Remedial Design, and implemented as part of the Remedial Action construction. These controls were designed and implemented to prevent erosion and runoff that could clog stormdrains or cause damage to neighboring businesses.

TABLE A.3.1

EMERGENCY PHONE NUMBERS
WASTE DISPOSAL, INC. SUPERFUND SITE

Fire Department	911 or (562) 868-1711
Police/Sheriff	911 or (562) 409-1850
Paramedics	911 or (562) 868-1711
Hospital: Presbyterian Intercommunity Hospital 1201 East Washington Boulevard, Whittier	(562) 698-0811
EPA Remedial Project Manager: Russell Mechem	(415) 972-3192
EPA Community Involvement Coordinator: Hector Aguirre	(415) 972-3238
USACE Field Representative: Richard Lane	(626) 401-4046
WDIG Project Coordinator: Roberto Puga, Project Navigator, Ltd.	(714) 388-1800
Recon Project Superintendent: Matt Jackson	(951) 272-2877
TRC Project Manager: Ronald V. Giraudi	(949) 727-9336

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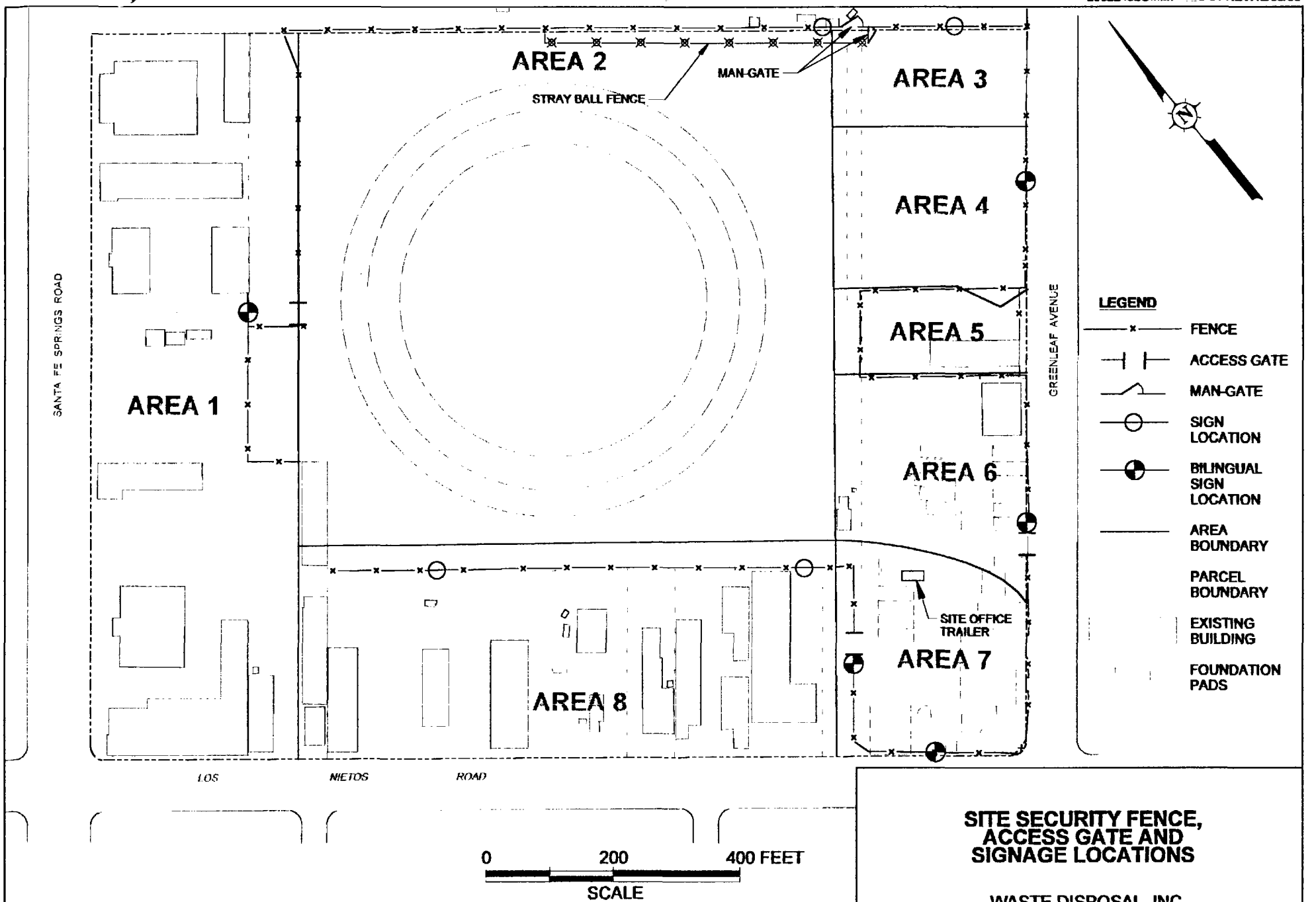

REFERENCE: NÚNEZ ENGINEERING.

SITE SECURITY FENCE, ACCESS GATE AND SIGNAGE LOCATIONS

WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CALIFORNIA

TRC

FIGURE A.3.1

48"

36"

WARNING (RED)
NO ENTRY PERMITTED (RED)
DUMPING STRICTLY PROHIBITED (RED)

Authorized Personnel Only (RED)

Waste Disposal, Inc.
Superfund Site (BLUE)

EPA (GREEN)

To Report Suspicious and/or Criminal Activities, Please Contact:
The City of Santa Fe Springs Police Services Center (BLACK)
(562) 409-1850

For Further Information on this Site, Please Contact:
EPA Community Involvement Coordinator at (BLACK)
(800) 231-3075

SITE SIGN

WASTE DISPOSAL, INC.
SUPERFUND SITE

TRC | FIGURE A.3.2

29022402OMMP705-14 REV.06/24/05

48"

36"

AVISO (RED)

PROHIBIDO ENTRAR (RED)

ESTRICTAMENTE PROHIBIDO (RED)

DESCARGAR DESECHOS

Solamente Personas Autorizadas (RED)

Waste Disposal, Inc.
Sitio "Superfund" (BLUE)

EPA (GREEN)

Para Reportar Actividades Sospechosas y/o Criminales, Por Favor Llame:
Centro de Servicios de Policía, Ciudad de Santa Fe Springs (BLACK)
(562) 409-1850

Para Mas Información Sobre Este Sitio Por Favor Llame:
Coordinador De Envolvimiento Comunal Del EPA (BLACK)
(800) 231-3075

SITE SIGN
(SPANISH)

WASTE DISPOSAL, INC.
SUPERFUND SITE

TRC | FIGURE A.3.3

APPENDIX B

OPERATION AND MAINTENANCE INSPECTION AND LONG-TERM MONITORING DATA SHEETS

B.0 OMMP INSPECTION AND MONITORING DATA SHEETS
B.1 RCRA SUBTITLE C-EQUIVALENT COVER O&M INSPECTION SHEET
B.2 RCRA SUBTITLE D-EQUIVALENT COVER O&M INSPECTION SHEET
B.3 RESERVOIR GAS COLLECTION SYSTEM O&M INSPECTION SHEET
B.4 PARCEL INSPECTION SHEET
B.5 SENTINEL BIOVENT SHEET O&M INSPECTION SHEET
B.6 GROUND WATER MONITORING WELL O&M INSPECTION SHEET
B.7 SOIL VAPOR MONITORING WELL O&M INSPECTION SHEET
B.8 STORM DRAINAGE SYSTEM O&M INSPECTION SHEET
B.9 LEACHATE MONITORING/CONTROL SYSTEM O&M INSPECTION SHEET
B.10 SITE SECURITY INSPECTION SHEET
B.11 LANDSCAPE MAINTENANCE INSPECTION SHEET
B.12 LEACHATE COLLECTION MONITORING DATA SHEET
B.13 GROUND WATER MONITORING DATA SHEET
B.14 SOIL VAPOR WELL MONITORING DATA SHEET
B.15 RESERVOIR GAS COLLECTION AND TREATMENT SYSTEM MONITORING DATA SHEET
B.16 IN-BUSINESS AND AIR AMBIENT AIR MONITORING DATA SHEET
B.17 STORMWATER MONITORING DATA SHEET
B.18 PROBLEM IDENTIFICATION AND CORRECTIVE ACTION REPORT
B.19 MAINTENANCE AND REPAIR ACTIVITY REPORT
B.20 LEACHATE WELL SOUNDING

APPENDIX B.0

OMMP INSPECTION AND MONITORING DATA SHEETS

APPENDIX B.0

OMMP INSPECTION AND MONITORING DATA SHEETS
WASTE DISPOSAL, INC. SUPERFUND SITE

O&M INSPECTION DATA SHEETS			
Item	Frequency	Form	OMMP Reference
RCRA Subtitle C-Equivalent Cover	Annually	B.1	Section 4.1
RCRA Subtitle D-Equivalent GCL Cover	Annually	B.2	Section 4.1
Reservoir Gas Collection System	Active – Monthly Passive – Semiannually	B.3	Section 4.2.1
Parcel Inspection	Annually	B.4	Section 4.2.2
Sentinel Biovent System	Semiannually	B.5	Section 4.2.3
Ground Water Monitoring Wells	Semiannually	B.6	Section 4.3
Soil Vapor Wells	Quarterly	B.7	Section 4.3
Stormwater Drainage System	Twice a year and following significant storm events	B.8	Section 4.4
Leachate Monitoring/Control System	Monthly (first year) then Quarterly	B.9	Section 4.5
Site Security	Quarterly	B.10	Section 4.6
Landscape Maintenance	Bi-Monthly - Mowing; Annually – Pruning/Weed Control	B.11	Section 4.7

APPENDIX B.0

OMMP INSPECTION AND MONITORING DATA SHEETS
WASTE DISPOSAL, INC. SUPERFUND SITE
(Continued)

MONITORING DATA SHEETS			
Item	Frequency	Form	OMMP Reference
Leachate Collection Monitoring/Control System	Liquid Level 6"-12": Twice a Week Liquid Level: 3"-6": Bi-Weekly Liquid Level <3": Monthly (first year) then Quarterly	B.12	Section 4.5
Ground Water Wells	Semiannually	B.13	Section 5.1
Soil Vapor Wells	Quarterly	B.14	Section 5.2
Reservoir Gas Collection and Treatment System	Active – Monthly Passive – Semiannually	B.15	Section 5.2
In-Business Air and Ambient Air Monitoring	Quarterly	B.16	Section 5.2
Stormwater Monitoring	First two significant storm events after completion of remedial construction	B.17	Section 5.3

PROBLEM IDENTIFICATION, CORRECTIVE ACTION, AND REPORTING			
Item	Frequency	Form	OMMP Reference
Problem Identification and Corrective Action Report	Per Event	B.18	Chapter 4
Maintenance and Repair Activity Report	Per Event	B.19	Chapter 4
Reporting	Semiannually	N/A	Sections 4.8 and 5.6

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APPENDIX B.1

RCRA SUBTITLE C-EQUIVALENT COVER
O&M INSPECTION SHEET

TRC
Customer-Focused Solutions

APPENDIX B.1

RCRA SUBTITLE C-EQUIVALENT COVER
O&M INSPECTION SHEET
WASTE DISPOSAL, INC. SUPERFUND SITE

INSPECTORS NAME	INSPECTORS SIGNATURE	INSPECTION TIME	INSPECTION DATE

ITEM OF POTENTIAL CONCERN	COMMENTS	CHECK (√) WHEN INSPECTED
Erosion		
Settlement		
Cracks		

APPENDIX B.1

RCRA SUBTITLE C-EQUIVALENT COVER
O&M INSPECTION SHEET
WASTE DISPOSAL, INC. SUPERFUND SITE
(Continued)

ITEM OF POTENTIAL CONCERN	COMMENTS	CHECK (√) WHEN INSPECTED
Vegetation Growth		
Weed Growth		
Animal burrows		

APPENDIX B.1

RCRA SUBTITLE C-EQUIVALENT COVER
O&M INSPECTION SHEET
WASTE DISPOSAL, INC. SUPERFUND SITE
(Continued)

ITEM OF POTENTIAL CONCERN	COMMENTS	CHECK (√) WHEN INSPECTED
Vectors (Mosquitoes, rats, mice)		
Access Road Condition		
Other:		

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APPENDIX B.2

RCRA SUBTITLE D-EQUIVALENT COVER O&M INSPECTION SHEET

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APPENDIX B.2

RCRA SUBTITLE D-EQUIVALENT COVER
O&M INSPECTION SHEET
WASTE DISPOSAL, INC. SUPERFUND SITE

INSPECTORS NAME	INSPECTORS SIGNATURE	INSPECTION TIME	INSPECTION DATE

ITEM OF POTENTIAL CONCERN	COMMENTS	CHECK (√) WHEN INSPECTED
Erosion		
Settlement		
Cracks		
Vegetation Growth		
Weed Growth		

APPENDIX B.2

RCRA SUBTITLE D-EQUIVALENT COVER
O&M INSPECTION SHEET
WASTE DISPOSAL, INC. SUPERFUND SITE
(Continued)

ITEM OF POTENTIAL CONCERN	COMMENTS	CHECK (√) WHEN INSPECTED
Animal burrows		
Vectors (Mosquitoes, rats, mice)		
Other:		
Other:		
Other:		

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APPENDIX B.3

RESERVOIR GAS COLLECTION SYSTEM
O&M INSPECTION SHEET

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APPENDIX B.3

RESERVOIR GAS COLLECTION SYSTEM
O&M INSPECTION SHEET
WASTE DISPOSAL, INC. SUPERFUND SITE

INSPECTORS NAME	INSPECTORS SIGNATURE	INSPECTION TIME	INSPECTION DATE

SYSTEM STATUS UPON ARRIVAL	On:	Off:	SYSTEM STATUS UPON DEPARTURE	On:	Off:

ITEMS TO INSPECT	COMMENTS	CHECK (√) WHEN INSPECTED
Gate		
Lock		
Fence		
Record Electrical Meter Reading		
Electrical Controls		

APPENDIX B.3

RESERVOIR GAS COLLECTION SYSTEM
O&M INSPECTION SHEET
WASTE DISPOSAL, INC. SUPERFUND SITE
(Continued)

ITEMS TO INSPECT	COMMENTS	CHECK (√) WHEN INSPECTED
Auto-Dialer		
Vent Stack		
Knockout Pot – Check level and drain as necessary		
Check integrity of all hoses, fittings, piping		
Measure Blower Running Amperage		
Check Carbon Canisters		

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APPENDIX B.4

PARCEL INSPECTION SHEET

APPENDIX B.4

PARCEL INSPECTION SHEET
WASTE DISPOSAL, INC. SUPERFUND SITE

INSPECTORS NAME	INSPECTORS SIGNATURE	INSPECTION TIME	INSPECTION DATE

PARCEL NUMBER	OWNER	ITEM TO BE INSPECTED	CRACKS OBSERVED	DAMAGE/ PENETRATIONS OBSERVED	EROSION OBSERVED	PID SURVEY READING	COMMENTS	CHECK (√) WHEN INSPECTED
		RCRA Subtitle D-Equivalent Cover						

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APPENDIX B.5

SENTINEL BIOVENT SHEET
O&M INSPECTION SHEET

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APPENDIX B.5

SENTINEL BIOVENT WELL
O&M INSPECTION SHEET
WASTE DISPOSAL, INC. SUPERFUND SITE

INSPECTORS NAME	INSPECTORS SIGNATURE	INSPECTION TIME	INSPECTION DATE

WELL ID	WELLHEAD (Vented steel enclosure and cover, concrete, Baroball valve)	WELL LOCK	WELL CASING	EROSION AROUND WELL	COMMENTS	CHECK (√) WHEN INSPECTED
BW-01						
BW-02						
BW-03						
BW-04						
BW-05						
BW-06						
BW-07						
BW-08						
BW-09						
BW-10						
BW-11						
BW-12						
BW-14						
BW-15						
BW-16						
BW-17						
BW-18						
BW-19						
BW-20						
BW-21						
BW-22						
BW-23						
BW-24						
BW-25						

APPENDIX B.6

GROUND WATER MONITORING WELL O&M INSPECTION SHEET

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APPENDIX B.6

GROUND WATER MONITORING WELL
O&M INSPECTION SHEET
WASTE DISPOSAL, INC. SUPERFUND SITE

INSPECTORS NAME	INSPECTORS SIGNATURE	INSPECTION TIME	INSPECTION DATE

WELL ID	WELLHEAD (Well box cover and concrete)	WELL LOCK	WELL CASING	EROSION AROUND WELL	COMMENTS	CHECK (√) WHEN INSPECTED
GW-01						
GW-02						
GW-10						
GW-11						
GW-22						
GW-23						
GW-26						
GW-27						
GW-29						
GW-30						
GW-32						
GW-33						

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APPENDIX B.7

SOIL VAPOR MONITORING WELL
O&M INSPECTION SHEET

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APPENDIX B.7

SOIL VAPOR MONITORING WELL
O&M INSPECTION SHEET
WASTE DISPOSAL, INC. SUPERFUND SITE

INSPECTORS NAME	INSPECTORS SIGNATURE	INSPECTION TIME	INSPECTION DATE

WELL ID	WELLHEAD (Well box, cover, concrete)	WELL LOCK	WELL CASING	EROSION AROUND WELL	COMMENTS	CHECK (√) WHEN INSPECTED
VW-29						
VW-31						
VW-32						
VW-33						
VW-34						
VW-36						
VW-37						
VW-38						
VW-39						
VW-41						
VW-42						
VW-25						
VW-30						
VW-35						
VW-46						
VW-49						
VW-51						
VW-55						
VW-56						
VW-58						
VW-61						
VW-62						

APPENDIX B.8

STORM DRAINAGE SYSTEM
O&M INSPECTION SHEET

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APPENDIX B.8

STORM DRAINAGE SYSTEM[1]
O&M INSPECTION SHEET
WASTE DISPOSAL, INC. SUPERFUND SITE

INSPECTORS NAME	INSPECTORS SIGNATURE	INSPECTION TIME	INSPECTION DATE

ITEM OF POTENTIAL CONCERN	COMMENTS	CHECK (√) WHEN INSPECTED
Catch Basin (near east corner)		
Excessive Sediment Build-up		
Excessive Vegetation Growth		
Drain Pipe from French Drain (Blockage, liquid flow)		
Cleanouts for Drainage Trench Collection Pipe (Ring and cover condition, blockage)		
Erosion		

(1) Inspector shall check all drainage courses and outfalls and report observations on this form.

APPENDIX B.8

STORM DRAINAGE SYSTEM[1]
O&M INSPECTION SHEET
WASTE DISPOSAL, INC. SUPERFUND SITE
(Continued)

ITEM OF POTENTIAL CONCERN	COMMENTS	CHECK (√) WHEN INSPECTED
Settlement		
Cracks		
Other:		
Other:		

(1) Inspector shall check all drainage courses and outfalls and report observations on this form.

APPENDIX B.9

LEACHATE MONITORING/CONTROL SYSTEM
O&M INSPECTION SHEET

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APPENDIX B.9

LEACHATE MONITORING/CONTROL SYSTEM
O&M INSPECTION SHEET
WASTE DISPOSAL, INC. SUPERFUND SITE

INSPECTORS NAME	INSPECTORS SIGNATURE	INSPECTION TIME	INSPECTION DATE

ITEM OF POTENTIAL CONCERN	CONDITIONS OBSERVED				COMMENTS	CHECK (√) BELOW WHEN COMPLETED
	WELL ID LC-1	WELL ID LC-2	WELL ID LC-3	WELL ID LC-4		
Wellhead (well box, cover, gasket, concrete)						
Well Casing and Cap/Plug						
Liquid Present in Well Box						
Other:						
Other:						
Other:						

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APPENDIX B.10

SITE SECURITY INSPECTION SHEET

APPENDIX B.10

SITE SECURITY INSPECTION SHEET
WASTE DISPOSAL, INC. SUPERFUND SITE

INSPECTORS NAME	INSPECTORS SIGNATURE	INSPECTION TIME	INSPECTION DATE

ITEM OF POTENTIAL CONCERN	COMMENTS	CHECK (√) WHEN INSPECTED
Security Fence		
Erosion or Undermining of Security Fence		
Access Gates		
Locks of Access Gates		
Warning Signs		
Stray-Ball Fence Condition (fabric, steel cables/hardware, etc.)		
Other:		

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APPENDIX B.11

LANDSCAPE MAINTENANCE INSPECTION SHEET

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APPENDIX B.11

LANDSCAPE MAINTENANCE INSPECTION SHEET
WASTE DISPOSAL, INC. SUPERFUND SITE

INSPECTORS NAME	INSPECTORS SIGNATURE	INSPECTION TIME	INSPECTION DATE

ITEM OF POTENTIAL CONCERN	COMMENTS	CHECK (√) WHEN INSPECTED
Condition of shrubs and planted vegetation		
Irrigation system operation and components		
Weed growth		
Erosion around planted vegetation		
Vectors (Mosquitoes, rats, mice)		
Site Housekeeping		
Other:		

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APPENDIX B.12

LEACHATE COLLECTION MONITORING DATA SHEET

APPENDIX B.12

LEACHATE COLLECTION
MONITORING DATA SHEET
WASTE DISPOSAL, INC. SUPERFUND SITE

DATE: _____

TECHNICIAN NAME: _____ TECHNICIAN SIGNATURE _____

WELL ID	BOTTOM OF WELL AFTER CONSTRUCT-ED [TOTAL DEPTH] (ft)	MEASURED BOTTOM OF WELL [TOTAL DEPTH] (ft)	GAUGING TIME		DEPTH TO LIQUID (ft)						HEIGHT OF LIQUID COLUMN (ft)		VOLUME OF LIQUID REMOVED (gallons)	COMMENTS
			Start	Finish	Start			Finish			Start	Finish		
					1st Rdg.	2nd Rdg.	3rd Rdg.	1st Rdg.	2nd Rdg.	3rd Rdg.				
LC-1	22.25													
LC-2	21.90													
LC-3	22.20													
LC-4	21.90													

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APPENDIX B.13

GROUND WATER MONITORING DATA SHEET

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APPENDIX B.13

GROUND WATER MONITORING DATA SHEET
WASTE DISPOSAL, INC. SUPERFUND SITE

DATE: _____ INSTRUMENT SERIAL NO.: _____

TECHNICIAN: _____ INSTRUMENT MODEL NO.: _____

WELL ID	START TIME	FINISH TIME	TOTAL WELL DEPTH (ft)	DEPTH TO WATER (ft)		VOLUME PURGED (gallon)	TEMP. (°F)	pH	SPECIFIC CONDUCTIVITY (µS/cm)
				Before Sample	After Sample				
BACKGROUND WELLS									
GW-01									
GW-02									
GW-11									
GW-32									
POINT OF COMPLIANCE WELLS									
GW-22									
GW-23									
GW-26									
NEAR-SOURCE DETECTION WELLS									
GW-10									
GW-33									
VERIFICATION WELLS									
GW-27									
GW-29									
GW-30									

NOTE:

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APPENDIX B.14

SOIL VAPOR WELL MONITORING DATA SHEET

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APPENDIX B.14

SOIL VAPOR WELL MONITORING DATA SHEET
WASTE DISPOSAL, INC. SUPERFUND SITE

DATE:	TECHNICIAN:	LFG INSTRUMENT – MODEL NO.:_____	PID/FID INSTRUMENT – MODEL NO.:_____
		LFG INSTRUMENT – SERIAL NO.:_____	PID/FID INSTRUMENT – SERIAL NO.:_____

AMBIENT AIR TEMPERATURE @ START: _____°F AMBIENT BAROMETRIC PRESSURE @ START: _____in Hg

AMBIENT AIR TEMPERATURE @ END: _____°F AMBIENT BAROMETRIC PRESSURE @ END: _____ in Hg

WEATHER:

WELL ID	SAMPLE TIME	VAPOR WELL DEPTH (feet)	WELL VOLUME (cu.ft.)	GAS TEMP (°F)	WELL HEAD STATIC PRESSURE PRE-PURGE (in. H_2O)	PRE-PURGE WELL GAS READINGS (1)				PURGE TIME (min) @_____ LPM	PURGED WELL GAS READINGS (1)				SUMMA CAN DATA (2)		WELL HEAD STATIC PRESSURE POST-PURGE (in. H_2O)
						CH_4 (%)	CO_2 (%)	O_2 (%)	VOCs (ppmv)		CH_4 (%)	CO_2 (%)	O_2 (%)	VOCs (ppmv)	Initial Pressure (in. Hg)	Final Pressure (in. Hg)	
COMPLIANCE VAPOR MONITORING (PERIMETER) WELLS																	
VW-29-S																	
VW-29-I																	
VW-29-D																	
VW-31-S																	
VW-31-D																	
VW-32-S																	
VW-32-I																	
VW-32-D																	
VW-33-S																	
VW-33-D																	
VW-34-S																	
VW-34-I																	
VW-34-D																	
VW-36-S																	
VW-36-D																	
VW-37-S																	
VW-37-D																	
VW-38-S																	
VW-38-D																	
VW-39-S																	
VW-39-D																	
VW-41-S																	
VW-41-D																	
VW-42-S																	
VW-42-D																	

(1) CH_4, CO_2, and O_2 to be sampled using LFG Instrument (Landtec GEM 2000 or equivalent). TGNMO (VOCs) to be field analyzed by the PID/FID (Foxboro TVA 1000 or equivalent).

(2) Summa samples to be analyzed by EPA Method TO-15 (VOCs) and SCAQMD Method 25.1 (TGNMO, CH_4, CO_2 and O_2)

APPENDIX B.14

SOIL VAPOR WELL MONITORING DATA SHEET
WASTE DISPOSAL, INC. SUPERFUND SITE

WELL ID	SAMPLE TIME	VAPOR WELL DEPTH (feet)	WELL VOLUME (cu.ft.)	GAS TEMP (°F)	WELL HEAD STATIC PRESSURE PRE-PURGE (in. H_2O)	PRE-PURGE WELL GAS READINGS (1)				PURGE TIME (min) @____ LPM	PURGED WELL GAS READINGS (1)				SUMMA CAN DATA (2)		WELL HEAD STATIC PRESSURE POST-PURGE (in. H_2O)
						CH_4 (%)	CO_2 (%)	O_2 (%)	VOCs (ppmv)		CH_4 (%)	CO_2 (%)	O_2 (%)	VOCs (ppmv)	Initial Pressure (in. Hg)	Final Pressure (in. Hg)	
NON-COMPLIANCE VAPOR MONITORING WELLS																	
VW-25																	
VW-30-S																	
VW-30-I																	
VW-30-D																	
VW-35-S																	
VW-35-D																	
VW-46-S																	
VW-46-I																	
VW-46-D																	
VW-49-S																	
VW-49-I																	
VW-49-D																	
VW-51-S																	
VW-51-I																	
VW-51-D																	
VW-55-S																	
VW-55-I																	
VW-55-D																	
VW-56-S																	
VW-56-I																	
VW-56-D																	
VW-58-S																	
VW-58-I																	
VW-58-D																	
VW-61-S																	
VW-61-I																	
VW-61-D																	
VW-62-S																	
VW-62-I																	
VW-62-D																	
NOTES:																	

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(1) CH_4, CO_2, and O_2 to be sampled using LFG Instrument (Landtec GEM 2000 or equivalent). TGNMO (VOCs) to be field analyzed by the PID/FID (Foxboro TVA 1000 or equivalent).

(2) Summa samples to be analyzed by EPA Method TO-15 (VOCs) and SCAQMD Method 25.1 (TGNMO, CH_4, CO_2 and O_2)

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APPENDIX B.15

RESERVOIR GAS COLLECTION AND TREATMENT SYSTEM
MONITORING DATA SHEET

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APPENDIX B.15

RESERVOIR GAS COLLECTION AND TREATMENT SYSTEM MONITORING DATA SHEET
WASTE DISPOSAL, INC. SUPERFUND SITE

TECHNICIAN:

LFG INSTRUMENT – MODEL NO.:_____ PID/FID INSTRUMENT – MODEL NO.:_____

LFG INSTRUMENT – SERIAL NO.:_____ PID/FID INSTRUMENT – SERIAL NO.:_____

AMBIENT AIR TEMPERATURE @ START: _____ °F AMBIENT BAROMETRIC PRESSURE @ START: _____ in. Hg

AMBIENT AIR TEMPERATURE @ END: _____ °F AMBIENT BAROMETRIC PRESSURE @ END: _____ in. Hg

WEATHER:

DATE	TIME	IN-LINE SYSTEM PRESSURE AT BLOWER OUTLET (in. H_2O)	IN-LINE SYSTEM TEMPERATURE AT BLOWER OUTLET (°F)	PITOT TUBE DIFFERENTIAL PRESSURE (in. H_2O)	FLOW VELOCITY AT BLOWER OUTLET (ft/min)(1)	FLOW RATE AT BLOWER OUTLET (ACFM)(2)	FIELD INSTRUMENT GAS READINGS AT BLOWER OUTLET(3)				FIELD INSTRUMENT GAS READINGS AT CARBON VESSEL OUTLET(3)				SUMMA CANISTER DATA(4)								CARBON CANISTER CHANGE-OUT (Yes/No)	COMMENTS
															INLET CANISTER				OUTLET CANISTER					
							CH_4 (%)	CO_2 (%)	O_2 (%)	VOCs (ppmv)	CH_4 (%)	CO_2 (%)	O_2 (%)	VOCs (ppmv)	Sample Start Time	Initial Pressure (in. Hg)	Sample Stop Time	Final Pressure (in. Hg)	Sample Start Time	Initial Pressure (in. Hg)	Sample Stop Time	Final Pressure (in. Hg)		

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(1) Flow Velocity is calculated using Dwyer "velocity" calculator.
(2) Flow Rate calculated based on flow velocity and 4-inch diameter pipe.
(3) CH_4, CO_2, and O_2 to be sampled using LFG Instrument (Landtec GEM 2000 or equivalent). TGNMO (VOCs) to be field analyzed by the PID/FID (Foxboro TVA 1000 or equivalent).
(4) Summa samples to be analyzed by EPA Method TO-15 (VOCs) and SCAQMD Method 25.1 (TGNMO (VOCs), CH_4, CO_2 and O_2).

LFG = Landfill Gas
PID = Photoinization Detector
FID = Flameionization Detector

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APPENDIX B.16

IN-BUSINESS AND AIR AMBIENT AIR MONITORING DATA SHEET

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APPENDIX B.16

IN-BUSINESS AND AIR AMBIENT AIR MONITORING DATA SHEET
WASTE DISPOSAL, INC. SUPERFUND SITE

DATE: _____ TECHNICIAN: _____ WEATHER: _____

LFG INSTRUMENT – MODEL NO.:_____ PID/FID INSTRUMENT – MODEL NO.:_____

LFG INSTRUMENT – SERIAL NO.:_____ PID/FID INSTRUMENT – SERIAL NO.:_____

AMBIENT AIR TEMPERATURE @ START: _____ ^{o}F AMBIENT BAROMETRIC PRESSURE @ START: _____ in Hg

AMBIENT AIR TEMPERATURE @ END: _____ ^{o}F AMBIENT BAROMETRIC PRESSURE @ END: _____ in Hg

LOCATION ID	SAMPLING TIME		FIELD INSTRUMENT GAS OUTDOOR READINGS				FIELD INSTRUMENT GAS INDOOR READINGS				SUMMA CAN DATA		BUILDING CLOSED? (i.e., windows/ doors closed) (Yes/No)
			Start		End		Start		End				
	Start	End	CH_4 (%)	VOCs (ppmv)	CH_4 (%)	VOCs (ppmv)	CH_4 (%)	VOCs (ppmv)	CH_4 (%)	VOCs (ppmv)	Initial Pressure (in. Hg)	Final Pressure (in. Hg)	
IN-BUSINESS AIR MONITORING LOCATIONS													
IBM-03													
IBM-03B													
IBM-21													
IBM-22													
IBM-24B													
IBM-28													
IBM-32													
IBM-37													
IBM-41													
IBM-50													
AMBIENT AIR MONITORING LOCATIONS													
IBM-24							NA	NA	NA	NA			
IBM-49							NA	NA	NA	NA			
NOTES:													

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(1) CH_4, CO_2, and O_2 to be sampled using LFG Instrument (Landtec GEM 2000 or equivalent). TGNMO (VOCs) to be field analyzed by the PID/FID (Foxboro TVA 1000 or equivalent).

(2) Summa samples to be analyzed by EPA Method TO-15 (VOCs) and SCAQMD Method 25.1 (TGNMO and CH_4)

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APPENDIX B.17

STORMWATER MONITORING DATA SHEET

APPENDIX B.17

STORMWATER MONITORING DATA SHEET
WASTE DISPOSAL, INC. SUPERFUND SITE

DATE: _____ INSTRUMENT SERIAL NO.: _____

TECHNICIAN: _____ INSTRUMENT MODEL NO.: _____

LOCATION ID	PRECIPITATION (in)	STORM DURATION		pH	SPECIFIC CONDUCTIVITY (µS/cm)	RUN-OFF FLOW VEL. (ft/s)	HEIGHT OF FLOW (in)	WIDTH OF FLOW (ft)
		Start	End					
SW-1								
SW-2								
SW-3								
SW-4								
SW-5								
SW-6								

NOTE:

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APPENDIX B.18

PROBLEM IDENTIFICATION AND CORRECTIVE ACTION REPORT

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APPENDIX B.18

PROBLEM IDENTIFICATION AND CORRECTIVE ACTION REPORT WASTE DISPOSAL, INC. SUPERFUND SITE

Page:_____ of _____

Location: _____

Drawing/Specification Reference No.: _____

_____

_____

Description/Proposed Corrective Action: _____

_____

_____

_____

_____

Requested by: _____ Date: _____

Company/Title: _____

OM&M QA Officer: _____ Date: _____

Design Engineer: _____ Date: _____

WDIG Coordinator: _____ Date: _____

EPA Review Comments: _____

_____

EPA Approval: _____ Date: _____

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APPENDIX B.19

MAINTENANCE AND REPAIR ACTIVITY REPORT

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APPENDIX B.19

MAINTENANCE AND REPAIR ACTIVITY REPORT WASTE DISPOSAL, INC. SUPERFUND SITE

Page:_____ of _____

Location: _____

Maintenance Activity: _____

Problem Identification and
Corrective Action Report Reference: _____

Description of
Maintenance/Repair Performed: _____

_____

_____

_____

_____

_____

_____

Performed by: _____ Date: _____

Company/Title: _____

OM&M QA Officer: _____ Date: _____

Design Engineer: _____ Date: _____

WDIG Coordinator: _____ Date: _____

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APPENDIX B.20

LEACHATE WELL SOUNDING

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APPENDIX B.20

LEACHATE WELL SOUNDING
WASTE DISPOSAL, INC. SUPERFUND SITE

DATE: _____

TECHNICIAN: _____

WELL ID: _____

START TIME	TIME INTERVAL (Minutes)	WELL LEVEL (Feet)
	0	
	10	
	20	
	60	
	120	
	240	
	360	
	1440	

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APPENDIX C

EQUIPMENT MANUALS

C.1 RESERVOIR GAS COLLECTION SYSTEM
C.2 BUILDING MODIFICATIONS
C.3 SENTINEL BIOVENT SYSTEM
C.4 IRRIGATION SYSTEM

APPENDIX C.1

RESERVOIR GAS COLLECTION SYSTEM

For information about static pressure (SP), see page 586.

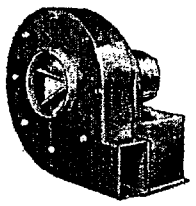
Cast Aluminum High-Pressure Blowers

These blowers are built to handle high pressure. They're spark-resistant and have cast aluminum housings to prevent corrosion. Motors are direct-drive and housings adjust to seven outlet positions. Inlets and outlets are round. Blower wheels are aluminum and rotate clockwise facing from the motor side. Temperature range is −15° to +150° F. There are four 7/16" mounting holes on the base (hardware not included).

Blowers with ***hazardous location motor*** are approved for Class I, Group D, and Class II, Groups F and G hazardous locations.

cfm @ Static Pressure (SP) 1"	3"	5"	Inlet Dia.	Outlet Dia.	Blower Wheel Dia.	Overall Size, Ht.×Wd.×Dp.	Decibels @ 5 ft.	hp	rpm	Amps	TEFC Motor	Each	Hazardous Location Motor	Each
115/230 VAC, Single Phase, 60 Hz														
225	134	—	4"	4"	7"	13¾"×12¼"×12"	80	1/3	3450	7.2/ 3.6	**1954K51**	$507.83	**1954K61**	$690.76
353	252	—	4"	4"	8"	13¾"×12¼"×12"	81	1/2	3450	9.8/ 4.9	**1954K52**	532.76	**1954K62**	708.33
658	524	454	6"	5"	9¾"	18" × 15⅝"×14½"	85	1	3450	16.0/ 8.0	**1954K54**	727.12	**1954K64**	895.24
795	653	534	6"	5"	10⅝"	18" × 15⅝"×14½"	85	1½	3450	20.0/10.0	**1954K55**	830.25	**1954K65**	1122.22
230/460 VAC, 3 Phase, 60 Hz														
353	252	—	4"	4"	8"	13¾"×12¼"×12"	81	1/2	3450	2.0/ 1.0	**1954K57**	541.38	**1954K67**	796.67
658	524	454	6"	5"	9¾"	18" × 15⅝"×14½"	85	1	3450	3.6/ 1.8	**1954K59**	711.86	**1954K69**	998.42
795	653	534	6"	5"	10⅝"	18" × 15⅝"×14½"	85	1½	3450	5.2/ 2.6	**1954K72**	784.75	**1954K73**	1074.60

Type 304 Stainless Steel High-Pressure Blowers

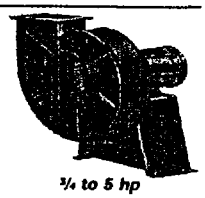


With Type 304 stainless steel housings, these blowers offer superior corrosion resistance—the most of any metal blower we offer. Motors are direct-drive, totally enclosed fan-cooled (TEFC); housings adjust to eight outlet positions. Inlets are round and outlets are rectangular. Blower wheels are aluminum and rotate clockwise facing from the motor side. Temp. range is −15° to +180° F. Blowers have four 3/8" mounting holes on the base, except 5-hp model which has six holes (hardware not included).

cfm @ Static Pressure (SP) 1"	3"	5"	Inlet Dia.	Outlet Size, Ht.×Wd.	Blower Wheel Dia.	Overall Size, Ht.×Wd.×Dp.	Decibels @ 5 ft.	hp	rpm	Amps	Each
115 VAC, Single Phase, 60 Hz											
525	405	200	5"	3½"×3½"	9"	15¾"×20¾"×13⅝"	84	1/3	3500	6.0	**2283K27** $598.50
800	680	500	6"	4" × 3½"	10⅝"	19" × 20¾"×15⅝"	86	1	3500	11.8	**2283K33** 797.52
230/460 VAC, 3 Phase, 60 Hz											
525	405	200	5"	3½"×3½"	9"	15¾"×20¾"×13⅝"	84	1/3	3500	1.4/0.7	**2283K39** 644.28
800	680	500	6"	4" × 3½"	10⅝"	19" × 20¾"×15⅝"	86	1	3500	3.6/1.8	**2283K44** 732.42
2280	2070	1840	8"	7⅛"×5¾"	13½"	23⅛"×22" × 22⅜"	93	5	3500	11.2/5.6	**2283K56** 1236.93

Plastic Corrosion-Resistant Low-Pressure Blowers

1/6 and 1/3 hp



3/4 to 5 hp

Plastic housings resist corrosion and offer enhanced chemical compatibility for your low-pressure jobs. The 1/3-hp models have a glass-fiber reinforced polyester housing; all others have a PVC housing. Blower wheels are polypropylene, unless noted. Bases are polyurethane-painted steel.

Polypropylene and glass-fiber reinforced polyester tolerate many organic chemicals; PVC resists strong oxidizing acids such as chromic, nitric, sulfuric, and phosphoric. PVC is not recommended for use with perchloric acid.

Motors are direct drive with a speed of 1725 rpm. Blower wheels rotate counterclockwise facing from the motor side. Air discharges out of the top.

All blowers have round inlets. Single phase units have round outlets; 3 phase units have rectangular outlets. For duct applications use optional round adapters (sold separately below) to convert rectangular outlets to round outlets.

Temperature range is 32° to 120° F. Mount using the four 3/8" mounting holes on the base (hardware not included).

TEFC motor is totally enclosed fan-cooled. Blowers with ***hazardous location motor*** are approved for Class I, Group D, and Class II, Groups F and G hazardous locations.

cfm @ Static Pressure (SP) ½"	¾"	1"	Inlet Dia.	Outlet Dia.	Blower Wheel Dia.	Overall Size, Ht.×Wd.	hp	Amps	TEFC Motor Dp.	Each	Hazardous Location Motor Dp.	Each
115/230 VAC, Single Phase, 60 Hz												
185	140	—	5⅝"	4½"	5¼"	12¼"×11"	1/6	1.9/0.95	14½"	**2093K24** $698.43	15½"	**2093K27** $916.91
955	880	800	8"	8"	7⅜"	16¾"×15⅛"	1/3	3.0/1.5	18½"	**2093K11**• 895.93	21½"	**2093K12** 1290.12
955	880	800	8"	8"	7⅜"	16¾"×15⅛"	1/3	3.0/1.5	18½"	**2093K13**•♠ 1133.32	21½"	**2093K14**♠ 1517.20

• 115/208-230 VAC. ♠ Blower wheel is PVC.

cfm @ Static Pressure (SP) ½"	1"	1½"	Inlet Dia.	Outlet Size, Ht.×Wd.	Blower Wheel Dia.	Overall Size, Ht.×Wd.×Dp.	hp	Amps	TEFC Motor	Each	Hazardous Location Motor	Each
208-230/460 VAC, 3 Phase, 60 Hz												
1350	1200	1020	7¾"	7 7/16"×5⅛"	9¼"	21 11/16"×19 9/16" × 20⅜"	¾	1.5/0.75	**2093K63**	$1770.81	**2093K62**	$2017.93
1350	1200	1020	7¾"	7 7/16"×5⅛"	9¼"	21 11/16"×19 9/16" × 20⅜"	¾	1.5/0.75	**2093K65**♠	2056.11	**2093K64**♠	2123.90
2480	2310	2140	9¾"	9⅜" × 6 11/16"	11¾"	24 3/16" × 22 13/16" × 24¼"	1½	2.1/1.05	**2093K75**♠	2240.70	**2093K76**♠	2713.56
4900	4650	4450	12¾"	11⅞" × 9 11/16"	14½"	31 9/16" × 29 15/16" × 29¾"	5	6.7/3.35	**2093K84**	2547.74	**2093K94**★	3811.35
4900	4650	4450	12¾"	11⅞" × 9 11/16"	14½"	31 9/16" × 29 15/16" × 29¾"	5	6.7/3.35	**2093K85**♠	2688.06	**2093K95**♠★	3873.88

PVC Outlet Adapters—Convert rectangular outlets to round outlets.

¾-hp units: Convert to 8⅝" OD outlet	**2093K68**	179.17
1½-hp units: Convert to 10¾" OD outlet	**2093K78**	199.74
5-hp units: Convert to 14" OD outlet	**2093K98**	237.03

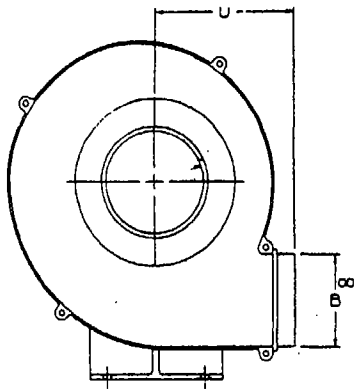
♠ Blower wheel is PVC. ★ 230/460 VAC.

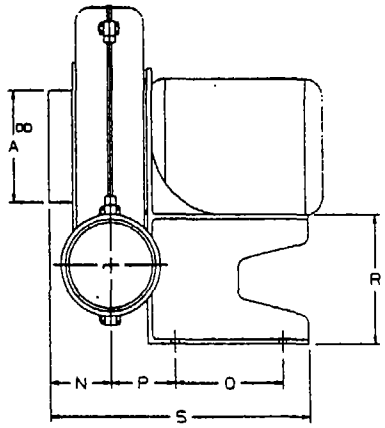
Plastic Corrosion-Resistant Low-Pressure DC Blowers

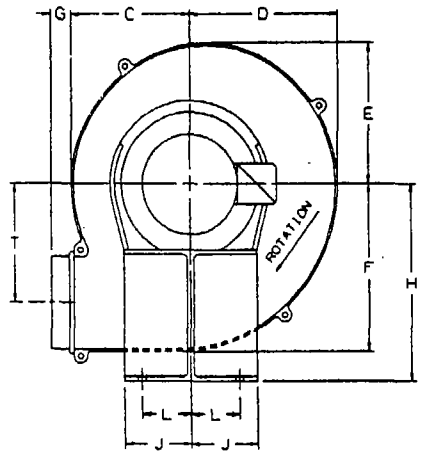
Use vehicle batteries and other DC power sources to operate these blowers—essential where you don't have access to AC service. Blowers have direct-drive motors and polypropylene housings for corrosion resistance.

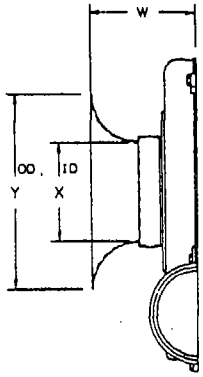
Blower wheels are nylon and rotate clockwise facing from the motor side. Inlets and outlets are round, so installing flexible duct is easy. Maximum temperature is 130° F. Blowers can be rotated in the furnished mounting bracket to point discharge in any direction. Install at any angle and on any surface. Bracket has four 1/4" mounting holes (hardware not included).

cfm @ 0" Static Press. (SP)	Inlet Dia.	Outlet Dia.	Blower Wheel Dia.	Overall Size, Ht.×Wd.×Dp.	Decibels @ 4 ft.	VDC	rpm	Amps	Each
105	3"	3"	3"	5½"×5" × 6¾"	86	12	1000	4.3	**2059K12** $54.79
250	4"	4"	4"	9⅝"×9¼"×8¾"	86	12	1000	12.0	**2059K14** 107.85
250	4"	4"	4"	9⅝"×9¼"×8¾"	86	24	1000	5.3	**2059K24** 128.88

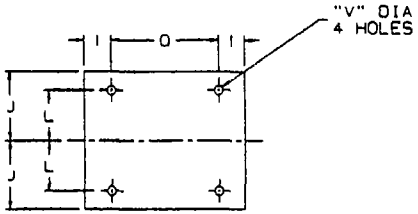








INLET BELL (OPTIONAL)



NOTES:

① OUTLET FLANGE NOT AVAILABLE ON DB DISCHARGE

② FOR FLANGE DETAILS, SEE DRAWING AFA11421F

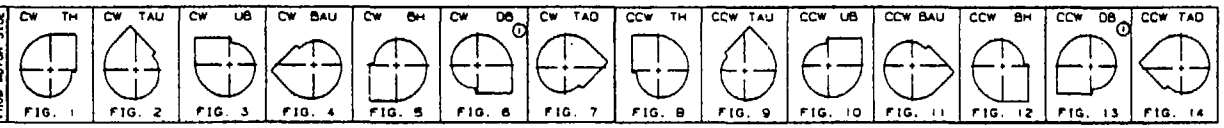
③ HOUSING, WHEEL, AND BASE CONSTRUCTED OF CAST ALUMINUM

APPROXIMATE MOTOR WTS.	
FRAME SIZE	WT. LBS.
56-C	24
143-TC	33
145-TC	45

FAN SIZE	INLET DIA.	INLET BELL W	INLET BELL X	INLET BELL Y
AF-8	3	$4\frac{1}{4}$	$2\frac{5}{8}$	$5\frac{1}{4}$
AF-8	4	$4\frac{3}{4}$	$3\frac{5}{8}$	$7\frac{1}{4}$
AF-9	4	$4\frac{15}{16}$		
AF-9	5	$5\frac{7}{16}$	$4\frac{5}{8}$	$9\frac{1}{4}$
AF-10	6	$6\frac{3}{16}$	$5\frac{1}{2}$	11

FAN SIZE	MOTOR FRAME SIZE	INLET DIA. A	OUTLET DIA. B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	V	NET WTS. LESS MOTOR LBS.
AF-8	56-C, 143-TC, 145-TC	3 4	4	$4\frac{15}{16}$	$5\frac{13}{16}$	$5\frac{3}{32}$	$6\frac{11}{16}$	$1\frac{3}{8}$	$8\frac{1}{2}$	$3\frac{3}{4}$	$1\frac{1}{8}$	$2\frac{3}{4}$	$3\frac{1}{2}$	$2\frac{7}{8}$	$2\frac{7}{8}$	5	5	$11\frac{3}{4}$	$4\frac{9}{16}$	$6\frac{5}{16}$	$\frac{7}{16}$	25
AF-9	56-C, 143-TC, 145-TC	4 5	4	6	$7\frac{1}{4}$	$6\frac{17}{32}$	$7\frac{3}{4}$	$1\frac{3}{16}$	$10\frac{1}{2}$	$3\frac{3}{4}$	$1\frac{3}{16}$	$2\frac{3}{4}$	$3\frac{3}{4}$	$3\frac{1}{16}$	$3\frac{1}{16}$	6	7	$13\frac{1}{8}$	$5\frac{5}{8}$	$7\frac{3}{16}$	$\frac{7}{16}$	33
AF-10	56-C, 143-TC, 145-TC	6	5	$6\frac{11}{16}$	$8\frac{5}{16}$	$7\frac{15}{32}$	9	$1\frac{1}{8}$	$10\frac{1}{2}$	$3\frac{3}{4}$	$1\frac{1}{2}$	$2\frac{3}{4}$	$3\frac{3}{4}$	$3\frac{3}{8}$	$3\frac{1}{16}$	6	7	$14\frac{7}{16}$	$6\frac{3}{8}$	$7\frac{13}{16}$	$\frac{7}{16}$	39

ROTATION VIEWED FROM MOTOR SIDE



DATE	REVISION	DRAWN BY	APPROVED BY
11/01/98	REVISED "X" DIMENSION (SIZES 8 & 9)	JAW	MAS
05/17/96	REVISED REDRAWN	JAW	MAS
03/27/96	REV. ADDED INLET BELL, ADDED INLET SIZES	REE	MAS
02/15/95	REVISED FLANGES, REDRAWN	JRB	MAS
08/30/91	REVISED "O" & "R" DIMS. WERE INCORRECT	REE	MAS

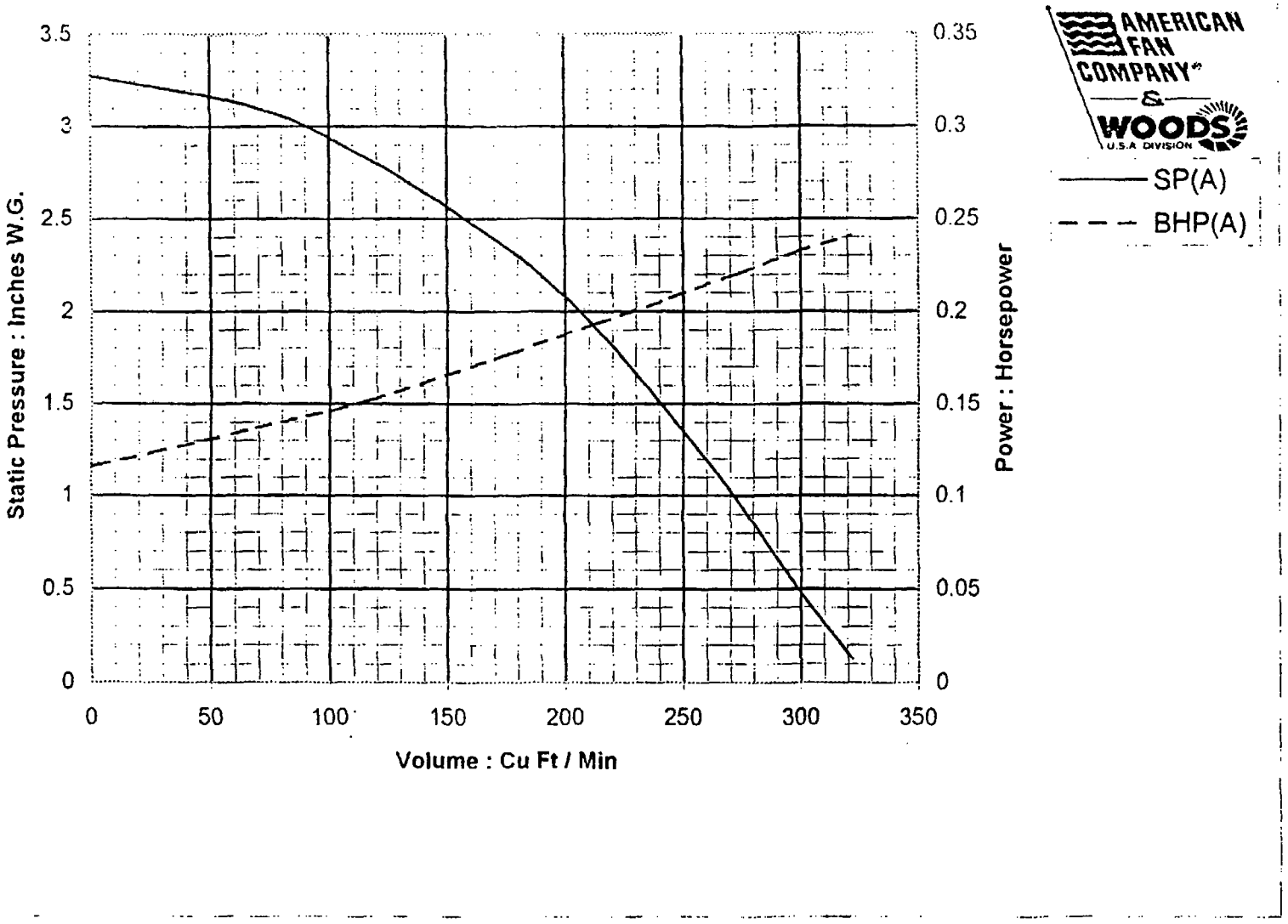
AMERICAN FAN COMPANY®
2933 SYMMES ROAD
FAIRFIELD, OHIO 45014
PHONE: (513) 874-2400
FAX: (513) 870-5877

WOODS U.S.A. DIVISION

TITLE: AF-8 THRU 10 PRESSURE BLOWERS ARR'T 4
ALUMINUM BASE

DATE: 08/13/90 | SCALE: NONE | DRAWING NO.: AFC1328F | SHEET 5

DRAWN BY: TK | APPROVED BY: MAS | REVISED BY:



A SIZE = AF-8-R07025-4 ; RPM = 3450 ; Density = 0.0750 Lb/CF ; Width = 100.00%

USFilter

Westates
11711 Reading Road
Red Bluff, CA 96080

Telephone (530) 527-2664
Facsimile (530) 527-8724

VSC1000

SPECIFICATION SUMMARY

VSC1000 Vapor Phase Adsorption Systems are designed to treat a wide range of contaminated process streams. With piping and valves can be configured for series, parallel, or vessel isolation flows. The adsorber is equipped with a carbon retention system capable of maximum flow rate of 500 cfm.

EACH VESSEL:

Vessel Diameter	48"
Side Shell Height	32"
Overall Height (Approx.)	4'-8"
Maximum Working Pressure	15 psig @ 150 °F
Manway at Head	18" dia
Vessel Volume	350 gal.
Carbon Capacity	1000 lbs.
Carbon Bed Volume-Typical	34 Ft^3
Maximum Flow	500 cfm
Empty Bed Contact Time	4.2 sec @ 500 cfm
Material	Carbon Steel
Supports	Skid mounted
Lifting	Lifting Lugs
Seismic	Zone 4
Interior Surface Prep	SSPC-SP5
Interior Surface Coating	3M ScotchKote 134, 10-15 mil min dft
Exterior Surface Primer	Carboline 893 Rust Preventative Epoxy 3 mil min dft
Exterior Surface Coating	Carboline 134 High Solids Urethane 3mil min dft
Standard Color	White (Federal Standard 17925)

CONNECTIONS:

Influent and Effluent	4" FNPT (SS)

SCREEN:

Lateral	PVC V-Wire

WEIGHT:

Shipping weight (vessel)	890 lb
Operating weight (vessel & carbon)	1,890 lb

VIVENDI water company

U.S. FILTER
WESTATES

VENT-SCRUB™
Installation and Start-Up Instructions
VSC-1000 and VSC-2000

IMPORTANT: Read all instructions prior to start-up

The Westates **VENT-SCRUB™** has been designed for easy and rapid installation. Final installation requires the connection of the **VENT-SCRUB™** to the process outlet through the use of pipes, ducts, or flexible hoses. The following instructions must be followed prior to system start-up:

1. Place the **VENT-SCRUB™** in an area close to the contaminated air source and accessible to maintenance personnel. The **VENT-SCRUB™** is self supporting and therefore requires no special stand or support pad. The area chosen for locating the **VENT-SCRUB™** should be level, flat and capable of supporting its weight.

2. Remove the **VENT-SCRUB™** protective shipping plugs from inlet and outlet and save for future storage and shipping.

3. Connect the **VENT-SCRUB™** to a pipe, duct or flexible hose to the inlet of the vessel. The **VENT-SCRUB™** is designed to operate under positive pressure. Please refer other applications to Westates.

4. For outdoor applications, the **VENT-SCRUB™** discharge should be equipped with a "U"-tube or rain hat to prevent water from entering the unit. **If flammable vapors are being adsorbed, a flame arrester should be installed at the inlet of the VENT-SCRUB™.** Consult your Westates sales representative for product selection.

5. All adsorption processes are exothermic in nature (liberate heat) and care must be exercised to ensure that excess heat does not build up in the **VENT-SCRUB™** during start-up and operation. In applications where low air flow and high concentrations of volatile organics are being treated, care must be taken to prevent overheating. If this type of application is anticipated or if the outlet air temperature from a **VENT-SCRUB™** should ever exceed 140°F, a Westates representative should be contacted for recommended precautions.

6. When using Westates' UOCH-KP or UOCH-KG, please refer to the "Use of UOCH-KP/UOCH-KG Activated Carbon" start-up instruction sheets.

7. Once operational, the **VENT-SCRUB™** will continue to remove contaminants with little or no maintenance, until the carbon is spent. Contact Westates for information on removal and reactivation of spent carbon.

NOTE: **Studies conducted have shown that low oxygen content exists in adsorbers containing wet carbon. Laboratory experiments conducted since that time also have revealed that commercial activated carbons in a wet or moist condition will lower the oxygen content of an isolated space.**

(CONTINUED)

CONNECTION SIZES

	SIZES	LOCATION
Inlet	4" FNPT	Top
Outlet	4" FNPT	Lower Side

OPERATING CONDITIONS

	OPTIMUM	MAXIMUM	
		VSC-1000	VSC-2000
Vapor Flow Rate	0-500 cfm	500 scfm	500 scfm
Vapor Temperature	77°F	140°F	140°F
System Pressure	-	15 psig	15 psig
Vacuum	-	6 in. Hg	12 in. Hg
Carbon Fill Volume	-	35 cu.ft.	63 cu.ft.
Shipping weight (approximate)	-	1,620 lbs.	2,540 lbs.

FOR ADDITIONAL INFORMATION PLEASE CONTACT
ONE FOR THE FOLLOWING OFFICES:

Los Angeles, CA
(800) 659-1771

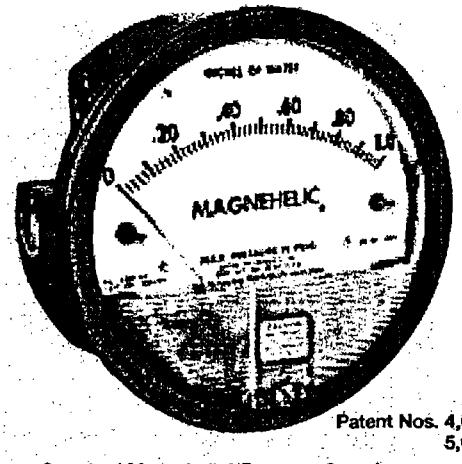
Oakland, CA
(800) 659-1718

Baytown, TX
(800) 659-1723

Warren, NJ
(800) 631-0878

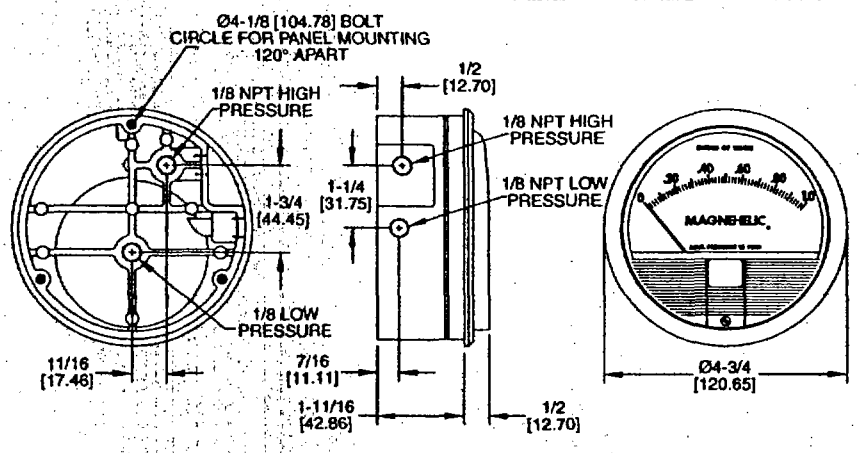
Series 2000 Magnehelic® Differential Pressure Gages

Indicate Positive, Negative or Differential, Accurate within 2%



Patent Nos. 4,030,365
5,012,678

Standard Magnehelic® Pressure Gage has a large, easy-to-read 4" dial.



Dimensions, Standard Series 2000 Magnehelic® Pressure Gages. (Slightly different on medium and high pressure models)

Select the Dwyer Magnehelic® gage for high accuracy – guaranteed within 2% of full scale – and for the wide choice of 81 models available to suit your needs precisely. Using Dwyer's simple, frictionless Magnehelic® movement, it quickly indicates low air or non-corrosive gas pressures – either positive, negative (vacuum) or differential. The design resists shock, vibration and over-pressures. No manometer fluid to evaporate, freeze or cause toxic or leveling problems. It's inexpensive, too.

The Magnehelic® is the industry standard to measure fan and blower pressures, filter resistance, air velocity, furnace draft, pressure drop across orifice plates, liquid levels with bubbler systems and pressures in fluid amplifier or fluidic systems. It also checks gas-air ratio controls and automatic valves, and monitors blood and respiratory pressures in medical care equipment.

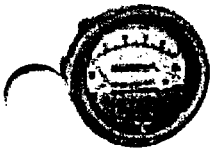
MOUNTING. A single case size is used for most models of Magnehelic® gages. They can be flush or surface mounted with standard hardware supplied. With the optional A-610 Pipe Mounting Kit they may be conveniently installed on horizontal or vertical 1¼" - 2" pipe. Although calibrated for vertical position, many ranges above 1" may be used at any angle by simply re-zeroing. However, for maximum accuracy, they must be calibrated in the same position in which they are used. These characteristics make Magnehelic® gages ideal for both stationary and portable applications. A 4⁹⁄₁₆" hole is required for flush panel mounting. Complete mounting and connection fittings plus instructions are furnished with each instrument.

Flush ...Surface...or Pipe Mounted

VENT VALVES

In applications where pressure is continuous and the Magnehelic® gage is connected by metal or plastic tubing which cannot be easily removed, we suggest using Dwyer A-310A vent valves to connect gage. Pressure can then be removed to check or re-zero the gage.

HIGH AND MEDIUM PRESSURE MODELS



Installation is similar to standard gages except that a 4¹³⁄₁₆" hole is needed for flush mounting. The medium pressure construction is rated for internal pressures up to 35 psig and the high pressure up to 80 psig. Available for all models. Because of larger case, the medium pressure and high pressure models will not fit in a portable case size. Installation of the A-321 safety relief valve on standard Magnehelic® gages often provides adequate protection against infrequent overpressure.

SPECIFICATIONS

Service: Air and non-combustible, compatible gases. (Natural Gas option available.)
Wetted Materials: Consult factory.
Housing: Die cast aluminum case and bezel, with acrylic cover. Exterior finish is coated gray to withstand 168 hour salt spray corrosion test.
Accuracy: ±2% of full scale (±3% on - 0, -100PA, -125PA, 10MM and ±4% on - 00, -60PA, -6MM ranges), throughout range at 70°F (21.1°C).
Pressure Limits: -20" Hg. to 15 psig.† (-0.677 bar to 1.034 bar); MP option: 35 psig (2.41 bar), HP option: 80 psig (5.52 bar).
Overpressure: Relief plug opens at approximately 25 psig (1.72 kPa), standard gages only.
Temperature Limits: 20 to 140°F.* (-6.67 to 60°C).
Size: 4" (101.6 mm) Diameter dial face.
Mounting Orientation: Diaphragm in vertical position. Consult factory for other position orientations.
Process Connections: 1/8" female NPT duplicate high and low pressure taps - one pair side and one pair back.
Weight: 1 lb 2 oz (510 g), MP & HP 2 lb 2 oz (963 g).
Standard Accessories: Two 1/8" NPT plugs for duplicate pressure taps, two 1/8" pipe thread to rubber tubing adapters and three flush mounting adapters with screws. (Mounting and snap ring retainer substituted for 3 adapters in MP & HP gage accessories.)

*Low temperature models available as special option.
†For applications with high cycle rate within gage total pressure rating, next higher rating is recommended. See Medium and High pressure options at lower left.

OPTIONS AND ACCESSORIES

Transparent Overlays

Furnished in red, green or yellow to highlight and emphasize critical pressures.

Adjustable Signal Flag

Integral with plastic gage cover. Available for most models except those with medium or high pressure construction. Can be ordered with gage or separate.

LED Setpoint Indicator

Bright red LED on right of scale shows when setpoint is reached. Field adjustable from gage face, unit operates on 12-24 VDC. Requires MP or HP style cover and bezel.

Portable Units

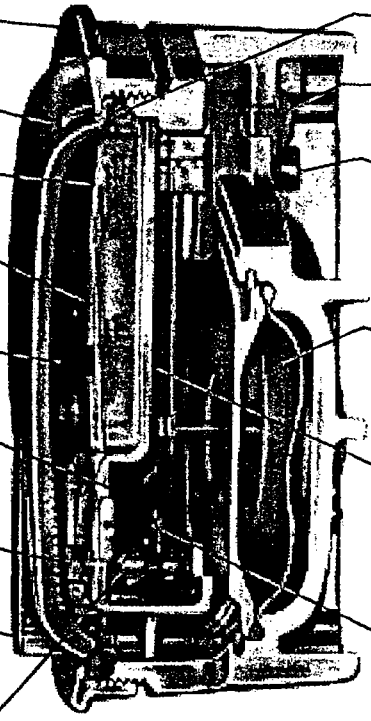
Combine carrying case with any Magnehelic® gage of standard range, except high pressure connection. Includes 9 ft. (2.7 m) of ⅜" I.D. rubber tubing, standhang bracket and terminal tube with holder. **A-432,** Portable Kit

Air Filter Gage Accessory Package

Adapts any standard Magnehelic® for use as an air filter gage. Includes aluminum surface mounting bracket with screws, two 5 ft. (1.5 m) lengths of ¼" aluminum tubing two static pressure tips and two molded plastic vent valves, integral compression fittings on both tips and valves. **A-605,** Air Filter Kit

Dwyer Instruments, Inc./P.O. Box 373/Michigan City, IN 46361/Phone 219 879-8000/Fax 219 872-9057 • U.K. Phone (+44) (0)1494-461707 • Australia Phone 61 2 4272-2055

Quality design and construction features



Bezel provides flange for flush mounting in panel.

Clear plastic face is highly resistant to breakage. Provides undistorted viewing of pointer and scale.

Precision litho-printed scale is accurate and easy to read.

Red tipped pointer of heat treated aluminum tubing is easy to see. It is rigidly mounted on the helix shaft.

Pointer stops of molded rubber prevent pointer over-travel without damage.

"Wishbone" assembly provides mounting for helix, helix bearings and pointer shaft.

Jeweled bearings are shock-resistant mounted; provide virtually friction-free motion for helix. Motion damped with high viscosity silicone fluid.

Zero adjustment screw is conveniently located in the plastic cover, and is accessible without removing cover. O-ring seal provides pressure tightness.

O-ring seal for cover assures pressure integrity of case.

Blowout plug of silicone rubber protects against overpressure on 15 psig rated models. Opens at approximately 25 psig.

Die cast aluminum case is precision made and iridite-dipped to withstand 168 hour salt spray corrosion test. Exterior finished in baked dark gray hammerloid. One case size is used for all standard pressure options, and for both surface and flush mounting.

Silicone rubber diaphragm with integrally molded O-ring is supported by front and rear plates. It is locked and sealed in position with a sealing plate and retaining ring. Diaphragm motion is restricted to prevent damage due to overpressures.

Calibrated range spring is flat spring steel. Small amplitude of motion assures consistency and long life. It reacts to pressure on diaphragm. Live length adjustable for calibration.

Samarium Cobalt magnet mounted at one end of range spring rotates helix without mechanical linkages.

Helix is precision made from an alloy of high magnetic permeability. Mounted in jeweled bearings, it turns freely, following the magnetic field to move the pointer across the scale.

STOCKED MODELS

Dual Scale English/Metric Models		
Model Number	Range, In. W.C.	Range, Pa or kPa
2000-0D	0-0.5	0-125 Pa
2001D	0-1.0	0-250 Pa
2002D	0-2.0	0-500 Pa
2003D	0-3.0	0-750 Pa
2004D	0-4.0	0-1.0 kPa
2006D	0-6.0	0-1.5 kPa
2008D	0-8.0	0-2.0 kPa
2010D	0-10	0-2.5 kPa

SERIES 2000 MAGNEHELIC®— MODELS AND RANGES
STOCKED MODELS in bold

The models below will fulfill most requirements. Page 5 also shows examples of special models built for OEM customers. For special scales furnished in ounces per square inch, inches of mercury, metric units, etc., contact the factory.

Model Number	Range Inches of Water
2000-00†••	0-.25
2000-0†•	0-.50
2001	0-1.0
2002	0-2.0
2003	0-3.0
2004	0-4.0
2005	0-5.0
2006	0-6.0
2008	0-8.0
2010	0-10
2015	0-15
2020	0-20
2025	0-25
2030	0-30
2040	0-40
2050	0-50
2060	0-60
2080	0-80
2100	0-100
2150	0-150

Model Number	Range Zero Center Inches of Water
2300-0†•	.25-0-.25
2301	.5-0-.5
2302	1-0-1
2304	2-0-2
2310	5-0-5
2320	10-0-10
2330	15-0-15

Model Number	Range PSI
2201	0-1
2202	0-2
2203	0-3
2204	0-4
2205	0-5
2210*	0-10
2215*	0-15
2220*	0-20
2230**	0-30

*MP option standard
†HP option standard

Dual Scale Air Velocity Units

Model Number	Range In W.C. Velocity, F.P.M.
2000-00AV†••	0-.25/300-2000
2000-0AV†•	0-.50/500-2800
2001AV	0-1.0/500-4000
2002AV	0-2.0/1000-5600
2010AV	0-10/2000-12500

For use with pitot tube.

Model Number	Range MM of Water
2000-6MM†••	0-6
2000-10MM†•	0-10
2000-25MM	0-25
2000-50MM	0-50
2000-80MM	0-80
2000-100MM	0-100
Zero Center Ranges	
2300-20MM†	10-0-10

Model Number	Range, CM of Water
2000-15CM	0-15
2000-20CM	0-20
2000-25CM	0-25
2000-50CM	0-50
2000-80CM	0-80
2000-100CM	0-100
2000-150CM	0-150
2000-200CM	0-200
2000-250CM	0-250
2000-300CM	0-300
Zero Center Ranges	
2300-4CM	2-0-2
2300-10CM	5-0-5
2300-30CM	15-0-15

Model Number	Range, Pascals
2000-60PA†••	0-60
2000-100PA†•	0-100
2000-125PA†•	0-125
2000-250PA	0-250
2000-300PA	0-300
2000-500PA	0-500
2000-750PA	0-750
Zero Center Ranges	
2300-250PA	125-0-125
2300-500PA	250-0-250

Model Number	Range, Kilopascals
2000-1KPA	0-1
2000-1.5KPA	0-1.5
2000-2KPA	0-2
2000-3KPA	0-3
2000-4KPA	0-4
2000-5KPA	0-5
2000-8KPA	0-8
2000-10KPA	0-10
2000-15KPA	0-15
2000-20KPA	0-20
2000-25KPA	0-25
2000-30KPA	0-30
Zero Center Ranges	
2300-1KPA	.5-0-.5
2300-3KPA	1.5-0-1.5

Accessories
A-299, Surface Mounting Bracket
A-300, Flat Flush Mounting Bracket
A-310A, 3-Way Vent Valve
A-321, Safety Relief Valve
A-432, Portable Kit
A-605, Air Filter Kit
A-610, Pipe Mount Kit
Scale Overlays — Red, Green, Mirrored or Combination, Specify Locations

Options — To order, add suffix: I.E. 2001-ASF
ASF (Adjustable Signal Flag)
HP (High Pressure Option)
LT (Low Temperatures to -20°F)
MP (Med. Pressure Option)
SP (Setpoint Indicator)

Special Purpose Ranges

Scale No. 2401	Scale No. 2402
Square Root	Blank Scale
Specify Range	Specify Range

Model 2000-00N. range -.05 to +.20" W.C. For room pressure monitoring

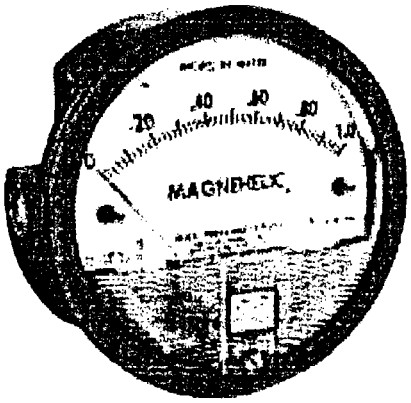
†These ranges calibrated for vertical scale position.
• Accuracy +/-3%. •• Accuracy +/-4%

1011R01-0298P

BULLETIN NO. A-27

Magnehelic® Differential Pressure Gage

OPERATING INSTRUCTIONS



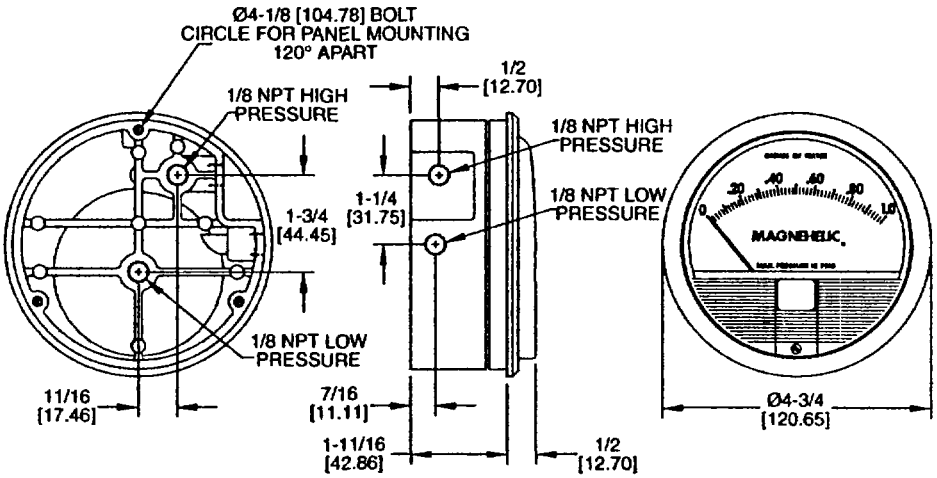
SPECIFICATIONS

Dimensions: 4-3/4" dia. x 2-3/16" deep.
Weight: 1 lb. 2 oz.
Finished: Baked dark gray enamel.
Connections: 1/8" NPT high and low pressure taps, duplicated, one pair side and one pair back.
Accuracy: Plus or minus 2% of full scale, at 70°F. (Model 2000-0, 3%; 2000-00, 4%).
Pressure Rating: 15 PSI (0,35 bar)
Ambient Temperature Range: 20° to 140°F (-7 to 60°C).
Standard gage accessories include two 1/8" NPT plugs for duplicate pressure taps, two 1/8" NPT pipe thread to rubber tubing adapters, and three flush mounting adapters with screws.

Caution: For use with air or compatible gases only.

For repeated over-ranging or high cycle rates, contact factory.

Not for use with Hydrogen gas. Dangerous reactions will occur.



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P.O. BOX 373 • MICHIGAN CITY, INDIANA 46361 U.S.A.
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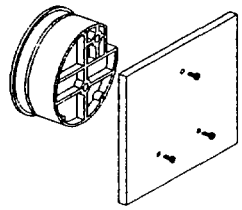
www.dwyer-inst.com
e-mail: info@dwyer-inst.com

MAGNEHELIC® INSTALLATION

1. Select a location free from excessive vibration and where the ambient temperature will not exceed 140°F. Also, avoid direct sunlight which accelerates discoloration of the clear plastic cover. Sensing lines my be run any necessary distance. Long tubing lengths will not affect accuracy but will increase response time slightly. Do not restrict lines. If pulsating pressures or vibration cause excessive pointer oscillation, consult the factory for ways to provide additional damping.

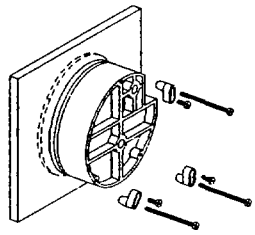
2. All standard Magnehelic gages are calibrated with the diaphragm vertical and should be used in that position for maximum accuracy. If gages are to be used in other than vertical position, this should be specified on the order. Many higher range gages will perform within tolerance in other positions with only rezeroing. Low range Model 2000-00 and metric equivalents must be used in the vertical position only.

3. Surface Mounting



Locate mounting holes, 120° apart on a 4-1/8" dia. circle. Use No. 6-32 machine screws of appropriate length.

4. Flush Mounting



Provide a 4-9/16" dia. opening in panel. Insert gage and secure in place with No. 6-32 machine screws of appropriate length, with adapters, firmly secured in place. To mount gage on 1-1/4"-2" pipe, order optional A-610 pipe mounting kit.

5. To zero the gage after installation

Set the indicating pointer exactly on the zero mark, using the external zero adjust screw on the cover at the bottom. Note that the zero check or adjustment can only be made with the high and low pressure taps both open to atmosphere.

Operation

Positive Pressure: Connect tubing from source of pressure to either of the two high pressure ports. Plug the port not used. Vent one or both low pressure ports to atmosphere.

Negative Pressure: Connect tubing from source of vacuum or negative pressure to either of the two low pressure ports. Plug the port not used. Vent one or both high pressure ports to atmosphere.

Differential Pressure: Connect tubing from the greater of two pressure sources to either high pressure port and the lower to either low pressure port. Plug both unused ports.

When one side of the gage is vented in dirty, dusty atmosphere, we suggest an A-331 Filter Vent Plug be installed in the open port to keep inside of gage clean.

A. For portable use of temporary installation use 1/8" pipe thread to rubber tubing adapter and connect to source of pressure with rubber or Tygon tubing.

B. For permanent installation, 1/4" O.D., or larger, copper or aluminum tubing is recommended. See accessory bulletin S-101 for fittings.

Ordering Instructions:

When corresponding with the factory regarding Magnehelic® gage problems, be sure to include model number, pressure range, and any special options. Field repair is not recommended; contact the factory for repair service.

MAINTENANCE

Maintenance: No lubrication or periodic servicing is required. Keep case exterior and cover clean. Occasionally disconnect pressure lines to vent both sides of gage to atmosphere and re-zero. Optional vent valves, (bulletin S-101), should be used in permanent installations.

Calibration Check: Select a second gage or manometer of known accuracy and in an appropriate range. Using short lengths of rubber or vinyl tubing, connect the high pressure side of the Magnehelic gage and the test gage to two legs of a tee. Very slowly apply pressure through the third leg. Allow a few seconds for pressure to equalize, fluid to drain, etc., and compare readings. If accuracy unacceptable, gage may be returned to factory for recalibration. To calibrate in the field. use the following procedure.

Calibration:

1. With gage case, held firmly, loosen bezel, by turning counterclockwise. To avoid damage, a canvas strap wrench or similar tool should be used.
2. Lift out plastic cover and "O" ring.
3. Remove scale screws and scale assembly. Be careful not to damage pointer.
4. The calibration is changed by moving the clamp. Loosen the clamp screw(s) and move slightly toward the helix if gage is reading high, and away if reading low. Tighten clamp screw and install scale assembly.
5. Place cover and O-ring in position. Make sure the hex shaft on inside of cover is properly engaged in zero adjust screw.
6. Secure cover in place by screwing bezel down snug. Note that the area under the cover is pressurized in operation and therefore gage will leak if not properly tightened.
7. Zero gage and compare to test instrument. Make further adjustments as necessary.

Caution: If bezel binds when installing, lubricate threads sparingly with light oil or molybdenum disulphide compound.

Warning: Attempted field repair may void your warrenty. Recalibration or repair by the user is not recommended. For best results, return gage to the factory. Ship prepaid to:

Dwyer Instruments, Inc.

Attn: Repair Dept.

102 Indiana Highway 212

Michigan City, IN 46360

Trouble Shooting Tips:

•*Gage won't indicate or is sluggish.*

1. Duplicate pressure port not plugged.
2. Diaphragm ruptured due to overpressure.
3. Fittings or sensing lines blocked, pinched, or leaking.
4. Cover loose or "O"ring damaged, missing.
5. Pressure sensor, (static tips, Pitot tube, etc.) improperly located.
6. Ambient temperature too low. For operation below 20°F, order gage with low temperature, (LT) option.

•Pointer stuck-gage can't be zeroed.

1. Scale touching pointer.
2. Spring/magnet assembly shifted and touching helix.
3. **Metallic particles clinging to magnet and interfering with helix movement.**
4. Cover zero adjust shaft broken or not properly engaged in adjusting screw.

We generally recommend that gages needing repair be returned to the factory. Parts used in various sub-assemblies vary from one range of gage to another, and use of incorrect components may cause improper operation. After receipt and inspection, we will be happy to quote repair costs before proceeding.

Consult factory for assistance on unusual applications or conditions.

Use with air or compatible gases only.

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Printed in U.S.A. 4/01 FR# 12-440212-00 Rev. 3

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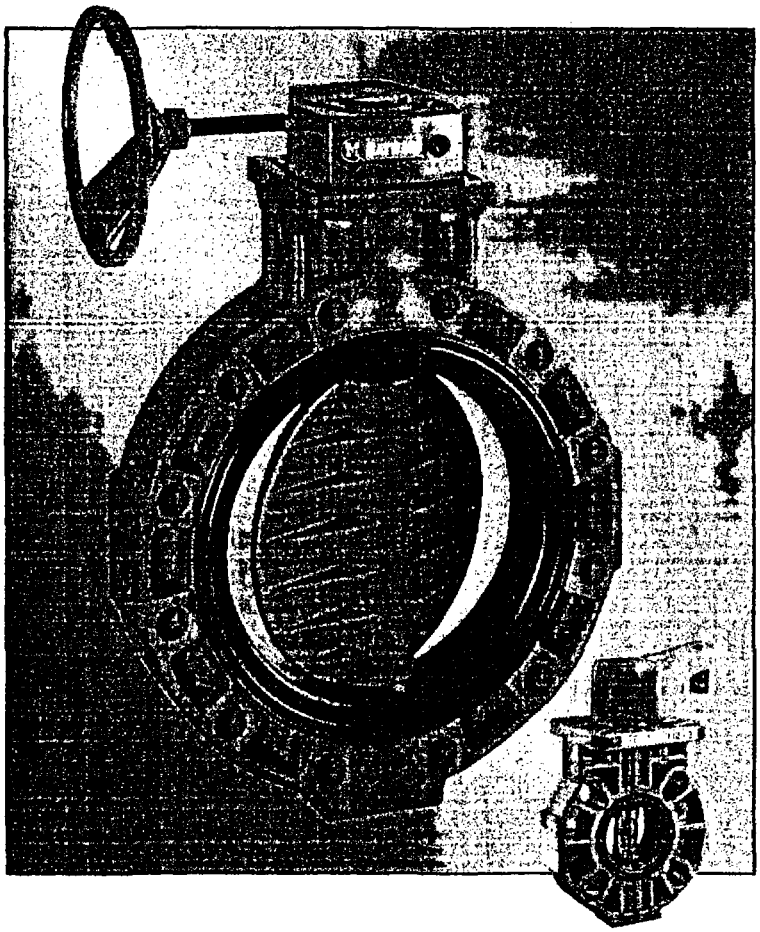
HAYWARD®

FlowControl

Butterfly Valves

1-1/2" to 12" • Bodies – PVC, Corzan® CPVC, PPL
Disks – PVC, Corzan® CPVC, PPL, PVDF



Features

- Rated at 150 PSI
- Stainless Steel Shaft
- Fully Supported Flange Bolt Holes
- Full Body, V-Notch Liner
- Blowout-Proof Shaft
- Viton, EPDM or Nitrile Liners

Options

- Stem Extensions
- Lug Body Design
- Gear Operators
- Electric Actuators
- Pneumatic Actuators
- Titanium Shaft
- 2" Square Operating Nut
- PVDF Discs

A Better Butterfly Valve

Hayward 1-1/2" through 12" all-Plastic Butterfly Valves are rated at a full 150 psi. Unlike other plastic butterfly valves, Hayward valves are constructed from a one piece body that incorporates fully supported flanged bolt holes to prevent stressing of the mating pipe flanges. Their heavy duty construction stands up to the most demanding applications. The rock solid integral mounting pad insures that the valve operator will function reliably – whichever operator is used, lever handle, gear box or actuator.

Extra Features, No Extra Cost

Hayward Butterfly Valves feature a blowout-proof stainless steel stem and a unique, full body liner that has a V-notch retention design. This assures positive sealing of the liner to the valve body. An integrally molded face seal provides positive sealing against the mating flange without the need for additional gaskets. And the lever handle has a built in lockout feature.

Better Sealing

Other plastic butterfly valves have only a thin o-ring on the disk to seal the valve, but Hayward valves feature a full body liner seal. This means that the process media never contacts the valve body. And you can count on the full liner seal to perform reliably, year after year.

Easy Retrofit

Hayward Butterfly Valves can be easily fitted into a metal piping system. All valve sizes meet industry face-to-face standards – allowing simple retrofit.

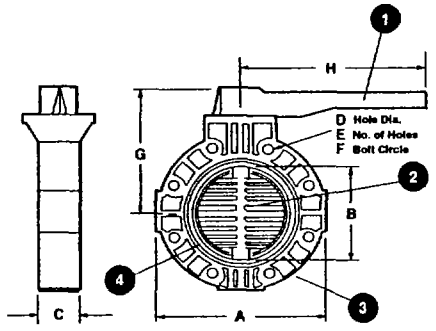
No Metal, No Corrosion

These valves have no metal in contact with the process media. They cannot corrode or rust – nor will they contaminate sensitive fluids flowing through them.

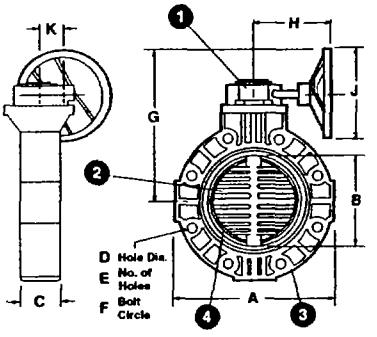
Corzan® CPVC is a trademark of Noveon, Inc.
Viton® is a trademark of DuPont Dow Elastomers

Technical Information

Lever Handle Operator



Gear Box Operator



Parts List Butterfly Valves

1. Operator (Lever or Gear Box)
2. Disc
3. Body
4. Liner

Dimensions - Inches / Millimeters

Size	A	B	C	D	E	F	G		H		J	K	Wt. Lb / Kg
							Gear Box	Lever	Gear Box	Lever			
1-1/2 / 50	6.00 / 152	1.75 / 44	1.50 / 38	.63 / 16	4	3.88 / 99	9.31 / 236	6.25 / 159	7.13 / 181	10.50 / 267	8.00 / 203	1.88 / 48	10.5 / 4.8
2 / 63	6.00 / 152	1.75 / 44	1.50 / 38	.75 / 19	4	4.75 / 121	9.31 / 236	6.25 / 159	7.13 / 181	10.50 / 267	8.00 / 203	1.88 / 48	10.5 / 4.8
3 / 90	7.75 / 197	3.13 / 80	2.00 / 51	.75 / 19	4	6.00 / 152	9.75 / 248	6.69 / 170	7.13 / 181	10.50 / 267	8.00 / 203	1.88 / 48	11.6 / 5.3
4 / 110	9.25 / 235	3.94 / 100	2.19 / 56	.75 / 19	8	7.50 / 191	10.19 / 259	7.94 / 202	7.13 / 181	12.00 / 305	8.00 / 203	1.88 / 48	14.3 / 6.5
6 / 160	11.25 / 286	5.81 / 148	2.31 / 59	.88 / 22	8	9.50 / 241	12.38 / 314	9.50 / 241	7.13 / 181	14.00 / 356	8.00 / 203	1.88 / 48	15.4 / 7.0
8 / 225	13.75 / 349	7.75 / 197	2.50 / 64	.88 / 22	8	11.75 / 298	13.50 / 343	10.63 / 270	7.13 / 181	16.00 / 406	8.00 / 203	1.88 / 48	23.5 / 10.7
10 / 280	16.00 / 406	9.76 / 248	3.00 / 76	1.00 / 25	12	14.25 / 362	16.00 / 406	N/A	8.09 / 205	N/A	8.00 / 203	2.36 / 59	39.0 / 17.7
12 / 315	19.00 / 483	11.50 / 292	3.18 / 81	1.00 / 25	12	17.00 / 432	17.50 / 445	N/A	8.09 / 205	N/A	8.00 / 203	2.36 / 59	51.0 / 23.1

DIN metric flanges available

Cv Factors

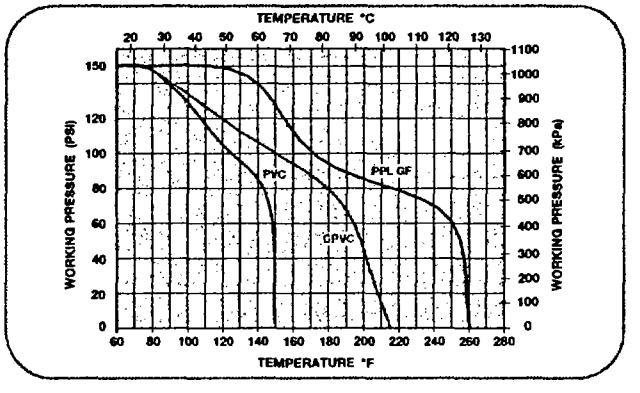
Size	Factor	Size	Factor
1-1/2"	90	6"	1100
2"	125	8"	2500
3"	280	10"	4700
4"	675	12"	7100

Pressure Loss Calculation Formula

$$\Delta P = \left[\frac{Q}{Cv}\right]^2$$

ΔP = Pressure Drop
Q = Flow in GPM
Cv = Flow Coefficient

Operating Temperature/Pressure



Selection Chart

Size	Body Material	Disc Material	Shaft Material	Liner	Operator	Pressure Rating
*1-1/2" to 8"	CPVC	CPVC	316 SSTL	Viton®, EPDM or Nitrile	Lever or Gear Box	150 PSI @70F Non-Shock
1-1/2" to 8"	PVC	PVC, PPL, or PVDF				
1-1/2" to 12"	PPL	PPL				

* CPVC/CPVC 8" gear operated only

HAYWARD®

Hayward Industrial Products, Inc.
One Hayward Industrial Drive, Clemmons, NC 27012
Tel: 1-888-429-4635 (1-888-HAYINDL) • Fax: 1-888-778-8410
E-mail: industrial@haywardnet.com
Web Site: http://www.haywardindustrial.com

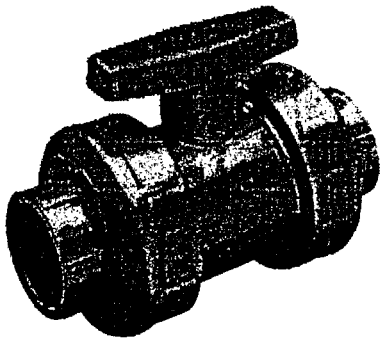
Hayward Industrial Products (UK) Ltd.
Unit 2, Crowngate, Wyncolls Road
Colchester, Essex C04 9HZ
Tel: +44 (0) 1206 854454 • Fax: +44 (0) 1206 851240

MC-1-BFY-12 Rev. 4 Printed in U.S.A.

PVC & CPVC TRUE UNION BALL VALVES
(Regular Style)

TU-2-0901

Multi-Featured Industrial Valve



The unique design features of this quarter-turn shut off valve make it one of the most specified ball valves for industrial and chemical processing applications. Available in IPS sizes 1/2" through 4" with choice of socket, threaded or flanged end connectors, and 6" (venturied 4" valve) with choice of either socket or flanged end connectors. Also available in metric socket sizes 20mm through 110mm, and 1/2" through 4" BSP threads.

Heavy Bodied PVC or CPVC Construction
Spears® True Union Ball Valves never rust, scale, or pit, providing exceptional chemical and corrosion resistence.

Buttress Threaded Double Union Nuts
Strong Buttress type threads on union nuts and seal carriers allow higher pressure handling capability and quick in-line installation and servicing.

Safe-T-Blocked® Carrier
Stops flow in either direction, allowing safe removal of the downstream union nut for system service or modification.

PTFE Ball Seats
Spears® PTFE floating seat design reduces seat wear for extended valve life, smooth operation, and bubble-tight shut-off. 100% factory tested.

EPDM or Viton® O-ring Options
Choice of high grade, abrasion resistent EPDM or Viton® elastomer O-rings allows application specific selection for optimum chemical resistance.

High Impact Polypropylene Handle
Features double stop engagement and exhibits excellent resisitance to most chemical environments.

Safe-T-Shear® Stem
Developed to help prevent line fluids from leaking out in the event of ball valve stem damage. Engineered for high strength, the stem incorporates a special shear point to control accidental breakage. Over torquing breaks occur above the stem O-ring leaving the seal intact until repair or replacement can be made.

For additional information, please refer to Spears® THERMOPLASTIC VALVES & ACCESSORIES PRODUCT GUIDE & ENGINEERING SPECIFICATIONS V-4 and THERMOPLASTIC VALVES & ACCESSORIES Price Schedules V-1.

Full Schedule 80 Bore
In full open position, full bore virtually eliminates pressure drop, providing optimum flow.

Full 235 psi Pressure Rating
Maximum Internal Pressure at 73°F for the most demanding applications of 1/2" - 2" valves, 150 psi for 2-1/2" - 6" valves.

Suitable For Vacuum Service
Spears® True Union Ball Valves are tested at 26 in. Hg vacuum for one hour with less than 1 in. Hg loss.

NSF Listed for Potable Water
All True Union Ball Valves are NSF Certified for potable water use.

Fully Repairable
Convenient Seat & O-ring Replacement Kits, or Full Cartridge Replacement Kits for easy ordering, servicing and extended valve life.

Easy Field Actuation, or Custom Factory Actuation Available
Easily actuated in the field using optional mounting kits listed below. Spears® in-house actuation program can quickly fit mechanical actuation to specific application needs.

Optional Accessories
- Round Safety Handle
- Stem Extension Kit
- Multi-Mount Valve Mounting Brackets
- Complete Multi-Mount Actuation Mounting Kit
- Mini-Mount Actuation Mounting Kit
- 2" Square/T-Style Operator Nut

Sample Engineering Specification
All thermoplastic ball valves shall be True Union type constructed from PVC Type I, ASTM D 1784 Cell Classification 12454 or CPVC Type IV, ASTM d 1784 Cell Classification 23447. All O-rings shall be EPDM or genuine Viton®. All valves shall have Safe-T-Shear® stem and double stop Polypropylene handle. All valve union nuts shall have Buttress threads. All seal carriers shall be Safe-T-Blocked®. All valve components shall be replaceable. All 1/2" - 2" valves shall be pressure rated at 235 psi and all 2-1/2" - 4" valves shall be pressure rated at 150 psi for water at 73°F, as manufactured by Spears® Manufacturing Company.

Viton® is a Registered Trademark of Dupont Dow Elastomers.

Assessed to ISO 9001

PROGRESSIVE PRODUCTS FROM SPEARS® INNOVATION & TECHNOLOGY

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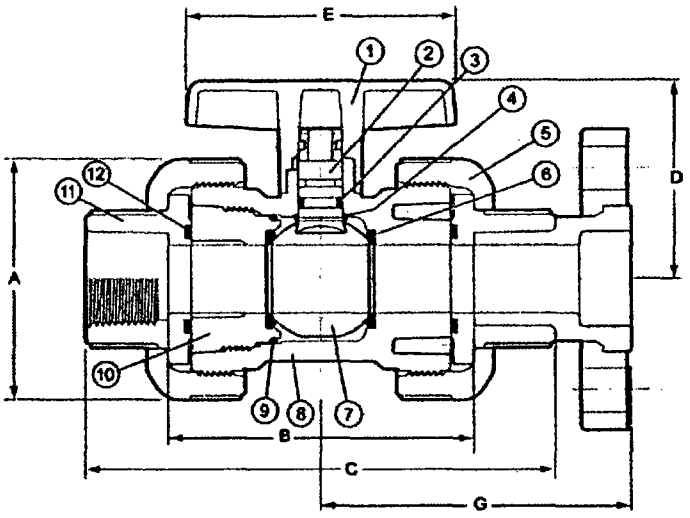

Replacement Parts

No.	Component	Qty.	Material
1	Handle	1	PP
2	Stem	1	PVC/CPVC
3	Stem O-ring	1	EPDM/Viton®
4	Stem Bearing*	1	PP
5	Union Nut	2	PVC/CPVC
6	Seat	2	PTFE
7	Ball	1	PVC/CPVC
8	Body	1	PVC/CPVC
9	Carrier O-ring	1	EPDM/Viton®
10	Seal Carrier	1	PVC/CPVC
11	End Connector	2	PVC/CPVC
12	End Connector O-ring	2	EPDM/Viton®

* sizes 1-1/4" and larger.

• Seat O-ring (not shown) on sizes 2-1/2" and larger.

Nominal Size	Dimension Reference (inches, ± 1/16)						Approx. Wt. (Lbs.)				Oper.[2] Torque (in.-lb.)	C_v[4] Values	
							PVC		CPVC				
	A	B[1]	C	D	E	G	Thd/Soc	Flanged	Thd/Soc	Flanged		Thd/Soc	Flanged
1/2	2-9/16	3-7/16	5-3/16	2-13/32	2-23/32	3-15/32	1.05	1.23	.95	1.14	20	25	18
3/4	3-1/32	4-1/16	6-3/16	2-5/8	3-3/16	4	1.44	1.64	1.50	1.73	30	51	36
1	3-13/32	4-1/2	6-9/16	2-13/16	3-23/32	4-5/16	1.91	2.22	2.08	2.43	40	97	67
1-1/4	3-11/16	4-1/2	7-1/16	2-31/32	4-1/8	4-19/32	2.38	2.78	2.52	2.91	60	204	142
1-1/2	4-3/8	5-5/16	8-1/32	3-9/32	4-15/32	5-9/32	3.63	4.00	3.82	4.26	80	285	201
2	5-3/16	5-13/16	8-13/16	4-13/32	5-1/4	5-23/32	5.40	6.14	5.70	6.54	90	540	381
2-1/2	7-7/16	8-3/8	11-7/8	4-29/32	9-7/8	7-3/16	12.87	14.26	13.44	15.85	300	712	512
3	7-7/16	8-3/16	11-15/16	4-29/32	9-7/8	7-11/32	13.24	15.67	13.85	16.96	300	1294	925
4	8-15/16	8-11/16	13-3/16	5-19/32	10-13/16	8-5/32	19.58	14.32	20.49	25.83	400	2629	1868
6 Socket[3]	8-15/16	19-5/8	26-1/16	6-3/4	10-13/16	14-11/16	22.66	30.98	26.11	34.78	400	N/A	N/A
6 Flanged[3]	11-3/16	29-3/8	N/A	6-3/4	10-13/16	14-11/16	N/A	N/A	N/A	N/A	400	N/A	N/A

1: Valve Lay Lengths.
2: Torque required at valve maximum internal pressure rating, 5 ft./sec. flow velocity.
3: Consists of 4" True Union Ball Valve with two 4" x 6" Adapters.
4: Gallons per minute at 1 psi pressure drop. Values calculated from valve laying length, based on derivative of Hazen-Williams equation with surface roughness factor of C=150.
C_v: Values for 6" venturied flange and socket valves are not available.

Temperature Pressure Rating

System Operating Temperature °F (°C)			100 (38)	110 (43)	120 (49)	130 (54)	140 (60)	150 (66)	160 (71)	170 (77)	180 (82)	190 (88)	200 (93)	210 (99)
Valve Pressure Rating psi (Mpa)	1/2" - 2"	PVC	235 (1.62)	211 (1.45)	150 (1.03)	75 (.52)	50 (.34)	-0- (-0-)	-0- (-0-)	-0- (-0-)	-0- (-0-)	-0- (-0-)	-0- (-0-)	-0- (-0-)
		CPVC	235 (1.62)	219 (1.51)	170 (1.17)	145 (1.00)	130 (.90)	110 (.76)	90 (.62)	80 (.55)	70 (.48)	60 (.41)	50 (.34)	-0- (-0-)
	2-1/2" - 4"	PVC	150 (1.03)	135 (.93)	110 (.76)	75 (.52)	50 (.34)	-0- (-0-)	-0- (-0-)	-0- (-0-)	-0- (-0-)	-0- (-0-)	-0- (-0-)	-0- (-0-)
		CPVC	150 (1.03)	140 (.97)	130 (.90)	120 (.83)	110 (.75)	100 (.70)	90 (.62)	80 (.55)	70 (.48)	60 (.41)	50 (.34)	-0- (-0-)

Note: Flanged valves are rated at 150 psi @73°F

NOT FOR USE WITH COMPRESSED AIR OR GASES

Spears® Manufacturing Company DOES NOT RECOMMEND the use of thermoplastic piping products for systems to transport or store compressed air or gases, or the testing of thermoplastic piping systems with compressed air or gases in above and below ground location. The use of our product in compressed air or gas systems automatically voids any warramty for such products, and its use against our recommendation is entirely the responsibilty and liability of the installer.

WARNING: DO NOT USE COMPRESSED AIR OR GAS TO TEST ANY PVC OR CPVC THERMOPLASTIC PIPING PRODUCT OR SYSTEM, AND DO NOT USE DEVICES PROPELLED BY COMPRESSED AIR OR GAS TO CLEAR SYSTEMS. THESE PRACTICES MAY RESULT IN EXPLOSIVE FRAGMENTATION OF SYSTEM PIPING COMPONENTS CAUSING SERIOUS OR FATAL BODILY INJURY.

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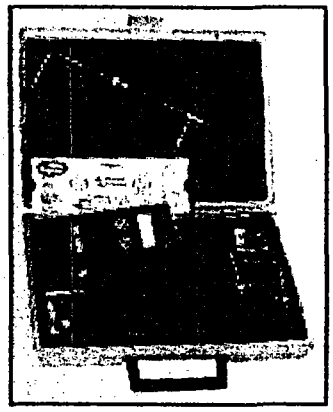
Model 475-1-FM-AV Air Velocity Kit

Includes Digital Manometer, Pitot Tube, Accessories

Convenient all-in-one kit is small, light and easy to use. No set-up or leveling needed. Digital manometer reads from 0-19.99 in. w.c. with ±0.5% F.S. accuracy and minor divisions to 0.01. Large ½" LCD readout is easy to see in poorly lighted areas and has "low battery" warning. Included is a 6" stainless steel Pitot tube with integral compression fitting to hold it securely when taking readings. Also, two static pressure tips with magnetic mounting measure pressure drop across filters, condenser coils, etc. Kit comes complete with rubber tubing, 9V battery, step drill, AV calculator slide rule, and custom fitted carrying case. An indispensable test kit for the plant engineer, industrial hygienist and HVAC technician.

STOCKED MODEL
475-1-FM-AV Air Velocity Kit

Complete Kit Includes:
- Model 475-1 Digital Manometer, range 0-19.99 in. w.c.
- Model 166-6-CF, 6" Pitot Tube with Compression Fitting
- Two No. A-303 Static Pressure Tips with Magnetic Mounting
- Two 9 Ft. Lengths 3/16" I.D. Rubber Tubing
- No. A-397 Step Drill for 3/16"-½" Holes in 1/16" Increments
- No. A-532 AV Slide Chart
- 9 Volt Battery
- Fitted Polyethylene Case



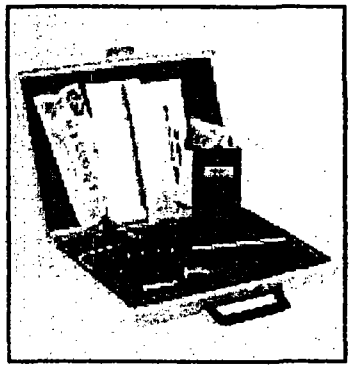
Model 475-1T-FM-AV Air Velocity Kit

Includes Digital Manometer, Telescoping 36 Inch Pitot Tube, Accessories

Convenient all-in-one kit is small, light and easy to use. No set-up or leveling needed. Digital manometer reads from 0-19.99 in. w.c. with ±0.5% F.S. accuracy and minor divisions to 0.01. Large ½" LCD readout is easy to see in poorly lighted areas and has "low battery" warning. Kit includes convenient telescoping Pitot tube, Model 166T, fully adjustable from 11.5 to 36 inches (29.2 to 91.4 cm). Also, two static pressure tips with magnetic mounting measure pressure drop across filters, condenser coils, etc. Kit comes complete with rubber tubing, 9V battery, step drill, AV calculator slide rule, and custom fitted carrying case. An indispensable test kit for the plant engineer, industrial hygienist and HVAC technician.

STOCKED MODEL
475-1T-FM-AV Air Velocity Kit

Complete Kit Includes:
- Model 475-1 Digital Manometer, range 0-19.99 in. w.c.
- Model 166T, 36" Telescoping Stainless Steel Pitot Tube
- Two No. A-303 Static Pressure Tips with Magnetic Mounting
- Two 4½ Ft. Lengths 3/16" I.D. Rubber Tubing
- No. A-397 Step Drill for 3/16"-½" Holes in 1/16" Increments
- No. A-532 AV Slide Chart
- 9 Volt Battery
- Fitted Polyethylene Case



Model 477-1T-FM-AV Air Velocity Kit

Includes Digital Manometer, Telescoping 36 Inch Pitot Tube, Accessories

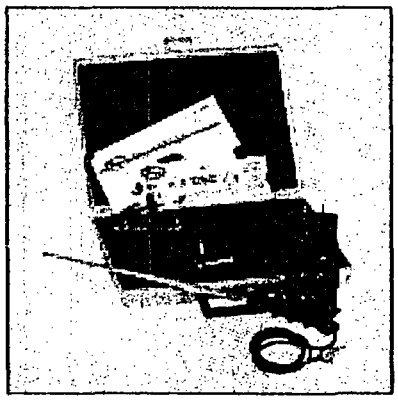
Convenient all-in-one kit is small, light and easy to use. No set-up or leveling needed. Digital manometer reads from 0-20 in. w.c. with ±0.5% F.S. accuracy. The Series 477 stores up to 20 readings in memory for later reference, instantly selecting up to nine English/Metric pressure units that are visible on a large, backlit 0.4" LCD readout. Both audible and visual overpressure alarms and a "low battery" warning are standard features.

Each kit includes convenient telescoping Pitot tube, Model 166T which is fully adjustable from 11.5 to 36 inches (29.2 to 91.4 cm). In addition, two static pressure tips with magnetic mountings measure pressure drop across filters, condenser coils, etc.

Kit comes complete with rubber tubing, 9V battery, step drill, AV calculator slide rule, and custom fitted carrying case. An indispensable test kit for the plant engineer, industrial hygienist and HVAC technician.

STOCKED MODEL
477-1T-FM-AV Air Velocity Kit

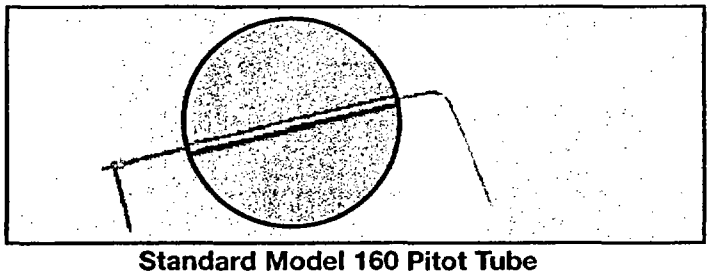
Complete Kit Includes:
- Model 477-1 Digital Manometer, range 0-20 in. w.c.
- Model 166T, 36" Telescoping Stainless Steel Pitot Tube
- Two No. A-303 Static Pressure Tips with Magnetic Mounting
- Two 4½ Ft. Lengths 3/16" I.D. Rubber Tubing
- No. A-397 Step Drill for 3/16" - ½" Holes in 1/16" Increments
- No. A-532 AV Slide Chart
- 9 Volt Battery
- Fitted Polyethylene Case



Series 160

Stainless Steel Pitot Tubes

ASME Design Meets AMCA and ASHRAE Codes

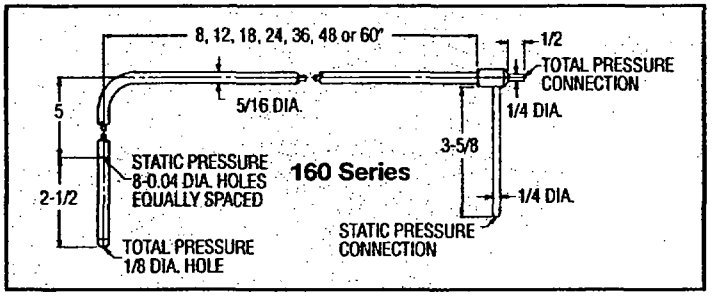


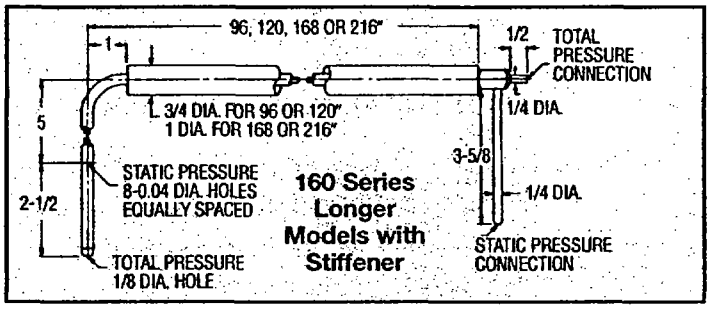
Standard Model 160 Pitot Tube

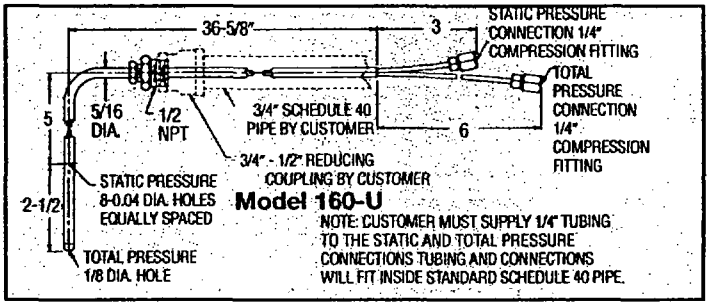
Ideal for use with our precision manometers and air velocity gages, Dwyer Pitot Tubes are constructed from corrosion resistant stainless steel for a lifetime of service. ASME design meets AMCA and ASHRAE specifications for maximum accuracy over a wide variety of flow conditions. No correction factors required as ASHRAE tip design yields a calibration factor of 1. ASHRAE design needs no calibration! Permanent, stamped insertion depth graduations on sides of 160 series facilitate accurate positioning. Static pressure port is parallel to sensing tube allowing quick, easy alignment of tube with air flow. Low sensitivity to misalignment gives accurate reading even when tube is misaligned up to 15 degrees. Various standard sizes are available for use in ducts as small as 4" dia. or as large as 36 ft. dia. A universal model fits user supplied ¾" schedule 40 (standard) pipe in any length. Several convenient mounting options are available for permanent installations.

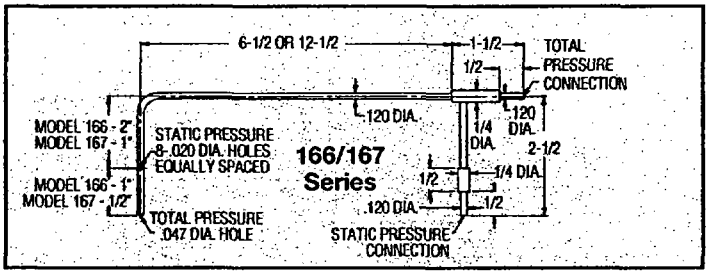
- No calibration needed.
- Precisely located, burr-free static pressure holes.
- Hemispherical tip design, best for accuracy if imperfectly aligned and nearly impossible to damage.
- Long lasting 304 stainless steel construction.
- Silver soldered connections for leak-proof operation.
- ASME design meets AMCA and ASHRAE specifications.
- Coefficient of "1."
- 5/16" models rated to 1500°F.
- Extended static connection helps guide tip within recommended 15° of air flow direction.
- Inch graduations on sides of 160 series to quickly determine exact insertion depth.
- Dwyer Air Velocity Calculator, direct reading flow charts and instructions included.
- Use ⅛" models in ducts as small as 4", 5/16" models in ducts 10" or larger.
- Optional mounting gland or split flange make permanent installation fast and simple.

A-158 Split Flange Mounting









ACCESSORIES

No. A-158 Split Flange Mounting can be added to any Dwyer No. 160 Standard Pitot Tube. Cadmium plated steel. Gasket is pattern for mounting holes. Secure flange loosely to tube, adjust tube depth and tighten screws. Gasket of ¼" Neoprene fits tightly around tube and against duct for leak-proof seal. Nuts, washers included.

No. A-159 Mounting Gland — No. A-159 Mounting Gland — Versatile adapter slips on any Series 160, 5/16" standard Pitot tube made after Dec. 1990. Two-part stainless steel fitting slides over tube and provides permanent, secure mounting. Where duct interior is accessible, use the washers and jam nut supplied. For blind applications or in thicker materials, use model A-156 flange mounting plate. Once tube is adjusted to proper depth and angle, tighten smaller hex bushing to lock position. Graphite bushing inside assures leak-proof seal even at higher temperatures. Teflon® bushing also available. **NOTE:** For full insertion with this fitting, order next longer Pitot tube.

No. A-397 Step Drill. For fast, convenient installation of Pitot tubes in sheet metal ducts. No center punch needed; automatic de-burring. Drills six sizes from 3/16"-½" in 1/16" increments.

A-159 Mounting Gland is used for both duct mounting and flange mounting. To flange mount, the A-159 must be used with the A-156 flange mounting plate.

A-159 Duct Mounting Gland

A-156 Flange Mounting Plate

A-397 Step Drill

STOCKED MODELS in bold

Standard ⅝" Dia.		Longer Length w/ Stiffener	
Model Number	Insertion Length	Model Number	Insertion Length
160-8	8"	160-96	96"
160-12	12"	160-120	120"
160-18	18"	160-168	168"
160-24	24"	160-216	216"
160-36	36"	Pocket Size ⅛" Dia.	
160-48	48"	166-6	6"
160-60	60"	166-12	12"
Universal Model for ¾" Pipe		167-6	6"
160-U	*	167-12	12"
Accessories & Options			
A-156 Flange Mounting Plate 1/2" female NPT A-158 Split Flange A-159 Mounting Gland A-397 Step Drill		Compression Fitting mounting option for 166/167 Series. Add -CF suffix (166-6-CF). Add to prices above	

*Universal model for permanent installation and connection to metal tubing. Make any length Pitot tube with ¾" schedule 40 pipe, ¾" to ½" reducing bushing and ¼" metal tubing.

See also: Ellipsoidals "S" Type Pitot Tubes - page 179

Dwyer Instruments, Inc./P.O. Box 373/Michigan City, IN 46361/Phone 219 879-8000/Fax 219 872-9057 • U.K. Phone (+44) (0)1494-461707 • Australia Phone 61 2 4272-2055

BULLETIN NO. H-11

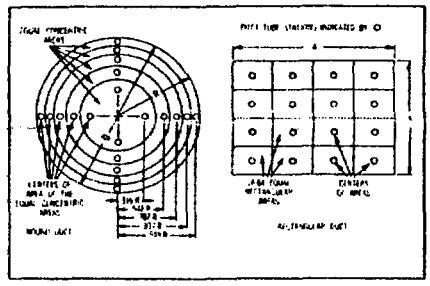
AIR VELOCITIES WITH THE DWYER PITOT TUBE

AIR VELOCITY

The total pressure of an air stream flowing in a duct is the sum of the static or bursting pressure exerted upon the sidewalls of the duct and the impact or velocity pressure of the moving air. Through the use of a pitot tube connected differentially to a manometer, the velocity pressure alone is indicated and the corresponding air velocity determined.

For accuracy of plus or minus 2%, as in laboratory applications, extreme care is required and the following precautions should be observed:

1. Duct diameter 4" or greater.
2. Make an accurate traverse per sketch at right, calculate the velocities and average the readings.
3. Provide smooth, straight duct sections a minimum of 8½ diameters in length upstream and 1½ diameters downstream from the pitot tube.
4. Provide an egg crate type straightener upstream from the pitot tube.



In making an air velocity check select a location as suggested above, connect tubing leads from both pitot tube connections to the manometer and insert in the duct with the tip directed into the air stream. If the manometer shows a minus indication reverse the tubes. With a direct reading manometer, air velocities will now be shown in feet per minute. In other types, the manometer will read velocity pressure in inches of water and the corresponding velocity will be found from the curves in this bulletin. If circumstances do not permit an accurate traverse, center the pitot tube in the duct, determine the center velocity and multiply by a factor of .9 for the approximate average velocity. Field tests run in this manner should be accurate within plus or minus 5%.

The velocity indicated is for dry air at 70°F., 29.9" Barometric Pressure and a resulting density of .075#/cu. ft. For air at a temperature other than 70°F. refer to the curves in this bulletin. For other variations from these conditions, corrections may be based upon the following data:

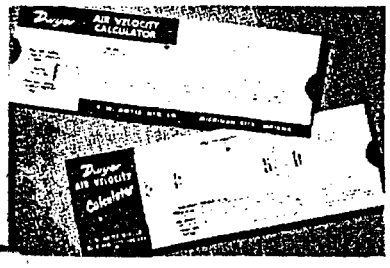
$$\text{Air Velocity} = 1096.2 \sqrt{\frac{Pv}{D}}$$

where Pv = velocity pressure in inches of water
D = Air density in #/cu. ft.

$$\text{Air Density} = 1.325 \times \frac{P_B}{T}$$

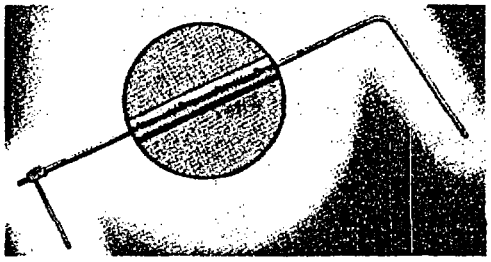
where P_B = Barometric Pressure in inches of mercury
T = Absolute Temperature (indicated temperature °F plus 460)

Flow in cu. ft. per min. = Duct area in square feet x air velocity in ft. per min.



AIR VELOCITY CALCULATOR

Computes velocity based on air density corrected for conditions of temperature and pressure. Eliminates tedious calculations. Ranges from .01 to 10" water corresponding to 400 to 20,000 FPM. Furnished with each pitot tube.



STAINLESS STEEL PITOT TUBES

Test confirmed unity coefficient and lifetime construction of No. 304 stainless steel. Inch graduations show depth of insertion for traversing. Complies with AMCA and ASHRAE specifications. Sizes 12" to 60" long. Hand or fixed mounting types.

nted in U.S.A. 8/92

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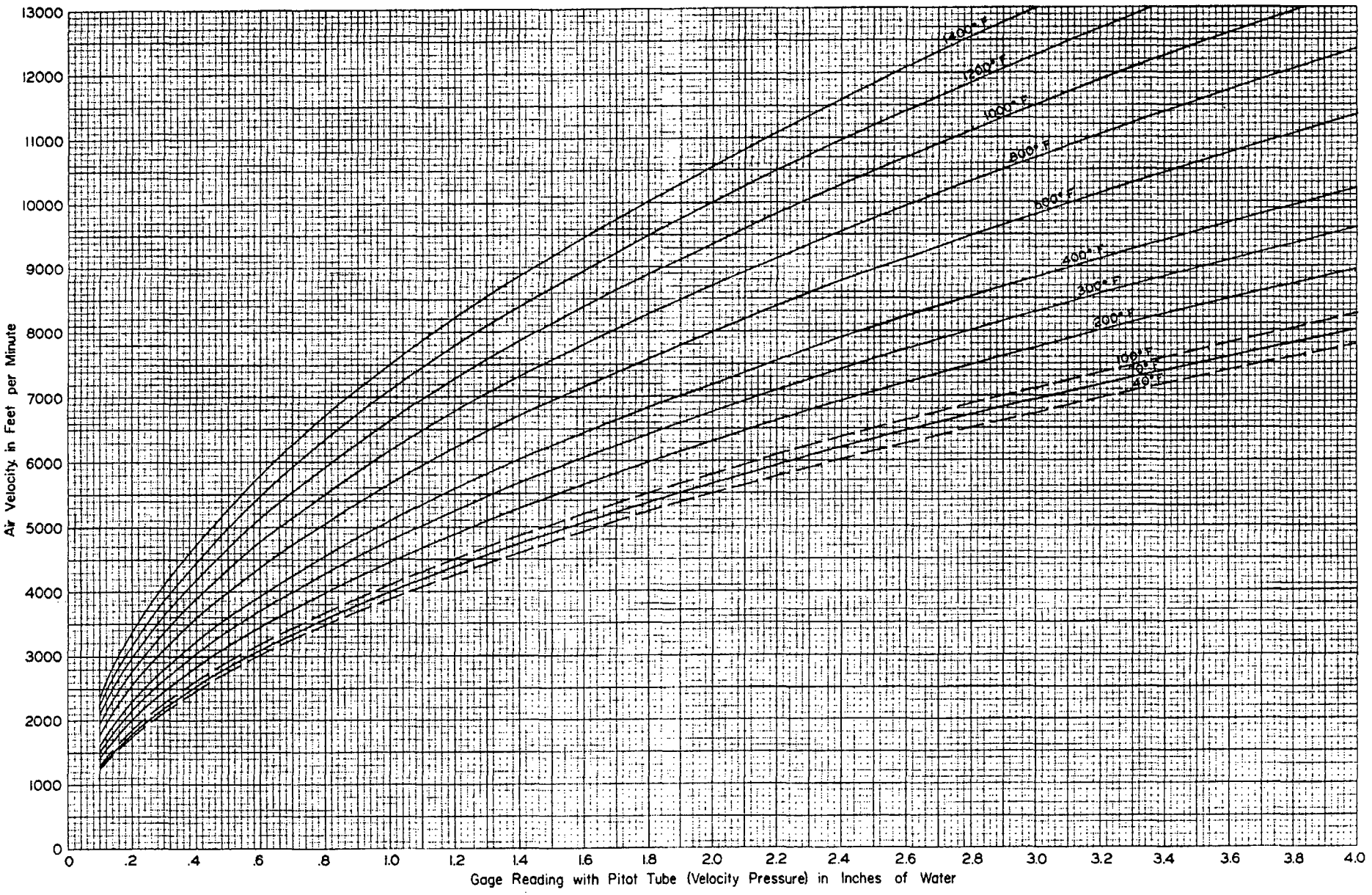
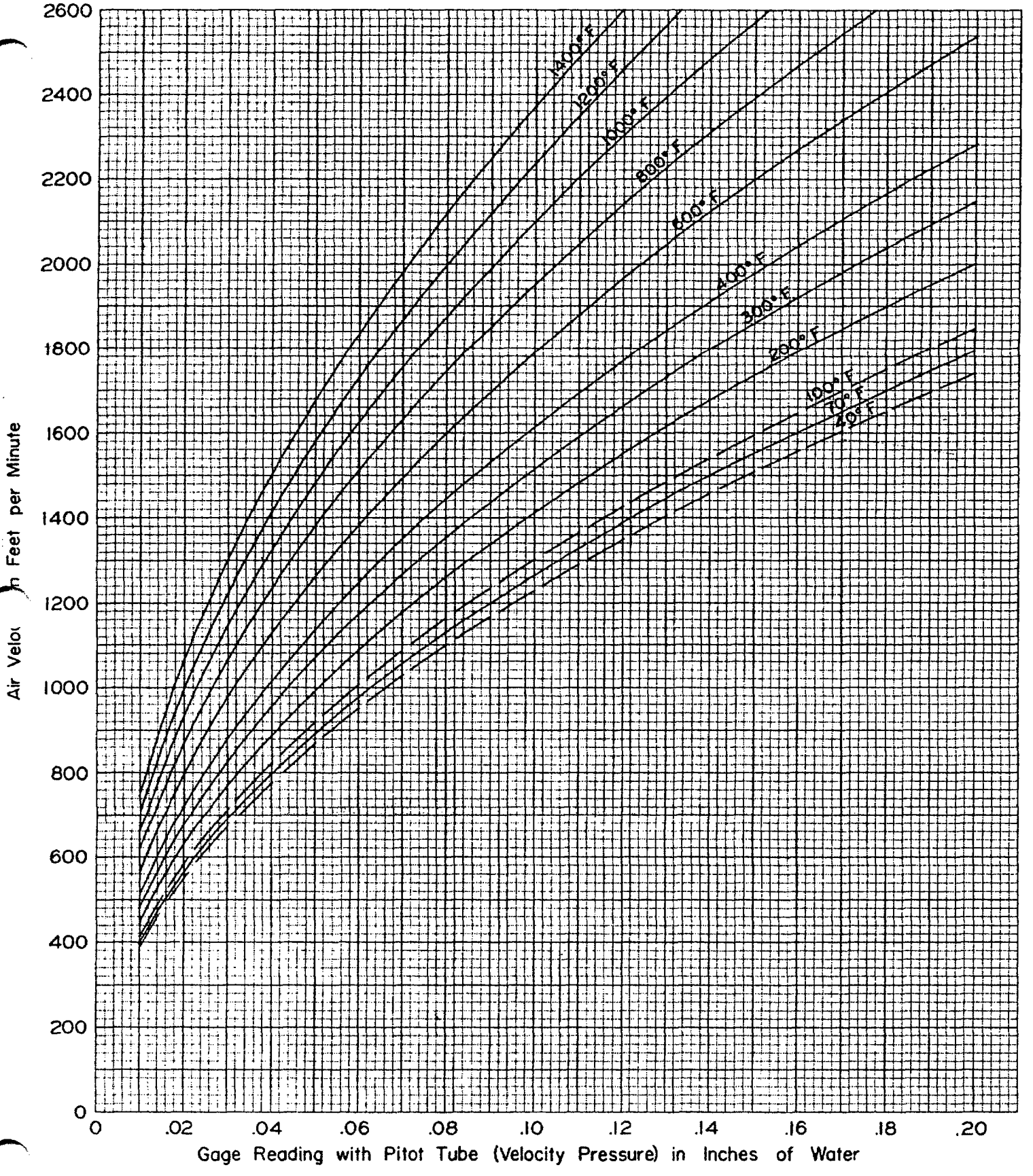
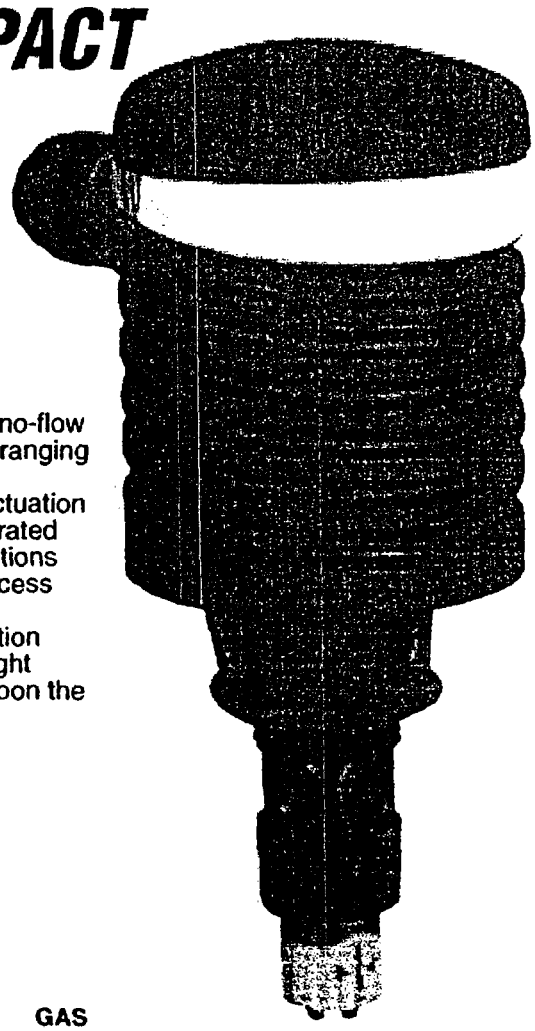

Air Velocity in Feet per Minute
13000
12000
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
0
.2
.4
.6
.8
1.0
1.2
1.4
1.6
1.8
2.0
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
3.8
4.0
Gage Reading with Pitot Tube (Velocity Pressure) in Inches of Water
1400° F
1300° F
1000° F
800° F
600° F
400° F
300° F
200° F
100° F
0° F
-40° F



FR 72-440226-00

FLOW SWITCH WITH COMPACT RELAY CONTROLLER



Model FST-211-R

$365

- Offered in Liquid and Gas Configurations
- All-Plastic Construction with PP/Ryton or PVDF Materials for Corrosive Environments
- Invert Switch Provides Simple NO or NC Relay Operation
- LED Indicators for Fluid, Relay and Power Status
- 0 to 60 Second Time Delay Dampens Out Relay Chatter
- Fail-Safe Controller Provides Direct Actuation of Pumps, Valves and Blowers

APPLICATION

This switch package offers a complete solution for flow or no-flow switching in pipes or ducting ranging up to 12". The compact relay controller provides reliable actuation of valves, pumps or blowers rated up to ½ HP. Common applications include low flow pump or process protection.
To complete the instrumentation package, simply select the right switch configuration based upon the liquid or gas application fluid.

APPLICATION VARIABLES

	Variable	Yes	No
Liquid	Clean	✓	
	Slurry	✓	
	Bubbles		✓
	Coating		✓
	Non-Coating	✓	
	Low Viscosity	✓	
	Med. Viscosity	✓	
	High Viscosity		✓
	Low Temperature	✓	
	Med. Temperature		✓
	High Temperature		✓
	Δ Temperature		✓
	Low Velocity	✓	
	High Velocity		✓

GAS

	Variable	Yes	No
Gas	Low Temperature	✓	
	Med. Temperature	✓	
	High Temperature		✓
	Δ Temperature		✓
	Coating		✓
	Non-Coating	✓	
	Low Velocity	✓	
	High Velocity		✓

SPECIFICATIONS

Relay Controller

Supply Voltage: 120/240 Vac 50/60 Hz
Consumption: 0.25 amps
Relay Type: (1) SPDT
Relay Current: 10 A, 250 Vac, ½ HP
Relay Mode: NO or NC Selectable
Time Delay: 0 to 60 sec
Temp. Range: -40 to 70°C (-40 to 158°F)
Enclosure Rating: NEMA-4X (IP65)
Enclosure Material: Polypropylene (U.L. 94VO)
Enclosure Rotation: 300° Swivel Base
Conduit Connection: ½" NPT

Sensor

Range: 0.04 to 3 ft/sec (liquids)
Accuracy: ±5% of setpoint at constant temperature and flowrate
Response Time: 10 seconds (approx.)
Setpoint Drift with Fluid Temperature: 0.5%/°C
Fluid Temperature: 60°C (140°F)
Max Fluid Pressure: PP or PVDF: 150 psi @ 25°C (779°F) derated @ 1.667 psi/°C above 25°C (779°F)
Process Connection: ¾" MNPT

☐ ***MOST POPULAR MODELS HIGHLIGHTED!***

To Order *(Specify Model Number)*

Model No.	Price	Description	Wetted Material	Pipe Size
FST-211-R	$365	Liquid flow switch with relay	PP/Ryton	¾ to 1½"
FST-212-R	465	Liquid flow switch with relay	PVDF	¾ to 1½"
FST-221-R	375	Liquid flow switch with relay	PP/Ryton	2 to 12"
FST-222-R	475	Liquid flow switch with relay	PVDF	2 to 12"
FST-321-R	375	Gas flow switch with relay	PP/Ryton	¾ to 1½"
FST-322-R	475	Gas flow switch with relay	PVDF	¾ to 1½"
FST-323-R	385	Gas flow switch with relay	PP/Ryton	2 to 12"
FST-324-R	485	Gas flow switch with relay	PVDF	2 to 12"
Flow Switch Fittings, use with 3" sensor only (¼-½" pipe and tubing)				
FT-51	$40	Use with 0.05 - 1.53 GPM range	PP	¼ to ½"
FT-52	80	Use with 0.10 - 6.53 GPM range	PVDF	¼ to ½"

To order CE approved switch configuration, add suffix "-CE" to model number and add $30 to price. The CE approved configuration complies with EN50082-2 immunity, EN55011 emission and EN 61010-1 safety standards. Ordering Example: FST-211-R-CE, CE approved Polypropylene liquid flow switch with relay, $365 + 30 = $395.

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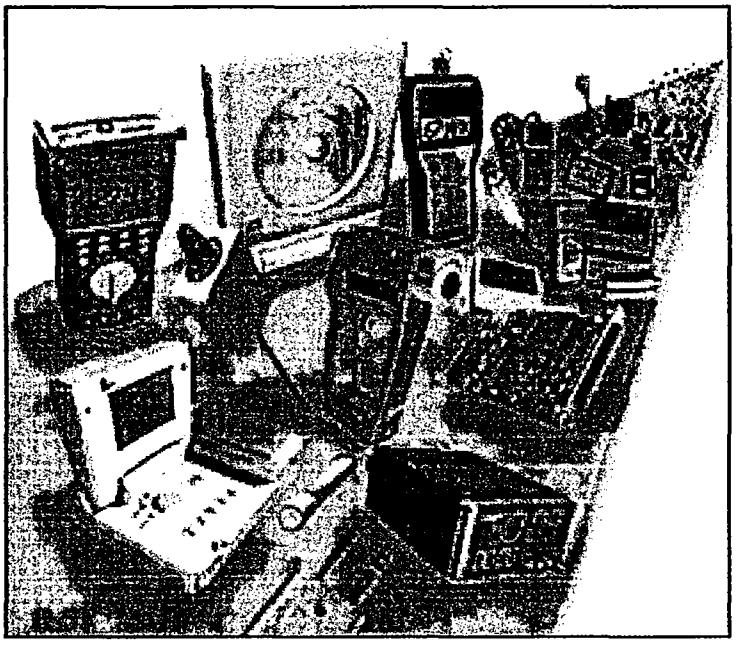

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SENSAPHONE®

Model 1104

User's Manual

Version 1.21

PHONETICS, INC.

Sensaphone® Model 1104 User's Manual

Every effort has been made to ensure that the information in this document is complete, accurate and up-to-date. PHONETICS, INC. assumes no responsibility for the results of errors beyond its control. PHONETICS, INC. also cannot guarantee that changes in equipment made by other manufacturers, and referred to in this manual, will not affect the applicability of the information in this manual.

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Revised Edition, version 1.21, April, 2004

Written and produced by Phonetics. Inc.

Please address all comments on this publication to:

PHONETICS, INC.
901 Tryens Road
Aston, PA 19014
www.sensaphone.com

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IMPORTANT SAFETY INSTRUCTIONS

Your Model 1104 has been carefully designed to give you years of safe, reliable performance. As with all electrical equipment, however, there are a few basic precautions you should take to avoid hurting yourself or damaging the unit:

- Read the installation and operating instructions in this manual carefully. Be sure to save it for future reference.
- Read and follow all warning and instruction labels on the product itself.
- To protect the Model 1104 from overheating, make sure all openings on the unit are not blocked. Do not place on or near a heat source, such as a radiator or heat register.
- Do not use your Model 1104 near water, or spill liquid of any kind into it.
- Be certain that your power source matches the rating listed on the AC power transformer. If you're not sure of the type of power supply to your facility, consult your dealer or local power company.
- Do not allow anything to rest on the power cord. Do not locate this product where the cord will be abused by persons walking on it.
- Do not overload wall outlets and extension cords, as this can result in the risk of fire or eleetric shock.
- Never push objects of any kind into this product through ventilation holes as they may touch dangerous voltage points or short out parts that could result in a risk of fire or electric shock.
- To reduce the risk of electric shock, do not disassemble this product, but return it to Sensaphone Customer Service, or other approved repair facility, when any service or repair work is required. Opening or removing covers may expose you to dangerous voltages or other risks. Incorrect reassembly can cause electric shock when the unit is subsequently used.
- If anything happens that indicates that your Model 1104 is not working properly or has been damaged, unplug it immediately and follow the procedures in Appendix D for having it serviced. Return the unit for servicing under the following conditions:

1. The power cord or plug is frayed or damaged.
2. Liquid has been spilled into the product or it has been exposed to water.
3. The unit has been dropped, or the cabinet is damaged.
4. The unit doesn't function normally when you're following the operating instructions.

- Avoid using a telephone (other than a cordless type) during an electrical storm. There may be a remote risk of electric shock from lightning.
- Do not use the telephone to report a gas leak in the vicinity of the leak.

CAUTION

To Reduce the Risk of Fire or Injury to Persons, Read and Follow these Instructions:

1. Use only the following type and size batteries: Alkaline, size D.
2. Do not dispose of the batteries in a fire. The cell may explode. Check with local codes for possible special disposal instructions.
3. Do not open or mutilate the batteries. Released electrolyte is corrosive and may cause damage to the eyes or skin. It may be toxic if swallowed.
4. Exercise care in handling batteries in order not to short the battery with conducting materials such as rings, bracelets, and keys. The battery or conductor may overheat and cause burns.
5. Do not mix old and new batteries in this product.

FCC Requirements

Part 68: The Sensaphone® Model 1104 complies with Part 68 of the FCC rules. On the back of the unit there is a label that contains, among other information, the FCC Registration Number and the Ringer Equivalence Number (REN) for this equipment. You must, upon request, provide this information to your local telephone company.

The REN is useful to determine the quantity of devices that you may connect to your telephone line and still have all of those devices ring when your telephone number is called. In most, but not all areas, the sum of the REN's of all devices connected to one line should not exceed five (5.0). To be certain of the number of devices that you may connect to your line, you may want to contact your local telephone company to determine the maximum REN for your calling area.

This equipment may not be used on coin service provided by the telephone company. Connection to party lines is subject to state tariffs.

Should the Model 1104 cause harm to the telephone network, the telephone company may discontinue your service temporarily. If possible, they will notify you in advance. But if advance notice isn't practical, the telephone company may temporarily discontinue service without notice and you will be notified as soon as possible. You will be informed of your right to file a complaint with the FCC. The telephone company may make changes in its facilities, equipment, operations, or procedures where such action is reasonably required in the operation of its business and is not inconsistent with the rules and regulations of the FCC that could affect the proper functioning of your equipment. If they do, you will be notified in advance to give you an opportunity to maintain uninterrupted telephone service.

If you experience trouble with this equipment, or you need information on obtaining service or repairs, please contact:

PHONETICS, INC.

901 Tryens Road, Aston, PA 19014

(610)558-2700 Fax: (610)558-0222

The telephone company may ask that you disconnect this equipment from the network until the problem has been corrected or until you are sure that the equipment is not malfunctioning.

Part 15: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits a designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/television technician for help.

Canadian Department of Communications Statement

Notice: The Canadian Department of Communications label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective operational and safety requirements. The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, where the company's inside wiring is associated with a single line, individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

CAUTION: Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

The Load Number (LN) assigned to each terminal device denotes the percentage of the total load to be connected to a telephone loop which is used by the device to prevent overloading. The termination on loop may consist of any combination of devices subject only to the requirement that the total of the Load Numbers of all the devices does not exceed 100. For the Sensaphone® Model 1104, the Load Number is 8.

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Chapter 1: Introduction

The Sensaphone® Model 1104 is a fully-programmable, environmental monitoring system that offers extensive on-site and remote monitoring capability to small businesses, private homes, farms, greenhouses, computer rooms, and remote facilities. Designed for desktop or wall mounting, the Model 1104 is simple to install, program and operate; no changes to standard electrical or telephone service are required. Connected to a telephone line, it will respond to an alarm by dialing up to four separate telephone numbers. When the call is answered, an "Alert Condition" message is delivered in digitized speech.

The Model 1104 features built-in sensors to monitor a variety of conditions:

- High sound level
- AC electric power failure
- Battery backup
- Temperature*

*Note: While technically not a "built-in" sensor, temperature is factory installed on input 1, and if left installed will limit your additional inputs as listed below to 3.

1104 is equipped with 4 alert inputs. Additional sensors* can be added to extend monitoring capabilities to include:

- Intrusion or unauthorized entry
- Water leaks and seepage
- Temperature
- Humidity
- Equipment operation
- Many other conditions that may require unique monitoring solutions

* Refer to Appendix C for information on additional sensors (available separately from Sensaphone) best suited to your application.

The status of each monitored condition is readily obtained at the unit's installation site, or remotely by telephone. At the close of every Status Report, time is provided for listening to on-site sounds.

To ensure reliable operation, the Model 1104 features power backup capability; in the event of AC power failure, six D-cell batteries (not included) will continue to power the unit for approximately 24 hours.

This manual comprises the instructions and commands for installing and operating the Model 1104. The Quick Start chapter is included to speed understanding of programming and operation. Communication and Alarm Programming chapters demonstrate step-by-step methods for utilizing the full range of available features. The Troubleshooting chapter provides assistance in the event that problems are encountered.

Technical Support

If any questions arise upon installation or operation of the Model 1104, please contact Sensaphone Technical Service Department, at the number shown below, and have the following information:

- Date of Purchase _____
- Serial number of your Model 1104 _____

Technical Support is available from 8:00AM to 5:00PM EST.

Phonetics, Inc.

901 Tryens Road

Aston, PA 19014

610-558-2700

Fax: 610-558-0222

www.sensaphone.com

Chapter 2: Installation

Correctly installing the Model 1104 will ensure proper functioning of the unit. Please read the entire chapter before starting the installation process.

Within the packaging will be a Warranty Registration Card. Please take the time to fill this out and mail. The One Year Limited Warranty is explained in the back of this manual.

2.1 Operating Environment

The Model 1104 should be installed and operated in an area that provides space for wiring sensors to the screw terminals, near an AC power source and telephone line. Operating temperature ranges from 32° Fahrenheit (0° Celsius) to +120° Fahrenheit (+49° Celsius).

NOTE

The Model 1104 is a sensitive electronic device. Do not install the Model 1104 near strong electrostatic, electromagnetic or radioactive fields. Do not expose to fumes or corrosive vapors.

2.2 Mounting

Flat Mount: Place the Model 1104 on top of a desk or other horizontal surface. Wall Mount: Mount on a wall with two screws using the keyholes on the back panel of the unit. Place the screws or bolts 3 13/16" apart at the desired height from the floor. Hook the unit over the screws and toward the floor. Refer to Figure 2-1.

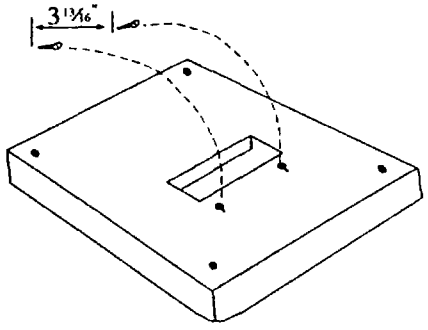


Figure 2-1. Wall Mount

2.3 Power Surge Protection

The Model 1104 can be damaged by power surges and lightning through the telephone line and the 120 VAC power supply. Although the Model 1104 has built-in surge protection, we recommend that additional protection be obtained for the unit and for any electronic equipment that is attached to your power supply and telephone lines. Power surge protection is especially important if you live in a lightning-prone area. The ISOTEL Surge Protector Model IB-4 is available through Sensaphone, Inc. See Appendix B.

2.4 Power Supply and Battery Backup

The Model 1104 is provided with an AC power transformer that will plug into any standard 120 VAC outlet and a battery backup (batteries not included) that enables the unit to continue functioning if AC power is removed (due to electric power disruption or failure). The Model 1104 uses six, D-cell alkaline batteries. Do not use rechargeable nicad batteries.

NOTE

Be sure that the AC transformer is plugged into an outlet before installing batteries.

To install the batteries, open the battery compartment hatch located underneath the unit, align batteries according to the diagram shown in Figure 2-2, and replace the hatch.

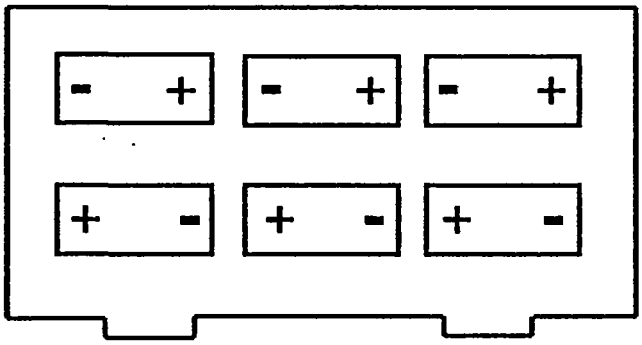


Figure 2-2. Battery Installation

2.5 Starting the Model 1104

When the AC power transformer is first plugged into the electrical outlet, the Model 1104 automatically starts in RUN mode. The red LED light will begin to glow. The unit will respond with,"Hello, this is Sensaphone 1104."

2.6 Run Mode and Standby Mode

Pressing the RUN/STANDBY key on the Model 1104 keypad will alternately activate or deactivate the unit. If the unit is activated and in RUN mode, the red LED (small red light on the upper right of the unit's front panel) glows steadily. In STANDBY mode, the red LED goes out, but will blink every few seconds to indicate that power is still supplied to the unit.

In RUN mode, the Model 1104 is able to receive incoming calls and to dial out automatically in the event of an alarm on one of the monitored conditions. To enter STANDBY mode, press RUN/STANDBY.

As soon as the Model 1104 enters STANDBY mode, it responds with "Have a good day." The red light immediately goes out and then resumes with a blink every few seconds. While in STANDBY mode, all functions are disabled, but programmed memory is preserved. Upon exiting STANDBY mode, any currently existing alert conditions will be announced.

NOTE

STANDBY mode is not equivalent to "power off"—an electrical source, such as the 120 VAC, or the battery backup, continues to provide full power to the unit. If the unit is placed in STANDBY mode, unplugged from the 120 VAC outlet, and placed in storage, the batteries will continue to power the Model 1104, discharging until they fail. Consequently, batteries should always be removed from the unit following disconnection from any 120 VAC outlet, prior to storage.

Press the RUN/STANDBY key again to return to RUN mode.

Figure 2-3. The RUN/STANDBY Key

2.7 Telephone Line

The Model 1104 will operate with all standard telephone systems that accept pulse or tone dialing. The Model 1104 cannot be used on an extension line to dial its own telephone number. Also, it may not be installed on a party line or pay telephone line.

Certain private telephone systems and public switching equipment may not accept the Model 1104 dialing or may generate an unacceptable ring signal. In those cases, a dedicated line may be required. Consult the supplier of your telephone system if you encounter problems.

If you do not have a modular telephone extension at the Model 1104's location, you must contact your local telephone company to have one installed (there is a charge for this service). If you have four-pin jacks, adapters are available to convert them to the modular plugs. Contact your local telephone company or electronics parts store.

CAUTION

Never install telephone wiring during a lightning storm. Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations. Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface. Use caution when installing or modifying telephone lines.

To install the telephone line, plug the modular telephone jack provided into any standard RJ11 phone outlet.
Refer to Figure 2-4.

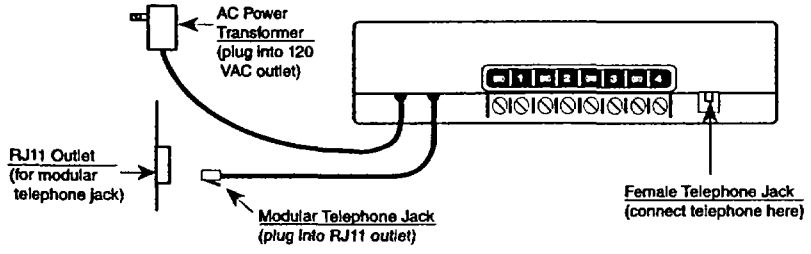


Figure 2-4. Installing the Telephone Line

On the back of the Model 1104 is a female telephone jack. This is provided so that a telephone or other answering device may be used on the same line as the unit. It is not necessary to hook up a telephone for the Model 1104 to operate.

2.8 The Microphone

The Model 1104 is provided with a built-in microphone which is used to monitor high sound levels produced near the installation site. The sensitivity of the microphone is configurable and will detect a continuous as well as a beeping alarm.

Other programming options that apply to the microphone include setting the length of time before a high sound causes an alarm.

If this sound level exists for 8 consecutive seconds (default) or for the programmed length of time, the Model 1104 will dial out with an alarm message.

NOTE

The proximity of the audible alarm to the microphone is extremely important.

Normally, the Model 1104 and the audible alarm must be in the same room. The maximum distance can vary considerably depending on the alarm, the acoustics, and the size of the room.

During an alarm dial-out, the microphone allows four-second intervals to listen-in to sounds at the Model 1104's location.

When calling for a Status Report, the microphone permits listening to on-site sounds for a programmed time interval.

2.9 Alert Inputs

The Model 1104 can monitor up to 4 inputs (represented by the numbered terminal screws shown in Figure 2-5, below).

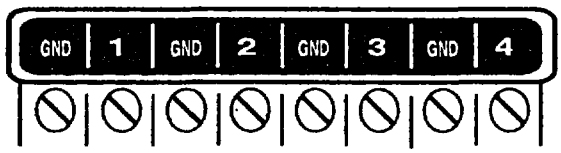


Figure 2-5. Alert Inputs

Inputs are configured as either dry contact or temperature. An input configured as dry contact can be used with any normally open (N.O.) or normally closed (N.C.) device. "Open" refers to an opened circuit path; if conditions cause the circuit to close, an alert condition occurs. "Closed" refers to a continuous circuit path; if a closed circuit is opened, an alert condition occurs. The Model 1104 determines the way inputs are configured by the type

of sensor connected to each alert input (refer to Chapter 5, Section 5.1).

An input configured as "temperature" is designed to evaluate a range of settings. The Model 1104 will read the temperature at the sensor's location and compare that value to programmed high and low temperature limits. Temperature inputs must be used with Sensaphone's Remote Temperature Sensor.

NOTE

Before wiring, it is advisable to disable the inputs to prevent accidentally tripping an alarm. See Chapter 5, Section 5.2.

2.10 Installing the Sensor

After you have selected the sensor, loosen the screw of the alert input and its corresponding ground. Two wire leads are used to connect any monitoring sensor. Fasten one lead to the numbered screw and the other lead to GND. Tighten both screws. If the input was not disabled, the Model 1104 may recite its "Alert Condition Exists" message as you connect the sensor. If it does, just press any key to stop it. Re-enable the input after wiring. Refer to Figures 2-6 and 2-7 for connecting a sensor to an alert input.

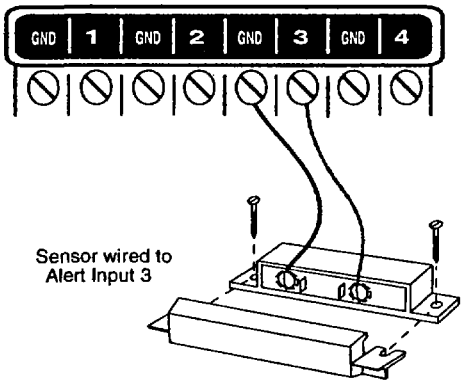


Figure 2-6. Sensor Connected to an Alert Input

Any sensor can be attached to the Model 1104 using 22-gauge wire. The sensor can be several hundred feet from the unit, as long as the total resistance of the circuit is not greater than 50 ohms. Use wire appropriate for the application.

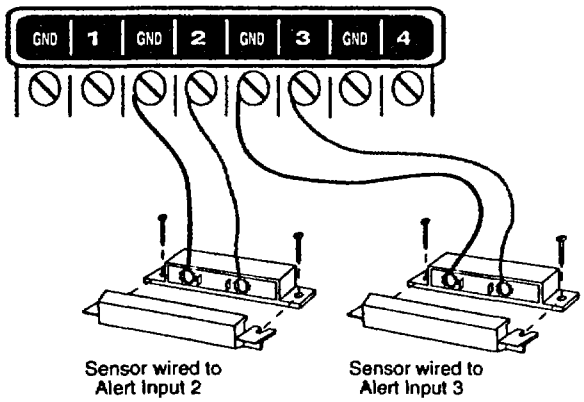


Figure 2-7. Two Sensors Wired to Adjacent Inputs

NOTE

Do not use sensors, switches, or relays that supply any voltage or current to the Model 1104. Be aware of proximity to other electrical wires or components when placing wires that lead from the sensors to the unit. Avoid running the wires near electrical devices that use high voltage or current, such as motors, heavy machinery, etc. This voltage may be inductively coupled into the sensor wiring and could result in damage to the the Model 1104's circuitry. Try to place wires at least 6 inches from other electrical wiring or devices.

2.11 Multiple Sensors

The Model 1104 may have more than one sensor connected to the same alert input, as long as the normal condition for each sensor on the same alert input is identical (either all N.O. or all N.C.). However, only one remote temperature sensor can be used on each input.

When wiring several normally closed sensors on one input, they must be connected in series. Connect one lead from the first sensor to the numbered screw of the alert input. Next, take the other lead from the first sensor and connect it to one lead from the next sensor. Continue connecting sensors end-to-end until you have connected all of your sensors. Take the second lead from the last sensor and connect it to the ground screw on the Model 1104. See Figure 2-8. Multiple N.C. sensors are typically magnetic reed switches to monitor the security of windows and doors.

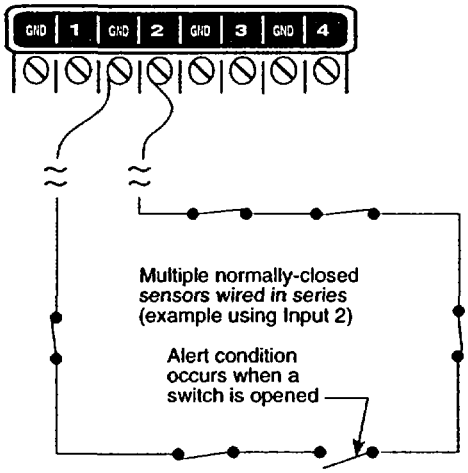


Figure 2-8. Multiple Normally Closed Sensors

To wire several normally open sensors to one alert input, connect them in parallel. To do this, take one lead from each sensor and attach it to the numbered terminal. Then, take the second lead from each sensor and attach each to the corresponding ground screw. Refer to Figure 2-9.

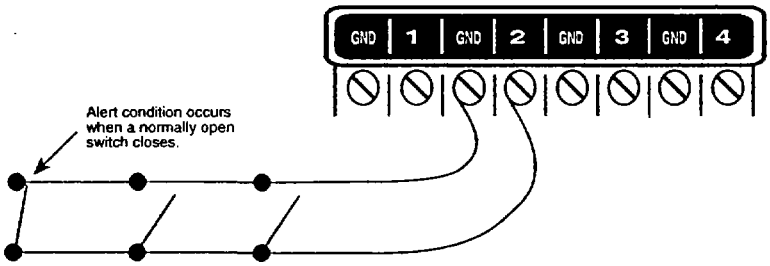


Figure 2-9. Multiple Normally Open Sensors

2.12 Outdoor Wiring

When wiring sensors outdoors, DO NOT allow exposed wires to run freely in open air; under such conditions, the Model 1104 is susceptible to serious damage during a lightning storm. Depending upon the distance outdoor wiring must travel, consideration should be given to the use of shielded wire inside a metal conduit. Both shield and conduit should be connected to an earth ground. This prevents stray voltage from entering the unit.

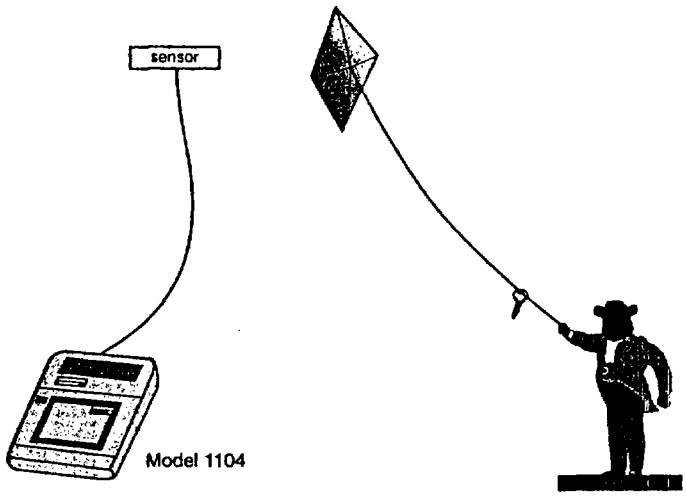


Figure 2-10. Potential Sensor Damage from Stray Electrical Noise

2.13 Disconnecting the Model 1104 for Storage or Seasonal Use.

If you plan to employ the Model 1104 as a seasonal "watchdog" for a few months during the year, **you must disconnect all wires from the unit completely to avoid damage to the circuitry when the unit is not in use.** If the unit is unplugged but left in place with all the sensors still connected, the wires act as antennae that draw in any stray "electrical noise" from such devices as fans, blowers, microwaves, etc.

Additionally, it is important to remove the batteries, or they will discharge until they fail.

Preserve your Model 1104 during the off-season, or when not in use:

- Remove the sensor wires at the screw terminals
- Remove the batteries
- Unplug the unit and store in a safe place

NOTES

Chapter 3: Quick Start

This section presents a useful guide for first-time programming of the Model 1104. Follow instructions for installation before attempting to program the Model 1104. Refer to Chapter 2: Installation.

3.1 The Local Keypad

Programming is accomplished using the local keypad (shown below, Figure 3-1). Notice that a single key has several functions assigned to it; programming results are determined by the order in which keys are pressed.

Individual keystrokes are illustrated to show programming steps in the correct order. If you make a mistake by entering the wrong key, do not press another key until you hear the message *"Error 1."* Then, start over with the first key in the programming sequence.

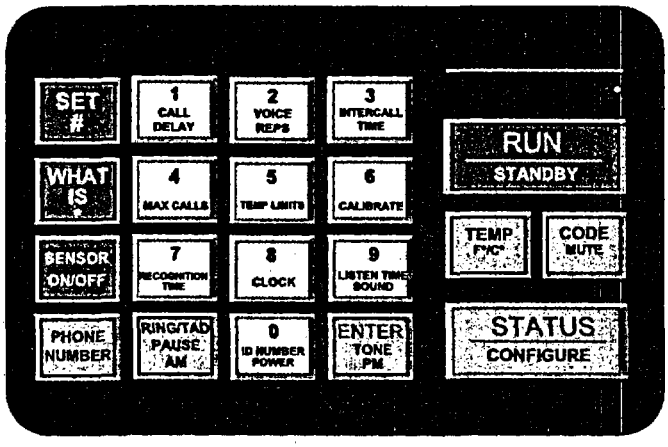


Figure 3-1. The Model 1104 Keypad

3.2 Preparation for Programming

Read complete instructions in Chapter 2: Installation, and make sure to follow these three steps first:

1. Plug the AC adaptor into the 120 VAC outlet.
2. Install the batteries.

3. Connect the Model 1104 to a telephone line.

When these steps are completed, the Model 1104 is fully operational and able to monitor temperature, high sound, AC power failure and battery backup condition; it can also be called on the telephone for a Status Report or used for listening to on-site sounds from any remote location. Now, the unit is ready for programming.

3.3 Quick-Start Programming Steps

Step 1: Set Configuration of Inputs

The Model 1104 will scan the 4 external inputs and determine if they are N.O. (normally open), N.C. (normally closed), or Temperature. If external sensors are added, make sure they are in their normal positions before proceeding—refer to Chapter 5, Section 5.1.

1. Press STANDBY to place the Model 1104 in Standby mode.

2. If you have external sensors available, wire the sensors to the inputs on the back of the Model 1104 (see Chapter 2, Section 2.10). Otherwise, skip this step and move to step 3.

3. Press RUN. The red light glows when the Model 1104 returns to Run mode.

4. Press SET.

5.

Press CONFIGURE.

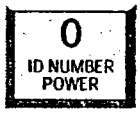
6. The Model 1104 will audibly recite the new configuration for each of the four inputs, responding with *"OK,"* if it detects N.O. (normally open), *"beep-OK,"* if it detects N.C (normally closed) or *"Temperature,"* if it detects temperature (regardless of whether all the inputs have attached sensors or not). If an input is unused, it is treated as normally open.

Step 2: Set the ID Number

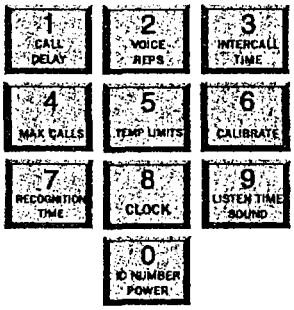
It is recommended that you set the ID number to reflect the telephone number on which the Model 1104 is installed.

1. Press SET

2. Press ID NUMBER.



3. Using the number keys, enter the digits (up to 16 are permitted) for the ID number. The Model 1104 will recite the digits as they are pressed.



4. Press ENTER. The 1104 will respond: *"Enter."*

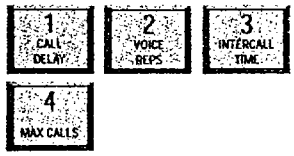
Step 3: Set Dial-Out Telephone Numbers

To program dial-out telephone numbers:

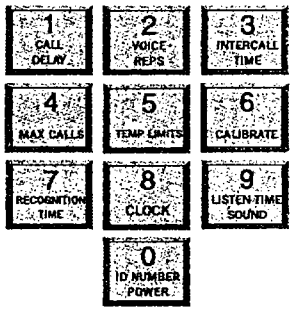
1. Press SET.

2. Press PHONE NUMBER.

3. Select which telephone number to program. Press any unassigned number key (from 1 to 4) to represent the new telephone number entry. Model 1104 will respond: *"Enter number."*



4. Enter the complete telephone number using the number keys. The Model 1104 will recite the digits as they are pressed.



5. Press ENTER. The unit will respond: *"Enter."*

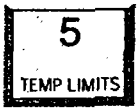
6. Repeat above procedure to program up to four separate telephone numbers.

Step 4: Set Temperature Limits

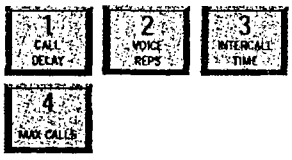
High and low temperature limits can be separately programmed for each input that is configured as temperature. Limits can range from –20° to +150° Fahrenheit, or from –30° to 65° Celsius. Default settings are: 10° F for low temperature and 100° F for high temperature. Do not set temperature limits too close to normal room temperature, since minor fluctuations could result in frequent and unnecessary alarm dialouts.

1. Press SET.

2. Press TEMP LIMITS.

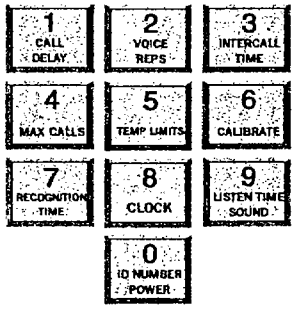


3. From the number keys, press a number (from 1 to 4) that corresponds to the temperature input being programmed.



The Model 1104 responds: *"Enter low temperature limit."*

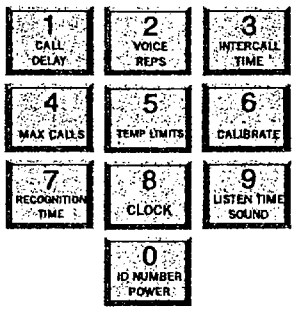
4. Using the number keys, enter a value for low temperature limit. The Model 1104 will recite the digits as they are pressed. If a negative number is required, first press PAUSE, then enter the number.



5. Press ENTER.

The Model 1104 responds: *"Enter high temperature limit."*

6. Using the number keys, enter the value for high temperature limit. The Model 1104 will recite the digits as they are pressed.



7. Press ENTER. The Model 1104 responds: *"Enter."*

This concludes minimum programming to achieve normal operation of the Model 1104. In additon to the programming just accomplished, default settings for many more features take effect when the unit is first powered. You will be able to reprogram most of these factory-set defaults to suit your application.

For a complete explanation of each feature (with illustrations of keystrokes), refer to Chapter 4: Communications Programming and Chapter 5: Alarm Programming.

To gain a basic understanding of how the alarm dial-out feature works, refer to this chapter, Section 3-4. For extended information regarding dial-out and related programmable parameters, refer to Chapter 7: Operation.

3.4 Summary of the Alarm Dial-Out Process

Action—Response	Programmable Feature
1. THE MODEL 1104 DETECTS AN ALERT CONDITION An alert condition is not the same as a valid alarm—the condition must continue for the programmed time period, or ***Recognition Time***, before it is recognized as a valid alarm. **2. A VALID ALARM IS CONFIRMED** An audible, on-site alarm message begins and continues until the alarm is acknowledged. (If the Mute feature is turned on, there is no on-site message.) ***Call Delay*** is activated. **3. DIAL-OUT BEGINS** Dial-out begins by calling telephone number 1 to report an alarm. If there is no acknowledgment, the Model 1104 waits the programmed ***Intercall Time*** before dialing subsequent telephone numbers. Dial-out continues in this manner, cycling through the remaining telephone numbers, for the programmed ***Max Calls***. **4. THE ALARM IS ACKNOWLEDGED** When the alarm is acknowledged, the dial-out process is cancelled and the audible, on-site alarm message stops.	• **Recognition Time** This is the programmed waiting period to determine if an alert condition has persisted long enough to be considered a valid alarm. If the sensor returns to normal within recognition time, then no alarm will occur. • **Call Delay** This is the programmed waiting period, before the first telephone number is called, to report an alarm. • **Intercall Time** This is the programmed waiting period, in between sequential dialing of telephone numbers, to report an alarm. • **Max Calls** This is the total number of telephone calls that will be dialed in response to any valid alarm. Telephone numbers are dialed sequentially, and continue to cycle until the maximum number of calls is reached. If no acknowledgment occurs, then at the completion of Max Calls, all alarms are automatically acknowledged.

Chapter 4: Communications Programming

This chapter explains the keypad commands for communications programming of the Model 1104, including interrogation and resetting of the following:

- The Unit ID Number
- Dial-out Telephone Numbers
- Tone or Pulse Dialing
- Special Dialing with Pagers, Beepers and Access Numbers.
- Rings Until Answer and Telephone Answering Device Compatibility
- Listen-in Time
- Call Delay
- Local Voice Mute
- Voice Repetitions
- Intercall Time
- Maximum Number of Calls
- The Clock
- Security Code

4.1 The Unit ID Number

The Unit ID Number is the identification number of the Model 1104. This number may be the same as the telephone number where the unit is installed, or it may be designated using any number that best suits your application.

The purpose of the Unit ID Number is to immediately provide the source of any alarm, especially when using multiple Model 1104 units in a complex monitoring system. When the Model 1104 is called from a remote location, it always begins its message with the identification number:

"Hello, this is telephone number (Unit ID Number)."

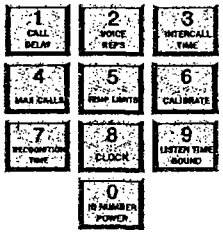
4.1.1 Programming the ID Number

To program the ID Number:

1. Press SET.

2. Press ID NUMBER.

3. Using the number keys, enter up to 16 digits for the ID number. The Model 1104 will recite the digits as they are pressed.



4. Press ENTER. The Model 1104 will respond: *"Enter."*

4.1.2 Interrogating the ID Number

To interrogate the ID numbers:

1. Press WHAT IS.

2. Press ID NUMBER. The Model 1104 will recite the Unit ID Number programmed.

4.2 Dial-out Telephone Numbers

The Model 1104 can store up to four 32-digit phone numbers. These are the numbers that will be called during dial-out. In the event of an alarm, the numbers are dialed sequentially, 1 through 4. Begin programming the first telephone number by assigning it to the key labeled with the number 1 on the keypad, and continue to assign any other telephone numbers in numerical order. ***A pause, pound or asterisk*** can be added to an individual phone number to access different phone and beeper systems. See *Special Dialing, Section 4.4.*

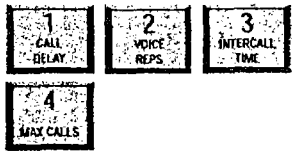
4.2.1 Programming Dial-out Telephone Numbers

To program dial-out telephone numbers:

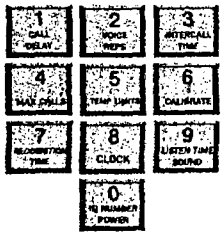
1. Press SET.

2. Press PHONE NUMBER.

3. Select which telephone number to program. Press any unassigned number key (from 1 to 4) to represent the new telephone number entry. The Model 1104 will respond: *"Enter number."*



4. Enter the complete telephone number using the number keys.



5. Press ENTER. The unit will respond with *"Enter."*

6. Repeat above procedure to program up to four separate telephone numbers.

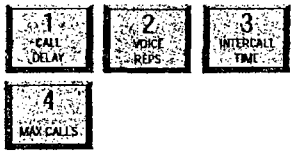
4.2.2 Interrogating a Dial-out Telephone Number

To interrogate dial-out telephone numbers:

1. Press WHAT IS.

2. Press PHONE NUMBER.

3. Press a number key (from 1 to 4).



Model 1104 will recite the corresponding telephone number. If there is no number programmed for a particular key, the unit will respond: *"No number."*

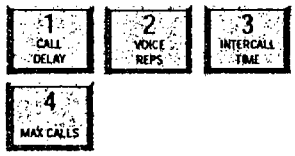
4.2.3 Erasing a Telephone Number

To erase a telephone number:

1. Press SET.

2. Press PHONE NUMBER.

3. Press the number key (from 1 to 4) representing the telephone number you want to erase.



4. Press ENTER. The Model 1104 will say *"Enter."*

4.3 Tone or Pulse Dialing

The Model 1104 can dial out in pulse or Touch Tone™. Select the type of dialing, in either pulse or tone, depending upon the type of service provided by your telephone company. The default is tone.

To program for either pulse or tone:

1. Press the SENSOR ON/OFF key.

2. Press TONE.

The Model 1104 will respond: *"Off"* to indicate that tone dialing is off and pulse is enabled, or *"On"* to indicate that tone dialing is on and pulse is disabled.

3. Repeat key sequence to switch between settings.

4.4 Special Dialing

The Model 1104 has provisions for special dialing sequences. Special dialing sequences allow:

- Dialing that requires an access number to connect with an outside line.
- Dialing that requires the pound (#) or asterisk (*).
- Dialing to a beeper or pager.

4.4.1 Special Dialing Keys

The following designated keys represent special functions when used with PHONE NUMBER entries:

1. *Pause*

PAUSE represents a four-second pause in dialing. It can be used when an access number is required before dialing to an outside line. (For example, in some cases a "9" or other number, must be dialed first, in order to get a dial tone for an outside line.) When

interrogating telephone numbers, PAUSE is audibly represented by a *"beep."*

2. *Pound (#)*

A pound may be required when calling some phone or beeper systems. When interrogating telephone numbers, pound (#) is audibly represented by the word *"twelve."*

3. *Asterisk (*)*

An asterisk may be required when calling some phone or beeper systems. When interrogating telephone numbers, asterisk (*) is audibly represented by the word *"eleven."*

4. *Code*

CODE instructs the Model 1104 to wait until the call is answered before continuing. When interrogating telephone numbers, CODE is audibly represented by the word *"fourteen."*

NOTE

Each time a pause, pound (#) or asterisk (*) is incorporated in a programming sequence, it is counted as one digit toward the total of 32 digits allowed.

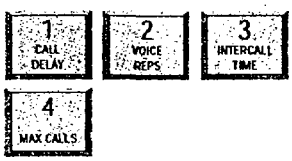
4.4.2 Incorporating a Pause

Incorporate PAUSE to access an outside telephone line:

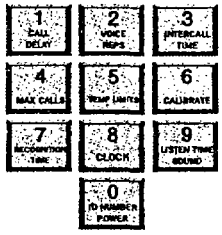
1. Press SET.

2. Press PHONE NUMBER.

3. Press any unassigned number key (from 1 to 4) to represent the new telephone number entry. Model 1104 will respond: *"Enter number."*

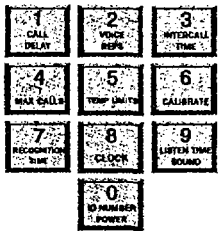


4. From the number keys, enter the access digit (i.e., 9). The Model 1104 will recite the digit.



5. Press PAUSE. The Model 1104 will *"beep."*

6. Enter the complete telephone number (1 + area code) using the number keys. The Model 1104 will recite the digits as they are pressed.



7. Press ENTER. The Model 1104 will say *"Enter."*

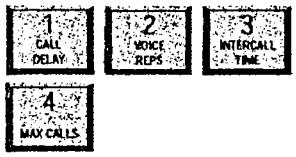
4.4.3 Incorporating a Pound (#) or Asterisk (*)

Incorporate a pound or asterisk if it is normally included in telephone number:

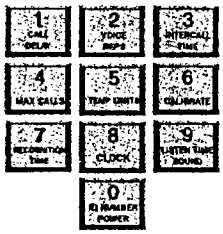
1. Press SET.

2. Press PHONE NUMBER.

3. Press any unassigned number key (from 1 to 4) to represent the new telephone number entry. Model 1104 will respond: *"Enter number."*



4. Enter the telephone number using the number keys. The Model 1104 will recite the digits as they are pressed.



5. Position the pound (#) or asterisk (*) within the telephone number where required by pressing SET (where the pound is located) or WHAT IS (where the asterisk is located). The Model 1104 will *"beep"* each time pound or asterisk is pressed.

–OR–

6. Enter any remaining digits of the telephone number.
7. Press ENTER. The Model 1104 will say *"Enter."*

4.4.4 Special Dialing to a Beeper or Pager

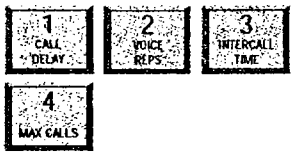
The following example demonstrates just one solution to programming the Model 1104 for dialing to a beeper or pager. Many other key sequences will also work. Start with steps 1–3 below; next, enter special dialing keys where required for your beeper or pager service.

To incorporate a pound or asterisk:

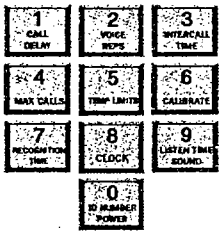
1. Press SET.

2. Press PHONE NUMBER.

3. Press any unassigned number key (from 1 to 4) to represent the new telephone number entry.



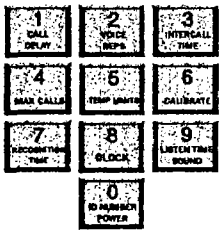
4. Enter the complete telephone number using the number keys. The Model 1104 will recite the digits as they are pressed.



5. Press CODE. This instructs the Model 1104 to wait for the telephone call to be answered by the beeper or pager service. (A voice message will not occur—only digital tones are used.) Note that CODE may not work with beepers where there is no ring before the beeper connects. If that proves to be the case for your particular beeper, skip the CODE step and proceed from Step 4 to Step 6.

6. Now press PAUSE once to activate a four second delay. This assumes the call is answered by a beeper/pager service that immediately delivers a prerecorded voice message. PAUSE may be pressed more than once to program more time for the beeper/pager service to finish its message. Each press of PAUSE allocates four additional seconds. The Model 1104 will *"beep"* with each press.

7. Enter a telephone number or custom code number that will identify the Model 1104 as the caller to your beeper or pager. A code may consist of any number(s) you designate. Many users find it convenient to use the telephone number to which the Model 1104 is connected.



8. A pound or asterisk may be required in some dialing situations. If required, position the pound (#) or asterisk (*) within the telephone number where required by pressing SET (where the pound is located) or WHAT IS (where the asterisk is located). The Model 1104 will *"beep"* each time pound or asterisk is pressed. Enter any remaining digits of the telephone number.

–OR–

9. Press ENTER. The Model 1104 will say *"Enter."*

Example 1 (using CODE key):

1-203-555-1123 - CODE - 621-9977-#
(beeper number) *(unit ID number)*

Example 2 (without using CODE key):

1-203-555-1123 - PAUSE - PAUSE - 621-9977-#
(beeper number) *(unit ID number)*

4.5 Rings Until Answer

Rings Until Answer is the programmed number of times the telephone rings before the Model 1104 will answer an incoming call. This can be set from 1 to 15 rings. The default value is 4.

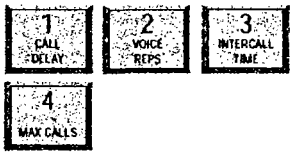
4.5.1 Programming Rings Until Answer

To program Rings Until Answer:

1. Press SET.

2. Press RING/TAD. The Model 1104 will respond: *"Enter number."*

3. Using the number keys, enter a value.



4. Press ENTER. The Model 1104 will respond: *"Enter."*

4.5.2 Interrogating Rings Until Answer

To interrogate Rings Until Answer:

1. Press WHAT IS.

2. Press RING/TAD.

4.6 TAD (Telephone Answering Device)

The TAD feature is especially useful because it integrates the operation of the Model 1104 with your telephone answering device in a way that retains the full flexibility of each system. This allows you to have on-demand telephone access to the Model 1104, for obtaining a Status Report, or for issuing call-in commands, while your telephone answering device is set to receive outside calls. Programming for use with a telephone answering device (TAD) is always used in conjunction with Rings Until Answer, detailed in section 4.5.

NOTE

The TAD feature only applies to answering devices connected to the same telephone line as the Model 1104.

4.6.1 TAD Enable/Disable

To enable/disable the TAD feature:

1. Press SENSOR ON/OFF.

2. Press RING/TAD.

The Model 1104 will respond: *"On."* (If the Model 1104 says *"Off,"* repeat steps 1 and 2 to reactivate TAD.)

4.6.2 Using the TAD Feature

1. Make sure the TAD feature is enabled on the Model 1104. (The default setting is disabled, so you must enable it first.)
2. Determine the number of rings your telephone answering device uses to answer the telephone. (Most answering devices require 4 rings; others are selectable.)
3. On the Model 1104, program Rings Until Answer to a greater number than the number of rings set on your answering machine.

Example:

Telephone answering device, rings = 4

Model 1104, Rings Until Answer = 6

Using the procedure just outlined, all incoming calls will be answered by the telephone answering device, allowing it to operate normally. With the programming just accomplished, the Model 1104 can be accessed remotely, by telephone, to obtain the Status Report.

1. Dial the telephone number of the Model 1104.
2. Let the telephone ring once and then hang up.
3. Wait approximately ten seconds
4. Call the Model 1104 back.

It will answer the telephone on the first ring.

Explanation: The pattern of one ring, followed by a second call (within 30 seconds), signals the Model 1104 to answer your incoming call, excluding the telephone answering device.

NOTE

Special Case: If the Model 1104 shares the same line with a telephone answering device, and during certain time periods, frequent, incoming calls are expected on that line, then you may want to temporarily disable the TAD feature. If you leave the TAD enabled, it will not adversely affect normal operation, but if two outside telephone calls are received within the same 30-second time window, the Model 1104 will interpret this pattern as a signal to answer the telephone. If this occurs, press any key on the Model 1104 to hang up.

4.6.3 No TAD In Use

If a telephone answering device is not used on the same telephone line as the Model 1104, make sure that the TAD feature is disabled, or turned off. Only Rings Until Answer programming will determine how incoming calls are answered. For example, if you program Rings Until Answer to 3, incoming calls will be answered in 3 rings.

4.7 Listen-in Time

The Listen-in Time is the amount of time you can listen to sounds from the Model 1104's built-in microphone at its installation site. When you call in for a Status Report, the Model 1104 announces Listen-in Time at the end of its first round of status readings, saying, *"Listen to the sound level for (programmed time entered)."* The programmable range is from 0 to 255 seconds (or up to 4.17 minutes). The default value is 15 seconds.

NOTE

The microphone is also used to monitor high sound level. See Chapter 5, Section 5.10 through Section 5.11.1.

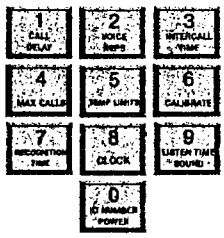
4.7.1 Programming the Listen-in Time

To program the Listen-in Time:

1. Press SET.

2. Press LISTEN TIME. The Model 1104 will respond: *"Enter seconds."*

3. Using the number keys, enter the seconds. The Model 1104 will recite the digits as they are pressed.



4. Press ENTER. The Model 1104 will respond: *"Enter."*

4.7.2 Interrogating the Listen-in Time

To interrogate the Listen-in Time:

1. Press WHAT IS.

2. Press LISTEN TIME. The Model 1104 will recite the listen time in seconds programmed.

4.8 Call Delay

Call Delay is the programmed length of time the Model 1104 waits, following detection of an alarm, before it begins the dial-out sequence. This applies only to the first call. (Delay time between calls is also programmable: refer to Intercall Time, Section 4-11.)

The purpose for Call Delay is to allow time for personnel at the Model 1104's installation site to respond to and cancel an alarm before dial-out begins. During this time, the Model 1104 will audibly repeat its *"alert condition"* message (unless the Local Voice Mute feature has been activated—refer to Section 4.9). The default for Call Delay is 30 seconds. Call Delay can be programmed from 0 seconds to 60 minutes (1 hour).

4.8.1 Programming the Call Delay

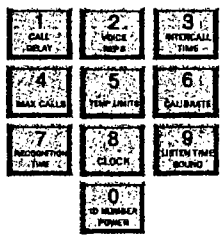
To program the Call Delay:

1. Press SET.

2. Press CALL DELAY.

The Model 1104 will respond: *"Enter minutes."*

3. Using the number keys, enter the minutes.



The Model 1104 recites the digits as they are pressed.

4. Press ENTER. The Model 1104 responds: *"Enter seconds."*

5. Using the number keys, enter the seconds. The Model 1104 recites the digits as you press them.
6. Press ENTER. The Model 1104 responds: *"Enter."*

4.8.2 Interrogating Call Delay

To interrogate Call Delay:

1. Press WHAT IS.

2. Press CALL DELAY.

The Model 1104 will recite the programmed Call Delay.

4.9 Local Voice Mute

When the Model 1104 dials out to report an alarm, it also audibly recites the alarm message at its installation site. The Local Voice Mute command allows you to turn off the voice at the Model 1104's site during alarm dialouts and status call-ins. This feature is used to prevent intruders or unauthorized persons from hearing the alarm dial-out message or from hearing the Status Report during an off-site call.

4.9.1 Enable/Disable Local Voice Mute

To enable/disable Local Voice Mute:

1. Press SENSOR ON/OFF.

2. Press MUTE.

The Model 1104 will say *"On"* to indicate that Local Voice Mute is enabled, or *"Off"* to indicate that it is disabled.

3. Repeat key sequence to switch between enabled or disabled Local Voice Mute.

4.10 Voice Repetitions

The Voice Repetitions feature allows programming of the number of times the alarm message is delivered *per phone call* during alarm dial-out.

The maximum repetitions may be set to 10; the default is

3 repetitions.

4.10.1 Programming Voice Repetitions

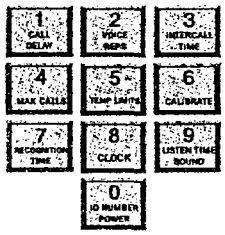
To program Voice Repetitions:

1. Press SET.

2. Press VOICE REPS.

The Model 1104 will respond: *"Enter number."*

3. Using the number keys, enter a value from 0 to 10.



4. Press ENTER. The Model 1104 will respond: *"Enter."*

4.10.2 Interrogating Voice Repetitions

To interrogate Voice Repetitions:

1. Press WHAT IS.

2. Press VOICE REPS.

The Model 1104 will recite the number programmed.

4.11 Intercall Time

The Intercall Time is the programmable period of time the Model 1104 waits in calling subsequent telephone numbers. Intercall Time is activated ***only after alarm dial-out to the first telephone number fails to be acknowledged.*** This period can be programmed from 10 seconds to 60 minutes. The default intercall time is 1 minute.

If an incoming telephone call is made to the Model 1104 during Intercall Time (in between its dialing of subsequent telephone numbers to report an alarm), it will answer the incoming call and immediately report any existing alarms. The manner in which the incoming call is answered depends upon whether or not TAD is enabled or disabled:

- If TAD (Telephone Answering Device) is enabled, Rings Until Answer will be 1.
- If TAD is disabled, Rings Until Answer will be 10.

Refer to Section 4.5, Rings Until Answer; and Section 4.6, TAD (Telephone Answering Device).

4.11.1 Programming Intercall Time

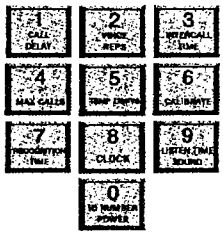
To program Intercall Time:

1. Press SET.

2. Press INTERCALL TIME.

The Model 1104 will respond: *"Enter minutes."*

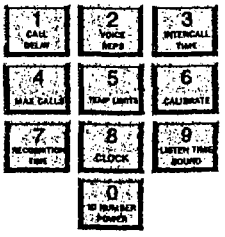
3. Using the number keys, enter the minutes.



The Model 1104 recites the digits as you press them.

4. Press ENTER. The Model 1104 will respond: *"Enter seconds."*

5. Using the number keys, enter the seconds. The Model 1104 recites the digits as you press them.



6. Press ENTER. The Model 1104 responds: *"Enter."*

4.11.2 Interrogating Intercall Time

To interrogate Intercall Time:

1. Press WHAT IS.

2. Press INTERCALL TIME.

The Model 1104 will recite the programmed Intercall Time.

4.12 Maximum Number of Calls (Max Calls)

The Max Calls feature controls the total number of repeated calling attempts by the Model 1104 in the event of an alarm. When an alarm occurs, the dial-out process begins, and continues to cycle through your programmed telephone numbers until a maximum number of calls is reached. The Max Calls setting regulates the number of calls that will be made as a result of any alarms; if more than one alarm is detected at once, or if a second alarm occurs during dial-out on the first alarm, the Max Calls setting will start the calling process from zero, until the programmed number of calling attempts are completed.

The default setting for Max Calls is 100, but it may be programmed from 0 to 255 calls. Max Calls is cancelled when an alarm is acknowledged. If the maximum number of calls is completed and no alarm acknowledgement has occurred, the Model 1104 will automatically acknowledge any alarm and stop the dial-out.

NOTE

If only one telephone number is programmed, the Model 1104 will dial out a maximum of 15 times to report an alarm.

4.12.1 Programming Max Calls

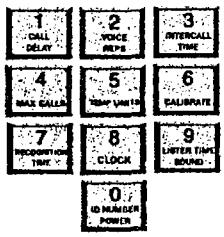
To program Max Calls:

1. Press SET.

2. Press MAX CALLS.

The Model 1104 will respond: *"Enter number."*

3. Using the number keys, enter a value. The Model 1104 will recite the digits as you press them.



4. Press ENTER. The Model 1104 responds: *"Enter."*

4.12.2 Interrogating Max Calls

To interrogate Max Calls programmed:

1. Press WHAT IS.

2. Press MAX CALLS.

The Model 1104 will recite the value set for Max Calls.

4.13 The Clock

The Model 1104 has a built-in clock. The power-up time is 12 AM. The clock will keep time from 12 AM until you program the current time. It will then keep time from your programmed time. If the AC power fails, the clock will continue to keep time until the battery back-up fails. It will then reset to 12 AM when power is restored. ***An incorrect time is a good indication that the power has failed and the batteries have been expended.***

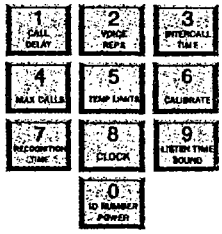
4.13.1 Setting the Clock

To set the clock:

1. Press SET.

2. Press CLOCK.

3. Using the number keys, enter the correct time. The Model 1104 will recite the digits as they are pressed.



4. If the time is AM, press the AM key. The Model 1104 will *"beep."* (If the time is PM , there is no key to press—the clock will be automatically set to PM if AM is not set.)

5. Press ENTER. The Model 1104 will say *"Enter."*

Example: You want to set the clock to 12:45 AM. Press the following keys in the order shown:

SET...CLOCK...1...2...4...5...AM...ENTER.

4.13.2 Interrogating for the Current Time

To interrogate the Model 1104 for the current time:

1. Press WHAT IS.

2. Press CLOCK. The Model 1104 will recite the programmed time.

4.14 The Security Code

The Security Code is the last step after setting all other programming parameters for the Model 1104. The code consists of a 4-digit number you select and will effectively prevent unauthorized changes to the Model 1104's programming. When the Security Code is activated, all keyboard programming is inaccessible. The Model 1104 may be interrogated using the WHAT IS key, but the keyboard must be unlocked, via the Security Code, before any additional programming is possible.

4.14.1 Locking the Keypad

To program the Security Code:

1. Press SET.

2. Press CODE.

The Model 1104 will say *"Enter security code."*

3. Using the number keys, enter 4 digits. The Model 1104 says, *"OK."* The keyboard is now locked.

If unauthorized persons attempt to set a parameter, an error message, *"Error 2,"* is returned. Whenever any operation except WHAT IS takes place without entering the security code first, this error message occurs.

4.14.2 Unlocking the Keypad

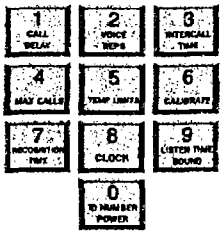
To unlock the keyboard:

1. Press WHAT IS.

2. Press CODE.

The Model 1104 will say *"Enter Security Code."*

3. Using the number keys, enter the digits for the code.



If the correct code is entered, the Model 1104 will say *"OK."* If the wrong code is entered, the Model 1104 will say *"Error 2."*

Chapter 5: Alarm Programming

This chapter explains the alarm programming and monitoring capabilities of the Model 1104, with specific instructions for the following features:

- Configure inputs as dry contact or temperature
- Enable/disable inputs
- Program alarm Recognition Time for each input
- Program high and low temperature limits
- Disable alarm response to high or low temperature
- Program temperature in Fahrenheit or Celsius scale
- Calibrate temperature
- Obtain current temperature
- Program AC power-failure Recognition Time
- Enable/disable AC power monitoring
- Program sound level sensitivity
- Program high sound Recognition Time
- Disable alarm response to high sound
- Use Exit Delay via Status Report

5.1 Input Configuration

In preparing the Model 1104 to sense an alert condition, the inputs must be configured as dry contact (either open or closed) or as temperature inputs. The default setting for input 1 is temperature; for inputs 2-4, the default is dry contact and open. To configure input normality, sensors are first wired to the terminal strip at the back of the unit. (Refer to Chapter 2, Section 2.9–2.12, for an explanation on wiring inputs.)

The configuration process directs the Model 1104 to initialize the 4 inputs and establish normal settings. Any change in the status of an input (for example, from a normally open contact to a suddenly closed contact) is recognized as an ***alert condition***. In the case of a temperature input, an alert condition is recognized when established temperature limits are exceeded.

NOTE

Before starting keyboard commands to configure input normality on the Model 1104, ***it is very important to check that the sensors you have wired to the unit are set in their normal, non-alarm positions.***

For example, if a magnetic reed switch (a normally-closed sensor used to detect unauthorized entry) has been wired to the Model 1104, make sure that the door or window to be monitored is shut before configuring the input. If a motion-detector is wired to the unit, it is advisable to block all sources of motion from the sensor before and during configuration.

5.1.1 Programming Input Configuration

1. Press STANDBY to place the Model 1104 in Standby mode.

2. Wire sensors to the inputs to the back of the Model 1104 (see Chapter 2, Section 2.10).

3. Press RUN. The red light glows when the Model 1104 returns to Run mode.

4. Press SET.

5. Press CONFIGURE.

6. The Model 1104 audibly recites the configuration for each of the four inputs:

- If the input is ***normally open***, the Model 1104 recites the number of the input and says *"OK."*
- If the input is ***normally closed***, the Model 1104 recites the number of the input, followed by a *"beep"* and *"OK."*
- If the input is configured as ***temperature***, the Model 1104 recites the number of the input, followed by *"Temperature."*

5.1.2 Verifying Input Configuration

Input configuration can be verified when interrogating the Model 1104 for a complete Status Report. Refer to Chapter 6 for a more detailed description of the Status Report.

5.2 Enable/Disable Inputs

This function allows you to enable or disable an input's response to an alert condition. An enabled input will respond to an alert condition and allow dial-out. A disabled input will cause dial-out to be suppressed, but any existing alert conditions will be revealed during the Status Report. Enable/disable programming is useful during wiring of inputs (see Chapter 2) or when a condition needs to be monitored, but is not critical enough to be programmed for dial-out reporting. It is important to verify input status after performing any task that requires disabling. The default setting for all inputs is enabled (ON).

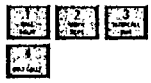
If an alert condition exists when inputs are re-enabled,

Recognition Time will restart—refer to Section 5.3.

5.2.1 Changing Enabled/Disabled Input Status

1. Press SENSOR ON/OFF.

2. Press the number (1 to 4) of the selected input to enable/disable. The Model 1104 says *"Off"* to indicate disabled or *"On"* to indicate enabled.



5.2.2 Verifying Enabled/Disabled Input Status

1. Press WHAT IS.

2. Press STATUS.

The Model 1104 audibly recites the current status of every input. In a Status Report, each input is first identified by its input number, followed by a report that specifies parameters currently affecting that input. ***If an input is disabled, the word "Off" immediately follows the number recited for that input.***

For example, input 3 is configured as a normally open, dry contact input. During the Status Report:

- ***If disabled***, the Model 1104 recites: *"Number 3—**Off**—OK,"* for input 3.
- ***If enabled***, the Model 1104 recites: *"Number 3—OK,"* for input 3.

In another example, input 2 is configured as a temperature input. The current temperature is 76 degrees. During a Status Report:

- ***If disabled***, the Model 1104 recites: *"Number 2—**Off**—76 degrees—OK."*
- ***If enabled***, the Model 1104 recites: *"Number 2—76 degrees—OK."*

5.3 Input Recognition Time

The Input Recognition Time is the length of time an alert condition must be present before a valid alarm exists and dial- out is activated. This time period is programmable, from 0 minutes, 0 seconds (for immediate response) up to a period of 272 minutes, 0 seconds. If an alert condition begins and then clears within the established Recognition Time, no dial-out will occur. When an alert condition continues beyond the programmed Recognition Time, the Model 1104 initiates dial-out. The default setting for Input Recognition Time is 0 minutes, 3 seconds.

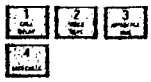
5.3.1 Programming Input Recognition Time

1. Press SET.

2. Press RECOGNITION TIME.

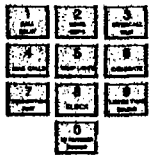
3. Press the number (1 to 4) of the selected input to be

programmed.



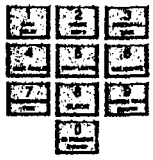
The Model 1104 responds: *"Enter minutes."*

4. Using the number keys, enter the minutes. For example, to set a Recognition Time of five minutes, simply press *"5"* on the keypad. The Model 1104 recites the digits as they are pressed.



5. Press ENTER. The Model 1104 responds: *"Enter seconds."*

6. Using the number keys, enter the seconds. The Model 1104 recites the digits as they are pressed.



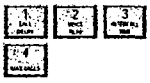
7. Press ENTER. The Model 1104 responds: *"Enter."*

5.3.2 Interrogating Input Recognition Time

1. Press WHAT IS.

2. Press RECOGNITION TIME.

3. Press the corresponding input key (1 to 4).



The Model 1104 recites the programmed Recognition Time for that input.

5.4 Establishing High and Low Temperature Limits

High and low temperature limits can be separately programmed for each input configured as temperature. Limits can range from –20° to +150° Fahrenheit, or from –30° to 65° Celsius.

When temperature limits exceed high or low settings, the Model 1104 will dial out with an alarm message. Default settings are: 10° F for low temperature and 100° F for high temperature.

5.4.1 Programming Temperature Limits for a Selected Input

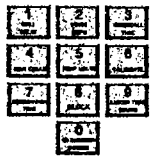
1. Press SET.

2. Press TEMP LIMITS.

3. From the number keys, press a number (from 1 to 4) that corresponds to the temperature input being programmed.

The Model 1104 responds: *"Enter low temperature limit."*

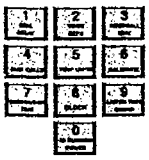
4. Using the number keys, enter a value for low temperature limit. The Model 1104 will recite the digits as they are pressed. If a negative number is required, first press PAUSE, then enter the number.



5. Press ENTER.

The Model 1104 responds: *"Enter high temperature limit."*

6. Using the number keys, enter the value for high temperature limit. The Model 1104 recites the digits as they are pressed.



7. Press ENTER. The Model 1104 responds: *"Enter."*

NOTE

Do not set temperature limits too close to normal room temperature. Minor temperature fluctuations could result in frequent and unnecessary alarm dialouts.

5.4.2 Disabling Alarm Response to High or Low Temperature

To disable alarm response to either high or low temperature settings exclusively, enter the maximum temperature limit when programming the selected input. (The Model 1104 will not respond to temperatures encountered at maximum settings or beyond.) Begin by following the key sequence shown in Section 5.4.1, and when prompted to enter the high or low temperature value:

- Set high temperature to either +150° F or +65° C (high temperature limit) to prevent the Model 1104 from responding to a high temperature alarm.
- Set low temperature to either -20o F or -30o C to prevent the Model 1104 from responding to a low temperature alarm.

5.4.3 Interrogating High and Low Temperature Limits

1. Press WHAT IS.

2. Press TEMP LIMITS.

3. Press the number key corresponding to the selected temperature input.

5.5 Temperature Scale

Temperature inputs may be set in either Fahrenheit or Celsius degrees. The default temperature scale is Fahrenheit. To change to Celsius:

1. Press SENSOR ON/OFF.

2. Press TEMP. The Model 1104 responds: *"Off,"* indicating Celsius scale has replaced Fahrenheit scale.

3. To return to Fahrenheit scale, repeat the key sequence. The Model 1104 responds: *"On,"* indicating Fahrenheit scale is in effect.

NOTE

When switching from Fahrenheit to Celsius, or vice versa, the change applies to all inputs configured to read temperature. When switching temperature scales it is important to reset high and low temperature limits on all temperature inputs. Refer to Section 5.4.1 to reset temperature limits.

5.6 Temperature Calibration

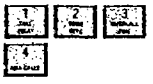
To compensate for minor variances in sensor accuracy, an offset may be programmed for each temperature input. The amount of offset is measured in degrees Fahrenheit or degrees Celsius. Adjustments are possible within a range from -10 degrees to +10 degrees. For example, if input 3 is sensing temperature and is reading 1 degree too high, then the calibration for input 3 is set at -1 to obtain an accurate reading.

5.6.1 Programming Temperature Calibration

1. Press SET.

2. Press CALIBRATE.

3. Press the number (1 to 4) of the selected temperature input to be calibrated.



4. Enter the number required to offset the current temperature reading so a correct reading is obtained.

   - To program a positive offset number (up to +10 degrees), enter the number on the keypad. The Model 1104 recites the digits as they are pressed.
   - To program a negative offset number (up to –10 degrees), first press PAUSE. The unit responds with a *"beep."* Next, enter the number on the keypad. The unit recites the digits as they are pressed.

5. Press ENTER. The Model 1104 responds: *"Enter."*

NOTE

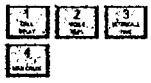
If you find that your calibration offset exceeds more than + 5 or –5 degrees, other complicating factors could be affecting normal operation of the Model 1104. Call Sensaphone, Inc. for technical assistance.

5.6.2 Interrogating Temperature Calibration

1. Press WHAT IS.

2. Press CALIBRATE.

3. Press the number key corresponding to the selected temperature input.



If a *"beep"* precedes the number as it is recited, then a negative offset is indicated.

5.7 Obtaining Current Temperature

Current temperature readings for each temperature input may be accessed at any time. The Model 1104 recites the input number, and the actual temperature detected by the attached sensor, for all inputs configured as temperature. To obtain current temperature:

1. Press WHAT IS.

2. Press TEMP.

5.8 AC Power Monitoring Enable/Disable

The Model 1104 monitors AC power failure. This command enables or disables the power failure detection feature.When enabled, the Model 1104 will monitor power and dial out when AC power failure exceeds a programmable span of time (refer to AC Power Failure Recognition Time, Section 5.9).

The default setting for AC power monitoring is enabled (on). When disabled, the Model 1104 will not dial-out to report power failure.

5.8.1 Enabling/Disabling the AC Power Alarm

1. Press SENSOR ON/OFF.

2. Press POWER.

   - The Model 1104 will say *"Off"* to indicate that the power alarm is disabled, or
   - The Model 1104 will say *"On"* to indicate that the power alarm is enabled.

3. Repeat key sequence to change settings.

5.9 AC Power Failure Recognition Time

The AC Power Failure Recognition Time is the length of time that AC electric power is off before a valid alarm is recognized and dial-out begins. The default setting is 5 minutes, 0 seconds, but is programmable from 0 seconds to a maximum of 272 minutes.

When AC power failure occurs, and throughout the programmed Recognition Time, the Model 1104 steadily repeats the message *"the electricity is off"* at the unit's installation site. There is no Call Delay programming available for AC power failure. Immediately following Recognition Time, the Model 1104 begins the dial-out process to report power failure.

To cancel the power-failure message locally at the keypad (during or after Recognition Time) press any key on the Model 1104 keypad. This action also cancels the dial-out process. The AC

power failure alarm may also be cancelled remotely, by telephone acknowledgment (see Chapter 6, Section 6.1).

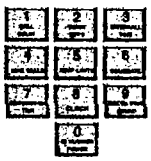
5.9.1 Programming Power Failure Recognition Time

1. Press SET.

2. Press RECOGNITION TIME.

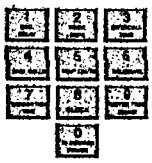
3. Press POWER. The Model 1104 responds: *"Enter minutes."*

4. Using the number keys, enter the number of minutes. The Model 1104 will recite the digits as they are pressed.



5. Press ENTER. The Model 1104 responds: *"Enter seconds."*

6. Using the number keys, enter the number of seconds. The Model 1104 will recite the digits as they are pressed.



7. Press ENTER. The Model 1104 responds: *"OK."*

5.9.2 Interrogating Power Failure Recognition Time

1. Press WHAT IS.

2. Press RECOGNITION TIME.

3. Press POWER.

The Model 1104 will recite the power Recognition Time.

5.10 Sound Alarm Monitoring

This feature allows you to program the level and duration of sound that will cause the Model 1104 to respond to an alarm and dial-out. It may be useful to desensitize the Model 1104 to sound if it is installed in an area with a relatively high noise level, or where a loud noise occurs frequently but is not associated with an alarm. In some applications, it may be desirable to increase sound sensitivity to low sound levels.

5.10.1 Programming Sound Alarm Sensitivity

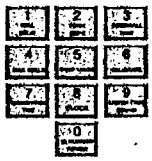
The sensitivity setting for sound alarm monitoring ranges from 1 to 255. A value of 1 makes the microphone the MOST sensitive to changes in sound. The value 255 makes the microphone the LEAST sensitive to sound. The default value is **32**.

1. Press SET.

2. Press CALIBRATE.

3. Press SOUND. The Model 1104 responds: *"Enter number."*

4. Using the number keys, enter a value for sound sensitivity.



The Model 1104 recites the digits as you press them.

5. Press ENTER. The Model 1104 responds: *"Enter."*

5.10.2 Interrogating Sound Sensitivity

1. Press WHAT IS.

2. Press CALIBRATE.

3. Press SOUND. The Model 1104 recites the programmed sound sensitivity level.

5.10.3 Programming High Sound Alarm Recognition Time

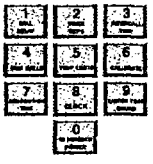
The Recognition Time for sound alarm monitoring ranges from 2 seconds to 59 seconds. The default value is **8** seconds.

1. Press SET.

2. Press RECOGNITION TIME.

3. Press SOUND. The Model 1104 responds: *"Enter seconds."*

4. Using the number keys, enter the number of seconds. The Model 1104 will recite the digits as they are pressed.



5. Press ENTER.

5.11 High Sound Alarm Enable/Disable

The Model 1104 monitors sound through the built-in microphone. When the sound level suddenly exceeds the programmed high sound limit, the Model 1104 will respond to an alert condition. The increased sound level must continue throughout the programmed recognition time. The default for high sound alarm is enabled (on).

NOTE

The microphone is also used for listening to on-site sounds. Refer to Chapter 4, Section 4.7. Disabling the sound alarm does not affect listen-in capability.

5.11.1 Changing Enabled/Disabled High Sound Alarm

1. Press SENSOR ON/OFF.

2. Press SOUND. The Model 1104 will say *"Off"* to indicate disabled or *"On"* to indicate enabled.

3. Repeat key sequence to change settings.

5.12 Exit Delay

When tripping an alarm is unavoidable, yet a true alert condition has not actually occurred, the alarm response, including dial-out, can be temporarily suppressed.

The Model 1104 is able to suppress and then reset its dial-out function automatically through use of the Status Report. This is especially convenient when an alert condition is created upon exiting a monitored door, and there is no way to cancel from the local keypad.

Example: You are planning to exit through a monitored door. Prior to exiting, you initiate a Status Report recitation at the Model 1104 keypad by pressing WHAT IS, followed by STATUS, (key sequence shown below). This allows you approximately 30 seconds to exit without activating the Model 1104's programmed response to an alarm. At the conclusion of the status report, normal alarm response is reactivated.

To use exit delay, initiate the Status Report.

1. Press WHAT IS.

2. Press STATUS. The Model 1104 recites the full Status Report; during this time, you are able to exit the monitored area without tripping an alarm.

Chapter 6: Acknowledgment, Status Report & Remote Access

In addition to communication and alarm monitoring capabilities, the Model 1104 will also respond to your instructions and provide you with access to information on monitored conditions at all times.

By issuing commands to the unit, either at the installation site or over standard telephone lines, the following features may be activated:

- Acknowledgment of existing alarms
- The Status Report on all monitored conditions.

6.1 Alarm Acknowledgment

When the Model 1104 dials out with an alarm message, it will request acknowledgment before hanging up. Acknowledgment indicates to the unit that the alarm message has been received. Upon acknowledgment, the Model 1104 will cancel the dial-out sequence.

There are three ways* that an alarm is acknowledged directly:

- Local Acknowledgment
- Touch-Tone™ Acknowledgment
- Callback Acknowledgment

* A fourth method of alarm acknowledgment is indirect. Refer to Max Calls, Chapter 4, Section 4.12 for an example of automatic alarm acknowledgment.

6.1.1 Local Acknowledgment

To acknowledge an alarm locally (directly at the installation site of the Model 1104), press any key.

6.1.2 Touch-Tone™ Acknowledgment

This method of remote alarm acknowledgment works with a Touch-Tone™ telephone.

Example: You receive a call from the Model 1104, reporting that an alarm exists. The message concludes: *"Indicate you have received warning message."* Now, or at any time during this call, you may acknowledge the alarm with the code **"555"** if you are using a Touch-Tone™ telephone.

- To enter "555," press the number (5) key on the Touch-Tone™ phone keypad three times. The Model 1104 will respond: * ***"Warning message received by telephone number (last number dialed)."*** The Model 1104 will hang up and the dial-out sequence, including any further response to the alarm, will be cancelled.
- If you enter the wrong code or do not enter it within 10 seconds following the conclusion of the message, the Model 1104 will respond: ***"Dial telephone number (the programmed unit phone number) within (Intercall Time)."*** Then, the Model 1104 will hang up. The alarm is still not acknowledged until you call back. You have a period equal to the programmed Intercall Time to call the unit back in order to acknowledge the alarm. Refer to Callback Acknowledgment, Section 6.1.3, below.

6.1.3 Callback Acknowledgment

This method of remote alarm acknowledgment works with any telephone: pulse, rotary, or Touch-Tone™.

Example: The Model 1104 calls you with an alarm message. You answer the call with a rotary or pulse telephone, and do the following:

- You listen to the message and hang up.
- Then you call the Model 1104 back on any telephone. You must wait for 10 rings—this signals the Model 1104 to answer your telephone call. (Make sure to call back within the programmed setting for Intercall Time—refer to Chapter 4, Section 4.11.)

When the Model 1104 answers your return call, it gives a Status Report (refer to Section 6.2). Then it says: *"Warning message received by ..."* and recites the telephone number last dialed. This indicates that the alarm has been acknowledged.

NOTE

If you have the TAD feature (telephone answering device) enabled, the Model 1104 will answer the telephone on the first ring. If it is disabled, the telephone must be allowed to ring 10 times. This serves as a precaution against a random alarm acknowledgment. Refer to Chapter 4, Section 4.6, for complete information on using the TAD feature.

6.2 Status Report

The Status Report allows access to complete information on all monitored conditions either locally, from the keypad, or by telephone, from any location. The Model 1104 will answer an incoming telephone call following the programmed Rings Until Answer (refer to Chapter 4, Section 4.5). Included with the Status Report are messages related to alarm conditions, AC power, battery backup and sound level. It also provides an opportunity for listening to on-site sounds (refer to Listen-in Time, Chapter 4, Section 4.7).

To initiate the Status Report:

1. Press WHAT IS.

2. Press STATUS.

Sections 6.2.1, 6.2.2, and 6.2.3 demonstrate two different Status Report recitations. The Status Report starts with:

"Hello. This is telephone number 555-1234 (or the programmed ID)."
"The time is 12:15PM (or the current time)."

The Model 1104 proceeds with a separate report for each input. Each input identifies itself by reciting the input number.

6.2.1 Example: Status Report, No Alarms

Inputs 2, 3, and 4 are configured as dry contact and input 1 is configured as temperature. No alarms exist. The Status Report begins by saying, *"Hello, this is telephone number 555-1234; the time is 12:15PM."*

Following this introduction, the report continues:

"Number 1, 74 degrees, OK."

"Number 2, OK."

"Number 3, OK."

"Number 4, OK."

"The electricity is ON." This refers to AC power.

"Battery condition, OK." Other possible responses: *"Battery condition low"* or *"Replace batteries."* (Refer to Section 6.2.4 for additional information regarding battery condition.)

"Sound level, OK."

"Listen to the sound level for 10 seconds." In this case, the programmed Listen-in Time is set at 10 seconds. (This feature is not available when obtaining the Status Report on-site, directly at the keypad.)

The Status Report repeats once more and the Model 1104 concludes the call, saying: *"Have a good day."* (The Status Report will not repeat if obtained at the keypad; *"Have a good day,"* is also not recited.)

The phrase *"no number"* at the end of a Status Report indicates that no dial-out phone numbers have been programmed.

6.2.2 Example: Status Report, Existing Alarms

Inputs 2, 3,and 4 are configured as dry contact and input 1 is configured as temperature. An emergency situation is at hand: a fire in a greenhouse has tripped a smoke alarm and electrical power has been disrupted. In addition to high sound and AC power alarms, separate alarms exist on inputs 1, 2, 3, and 4. You happen to call in for the Status Report, which begins with, *"Hello, this is telephone number 555-1234; the time is 12:15PM."* Following this introduction, the report continues:

"Number 1, 110 degrees, HIGH."

"Number 2, EXISTS."

"Number 3, EXISTS."

"Number 4, EXISTS."

"The electricity is OFF."

"Battery condition, OK."

"Sound level, HIGH."

"Warning message received by ...(last telephone number dialed)."*

"Listen to the sound level for 10 seconds."

The Status Report repeats once more and the Model 1104 concludes the call by saying: *"Have a good day."*

* The *"last telephone number dialed"* refers to any one of the programmed, dial-out telephone numbers through which the Model 1104 was able to receive alarm acknowledgment, prior to your call for a Status Report; this could also refer to the Model 1104's I.D. Number (identification number), if the alarms are acknowledged at the keypad by someone present at the site.

6.2.3 Example: Status Report, Disabled Inputs

If an input is disabled, the dial-out feature for that input is deactivated, but all other programmed parameters remain in effect. In the example below, all 4 inputs are disabled, although inputs 1 and 3 are detecting alarms. AC power and Sound Level is also disabled for dial-out. (Note that to indicate disabled status, only AC power will return two audible *"beeps,"* rather than the word *"OFF."*) When you call the Model 1104 for a Status Report, you hear the following:

"Hello, this is telephone number 555-1234.

"The time is 12:15PM."

"Number 1, OFF, 96 degrees, HIGH."

"Number 2, OFF, 74 degrees, OK."

"Number 3, OFF, EXISTS."

"Number 4, OFF, OK."

"The electricity is (beep, beep) ON." If the electricity is off, or the AC adaptor is disconnected, you will hear: *"The electricity is (beep, beep) OFF."*

"Battery condition, OK."

"Sound level OFF, OK." If the sound level is high you will hear: *Sound level OFF, HIGH."*

"Listen to the sound level for 10 seconds."

The Status Report repeats once more and the Model 1104 concludes the call, saying: *"Have a good day."*

6.2.4 Battery Condition

During a Status Report, you may hear one of three possible messages regarding battery power. The Model 1104 determines the appropriate message by measuring battery voltage.

Depending upon the remaining voltage, it may respond:

- *"Battery Condition OK,"* if over 8.2 Volts.
- *"Battery Condition low,"* if between 7.2 and 8.2 Volts.
- *"Replace batteries,"* if below 7.2 Volts.

6.2.5 Remote Access by Touch-Tone™ Telephone

Calling the Model 1104 for a Status Report provides the opportunity to access other functions, using Touch-Tone™ push-button commands. Remote telephone commands include:

- Disabling/enabling any input.
- Disabling/enabling High Sound Alarm monitoring.
- Disabling/enabling AC Power monitoring.
- Activation of Listen-In Time.
- Activation of the Status Report.

To issue commands by telephone, first dial the number of the Model 1104 to access the Status Report. The Status Report will be followed by the programmed Listen-In Time. If you remain on the telephone, the Status Report will be repeated, followed by a 10 second waiting period and hang-up. During this 10 second waiting period, or ***at any time during the call, other commands may by accessed by pressing any push button on the telephone.***

If a Security Code is in effect, the Model 1104 will prompt you with: *"Enter Security Code."* If no Security Code is set, then it will say *"O.K."*

- Enter your Security Code (4 digits) with the telephone push buttons. If the code you enter is correct, the Model 1104 will respond: *"OK."*
- If you enter the wrong Security Code, the Model 1104 says, *"Error. Have a good day,"* and hangs up.

Disabling/enabling inputs – If an input is set to detect an alert condition, it can be disabled to prevent the Model 1104 from dialing out, or re-enabled at any time.

This feature allows the convenience of disabling an input, even if you are away from the site of the Model 1104. One such application may involve an input programmed to detect unauthorized entry. You are in another locale, but must allow someone else temporary access to the area monitored by the Model 1104. Using a Touch-Tone™ telephone, you can disable the

appropriate input (thereby disabling any alarm dial-out response). The input remains disabled until you issue the same command, which effectively returns it to its former, enabled state.

Press the following push-buttons on the Touch-Tone™ telephone to execute the desired command:

*** (asterisk), 1**

...equal to Sensor On/Off, for input 1. To re-enable the input, repeat the same Touch-Tone™ button sequence used for disabling.

*** (asterisk), 2**

...equal to Sensor On/Off for input 2, and so on, for inputs up to 4. To re-enable the input, repeat the same Touch-Tone™ button sequence used for disabling.

Disabling/enabling High Sound Monitoring –

*** (asterisk), 9**

...equal to SENSOR ON/OFF for High Sound Alarm monitoring. To re-enable High Sound Alarm, repeat the command.

Disabling/enabling AC Power –

*** (asterisk), 0**

...equal to Sensor On/Off for AC Power monitoring. To re-enable AC Power monitoring , repeat the command.

Activating Listen-In Time –

 # (pound), 1

...initiates Listen-In Time for listening to on-site sounds for the programmed time available.

Activating Status Report –

 # (pound), 2

...initiates a full recitation of the Status Report.

Exiting –

 # (pound), # (pound)

...forces exit. The 1104 says, *"Have a good day,"* and hangs up.

Chapter 7: Operation

After installation and programming is completed, the Model 1104 is fully operational. This chapter explains the sequence of events that occur during an alarm dialout to illustrate how the Model 1104 operates.

7.1 Alarm Detection, Dial-out and Acknowledgment

Generally, an alarm event is structured in the following manner:

I. The Model 1104 detects an alert condition due to a change at the sensor.

II. A valid alarm is recognized.

III. Dial-out begins.

IV. The alarm is acknowledged.

Often, an alarm does not proceed through all stages: either an alert condition does not persist long enough to be considered valid, or a valid alarm is cancelled.

The table on the following pages explains the alarm detection, dial-out and acknowledgment features and lists important variable factors affecting their operation.

I.Model 1104 Detects a Change at the Sensor	Variable Factors
• Model 1104 detects a change in the monitored condition (from the sensor wired to one of the inputs). This is considered an alert condition, and does not qualify as a valid alarm at this point. • The condition continues throughout the programmed Recognition Time. If the condition (or sensor) reverts to its normal state before the Recognition Time is reached, no alarm will occur.	*Input Type: (1) An open circuit closes, (2) a closed circuit opens, or (3) temperature limits are exceeded.* *Recognition Time: Activated*
II. A Valid Alarm Is Recognized	**Variable Factors**
• The condition must persist long enough to meet or exceed the programmed Recognition Time. When Recognition Time has expired, but the alert condition continues, the Model 1104 will determine that a valid alarm exists.	*Recognition Time: Expired*
• When a valid alarm is determined, Call Delay is activated, forcing the Model 1104 to wait for a programmed period of time before starting the dial-out process. Call Delay applies to the period just prior to dial-out, before the first telephone call is made.	*Valid Alarm: Exists* *Call Delay: Activated*
• Call Delay provides the opportunity to cancel a valid alarm at the Model 1104's installation site, before dial-out occurs. An audible voice message indicates which of the inputs is in alarm. If on-site personnel acknowledge the alarm within the Call Delay time, the Model 1104 will not dial out. (Local Voice Mute is disabled, so that alarm messages can be heard at the site.)	*Alarm Message: Audible, On-site Activated* *Local Voice Mute: Disabled*

III. Dial-out Begins	Variable Factors
• The dial-out process is activated as soon as the Call Delay time expires (if the alarm has not been cancelled at the Model 1104's installation site.) The dial-out begins with telephone number 1 and proceeds sequentially, through the remaining telephone numbers.	*Call Delay: Expired*
• If the alarm is not acknowledged with the first dial-out telephone call, the Model 1104 waits the duration of Intercall Time before dialing the next telephone number. Intercall Time is the programmed waiting period in between each dial-out telephone call.	*Intercall Time: Activated*
• When the telephone is answered, the programmed Voice Repetitions determine the number of times per call the Model 1104 recites the alarm message.	*Voice Repetitions: Activated*
• Call Progress, an automatic feature, enables the Model 1104 to detect whether or not the telephone call is answered. After 8 rings, or if a busy signal is encountered, the Model 1104 will hang up, wait the programmed Intercall Time, and proceed to dial the next telephone number.	*Call Progress: Activated*
• If no telephone calls are answered, the Model 1104 dials out sequentially, through the remaining telephone numbers and continues to cycle until the programmed Maximum Number of Calls is reached.	*Max Calls: Activated*
• When the telephone is answered, the Model 1104 will immediately begin reciting a message that indicates which of the inputs is in alarm. At the same time, the alarm message is repeating at the Model 1104's installation site. The Model 1104 will request acknowledgment, if it has not yet occurred.	*Alarm Messages: By Telephone and On site*

IV. The Alarm Is Acknowledged	Variable Factors
• At any time after a valid alarm is determined, the alarm may be acknowledged at the Model 1104's installation site, by pressing any key.	*Local, On-site Acknowledgment*
• When the Model 1104 dials out and the call is answered via Touch-Tone telephone, any alarm may be instantly acknowledged by pressing "555."	*Touch-Tone Acknowledgment: Fast Code 555*
• If the alarm message repeats for the number of programmed Voice Repetitions, and "555" has not been entered, the Model 1104 will say:	
"Indicate that you have received warning message."	
The Model 1104 waits 10 seconds for the Touch-Tone code "555" to be entered. If the code is entered within 10 seconds, it responds:	*Touch-Tone Acknowledgment: Normal Code 555*
Warning message received by telephone number...(the dialed phone number)."	
The alarm is considered acknowledged and the dialout concludes.	*Tone or Pulse Callback Acknowledgment: Within Intercall Time*
• If the Model 1104 does not receive the Touch-Tone code within 10 seconds, it recites the following and then hangs up:	
"Dial telephone number (gives the Unit ID Number) within...(the programmed Intercall Time.)"	
The recipient of this message must call the Model 1104 back within the period programmed for Intercall Time, in order to acknowledge the alarm. If Local Voice Mute is off, the unit will beep at the installation site while waiting for this call.	
• Callback: The Model 1104 waits 10 rings before answering to guard against random acknowledgment. If an	

IV. The Alarm Is Acknowledged	Variable Factors
answering device is connected to the same line as the Model 1104 (and TAD is enabled), the Model 1104 will answer on the first ring. First, it recites the Status Report, followed by: *"Warning message received by telephone number...(the last number dialed)."* *"Have a good day."*	*Tone or Pulse Callback Acknowledgment: TAD Enabled*
When the Model 1104 hangs up, the alarm is acknowledged and dial-out stops.	
• If calls remain unanswered, or if they are received by an answering machine or FAX, the Model 1104 continues the dialout sequence; it waits the Intercall Time and proceeds to dial the next telephone number. Telephone numbers are dialed sequentially, and this cycle continues for the number of Max Calls programmed. If no acknowledgment occurs, then at the completion of Max Calls, the alarm is automatically acknowledged and the dial-out process is terminated.	*Max Calls Acknowledgment*

NOTE

Acknowledging the alarm does not correct the situation! The alarm condition will still exist until the sensor is restored to its normal state.

7.2 Example: A Dial-out Telephone Call

The following parameters are selected for demonstration purposes:

- Model 1104 Unit ID Number is set to 555-5674. It is currently installed at your place of business.
- Dial-out Telephone Number 1 is programmed to 555-1234, your home telephone number.
- Voice Repetitions are set to 4.

The Model 1104 is detecting an alarm on input 2.

The telephone rings at 555-1234, your home number.

You answer the telephone and hear the following message:

"Hello, this is telephone number 555-5674. The time is 8.30PM Alert condition two exists."
(4-seconds to hear on-site sound from unit's microphone.)

"Hello, this is telephone number 555-5674. The time is 8.30PM Alert condition two exists."
(4-seconds to hear on-site sound from unit's microphone.)

"Hello, this is telephone number 555-5674. The time is 8.30PM Alert condition two exists."
(4-seconds to hear on-site sound from unit's microphone.)

"Hello, this is telephone number 555-5674. The time is 8.30PM Alert condition two exists."
(4-seconds to hear on-site sound from unit's microphone.)

"Indicate you have received warning message."

NOTE

It is important that your dial-out telephone numbers be answered by you or other authorized personnel in order to ensure adequate response to an alarm.

Appendix A: Troubleshooting

In the event that a problem is encountered, this section will assist you in determining the cause, so you can return the unit to its usual monitoring routine with minimal interruption.

Most problems with the Model 1104 are easy to identify and quickly corrected, and are found under the following general headings:

- Communications/dial-out functions
- Temperature monitoring
- Sound level monitoring
- Other monitoring functions

If you have tried the solutions outlined in this section and are not satisfied with the results, call Sensaphone Technical Support at 610-558-2700, or follow the guidelines for shipping the Model 1104 to PHONETICS, INC. for repair (see Appendix D).

Communications / Dial-out:

Problem	Cause	Solution
1. The Model 1104 fails to dial out.	a) The telephone number may be incorrectly programmed.	Recheck programming steps. Refer to Chapter 4, Section 4.2.1.
	b) Tone or pulse (the current dialing method) is not compatible with the telephone line on which the Model 1104 is installed.	Switch from the current setting: from tone to pulse, or from pulse to tone. Refer to Chapter 4, Section 4.3.
	c) Recognition Time is too long. An alert condition does not remain in effect long enough to become a valid alarm.	Reprogram Recognition Time. Set the Recognition Time to the minimum duration required to create a valid alarm. If possible, test the new setting by deliberately creating an alert condition. Refer to Chapter 5, Section 5.3.
	d) Max Calls is set to zero.	Reprogram Max Calls. It is a good idea to set your Max Calls to at least equal the number of dial-out telephone numbers programmed. Refer to Chapter 4, Section 4.12.1.

	e) The Model 1104 is connected to an incompatible telephone line.	The Model 1104 must be connected to a standard (2-wire analog) telephone line, ***not a digital extension*** to a phone system. If the unit will not dial out and the factors previously listed have been ruled out, try connecting the unit to a standard residential telephone line.
2. The Model 1104 will not answer the telephone when called for a Status Report or alarm acknowledgment.	a) Rings Until Answer is incorrectly programmed.	Recheck programming of Rings Until Answer. Refer to Chapter 4, Section 4.5.1.
	b) The Model 1104 is connected to an incompatible telephone line.	Some telephone systems will not allow the telephone to ring beyond 4 rings. If your Model 1104's Rings Until Answer is set at more than 4 rings, you may not be able to access the unit. Try setting the Rings Until Answer to less than 4 rings. If this does not correct the problem, it may indicate telephone line incompatibility. In this case, try connecting the Model 1104 to a standard, residential telephone line.

Communications / Dial-out:

Problem	Cause	Solution
(Continued from previous page) 3. The Model 1104 will not answer the telephone for Callback Acknowledgement.	You did not allow the telephone to ring 10 times. Note: If the TAD (telephone answering device) is disabled, the telephone rings ten times before the Model 1104 answers. If the TAD is enabled, the telephone rings once before the Model 1104 answers the call.	When calling the Model 1104, and the TAD is disabled, allow the telephone to ring 10 times. Refer to Chapter 6, Section 6.1.3, and Chapter 4, Section 4.6.3.
4. The Model 1104 recites the alarm message or Status Report over the telephone, but is silent at the installation site.	The local voice mute feature is in effect.	Deactivate local voice mute. Refer to the programming steps in Chapter 4, Section 4.9.
5. The Model 1104 dials out correctly but fails to audibly recite its alarm message when you answer the call.	Voice Reps is set to zero.	Reprogram Voice Reps to 1 or greater. Refer to Chapter 4, Section 4.10.
6. The Model 1104 and telephone answering device (sharing the same line) answer incoming calls simultaneously.	The Model 1104's number of Rings Until Answer is set to equal the number of rings set for the telephone answering device.	Change the number of Rings Until Answer for the Model 1104. Refer to Chapter 4, Section 4.5.

Temperature Monitoring:

Problem	Cause	Solution
1. Can't program temperature limits; or the unit won't read the temperature sensor.	The input isn't configured to read a temperature sensor.	Press SET and CONFIGURE to program the input. (See Section 5.1.1 for more information on configuring inputs.)
2. The temperature reading is -20° F or -30° C.	The temperature sensor has been disconnected or has broken wires.	Examine the wires to temperature sensor and connect or replace wiring.
3. Temperature reads 150° F or 65° C.	Temperature sensor wires are touching or have shorted.	Verify and correct wiring.
4. Temperature reading is inaccurate.	a) Temperature sensing may be affected by a source of ambient heat (ie., direct sunlight, or heat duct proximity).	Try moving the unit to a different location.
	b) Temperature may require calibration.	After moving or placing the unit away from ambient heat sources, the temperature may be calibrated to offset inaccurate normal reading by several degrees. Refer to Chapter 5, Section 5.6.
	c) The unit is using the wrong temperature scale (Fahrenheit vs. Celsius).	Verify temperature scale. Refer to Chapter 5, Section 5.5.

Sound Level Monitoring:

Problem	Cause	Solution
1. False high sound alarms occur frequently.	The programmed sound sensitivity results in over-sensitivity to non-alarm sound as well as alarm sound.	Reprogram the sound sensitivity. Refer to Chapter 5, Section 5.10.
	Sound Recognition Time is too short.	Lengthen the sound Recognition Time. Refer to Chapter 5, Section 5.10.
2. High sound does not cause an alarm.	The unit is not close enough to the high sound source, or the programmed sound setting results in a lack of sensitivity to high sound.	Move the unit closer or reprogram the sound sensitivity. Refer to Chapter 5, Section 5.10.

Other Monitoring:

Problem	Cause	Solution
1. Alarm status of an alert input is incorrect.	Incorrect input normality.	Reconfigure the input. Refer to Chapter 5, Section 5.1.
2. False power out alarms	Programmed Recognition Time is too short.	AC power is often subject to brief interruptions. To avoid frequent, false alarms, increase the power Recognition Time. Refer to Chapter 5, Section 5.9.

3. The Model 1104 does not recognize power failure.	a) Batteries are either incorrectly installed or drained.	To verify proper battery function, unplug the unit and verify continued operation using batteries only. If unit ceases to function, first try reinstalling the batteries. If this is not successful, replace the batteries. Refer to Chapter 2, Section 2.4 for complete instructions.
	b) Recognition time setting is too long.	Reprogram Recognition Time. Set the Recognition Time to the minimum required before a valid alarm occurs. If possible, test the condition by deliberately creating an alert condition. Refer to Chapter 5, Section 5.9.
4. The Model 1104 does not recognize any alarm.	a) Inputs for alarm are disabled.	Enable the inputs for alarm. Refer to Chapter 5, Section 5.2.
	b) Programmed Recognition Time is too long.	Reprogram Recognition Time. Set the Recognition Time to the minimum required for a monitored condition to become a valid alarm. If possible, test the condition by deliberately creating an alert condition. Refer to Chapter 5, Section 5.3.

Other Monitoring:

Problem	Cause	Solution
(continued from previous page)		
5. The batteries drain prematurely.	The unit's AC transformer is unplugged or for some other reason, full AC power is not available to the unit.	The batteries will take over powering the unit when the AC transformer is unplugged from the 120 VAC outlet. When storing the unit, be sure to remove the batteries. Refer to Chapter 2, Section 2.4. *Be sure to use alkaline batteries—do not use rechargeable nicad batteries.*

If the solutions offered above do not appear to correct the problem, apply the following steps, in the order shown.

- Remove the batteries.
- Unplug the unit.
- Wait one minute for the Model 1104 to completely power down.
- Plug in the unit's AC adaptor into a standard 120 VAC outlet.
- Replace the batteries.

Refer to Chapter 2, Installation, for additional information on batteries and installation procedures.

Appendix B: Weekly Testing Procedure

We recommend that you test your Sensaphone weekly to be sure it is functioning properly. This will ensure that when a problem arises the Sensaphone will be ready to alert the appropriate personnel.

There are several tests that can be performed:

1) Call the unit and listen to the Status Report. This will test the unit's ability to answer the phone and speak a message. It will also verify that all of the inputs are reading properly, the alarm conditions are OK, the electricity is on, the microphone is functioning, and the batteries are OK.

2) Create an alarm on each input by tripping all connected sensors.

   Temperature sensors: Heat or cool the sensor.
   Motion sensors: Have someone walk in front of the sensor.
   Door/window sensors: open the door/window.
   Water sensors: Apply a small amount of water beneath the sensor or use a wet towel and touch it to the sensor probes.
   Humidity sensors: Raise the humidity around the sensor by holding a cup of very hot water beneath the sensor.

   Allow the unit to contact all programmed telephone numbers. This will make sure that the Sensaphone is programmed properly. It will also prepare personnel to respond appropriately when they receive a call from the Sensaphone.

3) Test the batteries by unplugging the AC adapter and making sure that the Sensaphone continues to function. Press WHAT IS, then STATUS on the keypad, and listen to the status report. Make sure the report states that *"the electricity is off"* and *"battery condition OK."* Keep the AC adapter unplugged so that a Power Failure alarm occurs. Allow the unit to dial all programmed telephone numbers while running on battery backup. Plug in the AC adapter after the unit has finished dialing all of the telephone numbers.

4) If you are using your Sensaphone to listen for a smoke alarm, then be sure to test the smoke alarm to make sure that the Sensaphone picks up the audible signal and triggers a high-sound-level alarm. Allow the unit to dial all programmed telephone numbers.

5) If you require assistance, call Sensaphone Technical Support at 610-558-2700.

Appendix C: Accessories

The sensors listed below are available from Phonetics, Inc., and represent the most commonly used input devices. Other dry contact sensors, designed for more specialized applications, may also be used. Commercial or industrial electrical supply houses can provide devices to monitor virtually any condition. For further information, contact Sensaphone Customer Service at 610-558-2700.

PART NUMBER	SENSOR / SWITCH
FGD-0006	Magnetic Reed Switch
FGD-0007	Passive Infra-Red Detector
FGD-0010	Accessory Hook-Up Wire
FGD-0013	Water Detection Sensor
FGD-0022	Temp° Alert
FGD-0023	ISOTEL Surge Protector
FGD-0027	Humidistat
FGD-0049	Smoke Detector with Built-in Relay
FGD-0100	Remote Temperature Sensor
FGD-0101	Weatherproof Temperature Probe
FGD-0200	Phonecell SX3e Cellular Phone

Appendix D: Returning the Unit for Repair

In the event that the Model 1104 does not function properly, we suggest that you do the following:

1) Record your observations regarding the Model 1104's malfunction.

2) Call the Technical Service Department at 610-558-2700 prior to sending the unit to Sensaphone for repair.

If the unit must be sent to Sensaphone for Servicing, please do the following:

1) Unplug the AC power supply from the wall outlet, remove the batteries, and disconnect all sensors from the alert inputs.

2) Carefully pack the unit to avoid damage in transit. Use the original container (if available) or a sturdy shipping box.

3) **You must include the following information to avoid shipping delays:**

   a) Your name, address and telephone number.

   b) A note explaining the problem.

4) Ship your package to the address below:

SERVICE DEPARTMENT
Phonetics, Inc.
901 Tryens Road
Aston, PA 19014

5) Ship prepaid and insured via UPS or US Mail to ensure a traceable shipment with recourse for damage or replacement.

1 YEAR LIMITED WARRANTY

1. **WARRANTOR**: Dealer, Distributor, Manufacturer

2. **ELEMENTS OF WARRANTY**: This Product is warranted to be free from defects in materials and craftsmanship with only the limitations and exclusions set out below.

3. **WARRANTY AND REMEDY**:

One-Year Warranty — In the event that the Product does not conform to this warranty at any time during the time of one year from original purchase, warrantor will repair the defect and return it to you at no charge.

This warranty shall terminate and be of no further effect at the time the Product is (1) damaged by extraneous cause such as fire, water, lightning, etc. or not maintained as reasonable and necessary; (2) modified; (3) improperly installed; (4) repaired by someone other than warrantor; (5) used in a manner or purpose for which the Product was not intended; or (6) sold by original purchaser.

WARRANTORS' OBLIGATION UNDER THIS WARRANTY IS LIMITED TO REPAIR OR REPLACEMENT OF THE PRODUCT. THIS WARRANTY DOES NOT COVER PAYMENT OR PROVIDE FOR THE REIMBURSEMENT OF PAYMENT OF INCIDENTAL OR CONSEQUENTIAL DAMAGES.

It must be clear that the warrantors are not insuring your premises or guaranteeing that there will not be damage to your person or property if you use this Product. The warrantors shall not be liable under any circumstances for damage to your person or property or some other person or that person's property by reason of the sale of this product or its failure to operate in the manner in which it is designed. The warrantors' liability, if any, shall be limited to the original cost of the Product. The warrantors assume no liability for installation of the Product and/or interruptions of the service due to strikes, riots, floods, fire, and/or any cause beyond Seller's control.

4. **PROCEDURE FOR OBTAINING PERFORMANCE OF WARRANTY**: In the event that the Product does not conform to this warranty, the Product should be shipped or delivered freight prepaid to a warrantor with evidence of original purchase.

5. **LEGAL REMEDIES**: This warranty gives you specific legal rights, and you may also have other rights which vary from state to state to the extent allowed by law expressly in lieu of any other express or implied warranty, condition, or guarantee.

Effective date 07/01/90

PHONETICS, INC.
901 Tryens Road
Aston, PA 19014
Phone: (610) 558-2700
Fax: (610) 558-0222

APPENDIX C.2

BUILDING MODIFICATIONS

ChemCo Systems
2800 Bay Road, Redwood City, CA 94063, PH: 650.261.3790, FAX: 650.261.3799

CCS™ BONDER PASTE LWL

Long Working Life Epoxy Paste Adhesive For Bonding

CCS Bonder Paste, LWL (Long Work Life) is a two-component, long working life, structural, epoxy paste adhesive designed for application on vertical surfaces and in horizontal and overhead oriented holes. The physical properties of the product allow its use in applications requiring resistance to creep and stress relaxation, maintenance of mechanical properties at high ambient temperatures and high load bearing strength. Primary applications include the filling of wide cracks, gaps and voids in concrete and masonry, bonding of hardened concrete, masonry and stone to themselves and each other and anchoring bolts, dowels and rebar into horizontal and overhead oriented holes in concrete, masonry or stone. The product is ideally suited for applications requiring significant manual labor (due usually to restricted access to the substrate) and when a long cure time is not a constraint. The working/cure time and viscosity of Bonder Paste, LWL can be adjusted by blending with the appropriate companion products (see below). The product is non-sagging in an applied thickness of 1/2 inch, bonds to dry, damp and wet (no free standing water) substrates and meets the *ASTM C 881* requirements for bonding agents in load bearing applications.

Features

Convenient 2: 1, by vol. mix ratio
Long work life for high temperatures, limited access
Bonds to dry, damp end wet (no free standing water) substrates
Adjustable work life/viscosity using product blends
Exceptional substrate wetting/water displacement
Environmentally safe- No VOC solvents

Limitation: The recommended minimum substrate temperature during installation and cure is 50 deg F. (For installation and cure temperatures down to 40 F or when a faster cure is needed, use CCS Bonder Paste, SWL.) The maximum in-service temperature should not exceed 20 deg F below the HDT in applications subjected to substantial and sustained shear stresses that may cause creep. When bonding plastic concrete containing resinous admixtures, establish the suitability of the concrete mix before actual use. Do not add solvents to this material. The viscosity may be decreased only by blending with the appropriate companion product (see below, Blending With Compatible Products).

Packaging & Colors: Standard package sizes of Part A & Part B are 3 and 15 gallons. Standard color is Concrete gray (blue-gray

Chemical Resistance: Bonder Paste, LWL has excellent resistance to a wide range of commonly encountered chemicals including acids and bases, aircraft and automotive fluids, cutting oils, etc. Performance is a function of the specific chemical and concentration, exposure times and housekeeping procedures. For information on specific chemicals and exposure conditions, contact a ChemCo Systems, Inc., technical representative.

Surface Preparation: Concrete surfaces may be dry, damp or wet (no free standing water) but must be sound and free of all bond-inhibiting substances. Prepare surfaces in accordance with *ASTM D 4259* or *ACI 503R* and ChemCo Systems' specific recommendations. Cleaned concrete surfaces should have a minimum strength of 250 psi in direct tension. Steel surfaces should be cleaned to "white metal" according to SSPC SP 5.

Mixing: Bonder Paste, LWL is a two-component system. The resin to hardener (Part A : Part B) mix ratio is 2 :1, by volume. Read all material safety data (MSDS) information before handling the product. Wear safety glasses and clean neoprene rubber gloves when handling the materials, Premix the individual components before drawing from bulk packaging. Transfer the appropriate quantities of Part A and Part B into a mixing container. Use quantities that can be applied before the pot life of the material expires. Blend thoroughly using a Jiffy mixer blade attached to a low speed (350 - 750 rpm) electric or pneumatic drill. Proper mixing will take 2 - 3 minutes.

Installing: For fairing and leveling applications, apply mixed material on the prepared substrate using a margin or finishing trowel. Fill wide cracks, gaps and voids by pumping or caulking the material into place. When bonding two solid surfaces, apply bonding agent to both surfaces. Establish contact between the surfaces using positive contact pressure. Maintain contact pressure until the adhesive has set. Remove excess material (squeeze-out) before the material sets. To grout bolts, dowels and rebar into horizontal and overhead holes, place the required amount of material in the hole (approx. 40% of hole volume) using a caulking gun with a nozzle of appropriate length. Retract the nozzle tip as the hole fills. Insert the bar slowly while rotating to expel air. Secure the bar in the center of the hole

Blending With Compatible Products: The working life/cure time of Bonder Paste, LWL may be decreased, if required, by pre-blending the Part B with the Part B of the short work life product, Bonder Paste, SWL. The viscosity of Bonder Paste, LWL may be decreased by blending the mixed product with mixed companion liquid product, Bonder Liquid, LWL. The long and short work life and liquid and paste forms of the product employ a 2:1 (by vol.) mixing ratio that must be maintained at all times.

Shelf Life: Three years minimum in unopened, original containers when stored between 60 and 90 deg F in a dry place away from sunlight. Remixing of components may be required upon prolonged storage.

TYPICAL PROPERTIES (1)

Property (2)		Test Method	Value		
Mix Ratio, A:B,	by vol			2:1	
	by wt			100:35	
Weight per Gallon, lb:	Part A	ASTM D 1475		12.3	
	Part B			8.4	
	Mixed			11.0	
			@ 50F	@ 73 F	@ 105F
Viscosity, p:	Part A	ASTM D 2393		7700	
	Part B			4800	
	Mixed			6700	
Gel Time, 1 quart, hours		ASTM D 2471	4.4	1.4	0.5
Non-Sag Thickness, inches		ASTM D 2730		½	
Thin Film Properties:					
Open Time, hours		AASHTO T-237	5	4	0.7
Hard Dry Time, hours		ASTM D 1640	38	10	3
Cure Time, days		AASHTO T-237	14	7	3
Compressive Yield Strength, psi		ASTM D 695		10,000	
Compressive Modulus, psi		ASTM D 695		350,000	
Flexural Strength, psi		ASTM D 790		10,000	
Flexural Modulus, psi		ASTM D 790		450,000	
Heat Deflection Temp., deg F		ASTM D 648		120	
Bond Strength, psi:	2 day cure @ 60 F	ASTM C 882		1000 (3)	
	14 day cure @ 60 F			1500 (3)	

(1) The properties listed are typical and descriptive of the product and should not be used for specification purposes. For specification preparation, reference the ChemCo Systems, Inc., product guideline specification.

(2) Cure schedule, 7 days at 73 ± 4 F and test temperature, 73 ± 4 F unless otherwise indicated.

(3) Compressive strength of cement mortar, 4500 psi.

Clean up: Excess mixed product is best removed from the work area and tools before it hardens. Use of rags and solvents such as acetone or heavy-duty detergents facilitate cleaning. Cured product may be removed from tools by soaking in an epoxy stripper

Handling and Toxicity: This bulletin does not accompany the product when sold. For hazard warnings, safe handling and first aid instructions, READ CAREFULLY THE MATERIAL SAFETY DATA SHEETS AND CONTAINER WARNING LABELS.
Part A: Liquid epoxy resin, HMIS Health Hazard Rating- 2 (Moderate Hazard). Warning! Causes eye and skin irritation. May cause allergic skin reaction. Harmful if swallowed. Avoid contact with eyes, skin and clothing. Wash thoroughly after handling. Avoid prolonged or repeated contact with skin.
Part B: Liquid epoxy hardener, HMIS Health Hazard Rating- 3 (Serious Hazard). Contains alkaline amines. Danger! Causes severe eye and skin burns. May cause allergic skin and respiratory reaction. Combustible, corrosive. Do not get in eyes or skin or on clothing. Avoid breathing vapor. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling. Keep away from heat and open flame

DISCLAIMER: NO EXPRESS WARRANTY IS MADE WITH RESPECT TO THE RESULTS OF ANY USE OF THIS PRODUCT. NO IMPLIED WARRANTIES, INCLUDING AND NOT LIMITED TO AN IMPLIED WARRANTY OF MERCHANTABILITY OR AN IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE ARE MADE WITH RESPECT TO THIS PRODUCT. NO LIABILITIES FOR PERSONAL INJURY, LOSS OR DAMAGE RESULTING FROM THE USE OF THIS PRODUCT IS ASSUMED.CHEMCO SYSTEMS, INC., RESERVES THE RIGHT TO ALTER OR DISCONTINUE THE PRODUCT DESCRIBED HEREIN AT ANY TIME AND WITHOUT PRIOR NOTICE.

CCS™ is a trade name of ChemCo Systems, Inc.

Publication Number: 3 EP CCS-122, Bonder Paste, LWL

Publication Date: Dec. 1995

MATERIAL SAFETY DATA SHEET
ChemCo Systems, Inc., 2800 Bay Road, Redwood City, CA 94063
Prepared by Dept. of Safety, Phone: 650/261-3790
24 Hour Emergency Phone: 800/424-9300 CHEMTREC

1. PRODUCT NAME:

CCS™ Bonder, Paste LWL, Part A
Chemical Family: Epoxy resin, filler mixture.

2. HAZARDOUS INGREDIENTS

NAME	CAS No.	TLV	STEL	PEL	CONTENT
Epoxy resin	25068-38-6	none	none	none	75-85%
Epoxy resin (CGE)	2210-79-9	none	none	none	15-25%

reference section 7, Health Hazard Data for LD (50)

3. PHYSICAL DATA:

Boiling Point:	> 250 f	Water/Oil Distribution Coefficient:	N/D
Percent Volatile:	Negligible	Solubility in Water:	Minimal
Freezing Point	N/D	Specific Gravity:	1.3
Vapor Pressure @ 20C:	N/D	pH:	N/D
Vapor Density	Heavier than air	Evaporation Rate:	N/D
Odor Threshold	N/D	Odor	Mild
Appearance	White paste		

N/D = Not Determined

4. FIRE AND EXPLOSION HAZARD DATA:

HMIS Flammability Rating: 1 - (Slight Hazard)

Flash Point:	> 250 F (PMCC)	
Auto Ignition Temperature:	N/D	
Limits of Flammability:	LEL: N/D	UEL: N/D

EXTINGUISHING MEDIA:
CARBON DIOXIDE, FOAM, DRY CHEMICAL AND WATER FOG

SPECIAL FIRE & UNUSUAL HAZARDS: At high temperatures vapors can cause pressure build-up in sealed containers. Use water to cool containers exposed to fire. Self-contained respirator equipment and full protective clothing required when smoke or fumes are generated. Electrical grounding not recommended.

5. REACTIVITY DATA:

HMIS Reactivity Rating: 1 - (Slight Hazard)

STABILITY: This product requires another component to react at room temperature. Excessive heat and fume generation can occur if improperly handled. Not sensitive to mechanical impact.
INCOMPATIBILITY: Strong acids, strong bases. Amines and mercaptains may initiate possible hazardous polymerization.
HAZARDOUS DECOMPOSITION PRODUCTS: Carbon monoxide and dioxide, aldehydes, various hydrocarbons from incomplete combustion.
HAZARDOUS POLYMERIZATION: May occur if product is not handled per instructions.

6. ENVIRONMENTAL AND DISPOSAL INFORMATION:

ACTION TO TAKE FOR SPILLS AND LEAKS: Wear appropriate protective gear. Contain leak/spill. Salvage. Clean up residue with absorbent material.
WASTE DISPOSAL METHOD: Handle disposal of waste material in manner which complies with local, state, province, and federal regulations. Landfill if solidified or incinerate at agency approved waste-disposal facility.

7. HEALTH HAZARD DATA:

HMIS Health Rating: 2 - (Moderate Hazard)

Primary Route Of Entry: Dermal

Effects of Overexposure:

Skin Contact:	Prolonged or repeated exposure may cause skin irritation and redness. Skin sensitization or allergic reaction may occur in some individuals.
Eyes:	Contact may cause irritation, redness, tearing and blurred vision.
Inhalation:	No known health information on inhalation of vapors. At higher temperatures fumes may be irritating and cause sensitization.
Ingestion:	Low oral toxicity. LD (50) CAS 25068-38-6 11.4 g/kg (rat) LD (50) CAS 2210-79-9 4 g/kg (rat)
Chronic:	Prolonged or repeated overexposure may cause sensitization or other allergic reactions. CGE is reported to be mutagenic in vitro.

8: FIRST AID:

Inhalation:	Remove victim from exposure. If difficulty with breathing; administer oxygen and seek immediate medical assistance.
Eyes:	Flush with water, lifting upper and lower lids occasionally for 15 minutes. Seek medical attention.
Skin:	Wash with soap and water; get medical attention if irritation persists.
Ingestion:	Do not give liquid if victim is unconscious or very drowsy; otherwise give no more than two glasses of water or milk and induce vomiting with two tablespoons of Syrup of Ipecac or by touching finger to back of victim's throat. Keep victim's head below hips while vomiting. Seek medical attention.

9. SPECIAL PROTECTION INFORMATION:

HMIS Personal Protection Rating C (Safety Glasses, Gloves, Apron)

Ventilation:	Ventilation is recommended. Air movement must be designed to insure turnover at all locations in work area to prevent build-up of heavy vapors.
Personal Protection:	Use eye protection. Selection of specific items such as gloves, boots and apron will depend on the operation.

10. ADDITIONAL INFORMATION:

DOT Proper Shipping Name:	Epoxy resin mixture
DOT Hazard Class or Division:	Not regulated
Identification Number:	N/A
Packing Group:	N/A
Labels Required:	N/A
WHMIS Classification:	Class D, Div. 2, Sub. B.
WHMIS Labeling:	Stylized T
Storage Conditions:	Keep containers tightly sealed. Store in dry and cool areas. Avoid freezing conditions.
Shelf life:	Indefinite.
Special Instructions:	Storage recommendations: Store at room temperature. Do not allow to freeze.

The information given herein is given in good faith. No warranty, expressed or implied, is made regarding the accuracy of these data or the results obtained from the use thereof. All materials may present unknown health hazards and must be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist. Consult ChemCo Systems,Inc.for further information. **MSDS122A 01/ 02**

MATERIAL SAFETY DATA SHEET

ChemCo Systems, Inc., 2800 Bay Road, Redwood City, CA 94063
Prepared by Dept. of Safety, Phone: 650/261-3790
24-Hour Emergency Phone: 800/424-9300 CHEMTREC

1. PRODUCT NAME:

CCS™ Bonder, Paste LWL, Part B
Chemical Family: Polyamines, filler mixture

2. HAZARDOUS INGREDIENTS

NAME	CAS No.	TLV	STEL	PEL	CONTENT
Polyamido amine	none	none	none	none	85-95%
Tetraethylenepentamine (TEPA)	112-57-2	none	none	none	1-5%
Tri(dimethylamino methylphenol) (DMP)	90-72-2	none	none	none	1-5%

reference section 7, Health Hazard Data for LD (50)

3. PHYSICAL DATA:

Boiling Point:	N/D	Water/Oil Distribution Coefficient:	N/D
Percent Volatile:	negligible	Solubility in Water:	slight
Freezing Point	N/D	Specific Gravity:	0.95
Vapor Pressure @ 20C:	<1mm	pH:	basic
Vapor Density	Heavier than air	Evaporation Rate:	N/D
Odor Threshold	N/D	Odor	Ammoniacal
Appearance	Black paste		

N/D = Not Determined

4. FIRE AND EXPLOSION HAZARD DATA:

HMIS Flammability Rating: 1 - (Slight Hazard)

Flash Point:	284 F (PMCC)	
Auto Ignition Temperature:	N/D	
Limits of Flammability:	LEL: N/D	UEL: N/D

EXTINGUISHING MEDIA:
CARBON DIOXIDE, FOAM, DRY CHEMICAL & WATER FOG
SPECIAL FIRE & UNUSUAL HAZARDS:
Self-contained respirator equipment and full protective clothing are required when smoke and fumes are generated. Electrical grounding is not recommended.

5. REACTIVITY DATA:

HMIS Reactivity Rating: 1 - (Slight Hazard)

STABILITY: Stable. This product must be mixed with another component to react. Not sensitive to mechanical impact.
INCOMPATIBILITY: Strong oxidizing agents, acids, epoxy resins, isocyanates and organic peroxides may result in violent explosive reactions.
HAZARDOUS DECOMPOSITION PRODUCTS: Carbon monoxide and dioxide, nitrogen oxides, aldehydes and various hydrocarbons from incomplete combustion.
HAZARDOUS POLYMERIZATION: Will not occur unless product is mixed with epoxy resins, isocyanates or urethane prepolymers.

6. ENVIRONMENTAL AND DISPOSAL INFORMATION:

ACTION TO TAKE FOR SPILLS AND LEAKS: Ventilate area. Wear appropriate protective gear. Contain leak/spill. Salvage. Clean up residue with absorbent material. Wash down area with water and diluted vinegar.
WASTE DISPOSAL METHOD: Handle disposal of waste material in manner, which complies with local, state, province, and federal regulations. Landfill if solidified or incinerate at agency approved waste-disposal facility.

7. HEALTH HAZARD DATA:

HMIS Health Rating: 2 - (Moderate Hazard)

Primary Route Of Entry: Dermal, Inhalation

Effects of Overexposure:

Inhalation	Due to low vapor pressure of this product, fumes will be minimal below 95F. At higher temperatures, fumes will be irritating, may cause coughing and chest pain.
Eyes:	Contact can cause severe burns, irritation, redness, tearing or blurred vision.
Skin Contact:	Short single exposure may cause moderate irritation to mild burn. Prolonged or repeated exposure may cause a severe burn. May result in an allergic reaction or sensitization response in some individuals.
Skin Absorption:	(DMP) may be absorbed through the skin to increase overall toxicity. LD (50) 90-72-2 1.3 g/kg (rabbit)
Ingestion:	Intake can cause gastrointestinal irritation, nausea, vomiting, diarrhea, headache and drowsiness. Can result in burns of mouth, esophagus and stomach. LD (50) 90-72-2 2.2 g/kg (rat)
Chronic:	Prolonged exposure may result in sensitization or other allergic reaction

8: FIRST AID:

Eyes:	Flush eyes with water and/or 1% boric acid, lifting upper and lower lids occasionally for 30 minutes. Seek prompt medical attention.
Skin:	Wash with soap and water for at least 15 minutes. Remove contaminated clothing and wash before re-use. Destroy contaminated leather. Seek medical attention if irritation persists.
Ingestion:	*Do not induce vomiting. Give large quantities of water or vinegar diluted with water. Get immediate medical attention. If vomiting occurs spontaneously, keep head below hips to prevent aspiration of liquids into lungs. Do not give anything by mouth to an unconscious person.*
Inhalation	Remove victim from exposure. If difficulty with breathing; administer oxygen and seek immediate medical assistance.

9. SPECIAL PROTECTION INFORMATION:

HMIS Personal Protection Rating C (Safety glasses, Gloves, Apron)

Ventilation	Ventilation is recommended. Air movement must be designed to insure turnover at all locations in work area to avoid the build up of heavy vapors.
Personal Protection	Use eye protection and gloves. . Selection of specific items such as gloves, boots and apron will depend on the operation. Wear respirator protection whenever airborne concentrations exceed TLV ceilings or TWA, use NIOSH approved respirators for listed hazard. Confined spaces, rooms or tanks are areas where concern for TLV's is especially important. Reference OSHA Regulation CFR 29 1910.134 for recommended respiratory protection.

10. ADDITIONAL INFORMATION:

DOT Proper Shipping Name:	Polyamine mixture
DOT Hazard Class or Division:	Not regulated
Identification Number:	N/A
Packing group:	N/A
Labels Required:	N/A
WHMIS Classification:	Class E
WHMIS Labeling:	Test tube, hand.
Shelf life:	Indefinite
Special Instructions:	Storage recommendations: Store at room temperature. Do not allow freezing.

The information given herein is given in good faith. No warranty, expressed or implied, is made regarding the accuracy of these data or the results obtained from the use thereof. All materials may present unknown health hazards and must be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist. Consult ChemCo Systems, Inc. for further information.

ChemCo Systems
2800 Bay Road, Redwood City, CA 94063, PH: 650.261.3790, FAX: 650.261.3799

CCS™ GROUT, CONTROL JOINT

Flexible Epoxy Grout For Control Joints And Saw cuts

CCS Grout, Control Joint is a two - component, fast curing, flexible, epoxy grout for filling control joints, wire slots and other saw cuts in concrete and asphalt. The cured product has excellent impact and abrasion resistance and is resistant to deicing chemicals and most automotive and aircraft fluids. Its low water absorption and high dielectric strength make it ideally suited for embedding wire and traffic detection loops in concrete and asphalt pavements and for filling properly prepared saw cut control joints in interior concrete slabs. Control Joint also may be used for bonding precast concrete curbing to concrete and asphalt substrates. It is available in two colors - concrete gray (blue/gray) and black.

Features

Convenient 1: 1, by vol. mix ratio
Fast cure for short downtime
High viscosity for single pour filling
Does not embrittle; stays tough and flexible
Resists road, auto and aircraft chemicals
Environmentally safe- No VOC solvents

Limitations: Substrates must be dry. Minimum installation and cure temperature is 40 deg F. NOT AN ELASTOMER- do not use in: joints subject to movement or flexing, expansion joints or exterior joints. Do not add solvents or otherwise thin this material.

Packaging & Colors: Standard package sizes of Part A + Part B are 2, 10 and 100 gallons. Standard color is Concrete gray (blue-gray) and black; custom colors available.

Shelf Life: Three years minimum in unopened, original containers when stored between 60 and 90 deg F in a dry place away from sunlight. Remixing of components may be required upon long-term storage.

Chemical Resistance: CCS Control Joint is resistant to a wide range of commonly used aircraft and automotive chemicals including jet fuels, gasoline, hydraulic fluids, anti-freeze and battery acid. Ongoing exposure to gasohol and heavy-duty brake fluid (polyether glycol based lubricants) is not recommended. Performance is a function of the specific chemical and concentration, ambient and solution temperatures, exposure times and housekeeping procedures. For information on specific chemicals and exposure conditions, contact a ChemCo Systems, Inc., technical representative.

Surface Preparation: Substrate surfaces must be dry, sound and free of all bond-inhibiting substances. Prepare surfaces in accordance with *ASTM D 4259* or *ACI 503R* and ChemCo Systems' specific recommendations. Cleaned concrete surfaces should have a minimum strength of 250 psi in direct tension. Cleaned asphalt surfaces should have a minimum strength of 100 psi at 73 ± 4 F. in direct tension. Steel surfaces should be cleaned to "white metal" according to SSPC SP 5.

Mixing: CCS Control Joint is a two-component system. The resin to hardener (Part A : Part B) mix ratio is 1:1, by volume. Read all material safety data (MSDS) information before handling the product. Wear safety glasses and clean neoprene rubber gloves when handling the materials. Premix the individual components before drawing from bulk packaging. Transfer appropriate quantities of Part A and Part B into a mixing container. Use quantities that can be applied before the potlife of the mixed material expires. Blend thoroughly using a Jiffy mixer blade attached to a low speed (350 -750 rpm) electric or pneumatic drill. Proper mixing will take 2-3 minutes.

Installing: For filling control joints, wire slots and saw cuts, transfer mixed material to a pour can with a spout sized for the joint to be filled. Fill the joint in a single direction. For a filled surface flush with the surrounding substrate, overfill slightly the joint until a crown of material is formed. Following cure, excess material (high spots) may be removed by warming with a hot air stream (heat gun) and cutting with a sharp blade.

Approximate Yield

Joint Dimensions, inches Width	Depth	Linear Feet/Gallon
1/2	1/4	154
1/2	3/8	102
3/4	3/8	68
3/4	1/2	51
1	3/4	25

Clean up: Excess mixed product is best removed from the work area and tools before it hardens. Use of rags and solvents such as acetone or heavy-duty detergents facilitate cleaning. Cured product may be removed from tools by soaking in an epoxy stripper.

TYPICAL PROPERTIES (1)

Property (2)		Test Method	Value
Mix Ratio, A:B,	by vol		1 : 1
	by wt		100: 79
Color:	Part A	VISUAL	Blue-gray or black
	Part B		Clear amber
	Mixed		Blue-gray or black
Weight per Gallon, lb:	Part A	ASTM D 1475	9.8
	Part B		7.8
	Mixed		8.8
Viscosity, cp	Part A	ASTM D 2393	4100
	Part B		4400
	Mixed		4300
Gel Time, 200 g, minutes		ASTM D 2471	15
Tensile Strength, psi		ASTM D 638	1200 (3)
Elongation at Break, %		ASTM D 638	90 (3)
Tear Resistance, lbf/in		ASTM D 624	110 (3)

(1) The properties listed are typical and descriptive of the product and should not be used for specification purposes. For specification preparation, reference the ChemCo Systems, Inc., product guideline specification.

(2) Cure schedule, 7 days at 73 ± 4 F and test temperature, 73 ± 4 F.

(3) Tested at crosshead speed of 2.0 inches/minute.

Handling and Toxicity: This bulletin does not accompany the product when sold. For hazard warnings, safe handling and first aid instructions, READ CAREFULLY THE MATERIAL SAFETY DATA SHEETS AND CONTAINER WARNING LABELS.
Part A: Liquid epoxy resin, HMIS Health Hazard Rating- 2 (Moderate Hazard). Warning! Causes eye and skin irritation. May cause allergic skin reaction. Harmful if swallowed. Avoid contact with eyes, skin and clothing. Wash thoroughly after handling. Avoid prolonged or repeated contact with skin.
Part B: Liquid epoxy hardener, HMIS Health Hazard Rating- 2 (Moderate Hazard). Contains alkaline amines. Warning! Causes eye and skin irritation. May cause allergic skin and respiratory reaction. Combustible, corrosive. Do not get in eyes or skin or on clothing. Avoid breathing vapor. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling. Keep away from heat and open flame.

DISCLAIMER: NO EXPRESS WARRANTY IS MADE WITH RESPECT TO THE RESULTS OF ANY USE OF THIS PRODUCT. NO IMPLIED WARRANTIES, INCLUDING AND NOT LIMITED TO AN IMPLIED WARRANTY OF MERCHANTABILITY OR AN IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE ARE MADE WITH RESPECT TO THIS PRODUCT. NO LIABILITIES FOR PERSONAL INJURY, LOSS OR DAMAGE RESULTING FROM THE USE OF THIS PRODUCT IS ASSUMED. CHEMCO SYSTEMS, INC., RESERVES THE RIGHT TO ALTER OR DISCONTINUE THE PRODUCT DESCRIBED HEREIN AT ANY TIME AND WITHOUT PRIOR NOTICE.

CCS™ is a trade name of ChemCo Systems, Inc.

Publication Number: 3 EP CCS-114, Control Joint

Publication Date: Dec. 1995

MATERIAL SAFETY DATA SHEET

ChemCo Systems, Inc., 2800 Bay Road, Redwood City, CA 94063
Prepared by Dept. of Safety, Phone: 650/261-3790
24 Hour Emergency Phone: 800-424-9300 CHEMTREC

1. PRODUCT NAME:

CCS™ Grout, Control Joint, Part A
Chemical Family: Epoxy resins, diluent.

2. HAZARDOUS INGREDIENTS

NAME	CAS No.	TLV	STEL	PEL	CONTENT
Epoxy resin	25068-38-6	none	none	none	58-68%
Epoxy resin	54208-63-8	none	none	none	6-11%
Aliphatic glycidyl ether	74398-71-3	none	none	none	8-12%
Dinonyl Phenol	1323-65-5	none	none	none	12-22%
Cresyl glycidyl ether	2210-79-9	none	none	none	2-6%

reference section 7, Health Hazard Data for LD (50)

3. PHYSICAL DATA:

Boiling Point:	>200 C	Water/Oil Distribution Coefficient:	N/D
Percent Volatile:	Slight	Solubility in Water:	Slight
Freezing Point	N/D	Specific Gravity:	1.14
Vapor Pressure@ 20C:	N/D	pH:	N/D
Vapor Density	Heavier than air	Evaporation Rate:	N/D
Odor Threshold	N/D	Odor	Slight
Appearance	Black or blue-grey liquid		

N/D = Not Determined

4. FIRE AND EXPLOSION HAZARD DATA:

HMIS Flammability Rating: 1 - (Slight Hazard)

Flash Point: >92 C (200 F) PMCC
Auto Ignition Temperature: N/D
Limits of Flammability: LEL: N/D UEL: N/D
EXTINGUISHING MEDIA:
CARBON DIOXIDE, FOAM, DRY CHEMICAL AND WATER FOG
SPECIAL FIRE & UNUSUAL HAZARDS: At higher temperature vapors can cause pressure build-up in sealed containers. Use water to cool containers exposed to fire. Self-contained respirator equipment and full protective clothing required when smoke or fumes are generated. Electrical grounding not recommended.

5. REACTIVITY DATA:

HMIS Reactivity Rating: 1 - (Slight Hazard)

STABILITY: This product requires another component to react at room temperature. Mix and use product in accordance with directions for safety. Excessive heat and fume generation can occur if improperly handled. Not sensitive to mechanical impact.
INCOMPATIBILITY: Strong acids, strong bases. Amines and ercaptains may initiate possible hazardous polymerization.
ZARDOUS DECOMPOSITION PRODUCTS: Carbon monoxide and te, aldehydes, various compounds from incomplete combustion.
RDOUS POLYMERIZATION: May occur is product is not handled tructions.

ENVIRONMENTAL AND DISPOSAL INFORMATION:

N TO TAKE FOR SPILLS AND LEAKS: Ventilate area, eliminate ces of ignition. Wear appropriate protective gear. Contain ill. Salvage. Clean up residue with absorbent material.
E DISPOSAL METHOD: Handle disposal of waste material in er which complies with local, state, province, and federal tions. Landfill if solidified or incinerate at agency approved waste-sal facility.

7. HEALTH HAZARD DATA:

HMIS Health Rating: 2 - (Moderate Hazard)

Primary Route Of Entry: Dermal

Effects of Overexposure:

Skin Contact:	Prolonged or repeated exposure may cause skin irritation and redness. Skin sensitization or allergic reaction may occur in some individuals.
Eyes:	Contact may cause irritation, redness, tearing and blurred vision.
Inhalation:	Vapors may cause severe irritation to nose, and mucous membranes.
Ingestion:	Intake can cause gastro-intestinal irritation, nausea, vomiting and diarrhea. LD (50) CAS 25068-38-6 11.4 g/kg (rat) LD (50) CAS 2210-79-9 11.4 g/kg (rat) LD (50) CAS 54208-63-8 11.4 g/kg (rat)
Chronic:	None known.

8: FIRST AID:

Inhalation:	Remove victim from exposure. If difficulty with breathing; administer oxygen and seek immediate medical assistance.
Eyes:	Flush with water, lifting upper and lower lids occasionally for 15 minutes. Seek medical attention.
Skin:	Wash with soap and water; get medical attention if irritation persists.
Ingestion:	Do not induce vomiting, give at least two glasses of water; get immediate medical attention. If vomiting occur spontaneously, keep head below hips to prevent aspiration of liquid into lungs. Do not give anything by mouth to an unconscious person.

9. SPECIAL PROTECTION INFORMATION:

HMIS Personal Protection Rating: C (Safety Glasses, Gloves, Apron)

Ventilation	Ventilation is recommended. Air movement must be designed to insure turnover at all locations in work area to prevent build-up of heavy vapors.
Personal Protection:	Use eye protection. Selection of specific items such as gloves, boots and apron will depend on the operation.

10. ADDITIONAL INFORMATION:

DOT Proper Shipping Name:	Epoxy resin mixture
DOT Hazard Class or Division:	Not regulated
Identification Number:	N/A
Packing Group:	N/A
Labels Required:	N/A
California Prop. 65:	N/A
WHMIS Classification:	Class D, Div. II, Sub. B
Storage Conditions:	Keep containers tightly sealed. Store in dry and cool areas. Avoid freezing conditions.
Shelf life:	Indefinite.
Special Instructions:	Storage recommendations: Store at room temperature. Do not allow to freeze.

The information given herein is given in good faith. No warranty, expressed or implied, is made regarding the accuracy of these data or the results obtained from the use thereof. All materials may present unknown health hazards and must be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist. Consult ChemCo Systems Inc. for further information. **MSDS114A 02/02**

MATERIAL SAFETY DATA SHEET

ChemCo Systems, Inc., 2800 Bay Road, Redwood City, CA 94063
Prepared by Dept. of Safety, Phone: 650/261-3790
24 Hour Emergency Phone: 800/424-9300 CHEMTREC

1. PRODUCT NAME:

CCS™ Grout, Control Joint, Part B
Chemical Family: Polyamines

2. HAZARDOUS INGREDIENTS

NAME	CAS No.	TLV	STEL	PEL	CONTENT
Dinonyl Phenol (DNP)	1323-65-5	none	none	none	72-78%
Amino Ethyl Piperazine (AEP)	140-31-8	none	none	none	20-30%
Diethylenetriamine (DETA)	111-40-0	1ppm	none	1ppm	1-2%

reference section 7, Health Hazard Data for LD (50)

3. PHYSICAL DATA:

Boiling Point:	316 C (DNP)	Water/Oil Distribution Coefficient:	N/D
Percent Volatile:	negligible	Solubility in Water:	30%
Freezing Point	N/D	Specific Gravity:	0.95
Vapor Pressure @ 20C:	N/D	pH:	alkaline
Vapor Density	Heavier than air	Evaporation Rate:	N/D
Odor Threshold	N/D	Odor	Ammoniacal
Appearance	Amber liquid		

N/D = Not Determined

4. FIRE AND EXPLOSION HAZARD DATA:

HMIS Flammability Rating: 1 - (Slight Hazard)

Flash Point:	99 C (210 F) PMCC	
Auto Ignition Temperature:	N/D	
Limits of Flammability:	LEL: 1.8% @ 140 C	UEL: N/D

EXTINGUISHING MEDIA:
CARBON DIOXIDE, FOAM, DRY CHEMICAL & WATER FOG
SPECIAL FIRE & UNUSUAL HAZARDS: *Self-contained respirator* equipment and full protective clothing are required when smoke and fumes are generated. Electrical grounding is not recommended.

5. REACTIVITY DATA:

HMIS Reactivity Rating: 1 - (Slight Hazard)

STABILITY: Stable. This product must be mixed with another component to react. Mix and use in accordance with directions for safety. Not sensitive to mechanical impact.
INCOMPATIBILITY: Strong oxidizing agents, acids, epoxy resins, isocyanates and organic peroxides may result in violent explosive reactions.
HAZARDOUS DECOMPOSITION PRODUCTS: Carbon monoxide and *dioxide, nitrogen oxides, aldehydes and various hydrocarbons from* incomplete combustion.
HAZARDOUS POLYMERIZATION: Will not occur.

6. ENVIRONMENTAL AND DISPOSAL INFORMATION:

ACTION TO TAKE FOR SPILLS AND LEAKS: Ventilate area. Wear appropriate protective gear. Contain leak/spill. Clean up residue with absorbent material. Wash down area with water and diluted acetic acid.
WASTE DISPOSAL METHOD: Handle disposal of waste material in manner which complies with local, state, province, and federal regulations. Landfill if solidified or incinerate at agency approved waste-disposal facility.

7. HEALTH HAZARD DATA:

HMIS Health Rating: 2 - (Moderate Hazard)

Primary Route Of Entry: Dermal, eyes, ingestion.

Effects of Overexposure:

Inhalation:	Low degree of volatility. At higher temperatures it is possible for vapors to be generated; the vapors are very disagreeable. This material may result in irritation of throat, lungs, and allergic type reaction or sensitization in some individuals.
Eyes:	Contact can cause severe burns. At higher temperatures vapors can cause severe, irritation, redness, tearing or blurred vision. Corneal injury is possible.
Skin Contact:	Short single exposure may cause moderate irritation to mild burn. Prolonged or repeated exposure may cause a severe burn. May result in an allergic reaction or sensitization response in some individuals.
Skin Absorption	(AEP) and (DETA) may be absorbed through skin in moderately toxic amounts. LD (50) CAS 140-31-8 880 mg/kg (rabbit) LD (50) CAS 111-40-0 880 mg/kg (rabbit)
Ingestion:	Intake can cause gastro-intestinal irritation, nausea, vomiting, diarrhea, headache and drowsiness. Can result in burns of mouth esophagus and stomach. LD 50 CAS 140-31-8 2140 mg/kg (rat) LD 50 CAS 87-72-5 340 mg/kg (rat)
Chronic:	None known.

8: FIRST AID:

Eyes:	Flush eyes with water and/or 1% boric acid, lifting upper and lower lids occasionally for 30 minutes. Seek prompt medical attention.
Skin:	Wash with soap and water for at least 15 minutes. Remove contaminated clothing and wash before re-use. Destroy contaminated leather. Seek medical attention if irritation persists.
Ingestion:	Do not induce vomiting. Give large quantities of water or vinegar diluted with water. Get immediate medical attention. If vomiting occurs spontaneously, keep head below hips to prevent aspiration of liquids into lungs. Do not give anything by mouth to an unconscious person.
Inhalation:	Remove victim from exposure. If difficulty with breathing; administer oxygen and seek immediate medical assistance.

9. SPECIAL PROTECTION INFORMATION:

HMIS Personal Protection Rating: C (Safety Glasses, Gloves, Apron)

Ventilation:	Ventilation at normal room temperature is a means of controlling vapor properly. If material is above 140 F, a positive pressure breathing apparatus is recommended.
Personal Protection:	Use chemical goggles. Selection of specific items such as gloves, boots and apron will depend on the operation. Wear respirator protection whenever airborne concentrations exceed TLV ceilings or TWA, use NIOSH approved respirators for listed hazard. Confined spaces, rooms or tanks are areas where concern for TLV's is especially important. Reference CFR 29 1910.134 for recommended respiratory protection.

10. ADDITIONAL INFORMATION:

DOT Proper Shipping Name:	N-Aminoethylpiperazine mixture
DOT Hazard Class or Division:	8
Identification Number:	UN 2815
Packing group:	III
Labels Required:	CORROSIVE
WHMIS Classification:	Class D, Div, 2, Sub. A; Class E.
WHMIS Labeling:	Test tube, hand., Stylized T
Shelf life:	Indefinite.
Special Instructions:	Keep containers tightly sealed. Store in dry and cool area. Avoid freezing conditions.

The information given herein is given in good faith. No warranty, expressed or implied, is made regarding the accuracy of these data or the results obtained from the use thereof. All materials may present unknown health hazards and must be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist. Consult ChemCo Systems Inc. for further information.

APPENDIX C.3

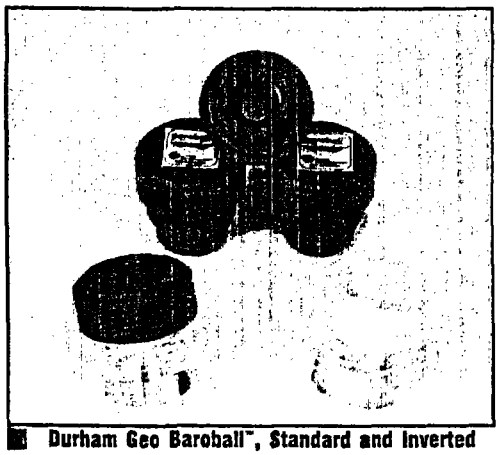
SENTINEL BIOVENT SYSTEM

TRC
Customer-Focused Solutions

Baroball™ (PSVE)

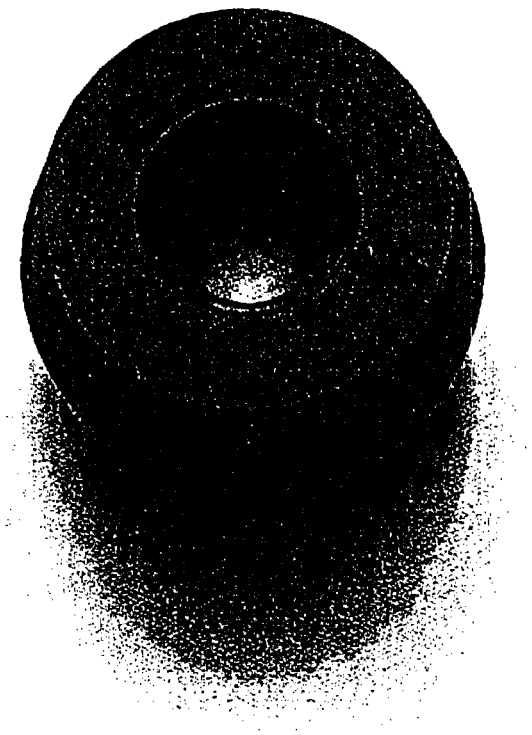
The Baroball™ is a patented technology that harnesses naturally occurring atmospheric pressure fluctuations to create a pumping method that passively removes vapors from the unsaturated soil zone (Passive Soil Vapor Extraction).This technology has been demonstrated to increase removal rates by up to 50%. Natural atmospheric pressure fluctuations are transmitted through the unsaturated subsurface resulting in pressure differential between the surface and subsurface. When the zones are directly connected by a well placed in the vadose zone, the pressure differentials will result in flow into or out of the well.

The Baroball™ is installed at the top of the well casing to permit gas flow in one direction. The Baroball™ has been used in conjunction with the FAP Plus™ systems to increase removal rates during LNAPL recovery. Other applications include the final polishing for an active SVE system where removal rates have been substantially reduced to the point where SVE system operation costs are very high. Inverted Baroball™ installations have been used to allow air flow into the subsurface, but prevent air escape to improve in-situ bioremediation.
The Baroball™ has also been used to provide plume control of methane production at landfills. Please contact Durham Geo or your local distributor for detailed information and a quotation or to receive case study documentation.



Durham Geo Baroball™, Standard and Inverted

Baroball™ - PSVE		
Model	Description	Ship Wt
TR-965	Standard Baroball™	2 lb
TR-966	Inverted Baroball™	2 lb



Application

The Baroball is a low-cost, low maintenance device that responds to the natural fluctuations of atmospheric pressure to significantly enhance the removal of volatile organic compounds from contaminated sites that use barometric pumping as a remediation technique.

Description

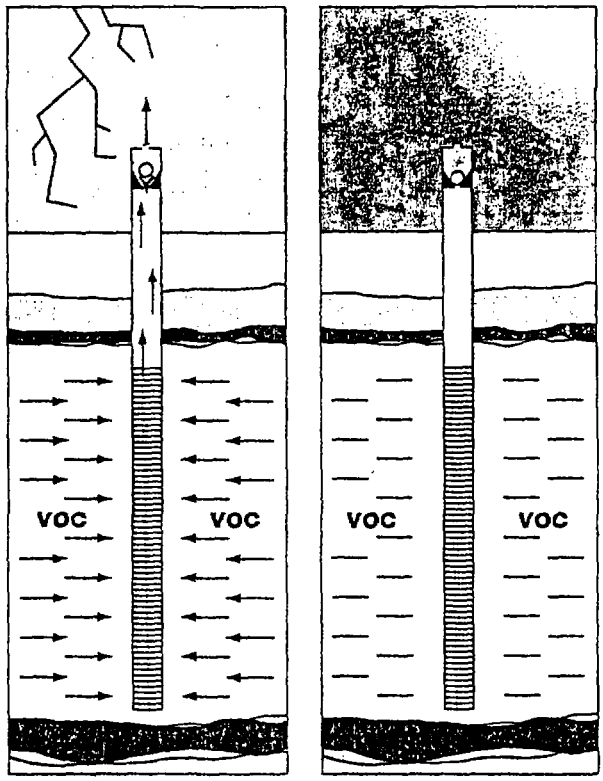
The Baroball blocks the influx of air into the venting well whenever the subsurface air pressure falls below the surface air pressure. This prevents the dilution and dispersion of pollutants that can reduce remediation efficiency. Subsurface pressure greater than atmospheric pressure actuates the device and permits the escape of the volatile contaminants. The Baroball can be activated with as little as a one millibar change in atmospheric pressure.

The Baroball has been proven to increase the removal efficiency of a contaminated well by a factor of 2 over simple venting. It improves environmental cleanup without adding significant cost to the process. The device pays for itself many times over by helping return a site to commercial viability years sooner than would happen otherwise. It costs significantly less than electronically powered valves and its simple construction allows unattended operation and virtually eliminates repairs or adjustments.

The Baroball also can be used to increase the accuracy of and reduce the time for collecting soil gas samples. By preventing surface air from diluting subsurface soil gas, a sample accurately representing the true ambient concentrations in the subsurface can be obtained immediately. Without the Baroball, representative gas samples can require several hours of pumping before ambient conditions are reached.

When installed in an inverted position, Baroballs can prevent the spread of contaminants such as methane out of a landfill boundary and direct gas flow toward on-site venting wells. Inverted Baroballs also may be used as passive injectors of air and gaseous nutrients to stimulate bioremediation of soils contaminated with hydrocarbons.

Barometric Pumping Process with Baroball™



Low Atmospheric Pressure

- ***2X Contamination Removal with Baroball™***
- ***VOCs: can escape***

High Atmospheric Pressure

- ***No Soil Gas Dilution with Baroball™***
- ***VOCs: no movement***

Rugged, durable construction. The Baroball is constructed of the same materials as the well and there is only one moving part. Unattended operation for an extended period of time can be expected.

- Increase efficiency. Compared with ordinary passive venting. Baroball may double the rate of contaminant removal by preventing the dilution of contaminants with fresh air from the surface.

- No power source or pressure sensing required. The Baroball is actuated and sustained by the naturally produced pressure gradients between the surface and subsurface.

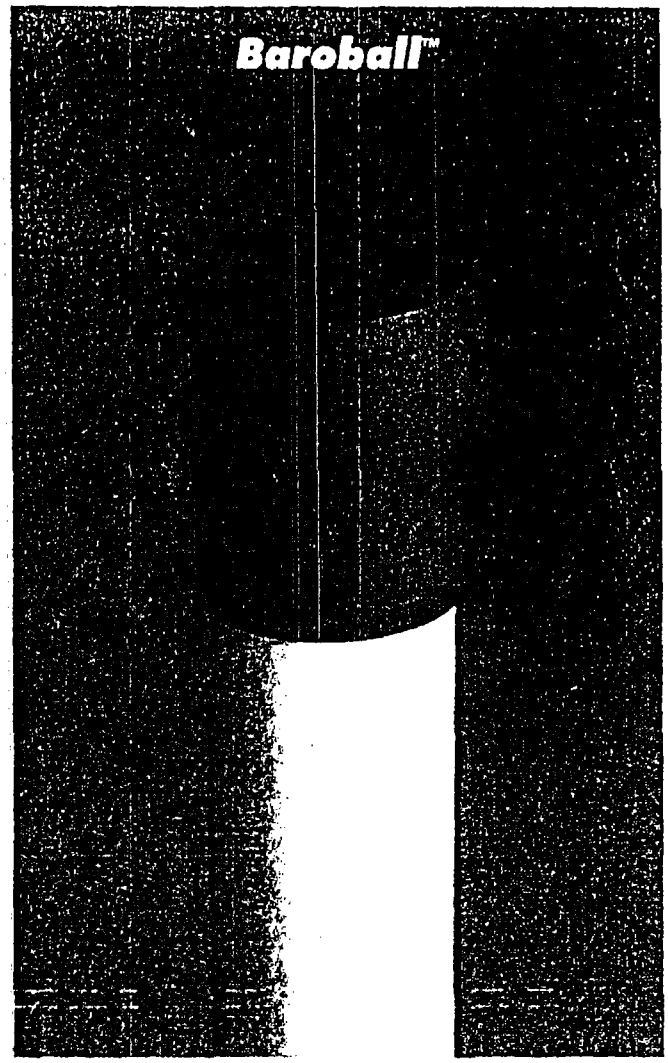
- High skill level not required for installation. The Baroball can be properly installed by any field technician.

- Small and unobtrusive. The Baroball is cylindrically shaped, three inches in diameter and approximately three inches tall (76 x 83 mm). It can be installed with a low profile and will not stand out from the surrounding landscape.

- Does not interfere with other remediation systems. The Baroball works in tandem with off-gas treatment systems that are typically connected to venting wells.

- Can be used in multiple flow configurations. The Baroball can be modified for gas extraction or air injection, permitting barometric pumping to be used for plume control or nutrient injection in bioremediation systems.

- Increases the accuracy of soil gas measurements. The Baroball prevents surface air from entering a well and diluting gas concentrations in the subsurface. This allows retrieval and analysis of actual ambient soil gas concentrations.



APPENDIX C.4

IRRIGATION SYSTEM

RAIN BIRD®

TECH SPECS

PEB and PESB Series Valves

Durable valves. Patented technology.

Pressure surges? Effluent water? Clogging debris? No problem. PEB and PESB Series valves offer long life and efficient, trouble-free performance—even under harsh conditions. Constructed of heavy-duty, glass-filled nylon, these valves resist clogging. And the PESB model features a patented scrubber to actively fight dirt, debris and particles.

Features

- Durable glass-filled nylon construction for long life and heavy-duty performance at 200 psi (13,80 bars) pressure.
- Stainless steel studs molded into the body. Bonnet can be attached and removed more easily and more often without damaging threads.
- One-piece solenoid design with captured plunger and spring for easy servicing. Prevents loss of parts during field service.
- External bleed does not allow debris to go through the solenoid ports when system is flushed.
- Internal bleed operates the valve without allowing water into the valve box; allows pressure regulator to be adjusted without turning on the valve at the controller first.
- Low flow operating capability (0.25 gpm; 0,06 m³/h; 0,02 l/s) for a wide range of applications. For flows below 3 gpm (0,75 m³/h; 0,21 l/s) or any Xerigation® application, install Rain Bird Y filter upstream.
- Slow closing to prevent water hammer and subsequent system damage.
- **PESB only:** Nylon scrubber scrapes its stainless steel screen clean to break down grit and plant material. Prevents debris build-up and clogging.

Options (order separately)

- Accommodate optional, field installed PRS-D pressure regulating module to ensure optimum sprinkler performance.
- Optional purple flow control handles for non-potable water applications
  PEB-NP-HAN1(1")
  PEB-NP-HAN2 (1½" and 2")
- Accepts latching solenoid for use with Rain Bird battery-operated controllers up to 150 psi (10,35 bars).

Operating Range

- Pressure: 20 to 200 psi (1,38 to 13,80 Bars)
- Flow: 0.25 to 200 gpm (0,06 to 45,40 m³/h; 0,02 to 12,60 l/s)
- Flow with PRS-D: 5 to 200 gpm (1,14 to 45,40 m³/h; 0,32 to 12,60 l/s)
- Temperature: up to 150° F (66° C)

Electrical Specifications

- Power: 24 VAC 50/60 cycle solenoid
- Inrush current: 0.41 A (9.9 VA)
- Holding current: 0.28 A (6.72 VA)

Models

- 100PEB and 100PESB 1" (26/34)
- 150PEB and 150PESB 1½" (40/49)
- 200PEB and 200PESB 2" (50/60)

BSP threads available, specify when ordering.

Pressure Loss (psi)

gpm	100 - 1"	150 - 1½"	200 - 2"
0.25	0.8	-	-
0.5	1.0	-	-
1	1.3	-	-
5	1.7	-	-
10	1.8	-	-
20	2.9	4.0	-
30	5.6	3.6	-
40	10.0	2.7	-
50	15.6	2.4	3.1
75	-	4.2	2.9
100	-	8.5	3.9
125	-	14.6	6.8
150	-	21.2	10.0
175	-	-	13.6
200	-	-	17.5

Pressure Loss (bars)

m³/h	l/s	100 - 1"	150 - 1½"	200 - 2"
0,06	0,02	0,05	-	-
1	0,28	0,11	-	-
2	0,56	0,12	-	-
3	0,83	0,15	-	-
4	1,11	0,18	-	-
5	1,39	0,24	0,27	-
6	1,67	0,32	0,26	-
7	1,94	0,41	0,24	-
8	2,22	0,54	0,21	-
9	2,50	0,68	0,19	-
10	2,78	0,84	0,18	-
12	3,33	-	0,18	0,21
14	3,89	-	0,22	0,21
16	4,44	-	0,26	0,20
22	6,11	-	0,55	0,26
28	7,78	-	0,98	0,46
34	9,45	-	1,46	0,69
40	11,11	-	-	0,95
45	12,50	-	-	1,18

Notes

1) Loss values are with flow control fully open.

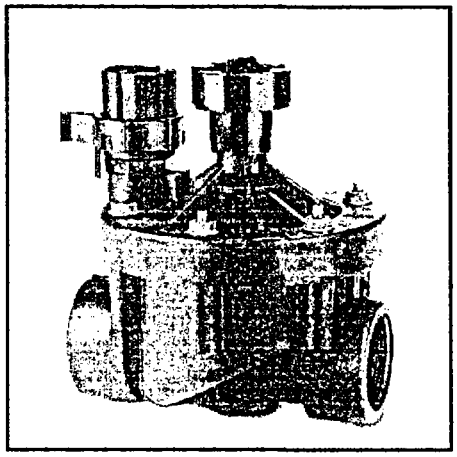
2) PRS-D module recommended for use below bold line.

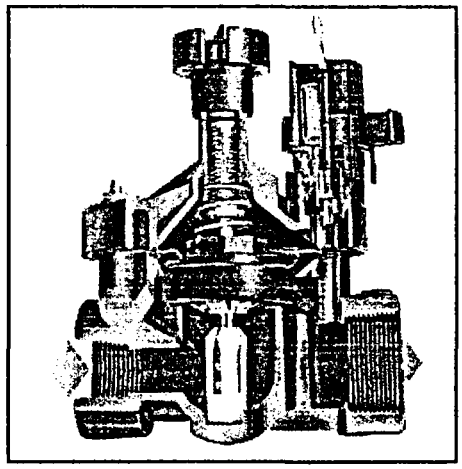
Recommendations

1) Rain Bird recommends flow rates in the supply line not to exceed 7.5 ft./sec. (2,29 m/s) in order to reduce the effects of water hammer.

2) For flows below 5 gpm (1.14 m³/h; 0.32 l/s), Rain Bird recommends use of upstream filtration to prevent debris from collecting below the diaphragm.

3) For flows below 10 gpm (2.27 m³/h; 0.63 l/s) Rain Bird recommends the flow control stem be turned down two full turns from the fully open position.





Dimensions

Size	Height	Length	Width
100	6½" (16,5 cm)	4" (10,2 cm)	4" (10,2 cm)
150	8" (20,3 cm)	6" (15,2 cm)	6" (15,2 cm)
200	8" (20,3 cm)	6" (15,2 cm)	6" (15,2 cm)

Note: The PRS-D option adds 2" (5,1 cm) to valve height.

How to Specify

100-PEB-PRS-D

Size	Model	Optional Feature
100: 1"	PEB	PRS-D: pressure regulating module
150: 1½"	PESB: scrubber model	
200: 2"		

Note Valve and PRS-D module must be ordered separately

Specifications

The electric remote control valve shall be a normally closed 24 VAC 50/60 cycle solenoid actuated globe pattern design. The valve pressure rating shall not be less than 200 psi (13,80 bars). The valve shall have the following characteristics (circle one):

Flow rate: _____ gpm m^3/h l/s

Pressure loss not to exceed: _____ psi bars

The valve body and bonnet shall be constructed of heavy-duty glass-filled UV-resistant nylon and have stainless steel studs and flange nuts; diaphragm shall be of nylon reinforced nitrile rubber.

The valve shall have both internal and external manual open/close control (internal and external bleed) to manually open and close the valve without electrically energizing the solenoid. The valve's internal bleed shall prevent flooding of the valve box.

The valve shall house a fully-encapsulated, one-piece solenoid. The solenoid shall have a captured plunger with a removable retainer for easy servicing and a leverage handle for easy turning. This 24 VAC 50/60 Hz solenoid shall open with 19.6 volt minimum at 200 psi (13,80 bars). At 24 VAC, average inrush current shall not exceed 0.41 amps. Average holding current shall not exceed 0.23 amps.

The valve shall have a brass flow control stem for accurate manual regulation and/or shut-off of outlet flow. The valve must open or close in less than 1 minute at 200 psi (13,80 bars), and less than 30 seconds at 20 psi (1,38 bars).

The PESB valve shall have a self-cleaning stainless steel screen designed for use in dirty water applications.

The valve construction shall be such as to provide for all internal parts to be removable from the top of the valve without disturbing the valve installation.

Optional Feature Specification

PRS-D Pressure Regulating Module:

100PEB-PRS-D 100PESB-PRS-D
150PEB-PRS-D 150PESB-PRS-D
200PEB-PRS-D 200PESB-PRS-D

When so indicated on the design, the 1", 1½" and 2" electric remote control plastic valves shall have a pressure regulating module (PRS-D) capable of regulating outlet pressure between 15 and 100 psi (±3 psi) (1,04 and 6,90 bars (±0,21 bars)).

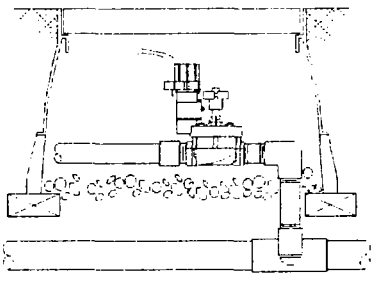
The PRS-D module shall have an adjusting screw for setting pressure and Schrader valve connection for monitoring pressure. The pressure shall be adjustable from the PRS-D when the valve is internally manually bled or electrically activated.

Non-Potable Flow Control Handle
PEB-NP-HAN1 - Fits 1"
PEB-NP-HAN2 - Fits 1½" and 2"

When so indicated on the design, the valve shall have a purple flow control handle to indicate to the user that non-potable water is being used. There shall be no difference between the black and purple handles except for the color.

The valve shall be as manufactured by Rain Bird Sprinkler Mfg. Corp., Glendora, California.

Plastic Electric Remote Control PEB or PESB Valve (with PRS-D)



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www.rainbird.com

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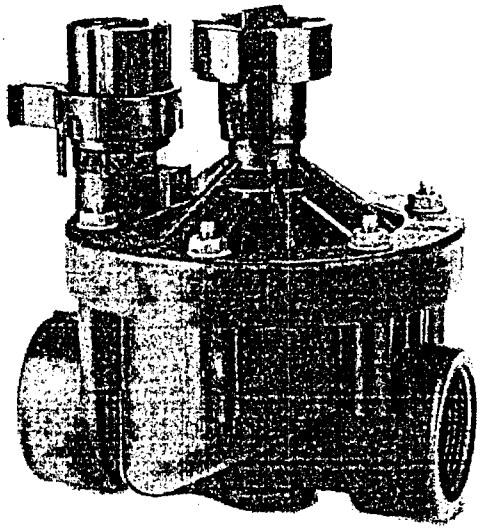
PEB & PESB Valve

Installation and Operating Instructions

Troubleshooting Guide

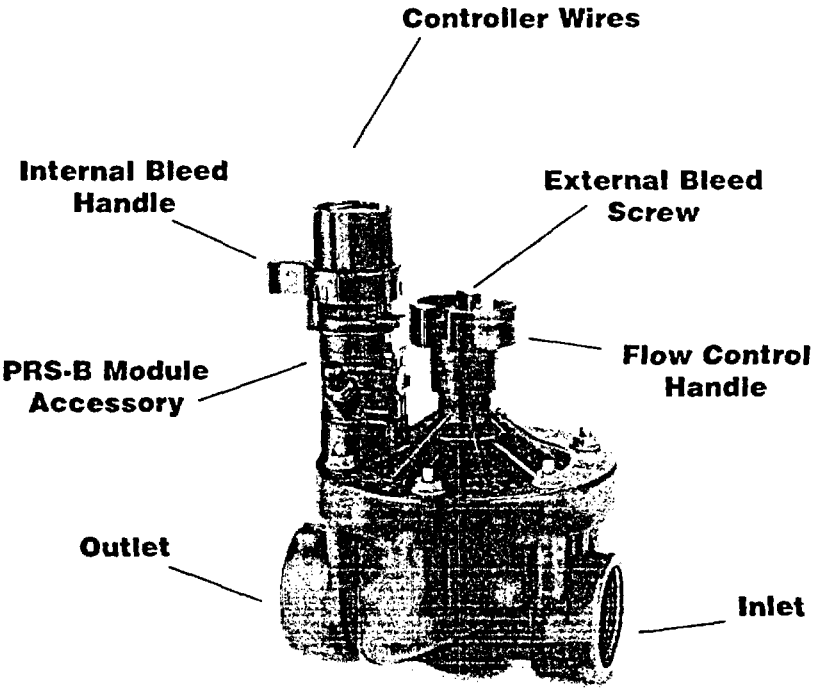


RAIN BIRD®

INSTALLATION & OPERATING INSTRUCTIONS

1. Flush main line thoroughly before installing valves.
2. Install valve onto main line. Ensure inlet side is connected to main line and outlet side is connected to lateral line. Note arrow on valve indicating direction of water flow. Solenoid should be on the downstream side of the valve.
3. Use two wraps "Teflon Tape" along the full length of the inlet and outlet pipe threads. **Do not use pipe thread or pipe dope compound.** Thread inlet pipe and fitting into the inlet port of the valve and hand tighten. Thread outlet pipe and fitting into the outlet port of the valve and hand tighten. Do not exceed two turns beyond hand tight.
4. Connect one solenoid wire to the controller common wire and the other to the controller power wire. Use only water-tight wire connectors, like RAIN BIRD ST-03.
5. After installing valves, slowly open water supply at point of connection. Valves may discharge water momentarily, then shut off.
6. To activate the valve using the **internal** manual bleed feature, turn the solenoid handle counter clockwise ¼ to ¾ turn or until you hear water flowing through the valve. To close valve, turn the solenoid handle clockwise ¼ to ¾ turn and wait a moment for the valve to close. Only hand tighten the solenoid to close the valve.
7. To activate the valve using the **external** manual bleed feature, turn the bleed screw on the top of the valve counter clockwise. Water will leak externally into the valve box to relieve bonnet pressure and open the valve. Turning the bleed screw clockwise will seal the o-ring and the valve will shut off momentarily.
8. For automatic valve operation, turn on the controller that has been wired to the valve according to the controller operating instructions, as controllers operate differently.

9. Use the flow control handle to adjust the amount of water flowing through the valve. Counter clockwise turns increase flow; clockwise turns decrease flow. Close the valve before making large flow adjustments, then activate the valve to fine tune flow adjustments. Good adjustment practice, when not intentionally trying to limit the flow, is to turn the flow control stem (from the full up position) clockwise until resistance is felt on the flow control stem handle.
10. If necessary, install Rain Bird's pressure regulating module PRS-B according to the installation manual.



TROUBLESHOOTING GUIDE

1. Sprinkler heads emit water when valve is turned off.

Dirt or debris is lodged on the diaphragm seat.

Remove bonnet and diaphragm to dislodge debris.

Solenoid is not fully closed after manual operation.

Turn solenoid handle clockwise to fully seated position.

Solenoid o-ring is damaged or twisted.

Turn off the water supply and turn the solenoid counter-clockwise to remove and inspect the o-ring. Remove any debris, then reset or replace the o-ring as necessary.

Diaphragm is damaged or not properly aligned.

Turn off the water supply and remove the bonnet. Check alignment of the diaphragm with the valve body and positioning tabs. Inspect the diaphragm for nicks or damage, then realign or replace diaphragm as necessary.

Dirt is interfering with proper solenoid operation.

Turn off the water supply and turn the solenoid counter-clockwise to remove and flush solenoid seating bowl in bonnet with clean water. Rinse solenoid bottom in clean water. For internal cleaning, remove the white retainer using a small flat screwdriver. Remove the plunger and screen and rinse with clean water. Return plunger, spring and retainer to solenoid. Return solenoid to bonnet by turning the solenoid clockwise.

Solenoid is shorted or damaged.

Turn off water supply and turn the solenoid counter-clockwise to remove. Replace with new solenoid by turning clockwise.

2. Water will not shut off.

Controller may be operating the valve automatically.

Check controller to confirm it is turned off.

Valve is set in the manual "ON" position.

Use finger-tight pressure to turn the solenoid clockwise to the "OFF" position. CAUTION: Over-tightening risks the possibility of damaging the solenoid seat. Re-tighten bleed screw on top of valve if leakage is observed. Verify that the o-ring is not damaged.

Diaphragm filter screen is blocked.

Turn off the water supply and remove the bonnet. Inspect the diaphragm filter screen located on the bottom of the diaphragm. Remove debris, rinse screen in clean water and return diaphragm and bonnet to valve body.

Solenoid is shorted or damaged.

Turn off water supply and turn the solenoid counter-clockwise to remove. Replace with new solenoid by turning clockwise.

3. Low or inadequate flow condition.

Flow control stem is turned down.

Adjust flow control stem by turning counter-clockwise in order to allow the diaphragm to open further.

Water pressure is being used elsewhere on the site.

Check the water requirements of all areas using the same water supply.

Too many sprinklers are operating at one time.

Check to see that the controller is only running one valve at one time. The system hydraulics may only be capable of single valve operation. If you find that all the sprinklers are located on one circuit, an additional valve may be required to better meet maximum hydraulic flow rates.

System gate or master valve is not fully open.

Locate the gate or master valve and open.

Obstruction in the mainline pipe.

Isolate obstruction and remove.

4. Valve will not turn on electrically.

Controller not supplying power to valve.

Check the controller for output power to the valve. If no power is detected at controller, then service controller. Check power input at the solenoid of the valve. If output is detected at the controller, but no input is detected at the solenoid, then a power wire is broken or damaged. Isolate and repair.

Main water supply is turned off.

Locate main gate or master valve and open.

Solenoid problem.

If power input is detected at solenoid, but valve still is not operating, then turn off the water supply. Without cutting wires, swap solenoids with the next valve (if present). If other solenoid operates valve, replace solenoid. If other solenoid does not operate valve, continue troubleshooting.

Flow control stem is turned all the way down.

Adjust the flow control stem by turning it counter-clockwise until water flows through the valve, but do not leave the stem in a full up position. While water is flowing through the valve, turn the flow control stem (from the full up position) clockwise until resistance is felt on the flow control stem handle. Then turn the flow control stem handle counter-clockwise one turn, as the valve will operate more effectively with the flow control stem handle in this position.

5. Valve with PRS-B Pressure Regulating Module.

Consult the PRS-B instruction manual for additional troubleshooting information.

For further assistance, please call the Rain Bird Spec Hotline at 1-800-458-3005.

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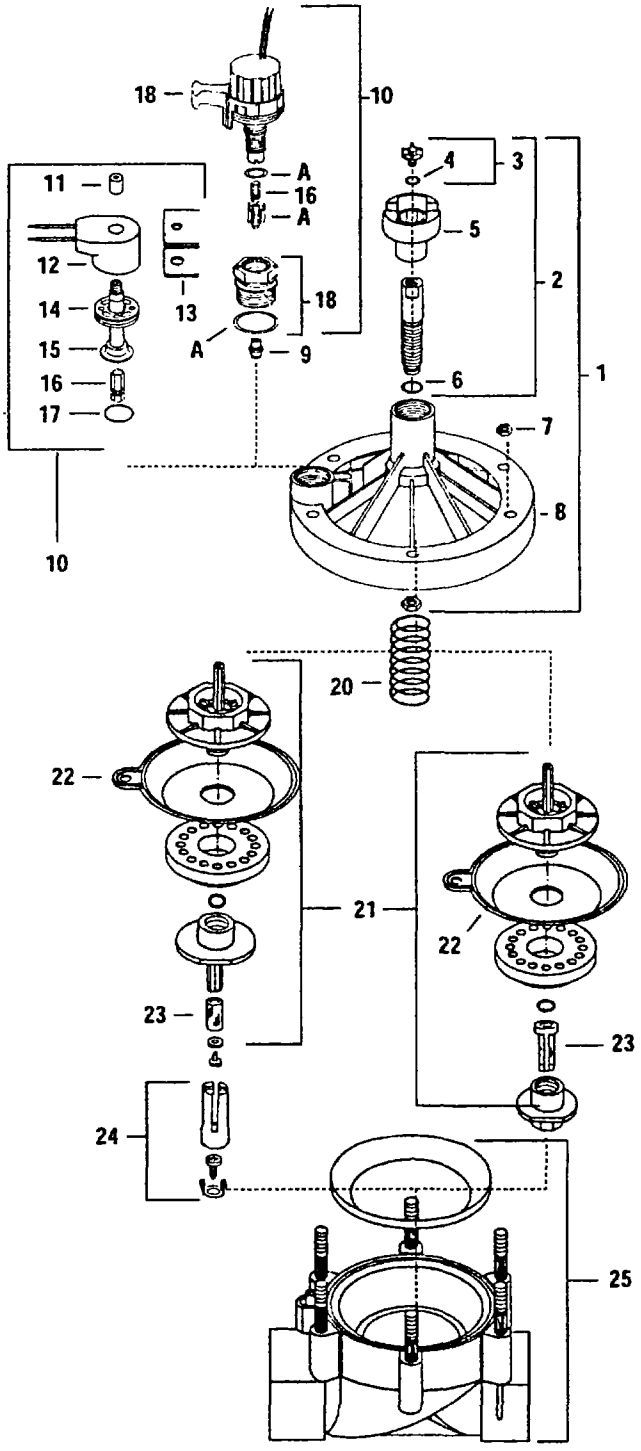
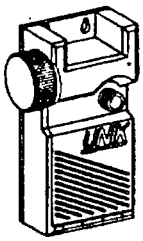


Ref.	Part Description	150PE	150PES	150PEB	150PESB
1	**BONNET ASSEMBLY**	209367-02	209367-02	209367-02	209367-02
2	Flow control assembly	204153	204153	204153	204153
3	Bleed screw assembly	204152	204152	204152	204152
4	O-ring, bleed screw	202668	202668	202668	202668
5	Handle, flow control	202889	202889	202889	202889
–	NP Handle (sold separately)	231232	231232	231232	231232
6	O-ring, stem	202896	202896	202896	202896
7	Lock Nuts (6 each)	204968	204968	204968	204968
8	Bonnet and solenoid seal	209813-02	209813-02	209813-02	209813-02
9	Solenoid seal	208629	208629	208629	208629
10	**SOLENOID ASSEMBLY**	206920-01	206920-01	209532-02	209532-02
11	Rubber retainer	627167	627167	–	–
12	Coil	602118	602118	–	–
13	U-Frame	210914	210914	–	–
14	Nut, base (plastic)	602606	602606	–	–
15	Tube, welded	630028	630028	–	–
16	Plunger/spring assembly	629453	629453	(629417)	(629417)
17	O-ring	202882	202882	–	–
18	Handle, solenoid	–	–	209943	209943
19	Adapter assembly	–	–	231986	231986
A	O-ring kit, with retainer	–	–	210463	210463
	PRESSURE REGULATOR PRS-D				
–	PRS-Dial	–	–	B33135	B33135
–	Cartridge assembly	–	–	B33136	B33136
	LOWER ASSEMBLY				
20	Diaphragm spring	203016	203016	200211	200211
21	Diaphragm assembly	208605	208518-02	208605	208518-02
22	Diaphragm	202898	202898	202898	202898
23	Screen	206092-02	203060-01	206092-02	203060-01
24	Scraper kit	–	206994	–	206994
25	Body assembly, NPT	208603	208603	208603	208603
–	Body assembly, BSP	208604	208604	208604	208604

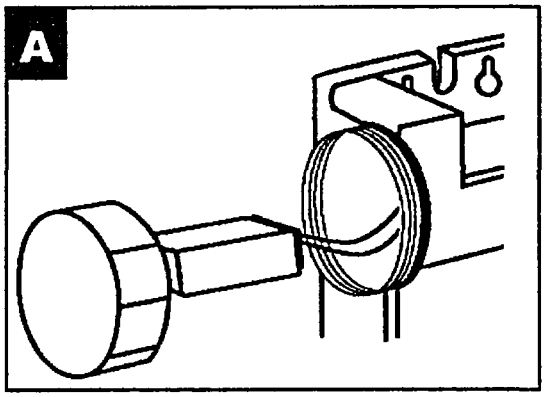
(When replacing PE/PES body, you must order PEB/PESB diaphragm)

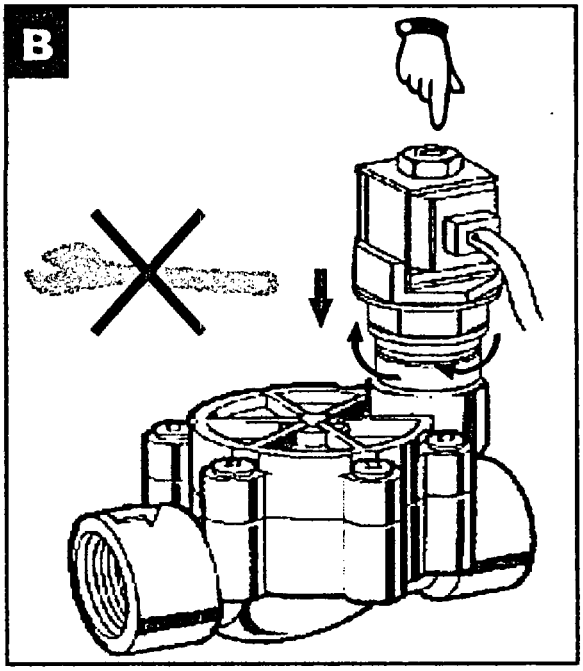
Note: Part numbers enclosed in brackets ( ) are not available individually, but may be sold in assemblies or kits.

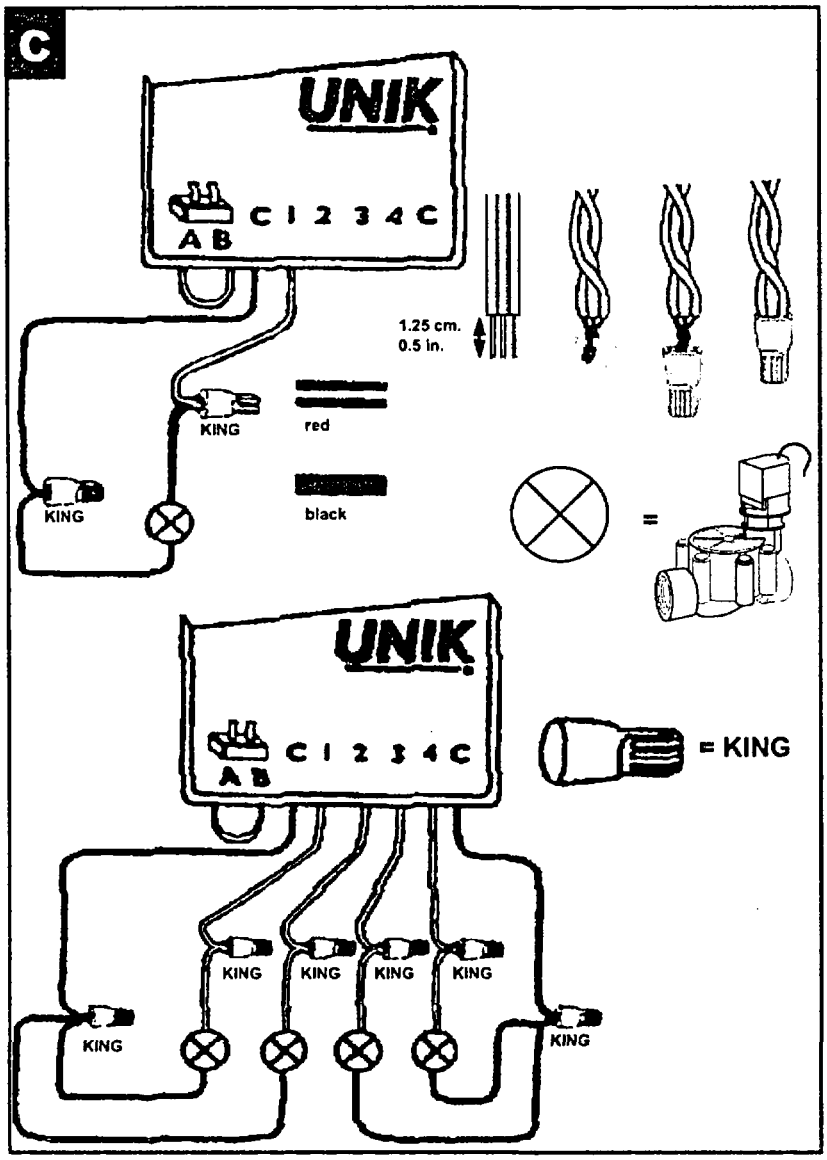
RAIN BIRD®

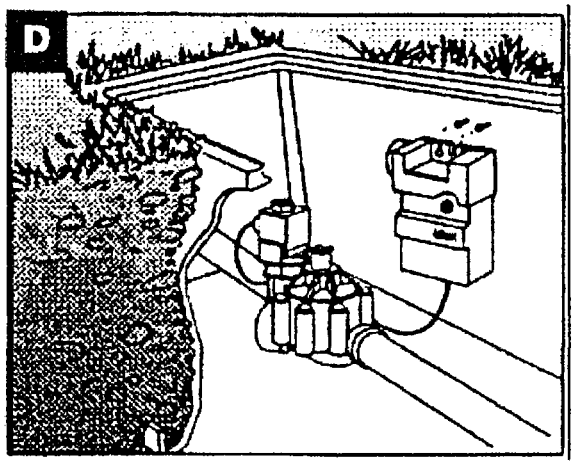


UNIK One, Two and Four Station Control Module









Welcome to Rain Bird

The UNIK® One, Two, and Four Station Control Modules, part of the UNIK irrigation system family, store programming information and relay it to the solenoids.

The Control Modules allow:

- One minute to 12 hour irrigation run times per station in one minute increments
- Three independent programs: A, B, C
- Up to eight start times per program, per day
- Seven-day programming schedule calendar
- Manual irrigation start or stop capacity
- Infrared data transmission (even if the module is submerged in water)

The Control Modules operate within a 32° to 140° F (0° to 60° C) temperature range and up to 10 bars.

Connecting the Control Module

Installing the battery

The Control Modules are powered by a 9-volt alkaline battery (not included), type 6AM6 or 6LR61. We recommend you use a high-quality alkaline battery, such as Energizer. A high-quality battery will last up to one year.

To install the battery:

1. Unscrew the cap to the battery compartment.
2. Remove the small tube of grease from the battery compartment.
3. Remove the battery connector from the battery compartment. and
4. Follow the instructions on the tube to apply grease to terminals on the battery conector and battery.
5. Attach the battery to the connector and insert the connected battery into the battery compartment, **connector side first** (see fig. A).
6. Screw the cap back on to the battery compartment. Make sure the cap is tightened securely by hand to seal the compartment and prevent water from damaging the battery.

Installing and connecting the DC latching solenoid

You must replace the existing solenoid on the valve with a UNIK DC latching solenoid.

To replace the solenoid:

1. Turn the water off.
2. Unscrew the existing solenoid from the valve.
3. Screw the DC latching solenoid onto the valve and gently tighten it by hand. Do not use a wrench or any other type of tool to tighten the solenoid. (See fig. B)
4. Turn the water back on.

To connect the DC latching solenoid to the Control Module, use the supplied wire connectors (the supplied wire connectors were changed from DBM wire connectors to King connectors in December 1997).

For King connectors:

1. Strip approximately 0.5 in. (1.25 cm.) of the insulation off the wires (see fig. C) and twist the wires together.
2. Push the twisted wires into a King connector and twist the connector to secure the wires. Gently pull on the wires to make sure they are secure.

If the wires slip out of the connector, get a new connector and repeat steps 1 and 2.

For DBM connectors:

1. Do not strip the wires. DBM wire connectors are designed to cut through the insulation to make a water resistant coupling without removing the insulation.
2. Push the wires all the way into the wire connector. Be sure to crimp the black cap all the way down (gel should ooze out of the top) to ensure a water-resistant connec- tion. Gently pull on the wires to make sure they are secure.

   If the insulation has been stripped, recut the wires and repeat steps 1 and 2.

   Important: **The wire run between the Control Module and the solenoid must not exceed 32 ft. (10m).**
3. Check the system by using the manual start command on the UNIK Field Transmitter. If the irrigation system does not start, tighten the DC latching solenoid by hand.

Mounting the Control Module

To mount the Control Module to the valve box:

1. Screw two mounting screws (not included) into the side of the valve box. (See fig. D)
2. Slide the Control Module's mounting key holes over the screws; press down to secure.
3. Tighten the mounting screws.

Automatic Self-Cleaning Solenoid Plunger Feature

Every night at midnight, the Control Module sends a signal to the solenoid to turn it on and then off. This cycle lasts about three seconds. This preventative maintenance feature is intended to keep the solenoid plunger clean for maximum reliability.

Maintaining the Control Module

To keep your UNIK Control Module in working order:

- Replace the battery once a year. We recommend you use a high-quality alkaline battery, such as Energizer.

Maintaining the Control Module (Continued)

Note: **If the Control Module battery is dead, any programs stored in the Control Module are lost. If the battery still has power, when you change the battery any stored programs will be lost within approximately two minutes.**

To avoid this:

1. Connect the Field Transmitter to the Control Module.
2. Press to retrieve (upload) stored programs into the UNIK Field Transmitter.
3. Change the battery and firmly hand tighten the battery compartment cap.
4. Press to transmit (download) the program into the Control Module.

• Make sure the optical connector is clean when you are transmitting data to the Control Module with the UNIK Field Transmitter or the UNIK PLIP. If necessary, clean the optical connector with water.

Troubleshooting

The following list contains possible problems you may encounter and some solutions.

Most of the problems involving the UNIK Control Module can be classified as transmis-sion / reception malfunctions usually caused by a dead or improperly connected battery. Other common causes of malfunction could be a dirty optical connector and poor wire connections.

These problems are easy to fix. If you experience transmission / reception problems, try using a Control Module that operates properly to determine if it is the Field Transmitter or Control Module that is the source of the problem.

Before calling Rain Bird, check the following list. If you cannot solve the problem yourself, call our Technical Service Hotline at 1-800-RAIN-BIRD (U.S.) or 626-963-9311

RAIN BIRD®

Customer Support Center
6640 S. Bonney Ave.
Tucson, AZ 85706
1-800-RAIN-BIRD
(520) 434-6289 FAX

Troubleshooting Guide Begins On The Next Page.

Troubleshooting (Continued)

Problem: **Faulty transmission**

Possible cause: The microprocessor did not reset properly.

Solution: Remove the battery. Short the Control Module battery clip (not the battery) contacts together with a paper clip or other piece of metal for 30 seconds. Reinstall a fresh battery.

Possible cause: A wire connection is faulty.

Solution: If you are using King wire connectors, gently pull on the wires to make sure they are secure. If the wires are loose, cut the wires. Strip 0.5 in. (1.25 cm.) of the insulation off the wires. Twist the wires, then push the wires into a new King connector and twist the connector around the wires. Gently pull on the wires to make sure they are secure. If you are using 3M DBM wire connectors, make sure the wires have not been stripped. Unlike other wire connectors on the market, DBMs are designed to cut through the insulation to make a water-resistant coupling without removing the insulation. Push the wires all the way into the wire connector. Be sure to crimp the black cap all the way down (gel should ooze out of the top) to ensure a water-resistant connection. Gently pull on the wires to make sure they are secure. If the insulation has been stripped, recut the wires and repeat the steps above.

Problem: **Station does not start**

Possible cause: No run time has been programmed for that station.

Solution: Transmit a run time to the Control Module.

Possible cause: The Rain-off Mode is activated (X on the sprinkler icon)

Solution: Permit irrigation by deactivating the Rain-off Mode.

Possible cause: Another station is in operation.

Solution: Use the manual station option to turn off that station.

Possible cause: The battery is weak.

Solution: Replace the battery.

Troubleshooting (Continued)

Possible cause: A wire connection is faulty.

Solution: If you are using King wire connectors, gently pull on the wires to make sure they are secure. If the wires are loose, cut the wires. Strip 0.5 in. (1.25 cm.) of the insulation off the wires. Twist the wires, then push the wires into a new King connector and twist the connector around the wires. Gently pull on the wires to make sure they are secure.

If you are using 3M DBM wire connectors, make sure the wires have not been stripped. Unlike other wire connectors on the market, DBMs are designed to cut through the insulation to make a water-resistant coupling without removing the insulation. Push the wires all the way into the wire connector. Be sure to crimp the black cap all the way down (gel should ooze out of the top) to ensure a water-resistant connection. Gently pull on the wires to make sure they are secure. If the insulation has been stripped, recut the wires and repeat the steps above.

Possible cause: The UNIK Rain Shut-off Device is wet.

Solution: Flip the UNIK Rain Shut-off Device switch to off. If you have an old style Control Module, cut the UNIK Rain Shut-off Device wires. Connect the black wires from the Control Module to the black field wires. Carry out a manual stop and then repeat the manual start.

Problem: **Station stops when it should start and vice versa**

Possible cause: The Control Module and solenoid wire connections are reversed.

Solution: Reconnect the red wires from the Control Modules to the red wires from the solenoids, then reconnect the black wires.

Problem: **Station 1 works, but the rest of the stations do not**

Possible cause: The underground UNIK Rain Shut-off Device is located in the zone watered by Station 1.

Solution: If possible, move the Rain Shut-off Device to the last irrigated zone or, better, outside the irrigated area altogether.

WARNING: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense.

Changes or modifications not expressly approved by Rain Bird Sales, Inc. could void the user's authority to operate the equipment.

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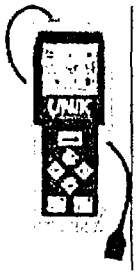
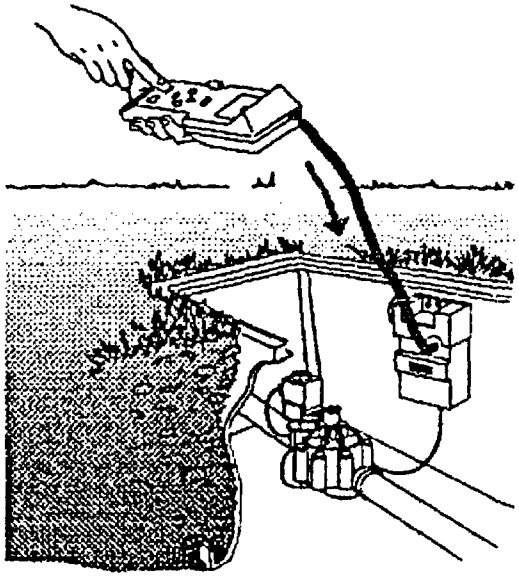
RAIN BIRD®

UNIK Field Transmitter

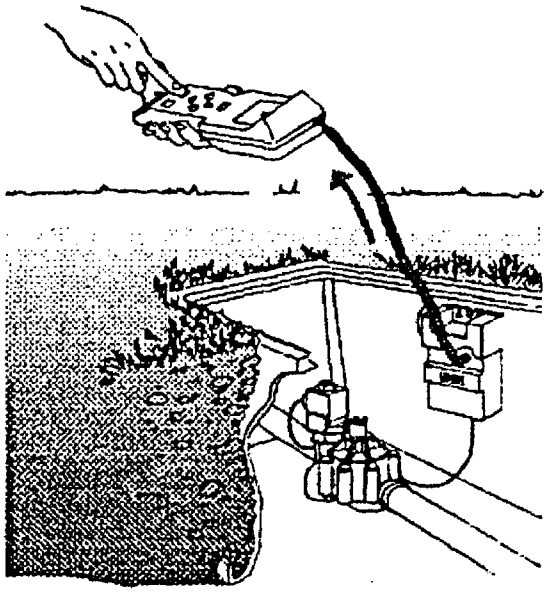


Operating Principle



The following parameters are transmitted to the module:

- Current time and day
- Water days / program
- Start times / program
- Run time / station and program as-



The following parameters are received by the transmitter:

- Water days / program
- Start times / program
- Run time / station and program assignment

Welcome to Rain Bird

The UNIK® Field Transmitter, part of the UNIK irrigation system family, allows you to create, transmit and retrieve irrigation programming information when used with the UNIK Control Module.

- The Field Transmitter features include:
- One minute to 12 hour irrigation run times per station in one minute increments
- Three independent programs: A, B, C
- Up to eight start times per program per day
- Seven-day programming schedule calendar
- Manual irrigation start or stop capacity
- Ability to program an unlimited number of Control Modules with one Field Transmitter
- Automatic reset of current time and day when transmitting a program to a Control

Quick Programming Guide

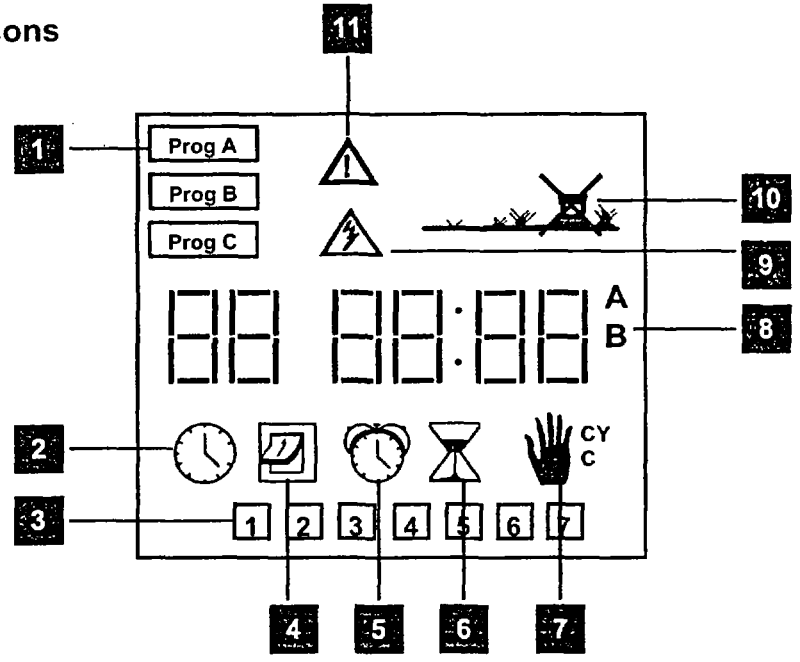
A *Quick Programming Guide label is provided with the Field Transmitter.* This label should be placed on the inside of the Field Transmitter's protective cover.

Understanding the Menu Display, Icons and Keypad

Menu system

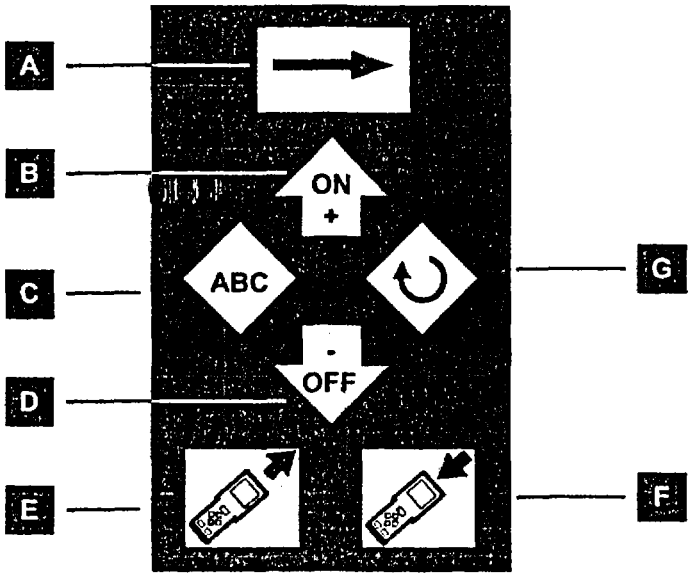
The Field Transmitter has a cyclical menu system, which means that you move through the eight menu displays one display at a time by pressing [→] . All of the displays (except the start-up display) have icons representing the function that you can program while in that display.

LCD display icons



1. Program (A, B, or C)
2. Current time
3. Day of week or water day
4. Set watering days
5. Start time
6. Run time for each station
7. Manual start:
   - single station: STA
   - multi-station (cycle): CYC
8. Assign a station to a program (A, B, or C)
9. Transmitting program
10. On-off mode
11. Transmission failed

Keypad



A. Arrow key/Next function
B. Increase/On
C. Program (A, B, C)
D. Decrease/Off
E. Transmit (download program) to Control Module
F. Retrieve (upload program) from Control Module and display program
G. Cycle key
   - set clock / set current day
   - watering time per station / select station

Installing the Battery

The Field Transmitter is powered by a 9-volt alkaline battery (not included), type 6AM6 (international standard) or type 6LR61 (European standard). We recommend that you use a high-quality alkaline battery, such as Energizer. A high-quality battery will last one year.

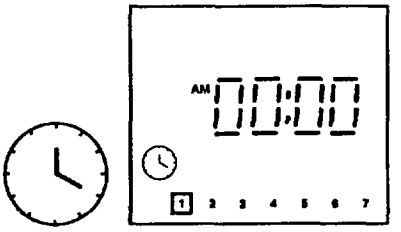
To install the battery:

1. Remove the screws that secure the battery compartment cover.
2. Remove the battery connector from the battery compartment and attach the battery to the connector.
3. Insert the battery and connector into the battery compartment.
   When the battery is properly connected, the start-up display will read 00:00.
4. Reinstall the screws that secure the battery compartment cover.

The Field Transmitter can now be programmed.

Setting up the Field Transmitter

Before you can create watering programs, you must set the current time and day.



Setting the time

To set the time:

1. Press until the clock icon appears in the display.

2. Select either a 12-hour or a 24-hour display. The default time display is 24 hour.

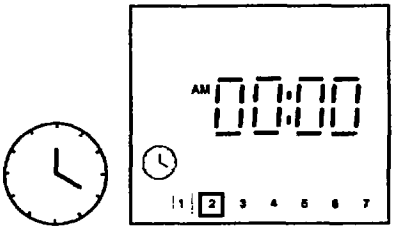
   If you would like a 12-hour display, press and hold down for two seconds. AM or PM will appear on the display to the left of the time.

   ***Important:* Only Field Transmitters with November 1997 date codes or later have the AM/PM option.**

3. Press to advance the clock or to reverse the clock. Pressing and holding down either key will make the numbers change more quickly.

   ***Note:* If the display shows AM and the current time is actually PM, advance or reverse the clock until the display shows PM.**

   Important: When you change the batteries in the Field Transmitter, the time reverts back to the 24-hour display.



Setting the current day

The days are indicated by a number, for example, 1 = Monday, 2 = Tuesday, etc

To set the current day:

Press to select the current day of the week. For example, if it is Wednesday, press repeatedly until the square is around 3.

Programming the Field Transmitter

Before you begin programming the Field Transmitter, please take some time to learn some of the programming and connection options you have with your irrigation system.

Three independent programs

The Field Transmitter has three independent programs: A, B and C. You can consider each program as a separate controller with its own water days, start times and run times. This allows you to select a program according to plant type; for example, A for grasses, B for shrubs and C for trees. Stations assigned to the same program operate sequentially.

Simultaneous watering start

If you assign a separate or different station to each program with the same water days, start times and run times, you will obtain an almost simultaneous start of all three stations.

Multiple stations and programs

If you want more than eight start times per day on a site equipped with only one valve, you can wire the valve to several stations on a Two or Four Station Control Module and program multiple start times for each station.

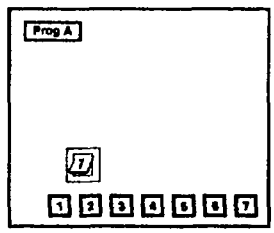
For example, if you wire the same valve to both stations on a Two Station Control Module, you can obtain up to 16 starts (2 x 8). If you connect the same valve to three stations on a Four Station Control Module, you can obtain up to 24 starts (3 x 8). Stations assigned to this valve, however, cannot be assigned to other valves. If you use this method, make sure that there is no program overlap. The program run time must be shorter than the time interval separating the two start times.

Note: **A One Station Control Module can use only one program.**

Now you can begin setting up your watering programs.

Setting the water days

You must select the days of the week that you want to water for each program. If there is a square around the day, watering will occur on that day. If the day does not have a square around it, watering will not occur on that day.



To set the watering days:

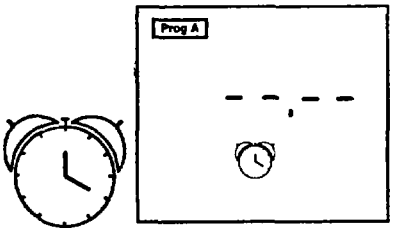
1. Press repeatedly until the icon is displayed.
   Program A will also appear in the display. If you want to select Program B or Program C, press until the program you desire is displayed.
2. If you do not want to water on a certain day that is set as a watering day (it has a square around it), press repeatedly to advance to that day.
   The day selected will blink.
3. Press to remove the square.
   The square will disappear and no watering will occur on the selected day.
4. If a day you want to water does not have a square around it, press repeatedly to advance to that day.
   The day selected will blink.
5. Press to place a square around the day.
   A square will appear around the day and watering will take place on the selected day.
6. Repeat steps 2-5 until all the days are set for program. When you are ready to move on to the next program, press to change to another program.
7. When you have set the watering days for all of your programs, press to move

Setting the start times

You can set up to eight start times for each program, but it is not necessary for you to use all eight start times with each program. After you enter all the start times, the transmitter will automatically organize the start times in chronological order, from 00:00 to 23:59 or 12:00 AM to 11:59 PM.

To set the start time:

1. Make certain the icon is visible on the display. If it is not, press repeatedly to cycle through the menu system and display the icon.



2. Press repeatedly until the program you desire (A, B, or C) appears in the display.
3. Use and to set the first start time.
4. Press to move to the next start time.
5. Repeat steps 3 and 4 until you have set all of the start times you desire (up to eight per program) for the program.
6. If you would like to set start times for additional programs, press until the program you desire is displayed. Then repeat steps 3 and
7. When you have finished setting the start times, press to move to the icon, Setting the Watering Time Length display.

Deleting a start time

To delete a start time:

1. Press to advance to the icon.
2. Press to change to the appropriate program.
3. Press to scroll through the start times and decide which one to delete (the start times will be in chronological order).
4. Again, scroll through the start times and pause on the start time just before the time you wish to delete.
5. Press and hold . The start time will flash momentarily on the display, signaling its cancellation, and then change to --.--.

   ***Note:* It is a common misunderstanding that a start time of 00:00 is "off." It is actually a midnight start time. An "off" time is indicated by --.-- in the display.**

Setting the run time per station

You can set the run time for each station from 0 to 12 hours (in one minute increments). All One Station Control Modules must be programmed on station 1. Multi-station Control Modules (Two Station and Four Station) must be programmed starting on station 1. For example, on a Four Station Control Module, programming would start on station 1, then station 2, 3 and 4.

Note: **Each station may be assigned to only one program (A, B or C)! The station will only respond to the start times and days on for this program.**

Note: **The time display is represented in hours and minutes. The first two placeholders are for hours; the second two placeholders are for minutes.**

To set the run time:

1. Make certain the icon is visible on the display. If it is not, press repeatedly to cycle through the menu system and display the icon.
2. The station number appears to the left of the run time. Use to select the station.
3. Press repeatedly until the program you desire (A, B, or C) appears in the display (to the right of the run time). Each station must be assigned to a program (A, B, or C).
4. Use and to set the station run time.
5. Press to move to the next station.
6. Repeat steps 3 through 5 until you have set all of the station run times.

   Note: **If there is an overlap on the same station, the second run time will not take place.**

7. When you have finished setting the run times, you may review the run times by pressing .

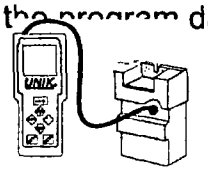
Erasing Field Transmitter programming data

To erase all programming data in the Field Transmitter (except the current time and day): Press and hold and simultaneously for at least three seconds. All programming data are erased.

Transmitting Programs to a Control Module

When you want to transmit (download) program data to a Control Module:

1. If the Field Transmitter's display is blank, press .
2. If you have not already done so, enter the program data into the Field Transmitter.
3. Plug the Field Transmitter's optical connector onto the Control Module's optical connector.



4. Press

   The icon will appear on the screen for two seconds. When the icon disappears from the display, the program data has been successfully transmitted.

   Important: **If there is a transmission problem, the icon will appear in the display and you will hear three beeps. Then the icon will appear.**

Verify that the:

- **Field Transmitter and the Control Module are connected properly**
- **Field Transmitter's and the Control Module's optical connectors are clean (wipe the connectors with a damp cloth)**
- **Field Transmitter and the Control Module have a fully charged 9-volt alkaline battery**

Press [→] and then transmit the programming information again.

5. Disconnect the Field Transmitter from the Control Module.

Reviewing Control Module programs

When you want to verify the program data of a Control Module:

1. Plug the Field Transmitter's optical connector onto the Control Module's optical con- nector.
2. If the Field Transmitter's display is blank, press [→].
3. Press on the Field Transmitter to receive (upload) the program data stored in the Control Module. You can now review all of the Control Module program data ex cept the current time of day stored in the Control Module.

   ***Note:* The Field Transmitter does not receive the current time from the Control Module because there may be a difference in the current time between the two devices. However, when you transmit (download) a program to a Control Mod- ule, the Field Transmitter synchronizes the Control Module's current time with the Field Transmitter's current time.**

4. To modify the program data stored in the Con Module, enter the desired modifi- cations into the Field Transmitter, then press to transmit (download) the pro- gram to the Control Module.

   The icon will appear on the screen for two seconds. When the icon disappears from the display, the program data has been successfully transmitted.

***Note:* Press even if you have not made any changes to the programming data. This will synchronize the time between the two devices.**

On-off Mode/System Override

The Field Transmitter's On-off function allows you to completely suspend and override all currently set programming in the Control Module, without changing or losing this programming for future use.

The Control Module's default mode is always ON, allowing programmed watering to take place. You can prevent watering, however, by activating the On-off Mode, thereby switching the Control Module's default mode to OFF.

Activating a Control Module's On-off Mode

To activate the On-off Mode (or turn the Control Module's default mode to OFF):

1. Press on the Field Transmitter repeatedly until the icon is displayed.
   - If the On-off Mode is deactivated, you will see the icon, indicating that the Control Module will water according to current programming.
   - If the On-off Mode is activated, you will see the icon, indicating that all Control Module programs have been overridden and no watering will take place.
2. If the icon is displayed, press .

   The Field Transmitter sends the irrigation OFF command to the Control Module. An X will appear on the sprinkler icon .

Deactivating a Control Module's On-off Mode

To deactivate the On-off Mode (or turn the Control Module's default mode on):

1. Press on the Field Transmitter repeatedly until icon is displayed.
   - If the On-off Mode is deactivated, you will see the indicating that the Control Module will water according to current programming.
   - If the On-off Mode is activated, you will see the ,indicating that all Control Module programs have been overridden and no watering will take place.
2. If the icon is displayed, press .

   The Field Transmitter sends the irrigation ON command to the Control Module. The X on the icon disappears.

Verifying the On-off Mode

To check the Control Module's On-off status:

1. Plug the Field Transmitter's optical connector into the Control Module's optical connector.
2. If the Field Transmitter's display is blank, press .
3. Press on the Field Transmitter to receive (upload) the program data stored in the Control Module.
4. Press on the Field Transmitter repeatedly until the icon is displayed.
   - If the On-off Mode is deactivated, you will see the icon, indicating that the Control Module will water according to current programming.
   - If the On-off Mode is activated, you will see the icon, indicating that all Control Module programs have been overridden and no watering will take place.

2. Press to stop any stations that may be watering. If a station is in operation, a manual start is impossible. A station may be in operation at the module level, but without any irrigation in the field. This is what occurs when the Rain Shut-off Device prevents programmed irrigation.
3. Press until the program cycle you would like to start is displayed.
4. Press to start the cycle.
   Irrigation will start after 20 seconds if you are using an old type Control Module. If you are using a new type Control Module (a control module with a yellow wire loop), irrigation will start after 10 seconds. The stations assigned to the program will operate in sequence until the last station has finished watering. Irrigation will then stop.
5. If you wish to stop watering before the manual cycle has completed, press .

Maintaining the UNIK Field Transmitter

To keep your Field Transmitter in working order:

- Change the battery once a year. We recommend you use a high-quality alkaline battery, such as Energizer. When changing the Field Transmitter battery, any stored programs will be lost. To avoid this:

1. Press to download the programs into a Control Module.
2. Change the battery.
3. Press to upload the programs into the Field Transmitter.

- Replace the Field Transmitter's protective cover after use.
- Secure the optical connector to the base of the cord after use.
- Do not expose the liquid crystal display (LCD) to sunlight for prolonged periods.

Performing Manual Starts and Stops

Important: **Before you perform manual starts and stops, you must verify the status of the Control Module's irrigation status. See Verifying the On-off Mode, on page 9 (previous page).**

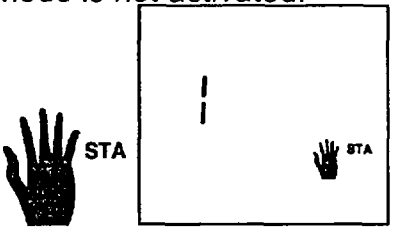
Note: **The manual functions described below override all other functions (except On-off); any program currently running will be suspended to permit their use. Manual starts and stops only affect an existing station run time or program.**

Important: Manual operations will not work if the On-off Mode is activated.

Starting a Control Module manually

You can perform either a single-station or a cycle (multi-station) manual start. Before carrying out either type of manual start, make sure you have programmed a run time of at least one minute and that the Control Module's On-off Mode is not activated.

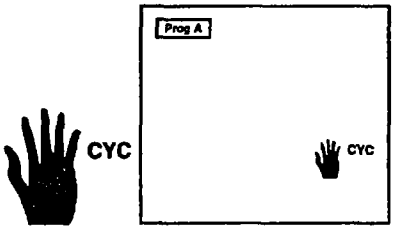
Performing a manual single-station start



If you would like to manually start one station:

1. Press until the icon is displayed.
   The station number will also be displayed.
2. Press to stop any stations that may be watering. If a station is in operation, a manual start is impossible. A station may be in operation at the module level, but without any irrigation in the field. This is what occurs when the Rain Shut-off Device prevents programmed irrigation.
3. Press until the station you would like to start is displayed.
4. To start a station, press . Irrigation will start after 20 seconds if you are using an old type Control Module. If you are using a new type Control Module (a Control Module with a yellow wire loop), irrigation will start after 10 seconds.
5. If you wish to stop watering before the programmed time is up, press .

Performing a manual cycle start



If you are using an old type Control Module, the manual cycle start option is only available on the Two and Four Station Control Modules. If you are using a new type Control Module (a Control Module with a yellow wire loop), the manual cycle start option is available on all Control Modules (One, Two and Four Stations). The cycle consists of all of the stations operating in sequential order.

To manually perform a cycle start:

1. Press until the icon is displayed.
   Prog A, B or C also appears in the display.

Troubleshooting

The following list contains possible problems you may encounter and some solutions.

Most of the problems involving the UNIK Field Transmitter can be classified as transmission/reception malfunctions usually caused by a dead or improperly connected battery. Other common causes of malfunction could be a dirty optical connector and poor wire connections.

These problems are easy to fix. If you experience transmission/reception problems, try using a Control Module that operates properly to determine if it is the Field Transmitter or Control Module that is the source of the problem.

Before calling Rain Bird, check this list. If you cannot solve the problem yourself, call our Technical Service Hotline at 1-800-RAIN-BIRD (U.S.) or 626-963-9311 (outside the U.S.) and we will be glad to help you.

Problem: **Weak LCD display/no display/incomplete display**

Possible cause: The battery is weak.
Solution: Replace the battery.

Possible cause: The microprocessor has locked up.
Solution: Remove the battery. Short the UNIK Field Transmitter battery clip (not the battery) contacts together with a paper clip or other piece of metal for 30 seconds. Reinstall a fresh battery.

Possible cause: The battery contact is faulty.
Solution: Tighten the battery connectors to ensure tight battery connection.

Problem: **Locked display or keypad**

Possible cause: The microprocessor did not reset properly.
Solution: Remove the battery. Short the UNIK Field Transmitter battery clip (not the battery) contacts together with a paper clip or other piece of metal for 30 seconds. Reinstall a fresh battery.

Problem: **Station does not start**

Possible cause: No run time has been programmed for that station.
Solution: Transmit a run time to the Control Module.

Possible cause: The On-off Mode is activated (X on Sprinkler icon).
Solution: Permit irrigation by deactivating the On-off Mode.

Possible cause: Another station is in operation.
Solution: Use the manual station option to turn off that station.

Possible cause: The battery is weak.
Solution: Replace the battery.

Possible cause: A wire connection is faulty.

Solution: If you are using King wire connectors, gently pull on the wires to make sure they are secure. If the wires are loose, cut the wires. Strip 0.5 in. (1.25 cm.) of the insulation off the wires. Twist the wires, then push the wires into a new King connector and twist the connector around the wires. Gently pull on the wires to make sure they are se cure.

If you are using 3M DBM wire connectors, make sure the wires have not been stripped. Unlike other wire connectors on the market, DBMs are designed to cut through the insulation to make a water-resistant coupling without removing the insulation. Push the wires all the way into the wire connector. Be sure to crimp the black cap all the way down (gel should ooze out of the top) to ensure a water re-sistant connection. Gently pull on the wires to make sure they are secure. If the insulation has been stripped, re-cut the wires and re-peat the steps above.

Possible cause: The UNIK Rain Shut-off Device is wet.

Solution: Flip the UNIK Rain Shut-off Device switch to off. If you have an old style Control Module, cut the UNIK Rain Shut-off Device wires. Con-nect the black wires from the Control Module to the black field wires. Carry out a manual stop and then repeat the manual start.

Problem: **Faulty transmission**

Possible cause: The optical connector on the Control Module and/or the Field Trans mitter is dirty.

Solution: Clean the connector(s).

Possible cause: The battery is weak.

Solution: Replace the battery.

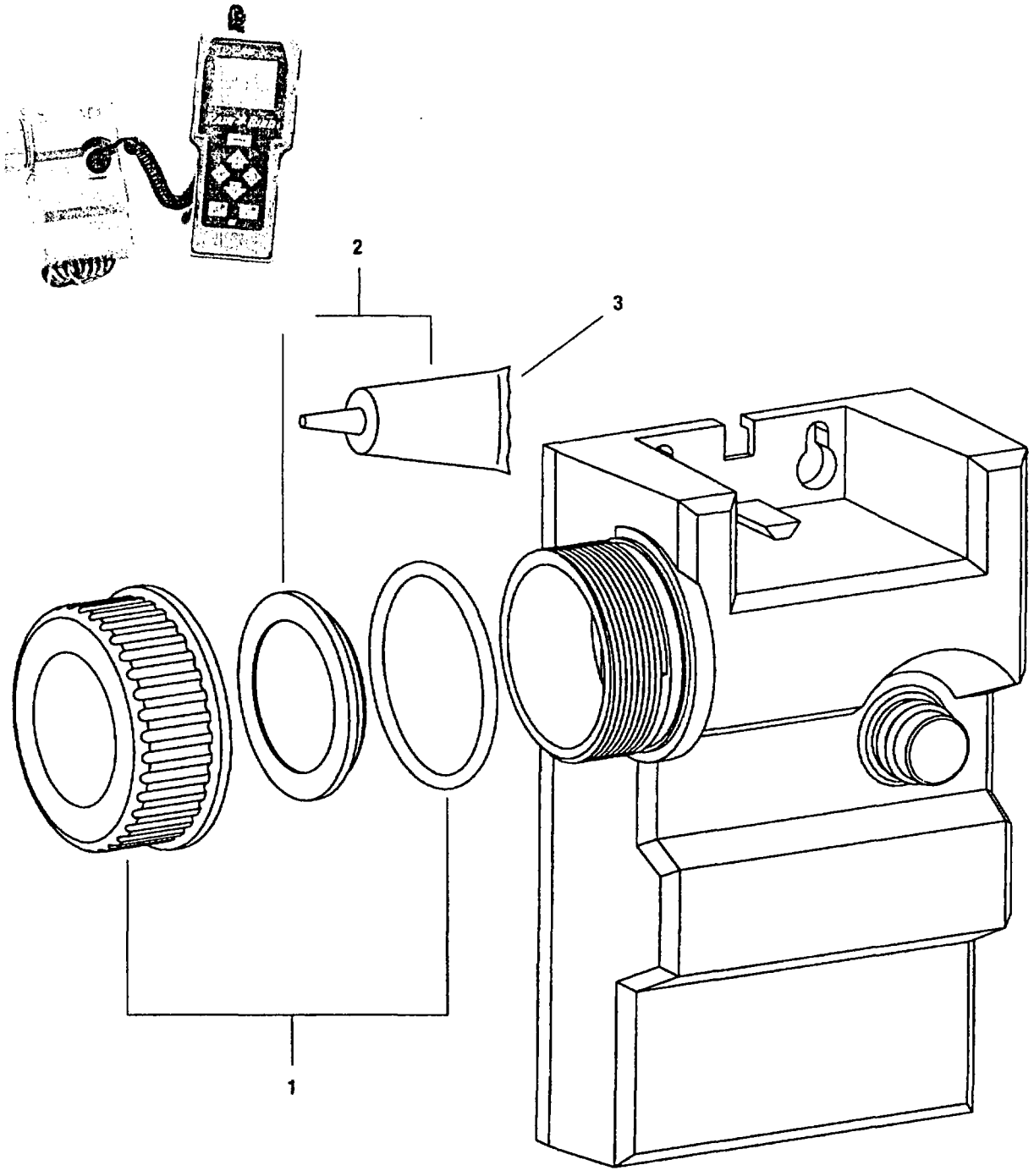
Possible cause: The microprocessor did not reset properly.

Solution: Remove the battery. Short the UNIK Field Transmitter battery clip (not the battery) contacts together with a paper clip or other piece of metal for 30 seconds. Reinstall a fresh battery.

RAIN BIRD®

Customer Support Center
6640 S. Bonney Ave.
Tucson, AZ 85706
1-800-RAIN-BIRD
(520) 434-6289 FAX

TBOS™ (UNIK™) CONTROL MODULE



Ref.	Part Description	Part Numbers
1	Module Cap + O-ring	633712
2	Seal + Protective Grease	634552
3	Protective Grease	634542

Note: Part numbers enclosed in brackets ( ) are not available individually, but may be sold in assemblies or kits.

APPENDIX D

INSTITUTIONAL CONTROLS MONITORING AND ENFORCEMENT WORK PLAN (ICMEWP)

TRC
Customer-Focused Solutions

Michael J. Skinner Consulting, LLC
230 Kings Highway East, #300
Haddonfield, NJ 08033

November 28, 2005

Mr. Russell Mechem
US EPA, Region 9
75 Hawthorne Street
San Francisco, CA 94105-3901

Re: Institutional Controls Monitoring and Enforcement Work Plan (ICMEWP), Revision 1
Waste Disposal Inc, Superfund Site, Santa Fe Springs, CA

Dear Russell,

According to section 5.13.4 of the SOW for the subject site, the Work Plan (WP) is scheduled to be updated two years after the Effective date of the site CD (October 1, 2003). As agreed, the revised Final Institutional Controls Monitoring and Enforcement Work Plan (ICMEWP), Revision 1 update is enclosed.

We believe that, for the most part, the WP will function well; however, since we have not had the opportunity to test it, we are unable to critically evaluate action components, e.g. Non-compliance Notifications to landowners, Non-compliance Notifications to EPA, etc. We will review those in the following update. Additionally, the Health and Safety Plan (HASP) will be updated in connection with the OM&M phase of the project.

Please call or email me if you have any questions or comments.

Regards,

Mr. Michael J. Skinner
Michael J. Skinner
Trustee, WDI Trust

Cc: Sarah Mueller, EPA counsel
Taly Jolish, EPA counsel
Roberto Puga, WDIG Project Manager
Shelby Moore, WDIG Counsel

ofc: 856-429-5336
fax: 856-429-3479
email: mjs@superfundmanagement.com

TABLE 1
RESPONSE TO EPA's COMMENTS ON INSTITUTIONAL CONTROLS
MONITORING AND ENFORCEMENT WORK PLAN
WASTE DISPOSAL, INC. SUPERFUND SITE
SANTA FE SPRINGS, CA

COMMENT NUMBER	EPA COMMENTS	RESPONSE TO EPA COMMENTS	CHAPTER AND SECTION ADDRESSED IN REPORT
PART I – General Comments			
1. General	Replace "Restrictive" with "Restriction" when saying "Environmental Restriction Covenant"	"Restrictive" was replaced with "Restriction" when referring to "Environmental Restriction Covenant" and was a global change in the document.	Overall
PART II – Specific Comments			
2.	Page 4, Section 1.2.1, Stake Holders: Roles and Responsibilities 2nd sentence: This is not really accurate. The owners are stakeholders because each is a party to the ERC for their property and must comply with its provisions. The City is a stakeholder to the extent that the ERCs may affect redevelopment. Not all future redevelopment must be approved by EPA -- only those activities that are specifically prohibited by the land use restrictions in the ERCs. Same comment for the 3rd sentence -- not all activities will be subject to EPA's review and approval.	1. This section was expanded to include descriptions of various stakeholders including the Site Trust and Trustee, EPA and DTSC, the City of Santa Fe Springs, property owners, and the WDIG Project Coordinator. 2. In the easements, subsection 25 of 402 requires that any new construction be approved by EPA to demonstrate compliance with 3 specific requirements set forth in subsection 25. If the proposed new construction is prohibitive by any other ERC provisions, then there needs to be an exception as noted in 5.01, also requiring EPA approval.	Section 1.2.1
3.	Page 4, Section 1.2.1, Stake Holders: Roles and Responsibilities 4th sentence: This is not accurate. The Trust must monitor the ERCs on all properties on which they have been recorded, not just those owned by the defendants or the Trust. The Trust must also enforce all ERCs, except for those properties where there are new buildings or improved buildings, as described later in the paragraph.	This section will be changed to clarify that the Trust will monitor the ERCs on all properties where they have been recorded. Additionally the Trust is responsible for enforcing all ERCs, except for those properties where there are new or improved buildings or other permanent structures.	Section 1.2.1
4.	Page 4, Section 1.2.1, Stake Holders: Roles and Responsibilities Last sentence: Change "power" to "authority" and add at the end-- "as third party beneficiaries."	Last sentenced changed from "power" to "authority" and "as third party beneficiaries" was added to the end of the sentence.	Section 1.2.1

TABLE 1
RESPONSE TO EPA's COMMENTS ON INSTITUTIONAL CONTROLS MONITORING AND ENFORCEMENT WORK PLAN
WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CA

COMMENT NUMBER	EPA COMMENTS	RESPONSE TO EPA COMMENTS	CHAPTER AND SECTION ADDRESSED IN REPORT
5.	Page 5, Section 1.2.2, Institutional Controls. 1st sentence: Change to "Institutional Controls (ICs) are required by the Amended ROD to [cite to Amended ROD]. Delete the rest of the sentence.	The first sentence was changed to- Institutional Controls (ICs) are required by the Amended ROD to ensure the long-term integrity of the remedy and to prevent exposure to waste remaining at the Site. (Waste Disposal Inc. Amended Record of Decision, Section L.3.G, p. II-58)	Section 1.2.2
6.	Page 5, Section 1.2.2, Institutional Controls. Delete last bullet point. It is redundant and is not one of the purposes and objectives of the ICs.	Last bullet point was deleted.	Section 1.2.2

TABLE 1
RESPONSE TO EPA's COMMENTS ON INSTITUTIONAL CONTROLS MONITORING AND ENFORCEMENT WORK PLAN
WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CA

COMMENT NUMBER	EPA COMMENTS	RESPONSE TO EPA COMMENTS	CHAPTER AND SECTION ADDRESSED IN REPORT
7.	Page 5-6 Section 1.2.3, Environmental Restriction Covenants. It's not clear what the point of this section is. If the point is to give a general description of the ERCs, then the land use restrictions should be described, at least generally, since the purposes for access are described. The first paragraph here describes just one of the CD requirements related to the ERCs. It would probably be more informative to say that the CD requires the WDIG Site Trust to be the covenantee of the ERCs and part of its responsibilities as covenantee include monitoring and enforcing the ERCs.	1. Section 1.2.3 was modified to describe the purpose of the ERCs and how they are enforced. In addition the text will be modified to add the following to the first paragraph: The CD requires the WDIG Site Trust to be the covenantee of the ERCs and part of its responsibilities as covenantee include monitoring and enforcing the ERCs. Additionally, land/water restrictions were included as well as a partial list of example restrictions. 2. The ERCs provide that if an Owner or an Occupant constructs a new building or other permanent structure on the property or substantially modifies an existing building or other permanent structure on the property, and such modification requires a City of Santa Fe Springs building or land use permit, Owner or Occupant shall implement and maintain any necessary engineered capping system(s) and any necessary engineering control(s) related to the new or modified building or other permanent structure, in conformance with the provisions of the Amended ROD and as specified by EPA. Such capping system and engineering controls shall be implemented only with the prior written approval of EPA.	Section 1.2.3
8.	Page 6, Section 2.1, General. 2nd sentence: This sentence should be deleted. It is not accurate and confusing and is out of place in this paragraph. The WP later mentions the WDIG role in applications for exceptions.	The second sentence was deleted and the document was checked for consistency.	Section 2.1

TABLE 1
RESPONSE TO EPA's COMMENTS ON INSTITUTIONAL CONTROLS MONITORING AND ENFORCEMENT WORK PLAN
WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CA

COMMENT NUMBER	EPA COMMENTS	RESPONSE TO EPA COMMENTS	CHAPTER AND SECTION ADDRESSED IN REPORT
9.	Page 6, Section 2.1, General. Last sentence: Change "powers" to "authority, change "such" to "all" and add at end "on which ERCs have been recorded, as third party beneficiaries."	Last sentence was changed from powers to authority, such was changed to all and "on which ERCs have been recorded, as third party beneficiaries" was added at the end of the sentence.	Section 2.1
10.	Page 6, Section 2.2, Identification and Location of Properties where Access Agreements and ERCs are Required by the Consent Decree and/or Amended ROD. Heading: Add "and/or Amended ROD"	Added to "and/or Amended ROD" to heading.	Section 2.2
11.	Page 6, Section 2.2.3, Current and Anticipated Land Use. Last sentence: Add a space between "land" and "use".	Last sentenced was corrected.	Section 2.2.3
12.	Page 2, Section 2.4, Monitoring Activities. Delete this section; it doesn't add anything and doesn't make much sense, since we don't have anything we are calling "Access Agreements."	Section was deleted from text. This section was added in the first 2003 ICMEWP since we were relying on agreements for access that EPA had obtained from landowners at the Site. Over time, we have retained easements, except for a few landowners (Holbrook, Bennett/Pitts, Timmons, Cote), as shown in Table 3. On these properties, we are still relying on these agreements.	Section 2.4
13.	Page 7-8, Section 2.5.1, Institutional Controls Compliance Checklists. Last sentence: Add "and" between "created" and "is."	Last sentence was corrected.	Section 2.5.1
14.	Page 8, Section 2.5.2, Non-Compliance Notifications to Landowners. 1st sentence: Delete "and in compliance with the terms of the ERC."	The following was deleted from the first sentence: "and in compliance with the terms of the ERC."	Section 2.5.2

TABLE 1
RESPONSE TO EPA's COMMENTS ON INSTITUTIONAL CONTROLS MONITORING AND ENFORCEMENT WORK PLAN
WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CA

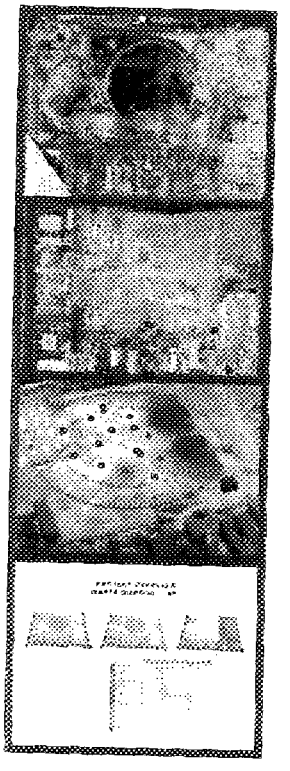
COMMENT NUMBER	EPA COMMENTS	RESPONSE TO EPA COMMENTS	CHAPTER AND SECTION ADDRESSED IN REPORT
15.	Page 8, Section 2.5.4, Corrective Action Procedures. Last sentence: Change "will" to "may" (a court may not grant recovery of costs and damages).	This section was clarified to read - Per Section 4.04 and 4.05 of the ERC, the Trust may recover all costs and damages.	Section 2.5.4
16.	Page 8-9, Section 2.6.1, Scope. Replace "owned by any Settling Defendant or the WDIG Site Trust" with "at the Site on which an ERC has been recorded."	Replaced "owned by any Settling Defendant or the WDIG Site Trust" with "at the Site on which an ERC has been recorded."	Section 2.6.1
17.	Page 9, Section 3.2, Elements and Contents of the Review. 2nd sentence: What is this referring to?	This section was clarified to read - A thorough and comprehensive review shall be conducted by the Trust, and specifically the requirements of the following sub-sections will be analyzed as appropriate.	Section 3.2
18.	Page 10, Section 4.0, Implementation Schedule. Wasn't the original ICMEWP approved by EPA? If so, provide the date and state that the WP is currently being implemented.	The ICMEWP is being implemented through continued monitoring and inspection activities during the construction phase. This Plan was approved on October 1, 2003.	Section 4.0
19.	Table 3: Property Owners where ERCs are Implemented in Accordance with the AROD. For parcel 25, add Pitts as an owner. For parcel 32, delete space in column on right next to David Neptune (son). Otherwise it appears as though that ERC has not been recorded.	Parcel 25: Pitts was added as an owner in the appropriate column. Parcel 32: Far right column indicating ERC being recorded was merged to center and apply date to both entries.	Table 3
20.	Figure 3: Institutional Controls Checklist. Under Vegetation, delete the 3rd and 5th entries, as they are not ICs and are not part of the land/water use restrictions. They are the responsibility of the WDIG as part of O & M.	These entries will be documented in OMMP. The 3rd and 5th entries were removed from the ICMEWP, as these items are not the responsibility of the property owners or tenants.	Figure 3
PART III – Additional Comments (non-EPA)			

TABLE 1
RESPONSE TO EPA's COMMENTS ON INSTITUTIONAL CONTROLS MONITORING AND ENFORCEMENT WORK PLAN
WASTE DISPOSAL, INC.
SANTA FE SPRINGS, CA

COMMENT NUMBER	EPA COMMENTS	RESPONSE TO EPA COMMENTS	CHAPTER AND SECTION ADDRESSED IN REPORT
n/a	To clearly outline communication procedures with landowners/tenants during IC activities, Section 2.5 Communication & Coordination with Landowners/Tenants was added to the Plan. This text was edited from the WDI Remedial Action Workplan (RAWP), Appendix B.3 Mitigation Plan.	<u>Section 2.5 Communication & Coordination with Landowners/Tenants was added:</u> The owners and tenants of perimeter businesses will be notified when operations, maintenance and monitoring activities are planned on their properties, which includes, among other items, the IC checklist activities. The impacts on most existing businesses will be minimal, however in some instances potential disruptions may occur. To minimize these disruptions the schedule proposed will be flexible to try and schedule activities around critical times or operations, performing the work as rapidly as possible to minimize the period of potential disruption, and to have open communication with tenants/owners.	Section 2.5
n/a	To maintain consistency with the OMMP, the ICMEWP has outlined major project stakeholders (roles and responsibilities) and has outlined the project organization.	1. Major stakeholders are identified in section 1.2.1, including the WDI Site Trustee, EPA/DTSC, the City of Santa Fe Springs, property owners, and the WDIG Project Coordinator. 2. Additionally a new Figure 1 was added to the ICMEWP entitled Project Organization Chart. This Figure is also part of the revised OMMP.	1. Section 1.2.1 2. Figure 1

Institutional Controls Monitoring and Enforcement Work Plan,
Revision 1

WDI Superfund Site
Santa Fe Springs, California



(CN:98101-RA-100)
Previous Version 8/18/03

Project No. 98-101
November 28, 2005

PROJECT NAVIGATOR, LTD.

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1.0 INTRODUCTION

1.1 General

This document is the Institutional Controls Monitoring and Enforcement Work Plan (ICMEWP), for the Waste Disposal Inc. Superfund Site. The Waste Disposal Inc. Group (WDIG), in compliance with Civil Action No. 03-CV-1593WJR Consent Decree (CD), United States v. Archer Daniels Midland Co., et al., are obligated, quarterly or at a frequency otherwise approved by the EPA, to perform Institutional Control monitoring and enforcement inspections of the properties at the WDI Site on which Environmental Restriction Covenant (ERCs) have been recorded. Additionally, the ICMEWP is required to be updated at least every 2 years (Section 3.0). This ICMEWP was prepared on behalf of the defendants by Michael J. Skinner Consulting, LLC; and, it describes the program components and plan activities as required in Sections IX and X of the CD and Section 3.13 of the Statement of Work (SOW).

1.2 Purpose and Objectives of ICMEWP

In accordance with Section 3.13.2 of the SOW, the ICMEWP is intended to contain Institutional Control and Environmental Restriction Covenant monitoring and enforcement provisions to limit human exposure to potentially contaminated materials as well as protect the integrity of the remedial action.

1.2.1 Stake Holders: Roles and Responsibilities

The following section details major stakeholders on the project, **(See Figure 1, Project Organization Chart)**.

1. The WDIG Site Trust (Trust) is the Trust that was established by the Settling Defendants in the Consent Decree (CD). The Trust meets the requirements for a qualified settlement fund as provided in the CD including the right of EPA to oversee its activities. The Settling Defendants designated Mike Skinner, of Michael J. Skinner Consulting, LLC, as the Trustee of the Trust. Additionally, the Trustee may utilize the services of a third-party contractor (Oversight Contractor) to assist in issues relating to monitoring and enforcement of ICs pursuant to the Trustee's responsibilities in the CD and ICMEWP.

   The Settling Defendants have delegated the Trustee the responsibility to coordinate the activities being undertaken by the WDIG Project Coordinator regarding the OMMP activities, and also the activities under the ICMEWP by the Trustee and the Oversight Contractor. Issues relating to the ICMEWP will be discussed directly between the Trustee and the EPA. Issues relating to OMM activities will be discussed directly between the WDIG Project

Coordinator and the EPA as provided in the CD.

It is the responsibility of the Trust to monitor the ERCs and enforce violations on all properties where ERC's have been recorded. Not withstanding the provisions in paragraph 34g of the CD, the WDIG Site Trust shall not be required to enforce the ERCs on any properties owned or controlled by persons other than Settling Defendants or the WDIG Site Trust if (1) buildings or other permanent structures are constructed on such properties after the date of lodging of the CD, or (2) buildings or other permanent structures which exist on any properties as of the date of lodging of the CD are substantially modified after the date of lodging and such modification requires a City of Santa Fe Springs building or other land use permit. At that time, the Trust will continue to monitor and report compliance or non-compliance, as described in this plan; however, pursuant to the ERCs on the Site properties, the EPA and the DTSC have enforcement authority on those properties as third party beneficiaries.

2. The EPA and DTSC are intended third-party beneficiaries of the Environmental Restriction Covenants that are executed by the WDIG Site Trust as the Covenantee.

3. Additionally, the property owners are stakeholders in that ERCs are encumbrances on the properties. As certain activities may be restricted, including certain types of redevelopment, it is the property owners' obligation to comply with the ERCs and its provisions. These activities will be subject to EPA's review and approval.

4. The City of Santa Fe Springs is a stakeholder to the extent that the ERCs may affect redevelopment on the Site. EPA does not have to approve all future redevelopment, however they must approve those activities that are specifically prohibited by the land use restrictions in the ERCs. Those entities seeking exceptions to the restrictions will be required to submit an Application for Exceptions, along with supporting documentation, for EPA review and approval.

5. Roberto Puga of Project Navigator, Ltd. (PNL) is the WDIG Project Coordinator designated in the CD. He will continue to interface with EPA and DTSC on the operations and maintenance of remedial components and systems on the Site.

1.2.2 Institutional Controls

Institutional Controls (ICs) are required by the Amended ROD to ensure the long-term integrity of the remedy and to prevent exposure to waste remaining at the Site. (Waste Disposal Inc. Amended Record of Decision, Section L.3.G, p.II-58).

The vehicle to implement, monitor, and enforce ICs is the Environmental Restriction Covenant discussed in Section 1.2.2. In general, the purpose and objectives of the Institutional Controls (ICs) are:

- To provide notification to all potential Site users of the presence of hazardous materials and on-Site contamination;
- To provide notification to potential Site users concerning the presence and location of all remedial systems;
- To expressly prohibit residential land use on any part of the Site and limit future uses to certain industrial activities;
- To minimize the potential for exposure of future Site users to Site related hazardous materials (including waste materials, groundwater, and/or soil gas emissions);
- To protect the integrity of the remedy from any activity that may interfere with the effective O&M of remedial control and monitoring systems;
- To provide access to the Site for appropriate regulatory agencies and responsible parties engaged in approved remedial actions and monitoring activities.

1.2.3 Environmental Restriction Covenants

Environmental Restriction Covenants (ERCs) are the legal instruments that define and enforce the ICs. The primary purpose of the ERCs is to protect present or future human health or safety or the environment as a result of the presence on the land of hazardous substances. The CD requires the WDIG Site Trust to be the covenantee of the ERCs and part of its responsibilities as covenantee include monitoring and enforcing the ERCs. These ERCs are enforceable under California Law against all future property owners and tenants. The ERCs will provide access on the land to the EPA and the potentially responsible parties (PRPs) conducting the remedial action, and their contractors. The following activities are examples of ERC requirements:

- Monitoring the remedial action and monitoring and O&M;
- Verifying any data or information submitted to EPA or the State;
- Conducting investigations relating to contamination at or near the Site;
- Obtaining samples;
- Assessing the need for, planning, or implementing additional response actions at or near the Site;
- Assessing implementation of quality assurance and quality control practices as defined in the approved Quality Assurance Project Plans;
- Implementing the remedial action, monitoring, and O&M;
- Assessing compliance with the access easements and environmental restrictions; and

- Determining whether the Site or other property is being used in a manner that is prohibited or restricted by the environmental restrictions, or that may need to be prohibited or restricted.

The ERCs also include land and water use restrictions to prohibit and restrict certain activities at the Site that may adversely affect the implementation, integrity, or protectiveness of remedial measures. The WDIG Site Trust must comply with these restrictions, unless approved by EPA. The following activities are examples of ERC requirements for land/water restrictions:

- Placement of warning signs or other posted information shall be allowed and, once posted, no removal or interference with such signs or information shall be permitted.
- Placement of Site access controls, such as gates or fencing, shall be allowed and not damaged or circumvented.
- The Site shall not be used in any manner that may interfere with the integrity of the remedial cap or other components of the remedy.
- Construction not approved by EPA that impacts any of the remedial capping or other remedy components shall not occur.
- No interferences with or alternations to the grading, vegetation, and surface water drainage controls shall be made.
- Portions of the Site or property underlain by waste and in soil gas noncompliance shall not be regraded.
- Areas of asphalt or concrete pavement shall not be removed or improved.
- No penetrations or interferences with the remedial cap or areas with remedial controls shall be made.

A complete list of land/water use restrictions is provided in the Consent Decree, Section 25b, (1-31).

In addition, the ERCs provide that if an Owner or an Occupant constructs a new building or other permanent structure on the property or substantially modifies an existing building or other permanent structure on the property, and such modification requires a City of Santa Fe Springs building or land use permit, Owner or Occupant shall implement and maintain any necessary engineered capping system(s) and any necessary engineering control(s) related to the new or modified building or other permanent structure, in conformance with the provisions of the Amended ROD and as specified by EPA. Such capping systems and engineering controls shall be implemented only with the prior written approval of EPA.

2.0 SCOPE OF WORK

2.1 General

The primary purpose of the ICMEWP is to document and report any violation of the ERCs. The Trust shall enforce any violations of the use restrictions and access provisions of the ERCs on properties at the Site, through its position as covenantee of the ERCs. The Trust shall not be required to enforce the ERCs for any property owned or controlled by persons other than Settling Defendants or the WDIG Site Trust on which a new building or other permanent structure has been constructed after the date of lodging of the CD, or on which buildings are substantially modified and in a manner that requires a City of Santa Fe Springs building or other land use permit. The EPA and DTSC have enforcement authority on all properties on which ERCs have been recorded, as third party beneficiaries.

2.2 Identification and Location of Properties where Access Agreements and ERCs are Required by the Consent Decree and/or Amended ROD

2.2.1 Identification of Property Owners

Table 1 lists all Site property owners, uniquely identifying each parcel.

2.2.2 Identification of Tenants

Table 2 identifies each tenant or occupant, whichever is applicable, for each of the Site properties.

2.2.3 Current and Anticipated Land Use

Table 2 lists the current use for each of the Site properties. Anticipated land uses are not described since no changes in property use are anticipated in the short-term. The City of Santa Fe Springs has approved a specific development plan for the Site. The plan, Adopted Specific Plan for the Development of the Waste Disposal, Inc. Site, City of Santa Fe Springs, California, was approved on May 13, 2004 and is available through the Department of Planning and Development (562-868-0511). Any changes in land use will be incorporated in future revisions of the ICMEWP.

2.3 Identification and Location of Properties where Access Agreements and ERCs are Implemented in Accordance with the Amended ROD

2.3.1 Identification of Property Owners

Table 3 lists all Site property owners, uniquely identifying each parcel and the date the specific ERC was recorded. **Figure 3** additionally illustrates property owners of various parcels located on the property.

2.4 Monitoring Activities

2.4.1 Physical Inspections

As described in Section 4.03 of the ERC (**Appendix A**), the Trust shall have access to the properties on the Site to conduct the activities described in Section 1.2.2 of this document. An on-Site inspection shall be made quarterly or on a frequency agreed to by the EPA. The elements listed in Section 4.02 of the ERC shall be inspected to verify that property use complies with all land/water use restrictions listed, except as otherwise authorized by the EPA to implement the remedy selected in the Amended ROD or any future response action required by the EPA.

2.4.2 Property Records Review

Semiannually, the City of Santa Fe Springs land use permits will be searched to confirm that no land use permits have been granted that conflict with the purpose of the ICs.

Title documents shall be reviewed semi-annually, or as directed by EPA, to determine whether or not ERCs remain in place on the properties at the Site.

2.5 Communication & Coordination with Landowners/Tenants

The owners and tenants of perimeter businesses will be notified when operations, maintenance and monitoring activities are planned on their properties, which includes, among other items, IC checklist activities.

The impacts on most existing businesses will be minimal, however in some instances potential disruptions may occur. To minimize these disruptions the schedule proposed will be flexible to try and schedule activities around critical times or operations, performing the work as rapidly as possible to minimize the period of potential disruption, and to have open communication with tenants/owners.

2.6 Non-Compliance Enforcement Mechanisms

2.6.1 Institutional Controls Compliance Checklists

A checklist reflecting the items listed in Section 4.02 of the ERC shall be developed by the Trust for use during the inspection. A copy of each inspection

form will be included in the quarterly reports to the EPA. An updated IC checklist has been created and is attached as **Figure 4**.

2.6.2 Non-Compliance Notifications to Landowners

Within 10 days of finding a violation of the land/water use restrictions on any Site property where an ERC has been recorded, the Trust shall send a letter to the landowner demanding that any and all violating improvements be removed or other violations be corrected within 15 days. If there is no response from the landowner within the 15 days, the Trustee will follow-up with efforts to achieve voluntary compliance through written or verbal notice and other communications to explain the issue, if appropriate. If voluntary compliance is not achieved through these efforts, the Trust may resort to legal processes and injunctive relief as necessary to remedy the non-compliant item(s).

2.6.3 Non-Compliance Notifications to EPA

The EPA and DTSC shall be copied on all Non-Compliance Notifications to Landowners. Additionally, if any ERCs are removed from any properties on the Site, the EPA will be notified within 5 days.

2.6.4 Corrective Action Procedures

If the property owner does not take action to correct the violation within 15 days of notification, the Trust will take appropriate steps, after consultation with the EPA, to correct the violation. Per Section 4.04 and 4.05 of the ERC, the Trust may recover all costs and damages.

2.6.5 Corrective Action Reports

At the completion of any corrective action, a full report will be submitted to the EPA and DTSC. The report will contain but is not limited to:

- A description of the violation.
- A description of the action taken by the Property owner.
- A description of the action taken by the Trust.
- A description of legal processes taken.
- A description of the final resolution.
- An Appendix containing:
    - Cost documentation of the full action.
    - A copy of the Non-Compliance Notification to the Landowner.
    - Copies of all relevant communications.

2.7 Application for Exceptions

2.7.1 Scope

It is anticipated that the Site may be redeveloped for industrial land uses at a future date and the EPA may, at its discretion, grant approvals for Exceptions to the land/water use restrictions on any property at the Site on which an ERC has been recorded.

2.7.2 Application Process

Applications for Exceptions will be submitted to the EPA and EPA will identify specific data that are required to support the application, which will be reviewed on a case-by-case basis. Such information may include, but not be limited to:

- Work plans
- Design reports
- Drawings
- Construction plans
- Operation and maintenance plans
- Land use plans

2.7.3 Application Review

EPA will seek to expedite its review of Applications for Exceptions, subject to the scope of the proposed activity. As set forth in Section 4.4 of the WDI SOW, through the IAC process, the EPA will coordinate requirements, schedules, technical reviews and comments with other public entities including the City of Santa Fe Springs. At EPA's request the Settling Defendants and/or the WDIG Site Trust shall, with appropriate assistance from qualified individuals or firms, evaluate the proposed activities requiring an Exception and identify potential systems, tasks, or activities that may impact the Site remedy and would therefore require mitigation by those entities seeking to undertake activities requiring an Exception.

3.0 BI-ENNIAL WORK PLAN REVIEW

3.1 General

As required by Section 5.13.4 of the SOW, the Trust shall prepare and submit an update of the ICMEWP for EPA review and approval every 2 years. No earlier than 2 years after the Effective date of the CD, the Trust may request a reduction in the frequency for the revision of the ICMEWP, and may implement such reduction upon EPA's written approval of the request.

3.2 Elements and Contents of the Review

A thorough and comprehensive review shall be conducted by the Trust, and specifically the requirements of the following sub-sections will be analyzed as appropriate. The purpose of the review is to adjust the monitoring and enforcement of ICs, and if necessary, to provide for efficient and cost effective compliance, and to update the ICMEWP regarding the Site properties, ERCs, anticipated future land uses, and other relevant information.

3.2.1 Property Ownership Update

The SOW (section 3.13.2) requires that "Settling Defendants shall review the title documents in the County Recorder's Office for the Los Angeles County semiannually---". As part of that review process, property ownership will be verified and updated as appropriate.

3.2.2 On-Site Program

A full on-site program review will be completed.

3.2.3 Plans

Each of the following plans will be reviewed and updated as necessary.

- Health and Safety Plan
- Site Access and Security Plan

3.2.4 Monitoring and Enforcement Plan

All key elements will be reviewed and updated.

- Institutional Controls Compliance Checklist
- Non-Compliance Notifications to Landowners
- Non-Compliance Notifications to EPA
- Corrective Action Procedures
- Corrective Action Reports

4.0 IMPLEMENTATION SCHEDULE

The ICMEWP was approved by the EPA on October 1, 2003 and is currently being implemented.

Tables

TABLE 1
Property Owners where ERCs are Required by the CD

Parcel #	Recorded Owner	Owner Contact	Phone Number
3	Raymond & Donnis Holbrook Trust	Eileen Holbrook	562-402-8389
4	Dia-Log Company	Steve Mason	818-575-3486
7	Eugene and Geraldine Welter Trust	Gene Welter	562-944-0291
11	Albert C K & Betty Leung	Albert Leung	562-698-9762
12	Albert C K & Betty Leung	Albert Leung	562-698-9762
21	Lucille F. Ferris Living Trust	John Maple	805-481-7238
		Lucille Ferris	562-869-4143
22	John I. Maple Family Partnership	John Maple	805-481-7238
		Lucille Ferris	562-869-4143
24	Raymond & Donnis Holbrook Trust	Eileen Holbrook	562-402-8389
25	Marvin W. Pitts and Cecelia Pitts, trustees under Declaration of Trust dated February 1, 1982 (Pitts Family Trust)	Marvin C. Pitts	562-756-7949
	Adeline R. Bennet, M.D. Living Trust	Adeline Bennet	562-696-0355
26	Marvin W. Pitts and Cecelia Pitts, trustees under Declaration of Trust dated February 1, 1982 (Pitts Family Trust)	Marvin C. Pitts	562-756-7949
	Adeline R. Bennet, M.D. Living Trust	Adeline Bennet	562-696-0355
28	Thomas J. Mersits	Tom Mersits	562-946-1220
	Irene L. Mersits Trust		
29	Thomas J. Mersits	Tom Mersits	562-946-1220
	Irene L. Mersits Trust		
30	Marvin W. Pitts and Cecelia Pitts, trustees under Declaration of Trust dated February 1, 1982 (Pitts Family Trust)	Marvin C. Pitts	562-756-7949
	Adeline R. Bennet, M.D. Living Trust	Adeline Bennet	562-696-0355
32	David Joseph Neptune Family Trust	Dave Neptune	562-946-6377
37	Lula Graziano, Trustee of Trust "A" of the Graziano Trust as restated March 4, 1992 Lula Graziano, Trustee of Trust "B" of the Graziano Trust as restated March 4, 1992	Jovita Ortega	562-902-5343
	Jovita I. Ortega	John Graziano	707-554-5696
		Lula Graziano	562-942-3672
41	Eugene and Geraldine Welter Trust	Gene Welter	562-944-0291
42	Danny R. Peoples & Dena Peoples	Danny Peoples	562-947-7725
43	Eddie Earl Timmons	Eddie Timmons	562-946-5401
44	Sisneros Family Trust		562-777-9797
49	Phil Campbell and Diane Cote Family Trust	Christina Huddle	714-990-1588
	Gwen Campbell	Diane Cote Campbell	858-755-0741
50	Brothers Machine & Tool, Inc.	Jose Razo	562-903-1117
51	Marvin W. Pitts and Cecelia Pitts, trustees under Declaration of Trust dated February 1, 1982 (Pitts Family Trust)	Marvin C. Pitts	562-756-7949
	Adeline R. Bennet, M.D. Living Trust	Adeline Bennet	562-696-0355

TABLE 2
Summary of Existing Businesses

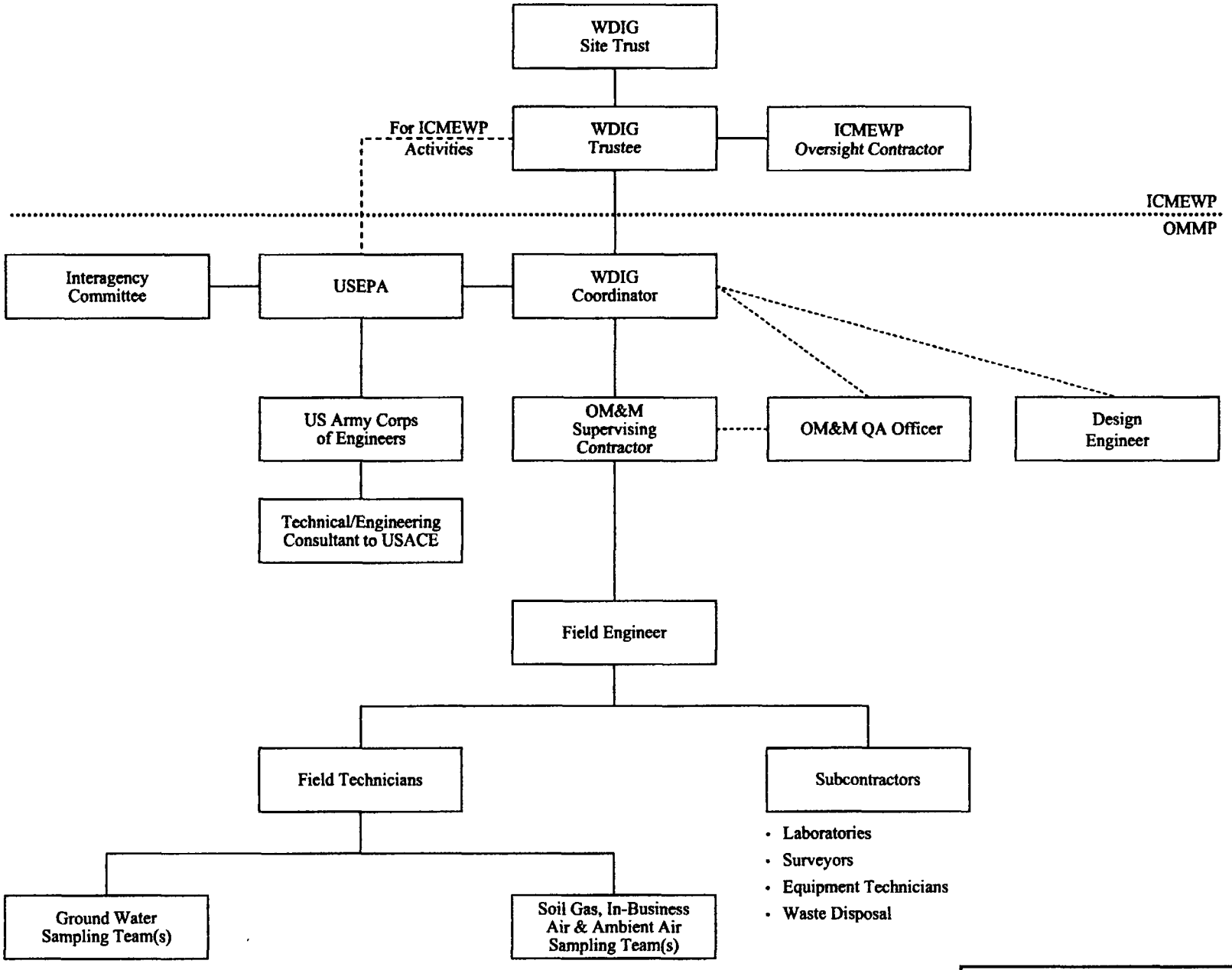
PARCEL NO.	UNIT NO.	TENANT	TENANT CONTACT	TENANT ADDRESS	TENANT PHONE NO.	CURRENT LAND USE
3	1	Metro Diesel Injection	Monty Torres	12631 Los Nietos Rd	562-944-4846	Manufacturing
	2	Ben Vasquez	Ben Vasquez	12633 Los Nietos Rd	562-903-1770	Unknown
	3	Vacant		12635 Los Nietos Rd		
	4	Stansell Brothers	Vern Stansell	12635 Los Nietos Rd	562-946-6676	Machine Shop
4	1	Air Liquide	Bruce Beaton	9756 Santa Fe Springs Rd	562-906-8710	Industrial Gas Distribution
7	1		Katherine Thrower	9618 Santa Fe Springs Rd #1	562-941-1821	Storage
	2	Ink Print	Martha De la Huerta	9618 Santa Fe Springs Rd #2	213-215-2103	Print Shop (business cards)
	3	The Polish Shop	Patrick Renish	9618 Santa Fe Springs Rd #3	714-362-1773	Polish Shop
	4	Cardon Cutting Tools	Abe & Frances Quighano	9618 Santa Fe Springs Rd #4	562-544-1420	
	5	Fontenont Construction	Jaret Fontenont	9618 Santa Fe Springs Rd #5	562-307-5371	
	6	Green Mountain Studios	Peter Schneckee	9618 Santa Fe Springs Rd #6&7	562-903-8556	Studio
	7					
	8		J. Silva	9618 Santa Fe Springs Rd #8	562-695-0132	Coffee Pots
	9		Jose Ramirez	9618 Santa Fe Springs Rd #9	310-787-7175	Welding
	10		Hugo Trujillo	9618 Santa Fe Springs Rd #10	714-447-4478	Welding - fences & gates
	11		Jesus Ramirez	9618 Santa Fe Springs Rd #11	562-212-2535	Metal Forming
	12	Conrad Enterprises	William Saxton	9618 Santa Fe Springs Rd #12	562-903-4006	
	13	City Steel	George Sullivan	9618 Santa Fe Springs Rd #13	562-944-3936	
	14		Leroy Bentaleou	9618 Santa Fe Springs Rd #14	310-779-1090	
	15		Mike Ferris	9618 Santa Fe Springs Rd #15	310-920-1296	Auto Electric
	16		Dennis Rodriguez	9618 Santa Fe Springs Rd #16	562-652-3516	Machine Shop
	1	Go Fast	Ronnie Tagle	9606 Santa Fe Springs Rd	562-698-2652	Auto/Machine Shop
	2		Roy Law	9608 Santa Fe Springs Rd		Wood Shop
	3	A & L Sweep Systems	Kim Goines	9610 Santa Fe Springs Rd	562-693-2971	Street Sweeping
11	1	AAG Metal Industries	Albert Leung		562-698-9762	Import company, cast iron for commercial stoves
12	1			12645 Los Nietos Road		
	2			12647 Los Nietos Road		
	3			12649 Los Nietos Road		
21	1	Chillers Services	Bruce Kolstad	9620 Santa Fe Springs Rd	562-906-0105	Air Conditioning/Demolition
22	1	Gold Coast Refractory	Robert Black	9630 Santa Fe Springs Rd	562-946-1942	Metal Work
24	1	Buffalo Bullet	Ronald Dahlitz	12637A Los Nietos Rd	562-944-0322	Bullet Manufacturing
	2	C & E Metal Products, Inc.	Mark Ellis	12637B Los Nietos Rd	562-946-6661	Machine Shop
25		Marvin Pitts (Reservoir Area)	Marvin Pitts			
26						
28	1	Mersits Equipment	Tom Mersits	9640 Santa Fe Springs Rd	562-946-5707	Heavy Equipment Rentals
29	1				562-946-5806	
30	1	Marvin Pitts (Driveway)	Marvin Pitts			Storage Lot
32	1	California Reamers	Dave/Lori Neptune	12747 Los Nietos Rd	562-946-6377	Machine Shop
37	1			12803 Los Nietos Rd	562-777-0994	Sporting Good Wholesaler
	2	Unknown				
41	1	Four C's Transmission	Julian Nieto	12807A Los Nietos Rd	562-946-9272	Automotive Shop
	2	Seal Methods, Inc.	Eugene Welter	12807B Los Nietos Rd	562-944-0291	Gadgets and Manufacturing
	3	2 Stage Enterprises	David Campion	12809A Los Nietos Rd	562-841-5149	
	4			12809B Los Nietos Rd	562-777-0994	Sporting Good Wholesaler
	5	Seal Methods, Inc.	Eugene Welter	12811A Los Nietos Rd	562-944-0291	Gadgets and Manufacturing
	6	Storage	Eugene Welter	12811B Los Nietos Rd		
	7	Leo's Lawnmower	Leo Rojas	12811C Los Nietos Rd	562-944-0538	Machine Shop
	8	Hernandez Auto	Octavio Hernandez	12811D Los Nietos Rd	562-777-1197	Automotive Shop
	9	H & H Contractors	Roger Hall	12811E Los Nietos Rd	562-946-5108	Contractors
	10			12811F Los Nietos Rd		
42	1	Airbrake Associates	Daniel Wedge	12741 Los Nietos Rd	562-946-4960	Automotive Manufacturing
43	1	Timmon's Wood Products	Ed Timmons	12723 Los Nietos Rd	562-946-5401	Wood Product Manufacturing
44	1	Sisneros Office Furniture	Dave Hoffman	12717 Los Nietos Rd	562-777-9797	Furniture Manufacturing
49		Vacant Lot				
50	1	Brothers Machine & Tool	Jose Razo	9843 S. Greenleaf Ave.	562-903-1117	Machine Shop
51		Vacant Lot				

Note: Tenants frequently rotate on the properties and as a result, this list may continue to vary.

TABLE 3
Property Owners where ERCs have been Implemented in Accordance with the AROD

Book	Page	Parcel	Size	Property Owner	ERC Recorded
8167	2	3	0.83	Raymond Holbrook	
8167	2	4	2.64	Air Liquide	
8167	2	7	1.15	Eugene & Geraldine Welter	29-Dec-04
8167	2	11	0.47	ORP LLC	23-Jun-03
8167	2	12	0.5	ORP LLC	23-Jun-03
8167	2	21	0.57	Lucile Ferris	22-Oct-03
8167	2	22	0.62	John Maple Family	17-Feb-04
8167	2	24	0.49	Raymond Holbrook	
8167	2	25	0.44	Marvin C. Pitts	
8167	2	26	17.65	Adeline Bennett / Pitts	
8167	2	28	0.62	James & Irene Mersits	17-Apr-03
8167	2	29	0.72	James & Irene Mersits	17-Apr-03
8167	2	30	0.14	Adeline Bennett / Pitts	
8167	2	32	0.39	David & Dorothy Neptune	6-Apr-04
				David Neptune (son)	
8167	2	37	0.39	Samuel & Luia Graziano	5-Jan-05
8167	2	41	0.78	Eugene & Geraldine Welter	29-Dec-04
8167	2	42	0.5	Danny (Julie)& Dena Peoples	5-Sep-05
8167	2	43	1.02	Ed Timmons	
8167	2	44	1.17	Milton & Doris Chasin	6-May-03
8167	2	49	3.87	Diane Cote Campbell	
8167	2	50	1.09	Brothers Machine & Tool Co.	21-Jun-05
8167	2	51	2.15	Adeline Bennett	

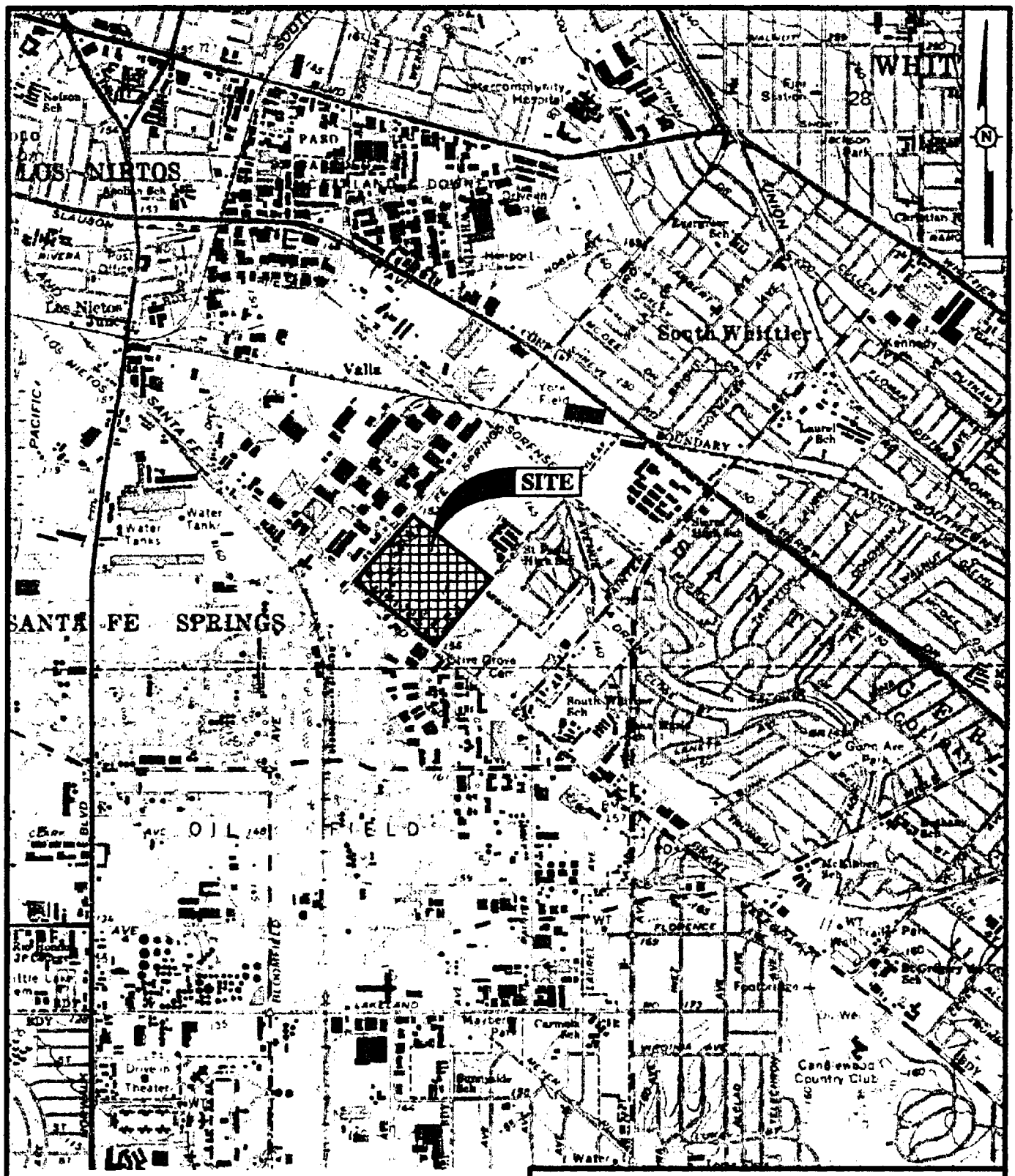
FIGURES



PROJECT ORGANIZATION CHART

WASTE DISPOSAL, INC.
SANTE FE SPRINGS, CALIFORNIA

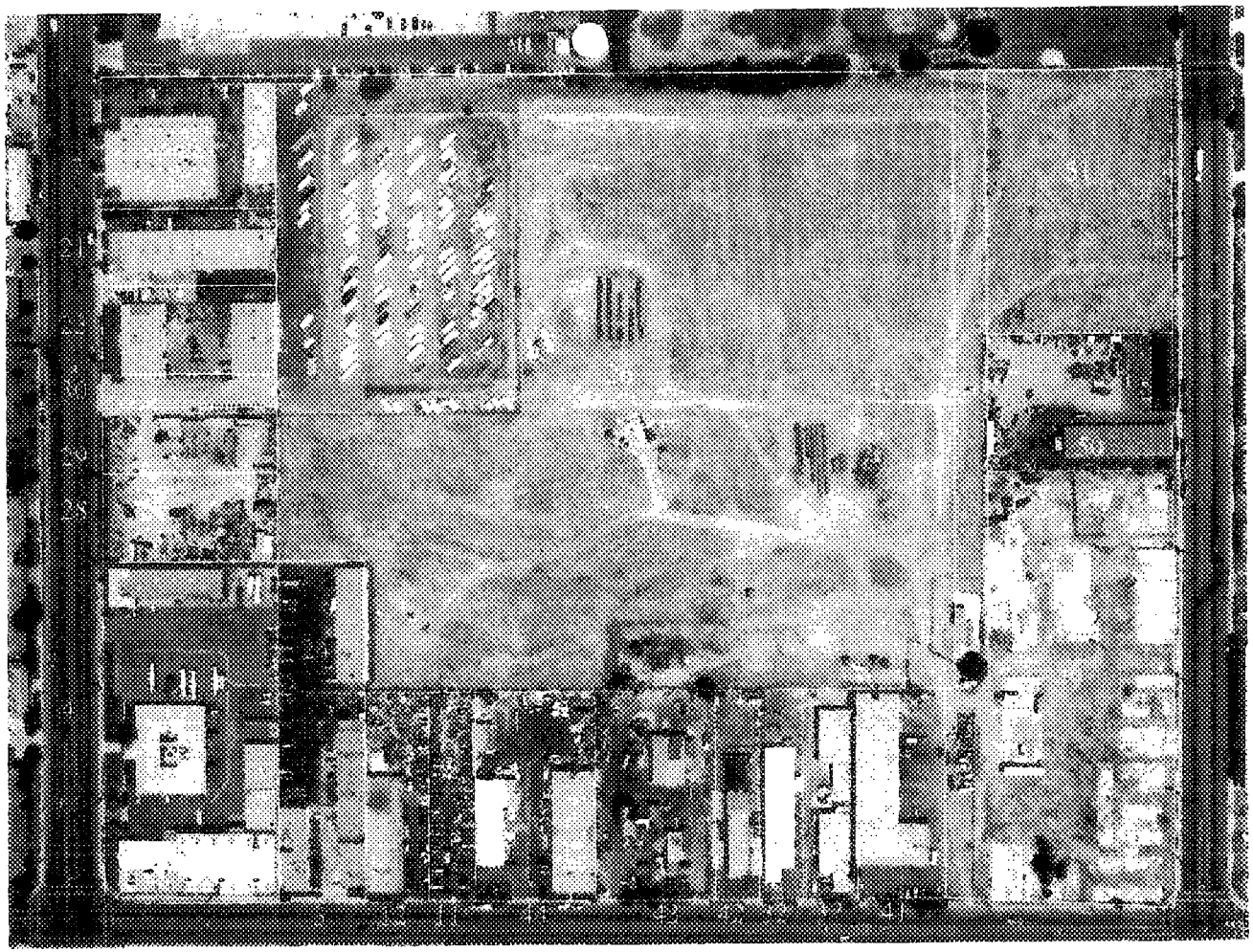
PROJECT NAVIGATOR, LTD.P | FIGBE 1



REFERENCE: USGS 7.5 MINUTE TOPOGRAPHIC MAP OF WHITTIER, CALIFORNIA, DATED 1981.

FIGURE 2

Site Location Map



Legend

Parcel Boundary

Parcel Number

Parcel No. / Owner

3 Raymond & Donnis Holbrook Trust
4 Dia-Log Company
7 Eugene and Geraldine Welter Trust
11 O.R.P., LLC
12 O.R.P., LLC
21 Lucille F. Ferris Living Trust
22 John I. Maple Family Partnership
24 Raymond & Donnis Holbrook Trust
25 Marvin W. Pitts and Cecelia Pitts, trustees under Declaration of Trust dated February 1, 1982 (Pitts Family Trust), Adeline R. Bennet, M.D. Living Trust
26 Marvin W. Pitts and Cecelia Pitts, trustees under Declaration of Trust dated February 1, 1982 (Pitts Family Trust), Adeline R. Bennet, M.D. Living Trust
28 Thomas J. Mersits, Irene L. Mersits Trust
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32 David Joseph Neptune Family Trust
37 Lula Graziano, Trustee of Trust "A" of the Graziano Trust as restated March 4, 1992
Lula Graziano, Trustee of Trust "B" of the Graziano Trust as restated March 4, 1992
41 Eugene and Geraldine Welter Trust
42 Danny R. Peoples & Dena Peoples
43 Eddie Earl Timmons
44 Chasin Trust, Hanson Trust, Searing Revocable 1989 Trust
49 Phil Campbell & Diane Cote Family Trust, Gwen Campbell
50 Brothers Machine & Tool, Inc.
51 Marvin W. Pitts and Cecelia Pitts, trustees under Declaration of Trust dated February 1, 1982 (Pitts Family Trust), Adeline R. Bennet, M.D. Living Trust

Ref.: Project Navigator, Ltd., 2003

Aerial Photograph- August 5, 1998

Site Map with Individual Properties and Landowners Identified		Figure 3
Institutional Controls Monitoring and Enforcement Work Plan (ICMEWP), Revision 1 Waste Disposal Inc, Superfund Site, Santa Fe Springs, California	November 2005	Project Navigator, Ltd.

FIGURE 4

INSTITUTIONAL CONTROL CHECKLIST
PARCEL No._____
WASTE DISPOSAL, INC. SUPERFUND SITE

Site Control	Parcel Specific Requirements	In Compliance? (Yes/No)	Description of Violation	Remedial Action
Signage:				
Allow placement of warning signs or other posted site information and, once posted, do not remove or interfere with.	Maintain sign on back fence			
* Inspect EPA-approved signs and remove graffiti.	Maintain signs on perimeter of property			
Remedy Integrity:				
Allow placement of site access controls, e.g., gates or fencing, and do not damage or circumvent the remedy components.	Maintain back fence integrity			
Uses of the property, including new development, must not interfere with or affect the integrity of the cap and other remedy components.	Maintain paving			
*Construction that impacts the remedial capping or other remedy components shall require EPA approval.	- If waste is discovered, it shall be remediated and structures must be designed to protect occupants.			
No interferences with or alterations to the grading, vegetation and surface water & drainage should be made.	- Maintain parcel drainage - Maintenance of vegetation (i.e. cutting/trimming of grass, weeds, or other ground cover)			
Portions of the property underlain by buried wastes should not be re-graded.	Maintain soil cap			
Areas of asphalt or concrete pavement should not be removed or improved	Maintain paving			

Note: * denotes new items that were added for ICMEWP Revision 1, November 28, 2005.

FIGURE 4

INSTITUTIONAL CONTROL CHECKLIST
PARCEL No._____
WASTE DISPOSAL, INC. SUPERFUND SITE

Site Control	Parcel Specific Requirements	In Compliance? (Yes/No)	Description of Violation	Remedial Action
without the concurrence of the site custodian.				
No penetrations (e.g., utility trench excavations, excavations for fence posts, excavations for planting trees or large bushes, foundation excavations, foundation piles, etc.) or interferences with the cap or any other areas with remedial controls should be made.	No subsurface work			
*Waste materials shall not be excavated without EPA approval.	No excavation			
*Construction shall not occur without EPA approval.	No construction			
Vegetation:				
Deep-rooting plants (i.e., plants whose root systems will penetrate more than about 2 feet deep) should not be planted.	No new plantings			
*In areas underlain by waste, obtain EPA approval for changes to irrigation and controls.	No irrigation changes without approval			
*Pesticides or herbicides shall not be applied on capped areas of the site or areas around monitoring locations without EPA approval.	No pesticides without approval			
Liquids Recovery System:				
*Liquids recovery, treatment and storage system components shall not	Maintain systems			

Note: * denotes new items that were added for ICMEWP Revision 1, November 28, 2005.

FIGURE 4

INSTITUTIONAL CONTROL CHECKLIST
PARCEL No._____
WASTE DISPOSAL, INC. SUPERFUND SITE

Site Control	Parcel Specific Requirements	In Compliance? (Yes/No)	Description of Violation	Remedial Action
be turned off or interfered with.				
Drainage:				
Drainage channels or pipes should not be blocked, rerouted or otherwise interfered with.	Maintain parcel drainage			
Gas Controls:				
Maintain integrity of existing and future foundations in areas underlain by waste and in soil gas noncompliance areas; report or repair cracks or damage.	Maintain foundation footings			
For buildings located over buried wastes, or in soil gas noncompliance areas no new openings should be made in building floor slabs.	Maintain slab integrity			
Indoor gas controls should not be circumvented.	Maintain gas vent system			
Indoor gas sensors or alarms should not be turned off or interfered with.	Not applicable			
Soil gas control systems/alarms should not be turned off or interfered with.	Not applicable			
Monitoring Points:				
Monitoring points (e.g., ground water monitoring wells, soil gas probes, reservoir leachate collection wells, soil gas vents, survey monuments) should not be blocked or otherwise obstructed.	Clear access to all wells and vents			
*Clearly label and maintain stenciling	Access allowed			

Note: * denotes new items that were added for ICMEWP Revision 1, November 28, 2005.

FIGURE 4

INSTITUTIONAL CONTROL CHECKLIST
PARCEL No._____
WASTE DISPOSAL, INC. SUPERFUND SITE

Site Control	Parcel Specific Requirements	In Compliance? (Yes/No)	Description of Violation	Remedial Action
for wells, biovent wells, and piezometers using appropriate large font stenciling.				
*Clearly label and maintain stenciling for settlement monuments using appropriate large font stenciling.	Not applicable			
Do not open or place anything into monitoring wells.	All wells and vents locked			
Ground water supply or monitoring wells should not be constructed.	No new wells			
Regulations:				
Allow property access, including access to existing and new buildings or structures, for inspections and monitoring for compliance with easements; monitoring; and installation, maintenance and operation of remedial measures, including signs and access controls.	Access allowed			
Comply with Waste Discharge regulations and DTSC hazardous waste disposal requirements.				

Note: * denotes new items that were added for ICMEWP Revision 1, November 28, 2005.

APPENDIX A

APPENDIX A

SAMPLE ENVIRONMENTAL RESTRICTION COVENANT

RECORDING REQUESTED BY:
Covenantor's name
***S*treet address**
City, California zip code

WHEN RECORDED, MAIL TO:
Trustee of the WDIG Site Trust
Michael J. Skinner
230 Kings Highway East, Suite 300
Haddonfield, New Jersey 08033

SPACE ABOVE THIS LINE RESERVED FOR RECORDER=S USE

COVENANT TO RESTRICT USE OF PROPERTY

ENVIRONMENTAL RESTRICTION

Re: ***Insert parcel number(s) and name of site property to be restricted.***

This Covenant and Agreement ("Covenant") is made by and between ***[name of Covenantor] [Note: "Covenantor must include all parties who are owners of record of the real property. Verify ownership in the records at the County Recorder's Office.]*** (the "Covenantor"), the current owner of property situated in Santa Fe Springs, County of Los Angeles, State of California, described in Exhibit "A", attached hereto and incorporated herein by this reference (the "Property"), and the WDIG Site Trust (WDIG Site Trust or Trust). Pursuant to Civil Code section 1471(c), this Covenant is reasonably necessary to protect present or future human health or safety or the environment as a result of the presence on the land of hazardous substances as defined in 42 U.S.C. ' 9601(14), pollutants or contaminants under 42 U.S.C. ' 9601(33), and in Health and Safety Code ("H&SC") section 25260. The Covenantor and the Trust, collectively referred to as the "Parties," hereby agree pursuant to Civil Code section 1471(c) and H&SC section 25355.5 that the use of the Property be restricted as set forth in this Covenant. The Parties further

intend that the provisions of this Covenant also be for the benefit of the U.S. Environmental Protection Agency (EPA) and the California Department of Toxic Substances Control (DTSC) as third party beneficiaries.

ARTICLE I

STATEMENT OF FACTS

1.01. The Property, totaling approximately [38 acres] is more particularly described and depicted in Exhibit "A," attached hereto and incorporated herein by this reference. ***[Exhibit "A" must include the legal description of the property used by the county recorder. If the property does not already have a legal description (it generally will not if it is a portion of a larger piece of property) a survey will be required.]*** The Property is located in the area now generally bounded by Los Nietos Road, Greenleaf Avenue, and Santa Fe Springs Road, in the County of Los Angeles, State of California. This property is more specifically described as [ ] County

Assessor's Parcel No.(s): [ ] *[list exact Assessor's Parcel number(s)]*

1.02. The Property is a portion of the Waste Disposal, Inc. Superfund Site and was listed on the National Priority List on July 22, 1987 by EPA. A map of the Site is attached as Exhibit B. Remediation of the Site is being conducted pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act, 42. U.S.C. " 9601 et seq (CERCLA). EPA has selected a remedy for the Site, which is documented in the Amended Record of Decision (Amended ROD) signed by EPA on June 21, 2002. The remedy includes construction of a RCRA-equivalent cap over the reservoir area in Area 2, use of engineered caps in portions of Areas 1, 2, 4, 5, 6, 7, and 8, installation and use of an active soil vapor extraction system and/or a soil gas monitoring system, use of a liquids collection system under the RCRA-equivalent cap, institutional controls, engineering controls in buildings overlying buried waste or soil gas noncompliance areas, use of in-business ambient air monitoring, long-term soil gas monitoring, long-term groundwater monitoring, and long-term operations, maintenance and monitoring. The Administrative Record for the Site is available for review at the Santa Fe Springs Public Library located at 11700 Telegraph Road in Santa Fe Springs, and at EPA's Region IX Records Center, located at 95 Hawthorne St., San Francisco, CA 94104.

1.03. Because waste will remain in place at the Site, EPA selected institutional controls as part of the remedy selected in the Amended ROD. The institutional controls will be implemented in order to ensure the long-term integrity of the remedy and to prevent exposure to waste remaining at the site. The Amended ROD provides for environmental restriction covenants to be recorded on the properties at the Site to fulfill the purposes of protecting the remedy and preventing certain activities on and uses of the properties.

ARTICLE II
DEFINITIONS

2.01. DTSC. "DTSC" means the California Department of Toxic Substances Control and includes its successor agencies, if any.

2.02. EPA. "EPA" means the United States Environmental Protection Agency and includes its successor agencies, if any.

2.03. Owner. "Owner" means the Covenantor, its successors in interest, and their successors in interest, including heirs and assigns, who at any time hold title to or an ownership interest in, all or any portion of the Property.

2.04. Occupant. "Occupant" means Owners and any person or entity entitled by ownership, leasehold, or other legal relationship to the right to occupy any portion of the Property, and their successors in interest.

2.05. CERCLA Lead Agency. "CERCLA Lead Agency" means the governmental entity having the designated lead responsibility to implement response action under the National Contingency Plan (NCP), 40 C.F.R. Part 300. EPA is the CERCLA Lead Agency at the time of the recording of this instrument.

2.06. WDIG Site Trust. "WDIG Site Trust" means the grantee and Covenantee of this environmental

restriction and its Trustee, and their successors in interest.

2.07. Waste Materials. "Waste Materials" means (1) any hazardous substance under Section 101(14) of CERCLA, 42 U.S.C. ' 9601(14); (2) any pollutant or contaminant under Section 101(33), 42 U.S.C. ' 9601(33); (3) any solid waste under Section 1004(27) of RCRA, 42 U.S.C. ' 6903(27); (4) any hazardous substance under California Health and Safety Code " 25316 and 25317; and (5) all material identified as waste or sump material in site investigations conducted prior to the date this Covenant is recorded, irrespective of whether it is classified as a hazardous substance, pollutant or contaminant, or solid waste under the above statutes.

ARTICLE III
GENERAL PROVISIONS

3.01. Restrictions to Run with the Land. This Covenant sets forth protective provisions, covenants, restrictions, and conditions (collectively referred to as "Restrictions"), subject to which the Property and every portion thereof shall be improved, held, used, occupied, leased, sold, hypothecated, encumbered, and/or conveyed. Covenantor covenants that each and every Restriction: (a) runs with the land pursuant to H&SC section 25355.5(a)(1)(C) and Civil Code section 1471; (b) inures to the benefit of and passes with each and every portion of the Property, (c) is for the benefit of and enforceable by the WDIG Site Trust (d) is for the benefit of EPA and DTSC as third party beneficiaries, and (e) is imposed upon the entire Property unless expressly stated as applicable only to a specific portion thereof.

3.02. Binding upon Owners/Occupants. Pursuant to H&SC section 25355.5(a)(1)(C), this Covenant binds all Owners of the Property, their heirs, successors, and assignees, and the agents, employees, and lessees of the Owners, heirs, successors, and assignees. Pursuant to Civil Code section 1471(b), all successive Owners of the Property are expressly bound hereby for the benefit of the WDIG Site Trust, EPA, and DTSC.

3.03. Written Notice of the Presence of Hazardous Substances. Prior to the sale, lease, sublease, assignment or other transfer of the Property, or any portion thereof, the Owner or Occupant or any other, lessor, sublessor, assignor or other transferor shall give the buyer, lessee, sublessee, assignee or other transferee written notice that hazardous substances are located on or beneath the Property, and provide written notice thereof to the WDIG Site Trust, EPA and DTSC.

3.04. Incorporation into Deeds and Leases. The Restrictions set forth herein shall be incorporated by reference in each and all deeds, leases, assignments, or other transfers of all or any portion of the Property which are hereafter executed or renewed. Further, each Owner or Occupant shall include in any instrument conveying any interest in all or any portion of the Property, including but not limited to deeds, leases, and mortgages, a notice which is in substantially the following form:

NOTICE: THE INTEREST CONVEYED HEREBY IS SUBJECT TO AN ENVIRONMENTAL RESTRICTION AND COVENANT TO RESTRICT USE OF PROPERTY, RECORDED IN THE PUBLIC LAND RECORDS ON [DATE], IN BOOK, PAGE, IN FAVOR OF AND ENFORCEABLE BY THE WDIG SITE TRUST, AND FOR

THE BENEFIT OF THE U.S. ENVIRONMENTAL PROTECTION AGENCY AND THE CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL.

3.05. Conveyance of Property. The Owner shall provide notice to the WDIG Site Trust, and to EPA and DTSC not later than thirty (30) days after any conveyance of any ownership interest in the Property (excluding mortgages, liens, and other non-possessory encumbrances). The WDIG Site Trust, EPA, and DTSC shall not, by reason of this Covenant, have authority to approve, disapprove, or otherwise affect such proposed conveyance, except as otherwise provided by law, by administrative order, consent decree or by a specific provision of this Covenant.

ARTICLE IV
RESTRICTIONS

4.01. New or Modified Building. The Covenantor covenants that if Owner or an Occupant constructs a new building or other permanent structure on the Property, or substantially modifies an existing building or other permanent structure on the Property, and such modification requires a City of Santa Fe Springs building or other land use permit, Owner or Occupant shall implement and maintain any necessary engineered capping system(s) and any necessary engineering control(s) related to the new or modified building or other permanent structure, in conformance with the provisions of the Amended ROD and as specified by EPA. Such capping system and engineering controls shall be implemented only with the prior written approval of EPA.

4.02. Prohibited Uses. The Property shall not be used in any manner that would interfere with or adversely affect the implementation, integrity, or protectiveness of the remedial measures to be performed pursuant to the Amended ROD or any future response actions required by EPA. Owner and Occupants shall ensure compliance by all users of the Property with the following land/water use restrictions, except as otherwise authorized by EPA to implement the remedy selected in the Amended ROD or any future response action required by EPA.

(1) Placement of warning signs or other posted information shall be allowed and, once posted, no removal or interference with such signs or information shall be permitted.

(2) Placement of site access controls, such as gates or fencing, shall be allowed and shall not be damaged or circumvented.

(3) The Property shall not be used in any manner that may interfere with or affect the integrity of the remedial cap or other components of the remedy, as constructed pursuant to the Amended ROD.

(4) Construction not approved by EPA that impacts any of the remedial capping or other remedy components shall not occur.

(5) No interferences with or alterations to the grading, vegetation and surface water and drainage

controls shall be made.

(6) Portions of the Property underlain by Waste Materials and in soil gas noncompliance areas shall not be regraded.

(7) Areas of asphalt or concrete pavement shall not be removed or improved.

(8) No penetrations through or interferences (including, but not limited to, utility trench excavations, excavations for fence posts, excavations for planting trees or large bushes, foundation excavations, and foundation piles) with the remedial cap or any other areas with remedial controls shall be made.

(9) Deep-rooting plants (plants whose root systems will penetrate more than two feet below ground surface) shall not be planted.

(10) Obtain approval from EPA for settings of irrigation controls in areas underlain by Waste Materials. Such

settings shall not be changed without the prior written approval of EPA in accordance with Section 6.01 unless such settings are approved by EPA as part of the remedy selected in the Amended ROD.

(11) Drainage channels and pipes shall not be blocked, rerouted or otherwise interfered with.

(12) No new openings shall be made in building floor slabs in buildings located over Waste Materials or over soil gas noncompliance areas.

(13) Integrity of existing and future foundations shall be maintained in areas underlain by Waste Materials and in soil gas noncompliance areas. All cracks or damage in such foundations shall be reported to the WDIG Site Trust, EPA and DTSC and the Covenantor covenants that such cracks or damage shall be repaired by the Owner or Occupant.

(14) Indoor gas controls shall not be circumvented.

(15) Indoor gas sensors or alarms shall not be turned off or interfered with.

(16) Soil gas control systems shall not be turned off or interfered with.

(17) Monitoring points, including but not limited to groundwater monitoring wells, soil gas probes, reservoir leachate collection wells, soil gas vents, and survey monuments, shall not be blocked or otherwise obstructed.

(18) Monitoring wells shall not be opened; nothing shall be placed into the monitoring wells.

(19) Liquids recovery systems, liquids treatment systems, and treated liquids storage facilities shall not be turned off or interfered with.

(20) Groundwater supply or monitoring wells shall not be constructed.

(21) Owners of the Property shall disclose all land/water use restrictions to all Occupants on the property.

(22) Owners shall inform the WDIG Site Trust, EPA and DTSC of the identities of all Occupants on the Property.

During construction, excavation, or grading of any type on the Property, Owner or Occupant shall take measures to ensure that there is no offsite migration of dust, odors or organic vapors. During such activities, Owner or Occupant shall take appropriate measures to protect the health and

welfare of onsite personnel and workers and to prevent offsite impacts.

(23) Owner or Occupant must obtain prior written approval for all building or site modifications on the Property from EPA in accordance with Section 4.01 and Section 5.01.

(24) Owner or Occupant shall not excavate Waste Materials on the Site, except as authorized by EPA.

(25) No new construction shall occur on the Property without the prior written approval of EPA in accordance with Section 5.01 and the following requirements:

(i) New construction shall be supported by subsurface explorations and analytical laboratory data to characterize the construction area for the possible existence of Waste Materials.

(ii) If Waste Materials are discovered in the construction area, they shall be remediated or buildings and structures must be appropriately designed to protect occupants.

(iii) Appropriate worker and public health and safety precautions, including but not limited to dust control, safety plans, and other forms of worker protection, must be taken prior to approval of construction.

(26) Boreholes, foundation piles, or other subsurface penetrations into the reservoir or any other area of the site which could create conduits allowing Waste Materials to migrate to groundwater shall not be made.

(27) Construction workers shall be provided with appropriate personal protective equipment while they are working at the site.

(28) Pesticides or herbicides shall not be applied to the capped areas of the site or to areas surrounding monitoring points, except as approved by EPA for use in implementing the remedy selected in the Amended ROD.

(29) Use of any septic tanks on the property shall be discontinued and such tanks shall be decommissioned in accordance with local regulations.

(30) The Property shall not be used or redeveloped for residential use; use as a hospital, school for people aged 21 and under, or day care center; or other uses by sensitive receptors.

4.03. Access for the WDIG Site Trust. The WDIG Site Trust, EPA, and DTSC, and through them, their respective employees, agents, contractors, subcontractors, consultants, and other third parties authorized by the WDIG Trust, EPA and DTSC shall have reasonable right of entry and access to the Property for implementing any response actions, inspection, monitoring, and other activities consistent with the purposes of this Covenant as deemed necessary by EPA in order to protect the public health or safety, or the environment. Such activities shall include, but not be limited to:

(31) Maintaining and monitoring the remedial action selected in the Amended ROD;

(32) Verifying any data or information submitted to EPA or DTSC;

(33) Conducting investigations relating to Waste Materials at or near the Property;

(34) Obtaining samples;

(35) Assessing the need for, planning, or implementing additional response actions at or near the Property, if authorized by EPA;

(36) Assessing implementation of quality assurance and quality control practices as defined in the Quality Assurance Project Plans approved by EPA for the remedial actions;

(37) Implementing the remedy selected in the Amended ROD;

(38) Assessing Owner's or Occupant's compliance with this Covenant; and

(39) Determining whether the Property is being used in a manner that is prohibited or restricted, or that may need to be prohibited or restricted, in accordance with the Amended ROD.

Nothing in this instrument shall limit or otherwise affect EPA's right of entry and access, or EPA's authority to take response actions under CERCLA, the National Contingency Plan, 40 C.F.R. Part 300, and its successor provisions, or any federal law.

4.04. Enforcement. The WDIG Site Trust shall be entitled to enforce the terms of this instrument by resort to specific performance or legal process and injunctive relief. Failure of the Covenantor, Owner or Occupant to comply with any of the Restrictions specifically applicable to it shall be grounds for the WDIG Site Trust to require that the Covenantor, Owner, or Occupant modify or remove any improvements ("Improvements" herein shall mean all buildings, other structures, roads, driveways, and paved parking areas) constructed or placed upon any portion of the Property in violation of the Restrictions. All remedies available hereunder shall be in addition to any and all other remedies at law or in equity, including CERCLA or state law, and violation of this Covenant shall be grounds for the WDIG Site Trust to file civil actions as provided by law or equity. The WDIG Site Trust for itself and on behalf of any person or entity responsible for any response action authorized or required by EPA (collectively Responsible Parties) shall be entitled to recover damages for any violation of the terms of this Covenant, including but not limited to, the costs incurred by the WDIG Site Trust or by the Responsible Parties to repair any damage to any remedial facilities or any other feature of any response action or to perform the maintenance of the Improvements, and any expenditures incurred by the Trust or such Responsible Parties to reimburse EPA or DTSC for the agencies' oversight and enforcement costs related to this Covenant or violations thereof. Enforcement of the terms of this Covenant shall be at the discretion of the Covenantee and the third party beneficiaries and any forbearance, delay or omission to exercise their rights under this Covenant for breach hereof shall not be deemed a waiver by them of any such breach or subsequent breach of any term of this Covenant, or of any of their rights under this Covenant.

4.05. Attorneys' Fees. The WDIG Site Trust shall be entitled to recover its attorneys' fees and any costs from Owner and/or Occupant for any efforts, including but not limited to any legal actions, by the WDIG Site Trust to enforce the terms of this Covenant if the WDIG Site Trust prevails in such efforts or legal action.

ARTICLE V
EXCEPTIONS, TERMINATION, AND TERM

5.01. Exceptions to Land/Water Use Restrictions. If Owner or an Occupant seeks an exception to the land/water use restrictions in Section 4.01, Owner or Occupant shall obtain the prior written approval of EPA. Owner or Occupant shall submit a request in writing to EPA and to DTSC, with all necessary supporting documentation (such documentation may include appropriate design documents, work plans, and/or calculations). EPA shall respond to such request within a reasonable time, by: 1) providing written approval for the exception; 2) requesting further information in support of the request; 3) providing written approval of the exception with

modification; or 4) denying the request. The decision of EPA shall be final and shall not be subject to judicial review. If requested by EPA, any approved exception shall be recorded in the land records in an Amended and restated Covenant by the person or entity granted the exception.

5.02. Modification. The land/water use restrictions of this Covenant may only be modified upon the written agreement of the Owner and the WDIG Site Trust, with the prior express written approval of EPA. Such modifications shall become effective when they are incorporated into this Covenant and such modified and restated Covenant is executed by Owner and the WDIG Site Trust and recorded by the Owner.

5.03. Termination. Covenantor, or any other aggrieved person, may apply to the EPA for a termination of the Restrictions or other terms of this Covenant as they apply to all or any portion of the Property. The decision of EPA regarding any such request shall be final and not subject to judicial review.

5.04. Term. Unless ended in accordance with the Termination paragraph above or by law, this Covenant shall continue in effect in perpetuity.

5.05. Assignment. The WDIG Site Trust, EPA and DTSC may freely assign their interests in this Covenant to any other parties without the approval of the Covenantor. The WDIG Site Trust shall obtain the written consent of EPA prior to any assignment of its interests under this Covenant.

ARTICLE VI
MISCELLANEOUS

6.01. No Dedication or Taking. Nothing set forth in this Covenant shall be construed to be a gift or dedication, or offer of a gift or dedication, of the Property, or any portion thereof to the general public or anyone else for any purpose whatsoever. Further, nothing set forth in this Covenant shall be construed to effect a taking under state or federal law.

6.02. Recordation. The Covenantor shall record this Covenant, with all referenced Exhibits, in the County of Los Angeles within ten (10) days of the Covenantor's receipt of a fully executed original.

6.03. Notices. Whenever any person gives or serves any Notice ("Notice" as used herein includes any demand or other communication with respect to this Covenant), each such Notice shall be in writing and shall be deemed effective: (1) when delivered, if personally delivered to the person being served or

to an officer of a corporate party being served, or (2) three (3)
business days after deposit in the mail, if mailed by United States mail, postage paid, certified, return receipt requested:

To Owner: *[include name and address of Owner and name of person to receive service]*

To WDIG Site Trust:

Trustee of the WDIG Site Trust
c/o Shelby H. Moore, Jr.
143 Seaward Drive
Santa Rosa Beach, FL 32459

To EPA:

Russell Mechem
Remedial Project Manager
U.S. Environmental Protection Agency, Region IX
75 Hawthorne St.
San Francisco, CA 94105

Sarah Mueller
Assistant Regional Counsel
U.S. Environmental Protection Agency, Region IX
75 Hawthorne St.
San Francisco, CA 94105

To DTSC:

Any party may change its address or the individual to whose attention a Notice is to be sent by giving written Notice in compliance with this paragraph.

6.04. Partial Invalidity. If any portion of the Restrictions or other terms set forth herein is determined by a court of competent jurisdiction to be invalid for any reason, the surviving portions of this Covenant, or the application of such portions to persons or circumstances other than those to which it is found to be invalid, shall remain in full force and effect as if such portion found invalid had not been included herein.

6.05. Liberal Construction. Any general rule of construction to the contrary notwithstanding, this instrument shall be liberally construed to effect the purpose of this instrument and the policy and purpose of CERCLA. If any provision of this instrument is found to be ambiguous, an interpretation consistent with the purpose of this instrument that would render the provision valid shall be favored over any interpretation that would render it invalid.

6.06. Third Party Beneficiary. EPA's and DTSC's rights as third party beneficiaries of this Covenant shall be construed pursuant to principles of contract law under the statutory and common law of the State of California.

6.07. Statutory References. All statutory references include successor provisions.

6.08. Waiver of Certain Defenses. Covenantor hereby waives any defense of laches, estoppel or prescription.

6.09. Covenants. Covenantor hereby covenants to and with the Covenantee that the Covenantor is lawfully seized in fee simple of the Property; that Covenantor has a good and lawful title and has the right and power to impose this Covenant on the Property; that the Property is free and clear of encumbrances as of the date hereof, except [List any agreed-to exceptions]. Notwithstanding the foregoing, nothing herein shall prevent, preclude, limit or otherwise restrict the filing or recording against the Property of any liens (including but not limited to mortgages, deeds of trust and/or security agreements), encumbrances, covenants, conditions, restrictions, or other documents or instruments, provided that any such liens, encumbrances, covenants, conditions, restrictions, or other documents or instruments shall be subject and subordinate to this Covenant.

6.10. Controlling Law. Except as otherwise provided in Section 7.06, the interpretation and performance of this Covenant shall be governed by the laws of the United States or, if there are no applicable federal laws, by the law of the state of California.

6.11. Joint Obligations. If there are two or more parties identified as Covenantor in the Covenant, the obligations imposed by this Covenant upon them shall be joint and several.

6.12. Captions. The captions in this Covenant have been inserted solely for convenience of reference and are not a part of this Covenant and shall have no effect upon construction or interpretation.

6.13. Counterparts. The parties may execute this Covenant in two or more counterparts, which shall, in the aggregate, be signed by both parties; each counterpart shall be deemed an original instrument as against any party who has signed it. In the event of any disparity between the counterparts produced, the recorded counterpart shall be controlling.

IN WITNESS WHEREOF, the Parties execute this Covenant.

Covenantor: ***[Name of Covenantor]***

By: _____

Title: ***[Signatory's name and title]***

Date: _____

WDIG Site Trust:

By: _____

Title: ***[Signatory's name and title]***

Date: _____

STATE OF CALIFORNIA

COUNTY OF _____

On this _____ day of _____, in the year _____,

before me _____, personally appeared

_____, personally known to me (or proved to me on the basis of satisfactory evidence) to be the person(s) whose name(s) is /are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

WITNESS my hand and official seal.

Signature _____