VAPOR INTRUSION MITIGATION PLAN

SUB-SLAB DEPRESSURIZATION SYSTEM AND VAPOR BARRIER INSTALLATION PLAN

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SUB-SLAB DEPRESSURIZATION SYSTEM AND BARRIER OPERATION AND MAINTENANCE PLAN

Former Fafnir Bearing Plant
263 Myrtle Street
(Formerly 37 Booth Street)
New Britain, Connecticut

HRP #NEW4914.RA

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LIST OF ACRONYMS

C12DCE	=	cis-1,2-dichloroethene
CA	=	Chloroethane
CFM	=	Chloroform
CT DEP	=	Connecticut Department of Environmental Protection
11DCA	=	1,1-dichloroethane
11DCE	=	1,1-dichloroethene
ECAF	=	Environmental Conditions Assessment Form
ELUR	=	Environmental Land Use Record
EP	=	Environmental Professional
ETPH	=	Extractable Total Petroleum Hydrocarbons
HDPE	=	High Density Polyethylene
HRP	=	HRP Associates, Inc.
ICVC	=	Proposed Industrial/Commercial Volatilization Criteria
IPBZ	=	isopropylbenzene
4IPT	=	4-isopropyltoluene
Mil	=	thousandths inches
mg/l	=	Milligrams Per Liter
MW	=	Monitoring Well
NAP	=	Naphthalene
NAPL	=	Non-Aqueous Phase Liquid
NBBZ	=	n-butylbenzene
NPBZ	=	n-propylbenzene
Pa	=	Pascals
PCB	=	Polychlorinated Biphenyls
PCE	=	Tetrachloroethene
PID	=	Photoionization Detector
PMC	=	Pollutant Mobility Criteria
ppb	=	Parts Per Billion
ppm	=	Parts Per Million
PVC	=	Poly Vinyl Chloride
RA	=	Release Area

LIST OF ACRONYMS

(Continued)

RCP	=	Connecticut Department of Environmental Protection Reasonable Confidence Protocols
RSR	=	Remediation Standard Regulation
SBBZ	=	sec-butylbenzene
SMP	=	Soil Management Plan
SPLP	=	Synthetic Precipitation Leaching Procedure
SSD	=	Sub-Slab Depressurization
SVOC	=	Semi-Volatile Organic Compounds
SWPC	=	Surface Water Protection Criteria
TBBZ	=	tert-butylbenzene
TCA	=	1,1,1-Trichloroethane
TCE	=	Trichloroethylene
124TMB	=	1,2,4-Trimethylbenzene
TPH	=	Total Petroleum Hydrocarbons
µg	=	Micrograms
VC	=	Vinyl Chloride
VI	=	Vapor Intrusion
VIMP	=	Vapor Intrusion Mitigation Plan
VOCs	=	Volatile Organic Compounds

I. SUB-SLAB DE-PRESSURIZATION SYSTEM AND VAPOR BARRIER INSTALLATION PLAN

1.0 INTRODUCTION

HRP Associates, Inc. (HRP) has prepared this *Sub-Slab Depressurization and Vapor Barrier Installation Plan* for the City of New Britain (former property owner), the current property owner, and site occupant (if different). The depressurization system and barrier will be installed beneath the slab-on-grade building under construction at 37 Booth Street in New Britain, Connecticut (site). The installation plan is part of the overall *Vapor Intrusion Mitigation Plan*, (VIMP) which also includes the *Sub-Slab Depressurization System Operation and Maintenance Plan* (O&M Plan). A site plan showing the location of the proposed building is attached as Plate A.

At the time the VIMP was prepared, December 2007 to April 2008, the property was owned by Centerplan Development Co. and occupied by Celebration Foods. A letter acknowledging the presence of the system at the site signed by the owner and occupant is including as Appendix A.

1.1 Background

The site was formerly part of Ingersoll Rand's Fafnir Bearing Plant. Soil remediation was conducted at the site in 1998 and 1999 concurrent with the demolition of more than 30 buildings. Contaminants identified in remediated soils included; volatile organic compounds (VOCs), extractable petroleum hydrocarbons (ETPH), metals and polychlorinated biphenyl's (PCBs).

One of the areas remediated areas (RA-5) was a release of VOCs in the central portion of the site. The release was attributed to use of a floor drain located in former building #53, which is shown on Plate A. Soils impacted with VOCs were remediated at RA-5 area, and post-remediation groundwater monitoring was initiated in 2001.

The VOC plume emanating from RA-5 was identified in the overburden and shallow bedrock groundwater in the central portion of the site. The impacted groundwater in this area occurs at 2 to 3 feet below grade. The primary contaminants detected include: tetrachloroethylene (PCE), trichloroethylene (TCE), 1,1,1-trichloroethane (TCA), 1,1 dichloroethane (11DCA), 1,1, dichloroethene (11DCE), cis-1,2 dichloroethene (C12DCE), vinyl chloride (VC), chloroethane (CA) and chloroform (CFM). Recently, concentrations of VOCs detected in groundwater have been detected at levels above the Industrial/Commercial Volatilization Criteria (ICVC) presented in "Proposed Revisions to Connecticut's Remediation Standard Regulation (RSR), Volatilization Criteria, March 2003", published by the CT DEP. The locations of monitoring wells and groundwater analytical data from March 2007 sampling event are provided on Plate A. A groundwater monitoring plan for the site has been submitted under separate cover and approved by the DEP.

The area of the groundwater plume with concentrations of VOCs that exceed the ICVC underlies approximately 28,500 square feet of the eastern portion of the proposed building. Due to these two factors, there is the potential that VOC vapors emanating from the

groundwater may intrude (VI) into the site building after construction is completed unless vapor control measures are implemented.

In addition to the documented VOC plume in groundwater, soils containing VOCs, SVOCs, ETPH, and metals were identified during construction activities in the proposed building area. Constituents detected in these soils, included: 1,2,4-trimethylbenzene (124TMB), 4-isopropyltoluene (4IPT), isopropylbenzene (IPBZ), naphthalene (NAP), n-butylbenzene (NBBZ), n-propylbenzene (NPBZ), sec-butylbenzene (SBBZ), tert-butylbenzene (TBBZ). The area of soil containing VOCs was located in the western portion of RA-8. This location corresponds with the northwest corner of the proposed building. Groundwater samples have not been obtained from this area of the site. Therefore, evaluation of contaminant concentrations in groundwater with the ICVC could not be conducted prior to building construction. Consequently, there is a potential risk that VI may occur in this location. The SSD system proposed to address VI is discussed in Section 4.0. A summary of the analytical results for soil samples collected from this area is provided in Table 2.

1.2 Physical Soil Conditions

Soil beneath the building is heterogeneous fill consisting primarily of reddish brown fine to medium red brown sand with varying proportions of gravel, silt and clay at depths ranging from about 1-foot to greater than 10-feet across the property. During construction, these materials have been compacted in-place utilizing deep dynamic compaction methods. Although, the site specific vapor transmission characteristics of these materials have not been determined. It is anticipated that they have relatively low permeability and conductivity.

1.3 Purpose

The need for vapor intrusion mitigation measures will be determined based on an evaluation of VOC concentrations in sub-slab soil vapor, including sampling and laboratory analysis as described in Section II of this document. These determinations will be performed after building construction is completed. Since the potential risk of VI has been identified from historical groundwater monitoring activities, two measures will be installed at the time of building construction to mitigate VI in the event that the results of post-construction testing warrant. These measures include vapor barriers and SSD systems. Installation of these mitigation measures concurrently with building construction minimizes impacts to the building and avoids disruption of the building occupant. If an actual risk if VI is identified from soil vapor testing, the sub-slab components of the mitigation measures will be in-place. The installation and, if required, operation of these measures is intended to protect human health and satisfy Section 22a-133k-3(c)(3)(B) of the RSR.

The extent of the vapor barriers and SSD system are based on results of past environmental subsurface investigations. The need to operate the SSD system will be determined through soil gas testing, which will be performed after building construction. Operation of the SSD System would continue until such time as compliance with the ICVC is demonstrated.

The extents of the vapor barriers and SSD system areas are illustrated in Figure 1. Figure 1 depicts potential barriers and potential pathways for vapor migration. The potential barriers to vapor migration beneath the slab floor include foundation grade beams and footings. The

potential pathways for vapor migration include the following sub-slab utilities: electrical conduits, sanitary drain lines, plant waste drain lines, and domestic water supply lines.

1.3.1 Vapor Barrier

A vapor barrier will be installed beneath the entire 125,000 square feet of the proposed building. This vapor barrier will consist of a geotextile-backed high-density polyethylene (HDPE) material. The primary intent of the vapor barrier is to limit the overall rate and mass of soil vapor intrusion. The barrier will also promote the effectiveness of SSD systems and propagation of a vacuum by decreasing losses of vacuum beneath the slab floor. The installation of the vapor barriers is discussed in Section 3.0.

1.3.2 Sub-Slab Depressurization System

The SSD systems will be installed beneath the northeast (32,800 square feet) and northwest (10,000 square feet) portions of the Process Area, and beneath the Fire Suppression Room (1,000 square feet), where a source area of contamination of soil and/or groundwater was detected during past investigations. A SSD system will be installed along the eastern side of the Refrigeration Room to mitigate vapor migration from the Freezer Area to the west. When operated, the SSD systems will create negative pressure differential between the sub-slab air pressure and the ambient building interior air pressure. The vacuum beneath the building will prevent soil vapors from entering the building by controlling the direction of vapor migration. The vapors drawn in by the SSD systems from below the slab will be emitted at the roof level.

1.4 Overall Sequence of Installation

The components of the vapor intrusion mitigation measures will be installed in three phases.

Phase 1 Components of the mitigation measures that are located beneath the concrete slab floor of the building will be installed during construction activities and prior to installation of the slab floor. These components include: vapor barriers, venting stone layer, SSD pits, SSD horizontal vent lines, and associated SSD transfer piping.

Phase 2 The SSD pits and SSD horizontal vent lines will be modified for use as soil vapor monitoring points below the vapor barrier. In addition, soil vapor monitoring points will be installed through the concrete floor slab and above the vapor barrier following its completion. The SSD suction pits and vent lines will be monitored first to evaluate concentrations of VOCs in vapor phase below the vapor barrier. If concentrations of VOCs are detected and confirmed below the vapor barrier, then the vapor monitoring points above the barrier will be monitored to evaluate the potential of a complete vapor intrusion pathway.

Phase 3 Components of the SSD system that are located above the first floor slab will be completed at the time that operation of the SSD system is determined to be necessary. This determination will be based on the results of analysis of soil vapor samples obtained from the monitoring points installed under Phase 2 (above). These components include the transfer piping to the roof level and the depressurization fans.

The sub-slab installation processes will be supervised and inspected by a representative or agent for the City of New Britain that is knowledgeable of the design of the systems and vapor intrusion processes. The VIMP is a CT DEP approved plan and the CT DEP must approve any modifications to the maintenance plan, system designs or construction plan.

2.0 SUB-SLAB SOIL VAPOR EVALUATION - CONSTRUCTION

Following completion of the building, a soil vapor monitoring program will be implemented as described in Section II of this document. Initially, the program will consist of the collection and analysis of soil gas from the SSD suction pits and horizontal vent lines. The purpose of this program is to evaluate the concentrations of VOC in soil vapor beneath the building and vapor barrier. A minimum of four consecutive quarterly sampling events of this type of data is appropriate to demonstrate compliance with the ICVC of the RSRs. If VOC concentrations are detected and confirmed to exceed the ICVC beneath the building and vapor barrier, monitoring of points above the vapor barrier will be performed to evaluate the potential of a complete vapor intrusion pathway.

2.1 Soil Vapor Sampling Points

The soil vapor samples will be collected from all five suction pits and two of the three horizontal vent lines beneath the vapor barrier. The horizontal vent line that is not sampled is beneath the Fire Suppression Room, which is not an occupied area. The vent line beneath the Dry Dock Office is constructed similarly, the vertical line and fan is used for both vent lines, and is located directly adjacent to the Fire Suppression Room. Sampling of soil gas from beneath the Dry Dock Office is considered reasonably representative for both areas. If concentrations of VOCs exceeding the ICVC are detected in samples from the suction pits and vent lines, vapor samples will be collected from up to 12 permanent soil gas sampling points that will be constructed in the interstitial space between the floor slab and the vapor barrier. The construction details for each type of sampling location are provided on Figure 2. The twelve points installed above the barrier will also be used to evaluate the performance of the SSD systems, should their operation be determined necessary based on soil gas sampling results.

The temporary sampling points located within the SSD suction pits and horizontal vent lines will be constructed using ¼-inch Teflon lined polyethylene tubing, schedule 40 PVC pipe fittings, and hose barb fittings. The tubing will be installed from a sampling port mounted in a PVC "T" on the first floor level, then through the horizontal transfer lines beneath the slab. The tubing will enter into the suction pit or mid point of the horizontal vent line, as appropriate. The sampling end points will consist of a hose barb and mini ball valve that seals the port and the hose barb will be mounted in a sealed plug within the PVC "T". The PVC "T" will be fitted with a locking expansion cap to secure the sampling port. The port identification numbers will be labeled on the PVC "T" at the time of installation for future monitoring purposes.

The permanent above barrier sampling points will be constructed of 1/2-inch, schedule 40 PVC pipe and fittings installed through the existing concrete slab. The tops of the points consist of a hose barb and mini ball valve that seals the port. Each point will be completed in a 3-inch flush mount road box. The port identification numbers will be labeled on the road box covers at the time of installation for future monitoring purposes. The soil vapor monitoring points will be completed using a Portland cement and bentonite grout around the PVC materials and Portland cement to seal the hand ways. No glues or adhesives will be used, and any sealants used to construct the soil vapor sampling points shall not contain VOCs.

2.2 Soil Vapor Monitoring

The soil vapor monitoring will include the collection of discrete soil vapor grab samples and laboratory analysis of those samples as described in Section II of this document. A minimum of 24 hours will elapse after completion of the soil vapor monitoring point and prior to sample collection.

3.0 INSTALLATION OF VAPOR BARRIERS

3.1 Construction and Installation

A vapor barrier will be installed beneath all areas of the building. The construction of the barrier differs between five areas of the building based on contaminant distribution, locations of SSD systems, and the building construction. The vapor barrier will be installed above the high seasonal water table and will not be in direct contact with adsorbed or dissolved phase contaminants in soil or groundwater. The details for the vapor barrier construction are provided on Figure 2. The locations of the different types, as illustrated on Figure 1, include:

- The Freezer and Dry Dock, southeast and easternmost area.
- Central Process and West Central Process Areas
- The SSD Areas for the Northeast Process, Cooler, and Northwest Process Area
- The SSD Area for the Fire Suppression Room and Dry Dock Office Area
- The Office/Employee Area, Boiler Room, Wash Room, Whipping Room, Electric Room and the SSD Area for the Refrigeration Equipment Room

The vapor barrier installation is being conducted as a precautionary measure to mitigate the potential of sub-slab VOC vapors from entering the building. Specification of the materials used, for the vapor barriers and installation instructions are provided in Appendix B.

The vapor barriers are comprised of HDPE with a geo-textile backing or equivalent, which includes, but not limited to, a HDPE liner with a separate layer of non-woven geotextile. The thickness of the HDPE will be a minimum of 10 mil in areas of the building that are also fitted with an SSD system (northwest and northeast of the Process Area, Cooler Area, and the Fire Suppression Room), and 20 mils in all remaining areas (Office and Employee Areas, remaining Process Area, and Freezer Area). The HDPE materials selected for vapor barriers were based on the materials strength, permeance, and chemical resistance to the constituents of concern. The materials were selected based on reviews of published information and were designated for the different areas of the building respective of their intended uses.

The vapor barrier in the Freezer Area is integrated into the thermal system. The construction of the Freezer Area requires a vapor barrier and insulation system that is built into the concrete floor and keyed into the exterior walls. The required thickness of the vapor barrier for thermal purposes was less than that required for the vapor intrusion mitigation purposes and, therefore, was increased to 20-mil to accommodate both purposes.

The barrier will be installed overlying the structural sub-base and directly beneath the concrete slab in the Office/Employee Area, Boiler Room, Wash Room, Whipping Room, Electric Room, Refrigeration Equipment Room, and Fire Suppression Room and Dry Dock Office Area. The barrier will be installed overlying the top of the foundation walls and line the interior and floor of the west elevator shaft. The HDPE vapor barrier in all other areas will be installed beneath a layer of structural sub-base aggregate (approximately 6-inches), and above that, the concrete slab floor. The barrier will be keyed into the exterior foundation walls. The barrier in the two portions of the Process Area that are also fitted with SSD systems, will be installed overlying a six inch thick layer of ¾-inch diameter crushed and

washed stone. A structural sub-base aggregate layer will be installed overlying the vapor barrier and beneath the concrete slab.

The vapor barrier will be installed in panels 20 feet wide or greater. The panels will be installed to minimize the number of seams required for complete coverage. The panels will overlap a minimum of one foot and the seams will be welded in the field, or joined with a manufacturer recommended asphaltic double-sided tape. The vapor barriers will be installed under the concrete slab floor and over foundation grade beams and interior foundation column footings.

The barriers will be sealed to all penetrations that pass through the concrete floor (i.e. sub-slab utility lines). Pipe boots or an equivalent method will be used to seal at penetrations, as illustrated on Figure 2. For instances where pipe boots are used, the top of the boot will be cut down so as not to extend above the slab floor.

All cracks, expansion joints, or other gaps in the concrete slab and at monitoring points will be sealed with an approved caulk or approved rope caulk that is free of volatile organic compounds.

Activity above the vapor barrier will be minimized during and following successful installation of an area of barrier prior to installation of the concrete slab floor. No vehicles or heavy machinery will be driven or operated on the bare barrier. All other activity occurring on the bare barrier will be limited to those necessary for the barrier installation or installation of the concrete slab floor.

3.2 Integrity Assurance

Two measures will be employed to ensure the integrity of the vapor barrier following the complete installation of an area and prior to installation of the concrete slab floor or any materials (sub-base, insulation, etc.) that directly overly the barrier. The measures will include inspection and smoke testing as discussed below.

3.2.1 Inspection

A thorough visual inspection of all areas of a completed section of the vapor barrier will be performed prior to and during the placement of materials above the barrier. Photo-documentation will be maintained throughout the installation and inspection processes. The inspection will verify the following:

- That approved materials and proper installation methods were used,
- That adequate coverage was obtained and a sufficient quantity of material is present along the edges to adjoin the next panel or key into concrete walls,
- That no tears or holes are present in the barrier, and
- That all seals along penetrations, patches and seams are intact without ripples, bubbles or gaps that may result in leakage.

3.2.2 Smoke Test

Following the visual inspection of the vapor barrier, an integrity test will be performed to check for leaks. The test will utilize smoke, which will be applied with a blower to beneath the area of vapor barrier subject to the test. The smoke will be applied from an edge of the vapor barrier or along a seam. A detail of the smoke application method and a Material Safety Data Sheet is provided in Appendix C.

Smoke testing will be repeated until a passing and adequate test is achieved. A passing test occurs when no visible smoke is observed seeping through the area of the barrier subject to the test. An adequate smoke test will require smoke to be observed along all edges of the panel that are not adjoined to another panel and/or a rise of the barrier along the edges of the new panel where it adjoins previously installed and tested panels. The barrier will be re-inspected prior to follow-up smoke tests after repairs are completed.

4.0 SUB-SLAB DEPRESSURIZATION SYSTEM INSTALLATION

4.1 Overview

Sub-slab depressurization (SSD) systems are a proven method for the control of VOC vapor intrusion. The SSD systems for the site consist of sub-slab suction points, associate piping, and fans. The SSD system extracts soil vapors from beneath the building and vents it to the outside via pipes and fans. The purpose of an SSD system is to create a negative pressure field (in relation to the interior building pressures) immediately beneath the building slab. The pressure differential reduces the migration of soil vapors into the building. Gases, including soil vapors, will migrate towards the negative pressure field and consequently to the suction points, which function as a "sink". The system design is based on the propagation of vacuum and not air flow.

4.2 Design

The SSD technology will be used, if necessary, to control vapor intrusion in four areas of the building: the Northwest Process Area, the Northeast Process Area and Cooler, the Fire Suppression Room, and the Refrigeration Equipment Room. The SSD systems includes eight low vacuum suction points (five pits and three slotted suction pipes), each with individual vent lines and fans. The systems also include a 6-inch thick layer of 3/4 –inch diameter crushed stone to serve as a highly conductive vent layer. A 10 mil geotextile backed HDPE barrier will be installed beneath the floor and sub-base aggregate, and above the venting layer in most areas to reduce vertical air flow and provide further control of vapor migration. A 10-mil and 20-mil geotextile-backed HDPE barrier (or equivalents) will be installed directly beneath the floor and above the sub-base aggregate in the Fire Suppression Room and Refrigeration Equipment Room, respectively to reduce vertical air flow and provide further control of vapor migration.

The SSD system which will be installed in eastern areas of the proposed building is intended to address VOCs in soil and groundwater including PCE, TCE, TCA, 11DCE, VC and CFM, which have historically been detected in groundwater, and observed to exceed the current and/or proposed ICVC. The layout of the SSD system provides coverage of the building that overlies the groundwater plume source area and the majority of the groundwater plume including the eastern portion of the Process Area and the Cooler Area. The remaining area of this plume is outside to the east and southeast of the building or beneath the Freezer Area to the south. The system in this area extends to the west beyond the former monitoring wells where contaminants have not been previously detected in groundwater.

The SSD system that will be installed in the northwest area of the proposed building will address IPBZ, 4IPT, NAP, NBBZ, NPBZ, SBBZ, TBBZ, and 124TMB, which have been detected in soil. The layout of the SSD for the northwest area of the building is intended to provide coverage over the area where concentrations of these contaminants have been detected. It extends to soils that are not significantly impacted with VOCs.

The air handling systems designs were evaluated to ensure that the potential of the "stack effect" does not occur. Based on discussions with the mechanical engineer at TranSystems, the maximum design pressure for the building is 0.05 inches of water (12.4 Pascals, Pa)

generated from 10 to 15% make-up air. The freezers are designed to be neutral. The system design is based on the propagation of vacuum and not air flow. If operation of the SSD system is determined to be necessary from soil vapor sampling results, soil vapor will be monitored for VOCs from the respective above barrier observation points within the influence area of the SSD system during operation. The maximum allowable concentrations of VOCs at the above barrier monitoring points are the proposed ICVC. Monitoring for VOCs above the barrier will indicate if the combined SSD system and vapor barrier are effective at mitigating vapor intrusion. Modification of the system will be proposed if needed to achieve sufficient coverage of any areas greater than the ICVC

The proposed design plans for the SSD system are provided on Figures 1 and 2. Additional information related to the type of components, venting stone and building sub-base to be used are provided in Appendix D.

Each of the five (5) independent low-vacuum suction pit systems consists of the following;

- An approximate 4-foot by 4-foot square by 8-inch deep, sub-slab suction pit,
- A sub-floor, 4-inch, schedule 40 PVC vent line from the center of the pit to an interior or exterior wall or support column,
- A 4-inch PVC vertical pipe run, which connects the sub-floor vent-line to the ceiling pipe run,
- A U-tube manometer and low air flow sensor, installed on each vertical pipe run. The sensors are activated when a vacuum in the vent-line is less than 0.25 inches of water,
- An above-roof, 5 to 6-foot high discharge stack consisting of the following components (specification sheets are provided in Appendix D):
    - Radon Away GP-501 inline fan,
    - a separate electrical shut-off switch,
    - support cables (as necessary),
    - vertical 4-inch PVC vent pipe, and
    - a free-flow exhaust cap (rain guard).

The discharge point of the stack will be located a minimum of 25 feet from the air intakes of roof-mounted air handlers. According to the specification for the fan selected, the fans are expected to generate the desired vacuum radius of influence.

An open-ended suction pipe system will be installed in the fire suppression room that is located along the east exterior area of the building. This system is similar to the one identified above except that, instead of a suction pit, two 4-inch schedule 40 PVC vent lines, directed in opposite directions outward from the center of the room, will be placed in the sub-base aggregate located beneath the concrete slab. A single suction line will be installed similarly, and located in the south-central area of the building, immediately to the west of the Freezer Room. This vacuum point is intended to control vapors that, if present, could migrate westward from beneath the freezer. This is considered to be a suitable alternative to a

suction pit for this area. Although the sub-base aggregate is not as conductive as the vent layer, the areas are much smaller and require a limited vacuum distribution.

No sampling points or pits have been determined to be necessary or appropriate in the Freezer Area due to its design. The design of the Freezer is intended to isolate the interior air of the Freezer from the exterior air in all directions in order to control temperature and humidity. The design has been reviewed and deemed adequate to mitigate vapor intrusion into this area. The design of the freezer slab includes an ethylene glycol heating system, multiple layers of insulation, and concrete within the slab profile. The Freezer Area slab is designed to prevent warm moist air from coming into contact with the freezer floor.

If at any point soil vapor monitoring results indicate that operation of one or more of the SSD systems are necessary to comply with the Industrial/Commercial Volatilization Criteria, the respective system(s) will be operated in accordance with SSD Operation and Maintenance Plan provided in Section II. The low flow sensor for the system will be connected to on-site control areas and tested before the system is operated. The sensors will be installed in a manner to minimize the number of sensor locations. As such the sensors for suction pits SP-2 and SP-3 will be placed at the same location, and similarly the sensors for suction pits SP-4 and SP-5 will be place at the same location.

II. SUB-SLAB DEPRESSURIZATION SYSTEM OPERATION AND MAINTENANCE PLAN

5.0 INTRODUCTION

5.1 Background

The following sections of this document present the operation, maintenance and monitoring plan for the SSD systems should their operation be required, and maintenance of the sub-slab vapor barrier. General background information for this Site is provided in the Introduction to Section I of this document. The SSD systems and sub-slab vapor barriers, as identified in this document are designed to mitigate the vapor intrusion potential and satisfy Section 22a-133k-3(c)(3)(B) of the RSR.

On behalf of the City of New Britain, HRP Associates, Inc. (HRP) has prepared this Operation and Maintenance (O&M) Plan for the Sub-Slab Depressurization (SSD) system and vapor barriers installed beneath portions of the slab-on-grade building located at 37 Booth Street in New Britain, Connecticut (site). A site plan showing the layout of the site is provided on Plate A and the location and construction information for the vapor intrusion mitigation system are provided on Figures 1 and 2.

5.2 Purpose

As discussed in Section I of this document, vapor intrusion mitigation measures have been installed during construction activities, and include sub-slab depressurization (SSD) systems and vapor barriers. The SSD systems were not designed to remediate or reduce the mass of the contamination, but to maintain a negative pressure (in relation to the interior building pressure) beneath the building slab, and thus control the migration of potential soil vapor VOCs should vapor phase VOC be present based on post construction testing.

Following completion of the building, a soil vapor monitoring program will be implemented, which is discussed in the following section. The SSD system will be completed in its entirety below the concrete slab concurrent with building construction. The above slab system components will be completed and operated only if the post-construction soil vapor monitoring indicates a potential risk of vapor intrusion (VI) of VOCs exists as quantified and compared to the ICVC. If operation is necessary the system will be operated until VOC concentrations in soil vapors beneath the relevant portions of the new building are demonstrated as compliant with the RSRs. The emissions from the SSD stack(s) will be screened with a PID at the time of system start-up, and evaluated through calculations or stack testing to determine compliance with applicable air emission regulations. The subsequent sections of this document present operation, maintenance and monitoring plan of the SSD system should its operation be required.

In addition to these physical measures, an Environmental Land Use Restriction (ELUR) will be used as an administrative measure. An ELUR to restrict use of the property to exclude residential use is planned in an effort to limit exposure to subsurface soils. Any future expansions of the building or other development on the site while the ELUR is in effect will require the temporary release of the ELUR, which must be approved by the CT DEP.

A large part of the eastern section of the building, which consists of the freezer and dry dock, is double concrete slab construction (Appendix B). The spacing between the concrete slabs beneath the freezer and dry dock consists of a slip-sheet, 6-inch floor insulation, and a vapor barrier as depicted on Figure 3 in Appendix B. The insulation and vapor barrier are keyed into the building footings. These areas of the building are located above the down gradient and cross-gradient portions of the dissolved phase VOC plume source area.

The northeast portion of the building, which consists of the dry storage, and a portion of the process area overly the source area of a halogenated VOC contaminant plume, and these areas are single slab on grade design. The fire pump room and dry dock office are located along the east side of the building, in the vicinity and cross-gradient of the plume; these two rooms area also constructed with a single slab on grade design. Due to the slab construction at these locations and in anticipation that vapor phase VOC may exceed applicable ICVC over the plume source area, SSD was considered necessary to reduce vapor migration away from the source area to other parts of the building, and reduce the potential risk of indoor vapor intrusion from soil vapor impacts where single concrete slab construction overlies the groundwater contaminant plume.

An area of soil that contained concentrations of aromatic VOCs was identified beneath the northwest portion of the building during construction activities. The concentrations of VOCs detected were at levels that were considered to potentially pose a risk for VI.

6.0 POST-CONSTRUCTION SUB-SLAB SOIL VAPOR MONITORING

Sub-slab soil vapors will be evaluated for VOCs beneath the building following construction to determine if the SSD system will need to be started and operated. The evaluation program will initially include the collection of soil vapor samples from seven (7) soil vapor sample locations below the vapor barrier (suction pits and horizontal vent lines). The proposed locations of the soil vapor monitoring points, identified as SVB-1 through SVB-7, below the barrier coincide with suction pits and horizontal vent lines and are depicted on Figure 1. Each of these soil vapor sampling points will be constructed as shown on Figure 2 and discussed in Section I of this document. Sampling soil vapor from below the barrier will provide the data required for evaluating ICVC of the RSR and the necessity of the vapor intrusion mitigation measures.

If VOCs concentrations are confirmed to be present below the barrier at concentrations that exceed the ICVC, sampling above the barrier will be conducted at up to twelve (12) sampling point locations, which include SVA-1 through SVA-12. The proposed locations of the soil vapor sampling points above the barrier are also depicted on Figure 1. Again, each of these soil vapor sampling points will be constructed as shown on Figure 2 and discussed in Section I of this document. Sampling above the barrier will provide the data necessary to determine if operation of the SSD system(s) is needed. If VOCs are detected above the barrier at concentrations that exceed the ICVC, then the SSD system fans will be started. Approval from the CT DEP will be obtained prior to any planned changes in the monitoring program.

6.1 Purging

Field measurements will be obtained during the initial round of each soil vapor monitoring point to determine the optimal purge and sample times. An adjustable speed air pump will be used to purge soil vapor from the sampling point. A flow meter and magnehelic gauge will be used to monitor the flow rate and vacuum during purging. The target flow rate will be 200 ml/min. During the purge, a photo-ionization detection meter (PID) will be installed in-line to screen the purged soil gas for total VOCs. The soil vapor samples will be collected when the PID screening indicates that VOC concentrations have peaked in the purged soil gas. This process will be timed and subsequent soil vapor sampling will use these field results to determine the appropriate purge time, if any, prior to sample collection.

6.2 Sample Point Leak Testing

Leak testing will be conducted at each of the soil vapor monitoring points (SVA-1 through SVA-12, SVB 1 through SVB-7)) following the purging procedure described above and prior to each round of sampling to assess whether ambient air enters the sampling system. If an excess of a tracer is detected in a sample, then the cause of the leak will be evaluated, confirmed, and corrected. The data from any points suspected of leaks, will only be used with qualification, in the overall site analysis.

Locations of potential ambient air intrusions include sample system connections, cement-bentonite grout seals, or the top fittings of the monitoring point. Given the apparatus setup and the materials used, it is not expected that ambient air will enter the sampling system at any location. The leak check will use either isopropyl alcohol or helium as tracer. An

isopropyl alcohol saturated wipe will be placed within the road box for above barrier points and on the venting pipe for below barrier points while the vapor sample is extracted from the sampling point. Detections of isopropyl alcohol in the sampling results will indicate whether leaks in the sampling system have occurred and if ambient air may have been introduced to the sample. Although this method is effective in determining the integrity of the sampling system, the results are more qualitative than other methods. Due to the nature of this method less tolerance will be acceptable than with helium testing; Sample results will be considered usable with a leak of 0.5% or less using this method, which corresponds to a detection of approximately 500 µg/l.

Alternatively, the leak check compound (helium) may used and would be introduced into a sealed environment surrounding the point prior to sampling. The leak check sample will then be collected into a Tedlar bag for on-site screening analysis. The bags will be screened using a portable helium detector. This method allows for quantitative results by percent, which may support the usability of results where minor leaks may be detected. Sample results will be considered usable with leak of 10% or less using this method.

6.3 Sample Collection and Analysis

The soil vapor grab samples will be collected from each of the seven below barrier monitoring points for a minimum of four consecutive quarters. The samples will be collected using SUMMA® canister or equivalent, with a 3-liter capacity, and 15 minute regulators. The resulting flow rate, 200 milliliters per minute (ml/min), should minimize VOC stripping from soil or potential sample dilution.

The subsequent soil vapor samples will be collected over a time interval that spans the peak VOC concentration in the purged soil gas. If the peak time occurs later than half the regulator time, then a sufficient amount of soil gas will be purged such that the midpoint of the sample time interval occurs at the peak time. If the peak time occurs at less than half the regulator time or the PID detects no VOCs in soil gas, then no soil gas will be purged prior to the start of sample collection.

The soil vapor samples will be submitted to a state of Connecticut certified laboratory under chain of custody procedures. All soil gas samples will be analyzed by EPA Method TO-15 and reported in accordance with the DEP Reasonable Confidence Protocols (RCPs). The respective constituents of concern for the northwest area of the building and east area will be analyzed. The soil gas samples obtained from the northwest area of the building will be analyzed for aromatic VOCs as these constituents were detected in soil samples. The samples obtained in the east area of the building will be analyzed for chlorinated VOCs as these constituents were detected in groundwater samples approaching or exceeding the ICVC for groundwater.

6.4 Evaluation of Results and Response

The laboratory analytical results for sub-slab soil gas samples will be reviewed to determine 1) the necessity of vapor intrusion mitigation measures, 2) the effectiveness of the vapor barrier, and 3) whether completion and operation of the respective SSD systems is required. If concentrations of VOCs in all soil vapor samples remain below the proposed

Industrial/Commercial Volatilization Criteria (ICVC) for four consecutive quarters, then sampling will be discontinued and the system will not be started.

If confirmed VOC concentrations exceed the ICVC at one or more locations below the vapor barrier for a respective area, then sampling at locations above the barrier in that area will be conducted. If confirmed VOC concentrations exceed the ICVC at one or more locations above the vapor barrier for a respective area, then the SSD system(s) will be operated, and the CT DEP will be notified within 15 days. The respective SSD system will be started and operated within 30 days of the confirmed exceedance. The correlating sample locations and SSD system are as follows:

SAMPLING BELOW THE BARRIER IF VOCS > ICVC AT SAMPLE LOCATIONS, THEN	SAMPLING ABOVE THE BARRIER. IF VOCS > ICVC AT SAMPLE LOCATIONS	THEN OPERATE SSD SYSTEM AREA
SP-1/SVB-1	SVA-1 through SVA-3	Northwest Process Area
SP-2/SVB-2, SP-3/SVB-3, SP-4/SVB-4, and SP-5/SVB-5	SVA-4 through SVA-9, SVA-12	Northeast Process Area and Cooler
HV-1/SVB-6	SVA-10	Refrigeration Equipment Room
HV-2/SVB-7	SVA-11	Dry Dock Office and Fire Suppression Room

The completed SSD system(s) will be tested upon start-up, and operated continuously, and this O&M Plan will be implemented as provided in Section 7 below. Operation of the SSD System would then continue until such time as compliance with the ICVC is demonstrated as provided in Section 7 below. The above procedure will be followed for any future building expansions completed along the north and east sides of the new building.

6.5 Sampling for System Discontinuation

Following operation of the system for a minimum of one year, sampling to monitor soil vapor beneath the building may be conducted with CT DEP approval. The system will be shut down for a period of 10 days prior to sample collection. Sampling will be conducted from sample points beneath the barrier and as described above in Section 6.2. If the results from the sampling event indicate VOCs remain present in soil vapor at concentrations above the ICVC, then the system will be restarted immediately and continue to be operated. If the results from the sampling event indicate VOCs are present in soil vapor at concentrations below the ICVC or not present, then the system will remain off and sampling from the respective sampling locations below the barrier will be conducted for four consecutive quarters. If the results for the four consecutive quarters are below the ICVC then compliance with the ICVC of the RSR will be demonstrated.

7.0 OPERATION AND MAINTENANCE

7.1 Operation

The five sub-slab suction points, three horizontal vent lines, vapor monitoring points, and the above floor SSD system components (fans, transfer pipes, sensors, gauges, etc.) will be installed concurrent with building construction. As previously mentioned, samples will be collected from select monitoring points on a quarterly basis to determine the presence of VOC vapors at concentrations confirmed to exceed the ICVC. Based on these results, if needed, the respective SSD system shall be operated continuously, 24 hours a day, 7 days a week. The continuous operation is necessary to effectively control potential vapor intrusion. An evaluation of the emissions from the system will be performed following start up of the system to verify compliance with applicable air regulations.

Electrical

The SSD system will be linked to an individual electrical breaker and power outlet for each pit or screened point, which will provide electricity to both the fan and respective sensor. The breakers will be labeled inside the power panels. Separate rooftop electrical shut-off switches, which control the power to the fans only, will be located on each of the stacks.

Facility or System Modifications

Activities planned within the facility that affect components of an active SSD system, or may affect the integrity of the vapor barriers must be approved by the CT DEP prior to performing those activities. Similarly, approval by the CT DEP must be obtained for any planned modifications to the system.

7.2 Maintenance

Maintenance of the SSD system may include, but not necessarily be limited to, the following items:

Fan Replacement – The fan will require replacement in the event the fan is not working, or is damaged beyond repair. The fan should be replaced with the same model fan (Radon GP501 In-Line Fan), or a comparable make and model fan with performance specifications similar or better than the GP-501.

Pipe Repair – Leaking or damaged pipes, which comprise the vent lines and stacks, shall be repaired. If the system pipes are repaired, replaced, or re-routed, the following specifications must be met.

- The pipe must pitch with a slope towards the pit to facilitate drainage of in-pipe condensation. A slope of 1/8-inch per linear foot is recommended.
- The pipe run between the pit and the stack shall consist of no more than four 90-degree bends and no more than 100 linear feet of pipe, so that fan and air flow efficiency is not compromised.

Crack Sealing – Cracks, including expansion joints, in the floor or surface of the pits, within the subject soil vapor area of concern (depressurization zone), which are or have potential to leak or short-circuit the induced negative vacuum beneath the building floor, shall be sealed with an airtight, flexible sealant. Any future sub-floor installations or concrete floor replacement activities shall be conducted in a manner that will not result in potential air leakage through the floor.

Management of Future Rooftop Air Intake Installations – Any future installations of rooftop heating vent or air conditioning units, or any other unit which takes in air from above the roof, shall be installed with a minimum separation distance of 25 feet from the SSD discharge stacks.

7.3 System Monitoring

If soil vapor concentrations are confirmed to exceed the ICVC, the respective SSD system will be completed and operated and the following monitoring program will be implemented. The SSD system monitoring shall include, but not necessarily be limited to, the following two tasks listed below and discussed in more detail in the following sub-sections.

1. System Inspection,
2. Vent-Line (U-Tube) Vacuum Measurement, and

A copy of the inspection form to be used for system monitoring and inspection is attached in Appendix F.

7.3.1 System Inspection

The following items should be inspected routinely and immediately following any system damage, an activated sensor, observation of a significant decrease in the vacuum monitored by the U-tube, or any other observed problems or changes with the system.

- Visual and audible (air hissing or water noise) inspection of above-slab vent-line piping to observe for damage, air leaks, pipe or support failure, sagging or displacement of the pipe, or condensation accumulation inside the pipe.
- Visual inspection of the pits and floor within the subject area to observe for significant cracks, degradation of expansion joints, or seals at floor penetrations which could potentially cause short-circuiting of air or vapor intrusion, and require sealing or repair.
- Visual and audible inspection of the rooftop stacks to observe for damage, leakage, or infestation.
- Visual inspection of the roof penetrations to observe for precipitation leakage.

7.3.2 Vent-Line (U-Tube) Vacuum Measurement

The vacuum inside the vent-line shall be measured using the U-Tube manometer installed on the vertical pipe run for each pit. Any significant change in vent-line vacuum should be addressed to determine if any maintenance is required.

7.3.3 Monitoring Frequency

The above monitoring tasks including: system inspection and vent-line vacuum monitoring, should be conducted quarterly for the first year of operation and annually thereafter. VOC monitoring above the barrier will be conducted annually after the system has been started. Any modifications to the monitoring plan or frequency will be pre-approved by the DEP. Any obvious issues such as activated low flow sensors or observable damage should be addressed and documented immediately. A system inspection should be conducted following any repairs or modifications.

7.4 System Low Flow Sensors

The sensors will activate if a vacuum of less than 0.25 inches of water occurs within the vent-line. Low or zero vacuums will likely be indicative that maintenance is required for issues such as fan failure, leakage in the vent-line pipes, significant air leakage in the floor from cracks or other floor openings, or obstruction in the vent-line somewhere between the alarm and the top of the stack.

The sensors, switches, and circuit breakers will be labeled. The sensor labels will indicate who to contact if the sensor is activated. The switch and circuit breaker labels will identify the SSD system and indicate to keep in the "On" position. Samples of the types of labels to be used are included in Appendices F, respectively.

The area personnel, facility maintenance personnel and manager will be trained for response in the event the alarm is activated. These personnel should immediately notify the facility manager or designated personnel. Only the facility manager or designated personnel may turn-off the sensor. The facility manager or designated personnel will provide instruction to personnel for response and contact a party knowledgeable in the design and operation of the SSD system. An inspection of the system, as described above, should be conducted within 24-hours. Repairs to the system must be performed within ten business days of the sensor activation. An inspection of the system must be conducted following repairs and restarting the system. A report of the event summarizing the cause of the sensor and response actions must also be submitted to the CT DEP within ten business days of the sensor activation.

8.0 RECORD KEEPING AND REPORTING

Various types of documents and records will be generated during all phases of implementation of the VIMP. The documents and records include, but are not limited to, installation inspection reports, operation and maintenance inspection reports, and soil vapor monitoring reports. Copies of these records should be submitted to the DEP annually.

Reports providing the results of soil vapor monitoring and/or system status will be provided to the CT DEP for review and approval. Quarterly and annual reports providing the results from soil vapor monitoring will be provided within 30 days of sampling. If soil vapor monitoring results indicate that operation of the SSD System is necessary to comply with the RSR, the system will be completed and operated and a notification letter report will be provided to the DEP including the soil vapor sampling results and status of the system within 60-days of sampling. If soil vapor monitoring results from the initial four consecutive quarters do not indicate that the SSD system is necessary, the results will be provided to DEP in a report, which will also include the status of the SSD system and an evaluation of the soil vapor results with the proposed ICVC within 30-days of the fourth sampling event. No further evaluation will be required upon completion of the compliance monitoring.

If operation of the SSD System is determined necessary to comply with the RSR , an SSD System Status Report shall be prepared and submitted to the CTDEP annually for the duration of the system operation. The initial status report will include as-built plans for the SSDS and vapor barrier. The annual report will include: copies of all completed inspection forms, soil vapor monitoring analytical results, records of system repairs or modifications, and recommendations for future activities.

TABLES

TABLE 1
Former Fafnir Bearing
37 Booth Street, New Britain, Connecticut

Summary of Post Remediation Concentrations of Halogenated VOCs in Groundwater

Well ID	Date	Depth to Water (ft.)	PCE	TCE	111TCA	11DCA	11DCE	C12DCE	VC	CA	CFM	Total HVOCs
			ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb
RMW-1	Apr-01	5.01	-	-	-	-	-	-	-	-	-	-
	Jul-01	6.11	-	-	-	-	-	-	-	-	-	-
	Oct-01	6.58	-	-	-	-	-	-	-	-	-	-
	Jan-02	6.31	-	13	-	-	-	-	-	-	-	13
	Apr-02	4.75	-	-	-	-	-	-	-	-	-	-
	Aug-02	5.07	-	-	-	-	-	-	-	-	-	-
	Jan-03	3.94	-	-	-	-	-	-	-	-	-	-
	Jul-03	6.45	-	-	-	-	-	-	-	-	-	-
	Jan-04	4.15	-	-	-	-	-	-	-	-	-	-
	Jul-04	5.00	-	-	-	-	-	-	-	-	-	-
	Feb-05	4.33	-	-	-	-	-	-	-	-	-	-
	Aug-05	5.19	-	-	-	-	-	-	-	-	-	-
	Feb-06	4.14	-	-	-	-	-	-	-	-	-	-
	Sep-06	4.60	Not Sampled									
	Mar-07	4.88	Not Sampled									
RMW-2	Apr-01	8.95	-	-	-	-	-	-	-	15	-	15
	Jul-01	12.48	-	-	-	3	-	-	-	42	-	45
	Oct-01	12.31	-	-	-	3	-	-	-	16	-	3
	Jan-02	11.28	-	1	-	-	-	-	-	-	-	1
	Apr-02	8.70	-	-	-	-	-	-	-	-	-	-
	Aug-02	9.65	Not Sampled									
	Jan-03	7.80	-	-	-	1	-	-	-	-	-	1
	Jul-03	8.98	-	-	-	1	-	-	-	11	-	12
	Jan-04	7.76	-	-	-	-	-	-	-	13	-	-
	Jul-04	8.35	-	-	-	-	-	-	-	-	-	-
	Feb-05	7.15	-	-	-	-	-	-	-	1	-	-
	Aug-05	7.96	-	-	BB	-	-	-	-	-	-	-
	Feb-06	6.54	-	-	-	-	-	-	-	-	-	-
	Sep-06	7.38	Not Sampled									
	Mar-07	7.29	Not Sampled									
RMW-3	Apr-01	9.45	-	-	-	-	-	-	-	-	22	22
	Jul-01	11.91	-	-	-	-	-	-	-	-	17	17
	Oct-01	15.05	-	-	-	-	-	-	-	-	14	14
	Jan-02	16.00	-	1	-	-	-	-	-	-	-	1
	Apr-02	13.55	-	-	-	-	-	-	-	-	-	-
	Aug-02	13.23	-	-	-	-	-	-	-	-	-	-
	Jan-03	9.16	-	-	-	-	-	-	-	-	-	-
	Jul-03	10.53	-	-	-	-	-	-	-	-	-	-
	Jan-04	10.04	-	-	-	-	-	-	-	-	-	-
	Jul-04	9.41	-	-	-	-	-	-	-	-	-	-
	Feb-05	8.20	-	-	-	-	-	-	-	-	-	-
	Aug-05	10.96	-	-	-	-	-	-	-	-	-	-
	Feb-06	8.45	-	-	-	-	-	-	-	-	12.2	12.2
	Sep-06	9.26	Not Sampled									
	Mar-07	9.35	Not Sampled									
RMW-4	Apr-01	3.95	-	-	-	-	-	-	-	-	3	3
	Jul-01	4.80	-	-	-	2	-	-	-	-	-	2
	Oct-01	5.63	-	-	-	2	-	-	-	-	-	2
	Jan-02	5.48	-	-	-	2	-	-	-	-	-	2
	Apr-02	5.10	-	-	-	2	-	-	-	-	-	2
	Aug-02	5.10	-	-	-	3	-	-	-	-	-	3
	Jan-03	6.10	-	-	-	1	-	-	-	-	-	1
	Jul-03	6.56	-	-	-	1	-	-	-	-	-	1
	Jan-04	4.24	-	-	-	-	-	-	-	-	-	-
	Jul-04	4.93	-	-	-	-	-	-	-	-	-	-
	Feb-05	4.25	-	-	-	-	-	-	-	-	-	-
	Aug-05	5.11	-	-	-	2	-	-	-	-	-	2
	Feb-06	4.13	-	-	-	-	-	-	-	-	-	-
	Sep-06	4.78	Not Sampled									
	Mar-07	4.70	Not Sampled									
SWPC			88	2,340	62,000	NE	96	NE	15,750	NE	14,100	
Proposed I/C VC			810	67	16,000	41,000	920	11,000	52	29,000	62	
Current I/C VC			3,820	540	50,000	50,000	6	NE	2	50,000	710	

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			ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb
RMW-5	Apr-01	6.35	-	-	-	-	-	-	-	-	-	-
	Jul-01	7.84	-	-	-	1	-	-	-	-	-	1
	Oct-01	9.09	-	-	-	2	-	-	-	-	-	2
	Jan-02	9.10	-	1	-	2	-	-	-	-	-	3
	Apr-02	8.52	-	-	-	2	-	-	-	-	-	2
	Aug-02	8.81	-	-	-	-	-	-	-	-	-	-
	Jan-03	7.60	-	-	-	1	-	-	-	-	-	1
	Jul-03	10.21	-	-	-	-	-	-	-	-	-	-
	Jan-04	7.55	-	-	-	-	-	-	-	-	-	-
	Jul-04	8.23	-	-	-	-	-	-	-	-	-	-
	Feb-05	7.62	-	-	-	-	-	-	-	-	-	-
	Aug-05	8.72	-	-	-	1	-	-	-	-	-	1
	Feb-06	7.60	-	-	-	-	-	-	-	-	-	-
	Sep-06	8.15	Not Sampled									
	Mar-07	8.30	Not Sampled									
RMW-6	Apr-01	10.70	-	-	-	-	-	-	-	-	-	-
	Jul-01	10.94	-	-	-	20	-	1	2	70	-	93
	Oct-01	12.55	-	-	-	10	-	-	-	41	-	51
	Jan-02	12.32	-	-	-	5	-	1	-	42	-	48
	Apr-02	11.35	-	-	-	4	-	-	-	33	-	37
	Aug-02	11.38	-	-	-	5	-	1	-	49	-	55
	Jan-03	10.76	-	-	-	3	-	-	-	35	-	38
	Jul-03	12.70	-	-	-	3	-	-	-	42	-	45
	Jan-04	10.82	-	-	-	2	-	-	-	38	-	40
	Jul-04	11.37	-	-	-	2	-	-	-	72	-	74
	Feb-05	10.86	-	-	-	-	-	-	-	-	-	-
	Aug-05	11.75	-	-	-	2	-	-	-	-	-	2
	Feb-06	10.69	-	-	-	-	-	-	-	2.1	-	2.1
	Sep-06	10.99	Not Sampled									
	Mar-07	11.33	Not Sampled									
RMW-7	Apr-01	2.35	-	-	-	-	-	-	-	-	3	3
	Jul-01	4.43	-	-	-	-	-	-	-	-	6	6
	Oct-01	7.01	-	-	-	-	-	-	-	-	9	9
	Jan-02	8.32	-	-	-	-	-	-	-	-	-	-
	Apr-02	6.15	-	-	-	-	-	-	-	-	-	-
	Aug-02	5.58	-	-	-	1	-	-	-	-	-	1
	Jan-03	3.25	-	-	-	-	-	-	-	-	-	-
	Jul-03	6.38	-	-	-	-	-	-	-	-	-	-
	Jan-04	3.52	-	-	-	-	-	-	-	-	-	-
	Jul-04	5.20	-	-	-	-	-	-	-	-	-	-
	Feb-05	3.61	-	-	-	-	-	-	-	-	-	-
	Aug-05	5.68	-	-	-	-	-	-	-	-	-	-
	Feb-06	2.84	-	-	-	-	-	-	-	-	1.6	1.6
	Sep-06	4.11	Not Sampled									
	Mar-07	4.21	Not Sampled									
RMW-8R	Apr-01	2.69	2,409	1,772	64,926	375	4,968	2,635	-	-	-	77,085
	Jul-01	2.85	146	57	3,851	58	420	50	-	-	-	4,582
	Oct-01	5.05	1,975	1,081	101,114	1,111	8,874	3,827	-	-	-	117,982
	Jan-02	5.77	1,060	1,040	88,800	1,080	7,490	3,840	-	-	-	103,310
	Apr-02	4.05	2,399	1,395	243,755	1,031	9,654	3,688	-	-	-	261,922
	Aug-02	4.12	3,183	1,405	112,470	1,006	7,084	6,372	-	-	-	131,520
	Jan-03	2.87	-	-	71,600	-	5,410	2,210	-	-	-	79,220
	Jul-03	3.50	358	106	33,155	237	377	859	-	26	-	35,118
	Jan-04	2.94	-	-	11,347	318	796	413	-	-	-	12,874
	Jul-04	1.07	529	119	39,738	999	7,811	4,961	-	74	-	54,231
	Feb-05	2.89	295	-	28,364	523	3,480	1,533	-	-	-	34,195
	Aug-05	4.42	95	-	10,800	760	1,200	600	-	129	-	13,584
	Feb-06	2.26	10.7	3.8	465	169	52.7	62.3	8.5	65.3	-	837
	Sep-06	2.83	13.4	4.4	88.7	382	24.4	30.3	27.5	87.9	-	659
	Mar-07	2.87	90.0	-	3,540	86	75	-	-	-	-	3,791
SWPC			88	2,340	62,000	NE	96	NE	15,750	NE	14,100	
Proposed I/C VC			810	67	16,000	41,000	920	11,000	52	29,000	62	
Current I/C VC			3,820	540	50,000	50,000	6	NE	2	50,000	710	

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			ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb
RMW-9	Apr-01	9.48	-	-	-	-	-	-	-	-	-	-
	Jul-01	10.02	-	-	-	6	-	-	-	16	-	22
	Oct-01	10.06	-	-	-	5	-	-	-	17	-	22
	Jan-02	10.01	-	-	-	3	-	-	-	11	-	14
	Apr-02	10.00	-	-	-	6	-	-	-	10	-	16
	Aug-02	9.99	-	-	-	7	-	-	-	23	-	30
	Jan-03	9.82	-	-	-	8	-	1	1	9	-	19
	Jul-03	11.86	-	-	-	7	-	-	1	11	-	19
	Jan-04	9.30	-	-	-	7	-	-	-	12	-	19
	Jul-04	10.04	-	-	-	8	-	-	-	-	-	8
	Feb-05	9.94	-	-	3	11	-	-	-	2	-	16
	Aug-05	10.22	-	-	-	7	-	-	-	-	-	7
	Feb-06	9.80	-	-	33.7	38.3	2.8	3.5	2.7	7.1	-	88
	Sep-06	9.93	-	-	-	19.2	-	-	1.8	27.0	-	48
	Mar-07	10.27	-	-	-	4.0	-	-	-	-	-	4
RMW-10	Apr-01	5.07	-	8	294	274	50	22	9	65	-	722
	Jul-01	6.65	-	4	275	340	57	20	8	72	-	776
	Oct-01	7.18	-	-	87	213	11	-	-	31	-	342
	Jan-02	8.56	-	37,333	158	216	35	11	-	23	-	37,776
	Apr-02	7.20	2	5	176	312	37	18	-	26	-	576
	Aug-02	8.98	Not Sampled									
	Jan-03	5.62	-	7	154	173	56	8	3	11	-	412
	Jul-03	8.31	-	-	69	170	28	-	-	19	-	286
	Jan-04	5.57	-	9	87	139	46	4	-	9	-	294
	Jul-04	7.01	-	7	72	246	50	11	6	-	-	392
	Feb-05	5.35	1	4	29	86	27	3	2	2	-	154
	Aug-05	6.81	1	4	24	160	73	6	5	31	-	304
	Feb-06	4.53	-	2.8	6.9	25.9	8.1	1	-	-	-	44.7
	Sep-06	5.52	1.6	4.3	14.9	88.3	20.9	3.8	4.3	10.6	-	148.7
	Mar-07	6.68	1.0	5.0	13.0	88.0	14.0	4	3	9	-	137.0
RMW-11	Apr-01	9.20	24	23	4,723	126	117	864	64	42	-	5,983
	Jul-01	10.62	-	-	2,167	141	272	356	-	-	-	2,936
	Oct-01	12.04	71	26	2,212	-	203	626	132	92	-	3,362
	Jan-02	12.32	26	25	1,590	260	164	407	84	66	-	2,622
	Apr-02	11.50	-	-	1,821	205	127	394	-	-	-	2,547
	Aug-02	11.45	-	-	3,140	335	246	831	86	-	-	4,638
	Jan-03	9.96	22	14	3,506	167	220	470	41	30	-	4,470
	Jul-03	12.76	39	17	4,221	148	216	480	55	36	-	5,212
	Jan-04	10.29	27	17	2,106	211	289	631	58	-	-	3,339
	Jul-04	11.49	39	21	3,738	160	444	1,287	102	-	-	5,791
	Feb-05	10.32	33	18	2,618	167	250	482	118	46	-	3,732
	Aug-05	11.92	-	-	2,879	223	916	549	128	85	-	4,780
	Feb-06	9.62	16.1	11	3,190	194	185	457	56	19.3	-	4,128.4
	Sep-06	10.80	-	-	3,500	302	268	736	249	-	80	5,135.0
	Mar-07	11.82	-	-	3,650	260	140	580	-	-	-	4,630.0
RMW-12	Apr-01	13.29	-	-	150	65	-	-	-	-	-	215
	Jul-01	14.35	1	-	58	105	9	18	6	24	-	221
	Oct-01	15.32	-	-	11	35	2	4	-	-	-	52
	Jan-02	18.43	-	-	12	25	2	2	2	3	-	46
	Apr-02	14.95	-	-	5	43	3	5	-	9	-	65
	Aug-02	14.97	-	1	48	125	8	21	3	20	-	226
	Jan-03	14.09	-	-	41	95	4	20	2	9	-	171
	Jul-03	14.54	1	2	175	161	13	35	8	34	-	429
	Jan-04	14.30	-	-	257	183	13	36	9	34	-	532
	Jul-04	14.79	-	-	157	190	23	77	15	-	-	462
	Feb-05	14.16	-	-	219	118	7	14	2	2	-	362
	Aug-05	15.18	1	2	73	86	14	14	11	41	-	242
	Feb-06	13.65	-	-	590	212	13.9	21.7	-	4.6	-	842
	Sep-06	14.50	1.6	1.3	117	96.2	9.8	33.3	5.5	9.4	-	274.1
	Mar-07	14.95	2	2	79	94	9	38	12	12	-	248.0
SWPC			88	2,340	62,000	NE	96	NE	15,750	NE	14,100	
Proposed I/C VC			810	67	16,000	41,000	920	11,000	52	29,000	62	
Current I/C VC			3,820	540	50,000	50,000	6	NE	2	50,000	710	

TABLE 1
Former Fafnir Bearing
37 Booth Street, New Britain, Connecticut

Summary of Post Remediation Concentrations of Halogenated VOCs in Groundwater

Well ID	Date	Depth to Water (ft.)	PCE	TCE	111TCA	11DCA	11DCE	C12DCE	VC	CA	CFM	Total HVOCs
			ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb
RMW-13	Apr-01	16.56	-	-	-	-	-	-	-	-	-	-
	Jul-01	17.22	-	-	3	19	-	-	3	167	-	192
	Oct-01	18.02	-	-	3	51	-	-	3	235	-	292
	Jan-02	18.01	-	-	-	27	-	-	3	292	-	322
	Apr-02	17.65	-	-	1	24	-	-	-	296	-	321
	Aug-02	17.54	-	1	10	63	-	4	18	262	-	358
	Jan-03	16.92	-	1	3	41	-	2	6	276	-	329
	Jul-03	19.04	-	-	-	21	-	-	-	196	-	217
	Jan-04	16.77	-	-	-	19	-	-	-	240	-	259
	Jul-04	17.22	-	1	13	61	-	3	13	-	-	91
	Feb-05	16.75	-	1	21	-	82	4	28	200	-	336
	Aug-05	17.50	-	-	38	115	3	4	23	261	-	444
	Feb-06	16.43	-	1	55	171	1	6.2	31	164	-	429.2
	Sep-06	16.90	-	-	44.2	119	-	5.6	43	257	-	468.8
	Mar-07	16.95	-	1	25	112	-	5	21	199	-	363.0
RMW-14	Apr-01	15.88	-	-	3	10	-	-	-	-	-	13
	Jul-01	17.68	-	-	4	8	-	-	-	-	-	12
	Oct-01	19.16	-	-	-	-	-	-	-	-	-	-
	Jan-02	19.52	2	1	6	10	1	1	-	-	-	21
	Apr-02	18.70	-	-	-	7	-	-	-	-	-	7
	Aug-02	18.39	-	-	1	7	-	-	-	-	-	8
	Jan-03	16.67	-	-	3	6	-	-	-	-	-	9
	Jul-03	19.70	-	-	-	4	-	-	-	-	-	4
	Jan-04	16.86	-	-	-	4	-	-	-	-	-	4
	Jul-04	18.03	-	-	-	3	-	-	-	-	-	3
	Feb-05	16.85	-	-	2	4	-	-	-	-	-	6
	Aug-05	18.71	-	-	-	2	-	-	-	-	-	2
	Feb-06	15.78	-	-	-	4.5	-	-	-	-	-	4.5
	Sep-06	17.48	Not Sampled									
	Mar-07	18.27	Not Sampled									
RMW-15	Apr-01	6.79	-	-	-	9	-	-	-	-	-	9
	Jul-01	9.29	-	-	4	4	-	-	-	-	-	8
	Oct-01	10.54	-	-	4	6	-	-	-	-	-	10
	Jan-02	10.49	1	-	5	5	-	-	-	-	-	11
	Apr-02	10.20	-	-	2	4	-	-	-	-	-	6
	Aug-02	10.15	-	-	3	6	-	-	-	-	-	9
	Jan-03	Not Sampled										
	Jul-03	8.58	-	-	2	7	-	-	-	-	-	9
	Jan-04	7.75	-	-	3	14	-	-	-	-	-	17
	Jul-04	11.78	-	-	3	6	-	-	-	-	-	9
	Feb-05	9.06	-	-	5	20	-	-	-	-	-	25
	Aug-05	12.52	-	-	2	2	3	-	-	-	-	7
	Feb-06	6.35	-	-	15.6	14	1.1	-	-	-	1.2	31.9
	Sep-06	8.95	-	-	4.6	6.3	-	-	-	-	1.2	12.1
	Mar-07	11.88	-	-	2.0	2	-	-	-	-	5.0	9.0
RMW-16	Apr-01	8.73	-	3	2	4	-	2	-	-	-	11
	Jul-01	12.94	-	-	-	2	-	1	-	-	-	3
	Oct-01	15.31	-	6	-	6	-	2	-	-	-	14
	Jan-02	15.65	-	10	3	2	1	4	2	-	-	22
	Apr-02	15.00	-	6	-	4	-	3	-	-	-	13
	Aug-02	12.59	-	5	-	3	-	2	1	-	-	11
	Jan-03	10.95	-	3	1	4	-	1	-	-	-	9
	Jul-03	12.33	-	1	-	1	-	-	-	-	-	2
	Jan-04	11.41	-	3	1	4	-	-	-	-	-	8
	Jul-04	12.31	-	3	1	3	-	-	-	-	-	7
	Feb-05	11.50	-	3	3	4	-	-	-	-	-	10
	Aug-05	13.48	-	-	-	-	-	-	-	-	-	-
	Feb-06	9.22	-	2.1	2.8	3.8	-	-	-	-	-	8.7
	Sep-06	11.30	Not Sampled									
	Mar-07	13.75	Not Sampled									
SWPC			88	2,340	62,000	NE	96	NE	15,750	NE	14,100	
Proposed I/C VC			810	67	16,000	41,000	920	11,000	52	29,000	62	
Current I/C VC			3,820	540	50,000	50,000	6	NE	2	50,000	710	

TABLE 1
Former Fafnir Bearing
37 Booth Street, New Britain, Connecticut

Summary of Post Remediation Concentrations of Halogenated VOCs in Groundwater

Well ID	Date	Depth to Water (ft.)	PCE	TCE	111TCA	11DCA	11DCE	C12DCE	VC	CA	CFM	Total HVOCs
			ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb
RMW-17	Apr-01	13.26	-	-	-	4	-	-	-	-	-	4
	Jul-01	14.12	-	-	1	4	-	-	-	-	-	5
	Oct-01	14.93	-	-	-	4	-	-	-	-	-	4
	Jan-02	15.94	-	-	3	3	-	-	-	-	-	6
	Apr-02	14.72	-	-	-	3	-	-	-	-	-	3
	Aug-02	14.38	-	-	-	3	-	-	-	-	-	3
	Jan-03	13.83	-	-	2	1	-	-	-	-	-	3
	Jul-03	15.81	-	-	-	1	-	-	-	-	-	1
	Jan-04	13.78	-	-	-	-	-	-	-	-	-	-
	Jul-04	13.92	-	-	-	1	-	-	-	-	-	1
	Feb-05	13.87	-	-	-	1	-	-	-	-	-	1
	Aug-05	14.96	-	-	-	-	-	-	-	-	-	-
	Feb-06	13.71	-	-	-	1.1	-	-	-	-	-	-
	Sep-06	14.02	-	-	-	-	-	-	-	-	-	-
	Mar-07	14.43	-	-	-	-	-	-	-	-	-	-
RMW-18	Apr-01	16.23	-	-	17	13	-	11	-	-	-	41
	Jul-01	18.08	-	-	12	9	2	5	-	-	-	28
	Oct-01	19.17	-	-	5	6	-	-	-	-	-	11
	Jan-02	19.72	-	-	5	10	1	2	-	-	-	18
	Apr-02	18.82	-	-	6	10	1	2	-	-	-	19
	Aug-02	18.15	-	-	4	5	-	1	-	-	-	10
	Jan-03	17.03	-	-	5	6	-	2	-	-	-	13
	Jul-03	17.82	-	-	3	3	-	-	-	-	-	6
	Jan-04	17.25	-	-	3	5	-	-	-	-	-	8
	Jul-04	18.07	-	-	2	3	-	-	-	-	-	5
	Feb-05	17.08	-	-	19	11	2	5	-	-	-	37
	Aug-05	18.59	-	-	1	2	-	-	-	-	-	3
	Feb-06	16.30	-	-	1.4	2.5	-	-	-	-	-	3.9
	Sep-06	17.41	Not Sampled									
	Mar-07	18.25	Not Sampled									
RMW-19	Apr-01	14.48	-	-	-	-	-	-	-	-	4	4
	Jul-01	16.54	-	-	-	-	-	-	-	-	3	3
	Oct-01	17.31	-	-	-	-	-	-	-	-	4	4
	Jan-02	16.40	-	-	1	-	-	-	-	-	-	1
	Apr-02	16.50	-	-	-	-	-	-	-	-	-	-
	Aug-02	17.84	-	-	-	-	-	-	-	-	-	-
	Jan-03	15.24	-	-	-	-	-	-	-	-	-	-
	Jul-03	16.49	-	-	-	-	-	-	-	-	-	-
	Jan-04	15.82	-	-	-	-	-	-	-	-	-	-
	Jul-04	17.12	-	-	-	-	-	-	-	-	-	-
	Feb-05	16.08	-	-	-	-	-	-	-	-	-	-
	Aug-05	17.70	-	-	-	-	-	-	-	-	-	-
	Feb-06	15.71	-	-	-	-	-	-	-	-	2.6	2.6
	Sep-06	16.51	Not Sampled									
	Mar-07	16.48	Not Sampled									
SWPC			88	2,340	62,000	NE	96	NE	15,750	NE	14,100	
Proposed I/C VC			810	67	16,000	41,000	920	11,000	52	29,000	62	
Current I/C VC			3,820	540	50,000	50,000	6	NE	2	50,000	710	

TABLE 1
Former Fafnir Bearing
37 Booth Street, New Britain, Connecticut

Summary of Post Remediation Concentrations of Halogenated VOCs in Groundwater

Well ID	Date	Depth to Water (ft.)	PCE	TCE	111TCA	11DCA	11DCE	C12DCE	VC	CA	CFM	Total HVOCs
			ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb
RMW-20R	Jul-01	11.90	-	-	-	-	-	-	-	-	-	-
	Oct-01	12.23	-	-	-	-	-	-	-	-	6	6
	Jan-02	12.03	3	-	-	-	-	-	-	-	-	3
	Apr-02	11.95	-	-	-	-	-	-	-	-	-	-
	Aug-02	12.44	-	-	-	-	-	-	-	-	-	-
	Jan-03	11.36	-	-	-	-	-	-	-	-	-	-
	Jul-03	10.43	-	-	-	-	-	-	-	-	-	-
	Jan-04	7.70	-	-	-	-	-	-	-	-	-	-
	Jul-04	11.06	-	-	-	-	-	-	-	-	-	-
	Feb-05	8.71	-	-	-	-	-	-	-	-	-	-
	Aug-05	11.78	-	-	-	-	-	-	-	-	-	-
	Feb-06	8.32	-	-	-	-	-	-	-	-	-	-
	Sep-06	14.37	Not Sampled									
	Mar-07	14.14	Not Sampled									
RMW-21	Aug-05	18.13	-	-	-	-	-	-	-	-	-	-
	Feb-06	17.06	-	-	-	-	-	-	-	-	-	-
	Sep-06	17.91	Not Sampled									
	Mar-07	18.39	Not Sampled									
RMW-22	Aug-05	8.83	-	-	2	2	-	-	2	-	-	6
	Feb-06	7.04	-	1.7	2.4	2	-	-	-	-	1	7.1
	Sep-06	8.21	-	1	3.2	7.8	-	1	6.9	-	-	19.9
	Mar-07	8.61	-	-	-	3	-	-	-	-	-	3.0
RMW-23	Aug-05	8.81	34	-	955	599	81	83	152	560	-	2,464
	Feb-06	7.11	44.4	11	1,890	735	194	819	400	294	-	4,387
	Sep-06	7.78	83.2	-	2,830	770	174	614	378	178	-	5,027.2
	Mar-07	7.48	-	-	1,360	510	79	270	140	170	-	2,529.0
RMW-24	Aug-05	10.57	46	-	1,372	46	258	160	-	-	-	1,882
	Feb-06	8.22	32.8	8	1,890	111	193	342	2.8	2.8	2.6	2,585
	Sep-06	9.82	32.4	-	1,460	107	84.4	183	-	-	22.8	1,889.6
	Mar-07	10.16	-	-	1,840	75	85	210	-	-	-	2,210.0
RMW-25	Aug-05	3.73	20	6	377	60	59	15	7	9	-	553
	Feb-06	1.85	6	1.8	124	55.6	8.8	11.5	-	10.6	-	218
	Sep-06	2.62	Not Sampled									
	Mar-07	2.73	Not Sampled									
RMW-26	Aug-05	5.41	-	-	-	-	-	-	-	10	-	10
	Feb-06	2.55	-	-	-	-	-	-	-	-	-	-
	Sep-06	3.71	Not Sampled									
	Mar-07	3.69	Not Sampled									
RMW-27	Aug-05	10.76	-	-	-	-	-	-	-	13	-	13
	Feb-06	9.42	-	-	-	-	-	-	-	-	-	-
	Sep-06	10.28	Not Sampled									
	Sep-06	10.28	Not Sampled									
RMW-28	Aug-05	-	Not Installed									-
	Feb-06	12.28	-	-	-	-	-	-	-	-	-	-
	Sep-06	13.32	Not Sampled									
	Mar-07	13.42	Not Sampled									
RMW-29	Feb-06	15.72	-	-	2.1	3.6	-	-	-	-	-	5.7
	Sep-06	16.59	-	-	-	-	-	-	-	-	-	-
	Mar-07	16.18	-	-	-	-	-	-	-	-	-	-
SWPC			88	2,340	62,000	NE	96	NE	15,750	NE	14,100	
Proposed I/C VC			810	67	16,000	41,000	920	11,000	52	29,000	62	
Current I/C VC			3,820	540	50,000	50,000	6	NE	2	50,000	710	

I/C VC = Industrial/Commercial Volatilization Criteria
SWPC = Surface Water Protection Criteria
PCE = Tetrachloroethene
TCE = Trichloroethene
TCA = Trichloroethane
11DCA = 1,1 Dichlroroethane
11DCE = 1,1 Dichloroethene
C12DCE = cis 1,2 Dichloroethene
VC = vinyl chloride
CA = Chloroethane
CFM = Chloroform

TABLE 2
FORMER FAFNIR BEARING PLANT
37 BOOTH STREET, NEW BRITAIN, CT
HRP# NEW4914.RA

Summary of Soil Analytical Data From Northwest Area of Building

							Lab Report No.:	SA65115	SA65115	SA65115	SA65156	SA65156	SA65156	SA65156	SA65156
							Lab Sample No:	SA65115-01SITE	SA65115-02SITE	SA65115-03SITE	SA65156-02SITE	SA65156-03SITE	SA65156-04SITE	SA65156-05SITE	SA65156-06SITE
.	CAS #	Unit						TP-26	TP-26	TP-30	TP-34	TP-35	TP-38	TP-39	TP-40
Sample Depth (ft.)								(3.5')	(7')	(8')	(6-8')	(7-8')	(1-4')	(6-8')	(6-8')
Date Collected								7/13/2007	7/13/2007	7/13/2007	7/16/2007	7/16/2007	7/16/2007	7/16/2007	7/16/2007
Soil-Metals			DEP RDEC	DEP ICDEC	20X DEP GA PMC	20X DEP GB PMC									
Arsenic	7440-38-2	mg/kg	10	10	1	10		4.01	(<1.57)	1.82	8.2	NA	5.59	(<1.81)	2.83
Barium	7440-39-3	mg/kg	4700	140000	20	200		291	107	88.7	162	NA	182	141	135
Cadmium	7440-43-9	mg/kg	34	1000	0.1	1		1.69	(<0.522)	0.331	2.38	NA	1.62	0.646	1.36
Chromium, Total	7440-47-3	mg/kg	100	100	1	10		32.3	18.4	16.8	54.5	NA	64.9	19.2	38
Lead	7439-92-1	mg/kg	400	1000	0.3	3		146	12	16.3	203	NA	114	17.5	93.4
Mercury	7439-97-6	mg/kg	20	610	0.04	0.4		0.146	<0.0344	<0.0358	0.305	NA	0.248	<0.0354	0.173
Selenium	7782-49-2	mg/kg	340	10000	1	10		(<1.53)	(<1.57)	(<1.78)	3.04	NA	(<1.68)	(<1.81)	(<1.71)
Silver	7440-22-4	mg/kg	340	10000	0.72	7.2		42.2	53.9	71.3	69.5	NA	41.6	73.5	39.6
Soil-8270C	CAS #	Unit	DEP RDEC	DEP ICDEC	DEP GA PMC	DEP GB PMC									
1-Methylnaphthalene	90-12-0	ug/kg						<325	559	7250	<173	NA	<152	<182	<157
2-Methylnaphthalene	91-57-6	ug/kg	474000	2500000	980	9800		<325	573	10300	<173	NA	<152	<182	<157
Acenaphthene	83-32-9	ug/kg	1000000	2500000	8400	84000		658	<179	448	<173	NA	343	<182	453
Acenaphthylene	208-96-8	ug/kg	1000000	2500000	8400	84000		372	<179	<186	<173	NA	<152	<182	<157
Anthracene	120-12-7	ug/kg	1000000	2500000	40000	400000		1980	<179	<186	240	NA	1480	231	1790
Benzo(a)anthracene	56-55-3	ug/kg	1000	7800	1000	1000		6490	184	<186	604	NA	2080	490	3670
Benzo(a)pyrene	50-32-8	ug/kg	1000	1000	1000	1000		5490	<179	<186	624	NA	2860	499	4010
Benzo(b)fluoranthene	205-99-2	ug/kg	1000	7800	1000	1000		4630	<179	<186	470	NA	2500	490	3340
Benzo(ghi)perylene	191-24-2	ug/kg	1000000	2500000	4200	42000		2650	<179	<186	308	NA	1900	264	1600
Benzo(k)fluoranthene	207-08-9	ug/kg	8400	78000	1000	1000		5060	<179	<186	508	NA	2620	475	3670
Chrysene	218-01-9	ug/kg	84000	780000	1000	1000		5850	220	<186	586	NA	3280	583	4070
Dibenzo(a,H)anthracene	53-70-3	ug/kg	1000	1000	1000	1000		746	<179	<186	<173	NA	447	<182	418
Fluoranthene	206-44-0	ug/kg	1000000	2500000	5600	56000		11600	390	<186	1150	NA	6610	1150	8090
Fluorene	86-73-7	ug/kg	1000000	2500000	5600	56000		691	<179	742	<173	NA	376	<182	464
Indeno(1,2,3-cd)pyrene	193-39-5	ug/kg	1000	7800	1000	1000		3260	<179	<186	350	NA	1980	304	1880
Naphthalene	91-20-3	ug/kg	1000000	2500000	5600	56000		<325	654	<186	<173	NA	<152	<182	<157
Phenanthrene	85-01-8	ug/kg	1000000	2500000	4000	40000		7470	349	1690	511	NA	3780	566	4500
Pyrene	129-00-0	ug/kg	1000000	2500000	4000	40000		12900	385	267	969	NA	6230	924	6850
Soil-8260B	CAS #	Unit	DEP RDEC	DEP ICDEC	DEP GA PMC	DEP GB PMC									
1,1,1,2-Tetrachloroethane	630-20-6	ug/kg	24000	220000	20	200		<8.7	(<706)	(<75.2)	(<132)	(<96.2)	(<123)	(<253)	(<123)
1,1,2,2-Tetrachloroethane	79-34-5	ug/kg	3100	29000	10	100		<8.7	(<706)	(<75.2)	(<132)	(<96.2)	(<123)	(<253)	(<123)
1,1,2-Trichloroethane	79-00-5	ug/kg	11000	100000	100	1000		<8.7	(<706)	<75.2	(<132)	<96.2	(<123)	(<253)	(<123)
1,1-Dichloroethylene	75-35-4	ug/kg	1000	9500	140	1400		<8.7	(<706)	<75.2	<132	<96.2	<123	(<253)	<123
1,2,4-Trimethylbenzene	95-63-6	ug/kg	500000	1000000	7000	70000		<8.7	2550	<75.2	<132	1330	<123	552	<123
1,2-Dibromo-3-chloropropane	96-12-8	ug/kg	440	4100	NE	NE		<17.4	(<1410)	<150	<264	<192	<245	(<506)	<246
1,2-Dibromoethane (EDB)	106-93-4	ug/kg	7	67	10	100		(<8.7)	(<706)	(<75.2)	(<132)	(<96.2)	(<123)	(<253)	(<123)
1,2-Dichloroethane	107-06-2	ug/kg	6700	63000	20	200		<8.7	(<706)	(<75.2)	(<132)	(<96.2)	(<123)	(<253)	(<123)
1,2-Dichloropropane	78-87-5	ug/kg	9000	84000	100	1000		<8.7	(<706)	<75.2	(<132)	<96.2	(<123)	(<253)	(<123)
4-Isopropyltoluene / p-Isopropyltoluene	99-87-6	ug/kg	500000	1000000	600	14000		<8.7	3660	<75.2	790	1530	<123	<253	<123
Acrylonitrile	107-13-1	ug/kg	1100	11000	10	100		<8.7	(<706)	(<75.2)	(<132)	(<96.2)	(<123)	(<253)	(<123)
Benzene	71-43-2	ug/kg	21000	200000	20	200		<8.7	(<706)	(<75.2)	(<132)	(<96.2)	(<123)	(<253)	(<123)
Bromodichloromethane	75-27-4	ug/kg	9900	92000	11	110		<8.7	(<706)	(<75.2)	(<132)	(<96.2)	(<123)	(<253)	(<123)
Bromoform	75-25-2	ug/kg	78000	720000	80	800		<8.7	(<706)	<75.2	(<132)	(<96.2)	(<123)	(<253)	(<123)
Bromomethane	74-83-9	ug/kg	95000	1000000	200	2000		<17.4	(<1410)	<150	(<264)	<192	(<245)	(<506)	(<246)
Carbon tetrachloride	56-23-5	ug/kg	4700	44000	100	1000		<8.7	(<706)	<75.2	(<132)	<96.2	(<123)	(<253)	(<123)
Chloroform	67-66-3	ug/kg	100000	940000	120	1200		<8.7	(<706)	<75.2	(<132)	<96.2	(<123)	(<253)	(<123)
Chloromethane	74-87-3	ug/kg	47000	440000	54	540		<17.4	(<1410)	(<150)	(<264)	(<192)	(<245)	(<506)	(<246)
Dibromochloromethane	124-48-1	ug/kg	7300	68000	10	100		<8.7	(<706)	(<75.2)	(<132)	(<96.2)	(<123)	(<253)	(<123)
Isopropylbenzene	98-82-8	ug/kg	500000	1000000	600	132000		<8.7	741	509	447	810	<123	1410	<123
Methyl Isobutyl Ketone (MIBK)	108-10-1	ug/kg	500000	1000000	7000	14000		<86.8	(<7060)	<752	<1320	<962	<1230	<2530	<1230
Methylene chloride	75-09-2	ug/kg	82000	760000	100	1000		<86.8	(<7060)	(<752)	(<1320)	(<962)	(<1230)	(<2530)	(<1230)
Naphthalene	91-20-3	ug/kg	1000000	2500000	5600	56000		<8.7	1040	<75.2	<132	<96.2	<123	<253	<123
n-Butylbenzene	104-51-8	ug/kg	500000	1000000	1400	14000		<8.7	4390	1440	6800	4930	168	2690	<123
n-Propylbenzene	103-65-1	ug/kg	500000	1000000	1400	14000		<8.7	2010	1610	1170	1850	<123	3320	<123
sec-Butylbenzene	135-98-8	ug/kg	500000	1000000	1400	14000		<8.7	2070	931	3380	3060	147	2860	<123
tert-Butylbenzene	98-06-6	ug/kg	500000	1000000	1400	14000		<8.7	<706	83.5	452	385	<123	405	<123
Tetrachloroethylene	127-18-4	ug/kg	12000	110000	100	1000		<8.7	(<706)	<75.2	(<132)	<96.2	(<123)	(<253)	(<123)
Trichloroethylene	79-01-6	ug/kg	56000	520000	100	1000		<8.7	(<706)	<75.2	(<132)	<96.2	(<123)	(<253)	(<123)
Vinyl chloride	75-01-4	ug/kg	320	3000	40	400		<8.7	(<706)	(<75.2)	(<132)	(<96.2)	(<123)	(<253)	(<123)

TABLE 2
FORMER FAFNIR BEARING PLANT
37 BOOTH STREET, NEW BRITAIN, CT
HRP# NEW4914.RA

Summary of Soil Analytical Data From Northwest Area of Building

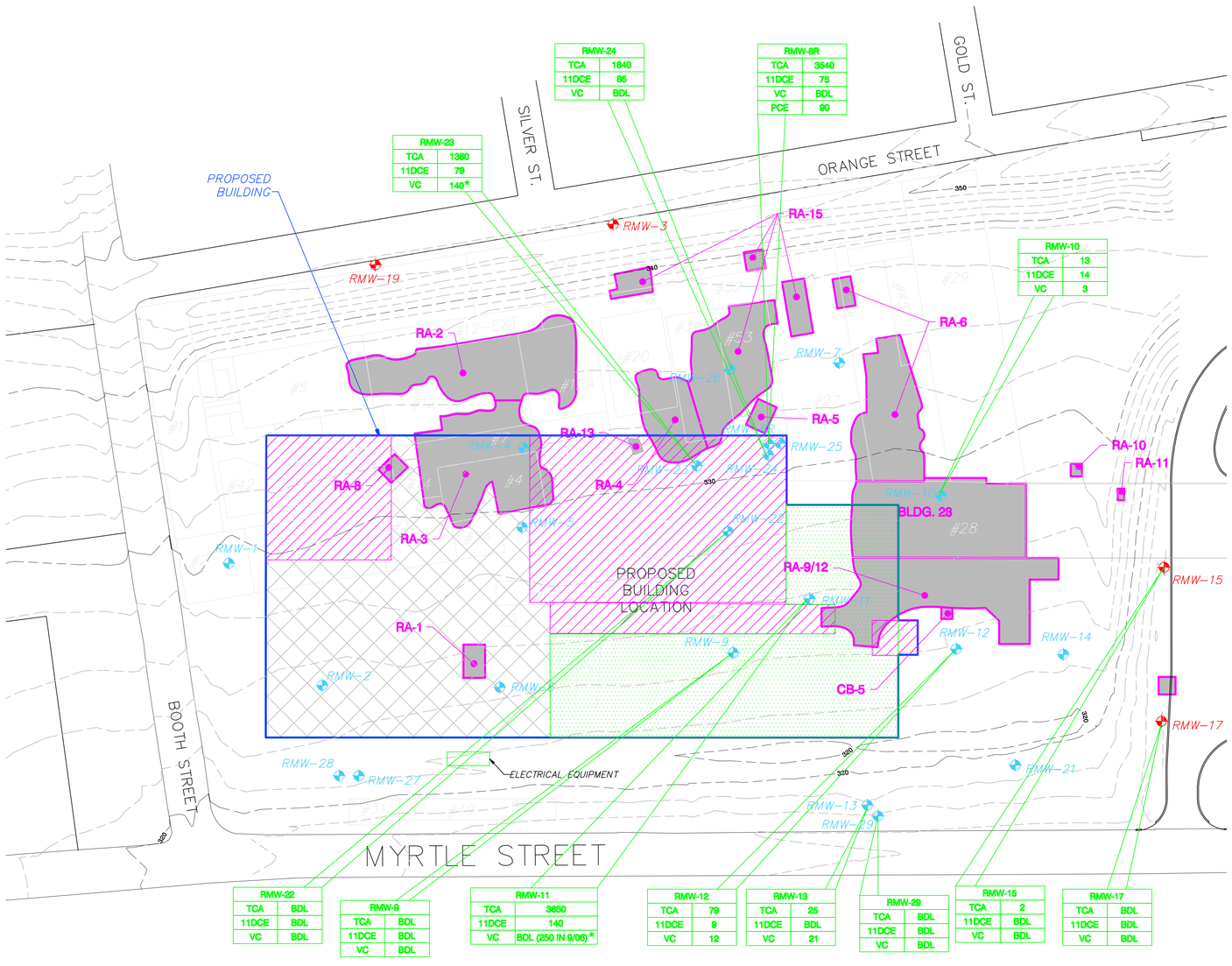
							Lab Report No.:	SA65115	SA65115	SA65115	SA65156	SA65156	SA65156	SA65156	SA65156	
							Lab Sample No:	SA65115-01SITE	SA65115-02SITE	SA65115-03SITE	SA65156-02SITE	SA65156-03SITE	SA65156-04SITE	SA65156-05SITE	SA65156-06SITE	
.	CAS #	Unit						TP-26	TP-26	TP-30	TP-34	TP-35	TP-38	TP-38	TP-40	TP-40 (6-8') Sample Reanalysis
Sample Depth (ft.)								(3.5')	(7')	(8')	(6-8')	(7-8')	(1-4')	(6-8')	(6-8')	
Date Collected								7/13/2007	7/13/2007	7/13/2007	7/16/2007	7/16/2007	7/16/2007	7/16/2007	7/16/2007	
Soil-8260B-SPLP	CAS #	Unit	.	.	10X GWPC	.										
1,1,1,2-Tetrachloroethane	630-20-6	ug/l			10			NA	<5.0	<1.0	<1.0	<5.0	<1.0	<1.0	<10.0	<1.0
1,1,2,2-Tetrachloroethane	79-34-5	ug/l			5			NA	<5.0	<1.0	<1.0	<5.0	<1.0	<1.0	(<10)	<1.0
1,1,2-Trichloroethane	79-00-5	ug/l			50			NA	<5.0	<1.0	<1.0	<5.0	<1.0	<1.0	<10.0	<1.0
1,1-Dichloroethylene	75-35-4	ug/l			70			NA	<5.0	<1.0	<1.0	<5.0	<1.0	<1.0	<10.0	<1.0
1,2,4-Trimethylbenzene	95-63-6	ug/l			3500			NA	357	6.3	<1.0	11.4	4.6	<1.0	89.3	<1.0
1,2-Dibromo-3-chloropropane	96-12-8	ug/l			NE			NA	<5.0	<1.0	<1.0	<5.0	<1.0	<1.0	<10.0	<1.0
1,2-Dibromoethane (EDB)	106-93-4	ug/l			0.5			NA	(<5)	(<1)	(<1)	(<5)	(<1)	(<1)	(<10)	<1.0
1,2-Dichloroethane	107-06-2	ug/l			10			NA	<5.0	<1.0	<1.0	<5.0	<1.0	<1.0	<10.0	<1.0
1,2-Dichloropropane	78-87-5	ug/l			50			NA	<5.0	<1.0	<1.0	<5.0	<1.0	<1.0	<10.0	<1.0
4-Isopropyltoluene / p-Isopropyltoluene	99-87-6	ug/l			300			NA	31.5	1.3	14.4	12	2	1.8	495	<1.0
Acetone	67-64-1	ug/l			7000			NA	<100	<20.0	<20.0	<100	<20.0	24	<200	<20
Acrylonitrile	107-13-1	ug/l			5			NA	<5.0	<1.0	<1.0	<5.0	<1.0	<1.0	(<10)	<1.0
Benzene	71-43-2	ug/l			10			NA	<5.0	<1.0	<1.0	<5.0	<1.0	<1.0	<10.0	<1.0
Bromodichloromethane	75-27-4	ug/l			5.6			NA	<5.0	<1.0	<1.0	<5.0	<1.0	<1.0	(<10)	<1.0
Bromoform	75-25-2	ug/l			40			NA	<5.0	<1.0	<1.0	<5.0	<1.0	<1.0	<10.0	<1.0
Bromomethane	74-83-9	ug/l			98			NA	<10.0	<2.0	<2.0	<10.0	<2.0	<2.0	<20.0	<2
Carbon tetrachloride	56-23-5	ug/l			50			NA	<5.0	<1.0	<1.0	<5.0	<1.0	<1.0	<10.0	<1.0
Chloroform	67-66-3	ug/l			60			NA	<5.0	<1.0	<1.0	<5.0	<1.0	<1.0	<10.0	<1.0
Chloromethane	74-87-3	ug/l			27			NA	<5.0	<1.0	<1.0	<5.0	<1.0	<1.0	<10.0	<1.0
Dibromochloromethane	124-48-1	ug/l			5			NA	<5.0	<1.0	<1.0	<5.0	<1.0	<1.0	(<10)	<1.0
Hexachlorobutadiene	87-68-3	ug/l			4.5			NA	(<5)	<1.0	<1.0	(<5)	<1.0	<1.0	(<10)	<1.0
Isopropylbenzene	98-82-8	ug/l			300			NA	9.4	13.3	7.1	10.2	3.3	<1.0	25.3	<1.0
Methyl isobutyl ketone (MIBK)	108-10-1	ug/l			3500			NA	<50.0	<10.0	<10.0	<50.0	<10.0	<10.0	<100	<1.0
Methylene chloride	75-09-2	ug/l			50			NA	<25.0	5.2	11	<25.0	10.2	6.6	<50.0	5.1
Naphthalene	91-20-3	ug/l			2800			NA	59.9	2.6	<1.0	<5.0	1.3	<1.0	<10.0	<1.0
n-Butylbenzene	104-51-8	ug/l			610			NA	<50.0	16.2	82.2	<50.0	7	1.3	44.5	<1.0
n-Propylbenzene	103-65-1	ug/l			610			NA	20.8	29.8	15.4	17.1	6.4	<1.0	39.3	<1.0
sec-Butylbenzene	135-98-8	ug/l			610			NA	14.5	12.1	36	20	7.6	3.3	38.4	2.2
tert-Butylbenzene	98-06-6	ug/l			610			NA	<5.0	1.5	5.6	<5.0	1.2	<1.0	<10.0	<1.0
Tetrachloroethylene	127-18-4	ug/l			50			NA	<5.0	<1.0	<1.0	<5.0	<1.0	<1.0	<10.0	<1.0
Trichloroethylene	79-01-6	ug/l			50			NA	<5.0	<1.0	<1.0	<5.0	<1.0	<1.0	<10.0	<1.0
Vinyl chloride	75-01-4	ug/l			20			NA	<5.0	<1.0	<1.0	<5.0	<1.0	<1.0	<10.0	<1.0
Soil-Misc	CAS #	Unit	DEP RDEC	DEP ICDEC	DEP GA PMC	DEP GB PMC										
Aroclor 1262	37324-23-5	ug/kg						<30.8	<34.1	<34.5	<35.8	NA	<32.1	<34.4	<33.5	
Aroclor 1268	11100-14-4	ug/kg						<30.8	<34.1	<34.5	<35.8	NA	<32.1	<34.4	<33.5	
Aviation Fuel	Aviation Fuel	mg/kg	500	2500	500	2500		<32.5	<35.7	<37.2	<34.7	NA	<30.5	<36.3	<31.5	
C9 - C36 Aliphatic Hydrocarbons	AC9-C36ALIP	mg/kg	500	2500	500	2500		431	1800	2750	230	NA	293	443	518	
Fuel Oil #2	68476-30-2	mg/kg	500	2500	500	2500		<32.5	<35.7	<37.2	<34.7	NA	<30.5	<36.3	<31.5	
Fuel Oil #4	68476-31-3	mg/kg	500	2500	500	2500		<32.5	<35.7	<37.2	<34.7	NA	<30.5	<36.3	<31.5	
Fuel Oil #6	68553-00-4	mg/kg	500	2500	500	2500		<32.5	<35.7	<37.2	<34.7	NA	<30.5	<36.3	<31.5	
Gasoline	8006-61-9	mg/kg	500	2500	500	2500		<32.5	<35.7	<37.2	<34.7	NA	<30.5	<36.3	<31.5	
Motor Oil	Motor Oil	mg/kg	500	2500	500	2500		<32.5	<35.7	<37.2	<34.7	NA	<30.5	<36.3	<31.5	
Other Oil	Other Oil (Spectrum CT ETPH)	mg/kg	500	2500	500	2500		<32.5	<35.7	<37.2	<34.7	NA	<30.5	<36.3	<31.5	
PCB-1016	12674-11-2	ug/kg						<30.8	<34.1	<34.5	<35.8	NA	<32.1	<34.4	<33.5	
PCB-1221	11104-28-2	ug/kg						<30.8	<34.1	<34.5	<35.8	NA	<32.1	<34.4	<33.5	
PCB-1232	11141-16-5	ug/kg						<30.8	<34.1	<34.5	<35.8	NA	<32.1	<34.4	<33.5	
PCB-1242	53469-21-9	ug/kg						<30.8	<34.1	<34.5	<35.8	NA	<32.1	<34.4	<33.5	
PCB-1248	12672-29-6	ug/kg						<30.8	<34.1	<34.5	<35.8	NA	<32.1	<34.4	<33.5	
PCB-1254	11097-69-1	ug/kg						<30.8	<34.1	<34.5	<35.8	NA	<32.1	<34.4	<33.5	
PCB-1260	11096-82-5	ug/kg						900	<34.1	<34.5	<35.8	NA	<32.1	<34.4	<33.5	
solids (percent)	solids	%						91.9	84.7	82.7	82.2	NA	88.7	82.4	86	
Total Petroleum Hydrocarbons	8012-95-1	mg/kg	500	2500	500	2500		431	1800	2750	230	NA	293	443	518	
Unidentified	Unidentified (Spectrum CT ETPH	mg/kg	500	2500	500	2500		431	1800	2750	230	NA	293	443	518	
PCBs-Total		ug/kg	1000	10000	0.5	5		900	<238.7	<241.5	<250.6	NA	<224.7	<240.8	<234.5	

Notes:
Shaded Cells indicate exceedances of one or more of the listed standards.
The Lab Sample No. is the merging of the Lab Sample ID and the Lab Sample Type.
* Chromium DEC standards as shown are for Hexavalent Chromium.

DEP RDEC = CT DEP Residential Direct Exposure Criteria
DEP ICDEC = CT DEP Industrial/Commercial Direct Exposure Criteria
DEP GA PMC = CT DEP GA Pollutant Mobility Criteria
DEP GB PMC = CT DEP GB Pollutant Mobility Criteria

NA = Not Submitted for analysis
NE = Not Established by CT DEP
mg/kg = milligrams per kilogram
ug/kg = micrograms per kilograms
ug/L = micrograms per liter
( ) = Indicates the stated minimum detectable level exceeds an RSR criteria.

FIGURES



North

LEGEND

- –MONITORING WELL
- –MONITORING WELL REMOVED TO ACCOMODATE FOR SITE REDEVELOPMENT
- **320** –SURFACE ELEVATION
- –FORMER REMEDIATION AREAS
- #31 –FORMER BUILDING
- –BUILDING
- –EXTENT OF SSD SYSTEM AGGREGATE AND VAPOR BARRIER
- –EXTENT OF FREEZER AREA SLAB CONSTRUCTION AND VAPOR BARRIER
- –EXTENT OF OFFICE, PROCESS AND OTHER AREAS VAPOR BARRIER
- –SURFACE ELEVATION CONTOURS PRIOR TO SITE REDEVELOPMENT (2' INTERVAL)
- * –CONCENTRATION IN GROUNDWATER EXCEEDS THE PROPOSED INDUSTRIAL/COMMERCIAL VOLATILIZATION CRITERIA.

NOTES:

- THE TABULATED DATA SHOWN INDICATES CONCENTRATIONS IN GROUNDWATER AS REPORTED FROM THE MARCH 2007 GROUNDWATER MONITORING EVENT UNLESS OTHERWISE NOTED.
- EXTENTS OF VAPOR BARRIER & SSD SYSTEM ARE BASED UPON RESULTS OF HISTORICAL ENVIRONMENTAL INVESTGIATIONS AND ASSESSMENTS THAT IDENTIFIED RELEASE AREAS THAT POSE A POTENTIAL RISK OF VAPOR INTRUSION. THE SSD AND VAPOR BARRIERS ARE INSTALLED TO MITIGATE THIS POTENTIAL RISK AND EXTEND BEYOND THE RELEASE AREAS TO ENSURE ADEQUATE PROTECTION FROM GROUNDWATER AND SOIL CONTAMINATION.
- THE NEED TO OPERATE THE SSD SYSTEM WILL BE DETERMINED THROUGH SOILGAS TESTING AFTER CONSTRUCTION OF THE BUILDING IS COMPLETE.

ABBREVIATIONS:
TCA – TRICHLOROETHANE
11DCE – 1,1–DICHLOROETHYLENE
VC – VINYL CHLORIDE
PCE – TETRACHLOROETHYLENE
BDL – BELOW DETECTABLE LIMITS

DRAFT

1" = 50'
50 0 25 50 100
APPROXIMATE SCALE IN FEET

REVISIONS

NO.	DATE	DESCRIPTION

SITE PLAN WITH REMEDIAL AREAS, PROPOSED BUILDING LOCATION AND EXISTING MONITORING WELLS

THE CITY OF NEW BRITAIN
FORMER FAFNIR BEARING
37 BOOTH STREET
NEW BRITAIN, CONNECTICUT

HRP Associates, Inc.
Environmental/Civil Engineering & Hydrogeology
Creating the Right Solutions Together
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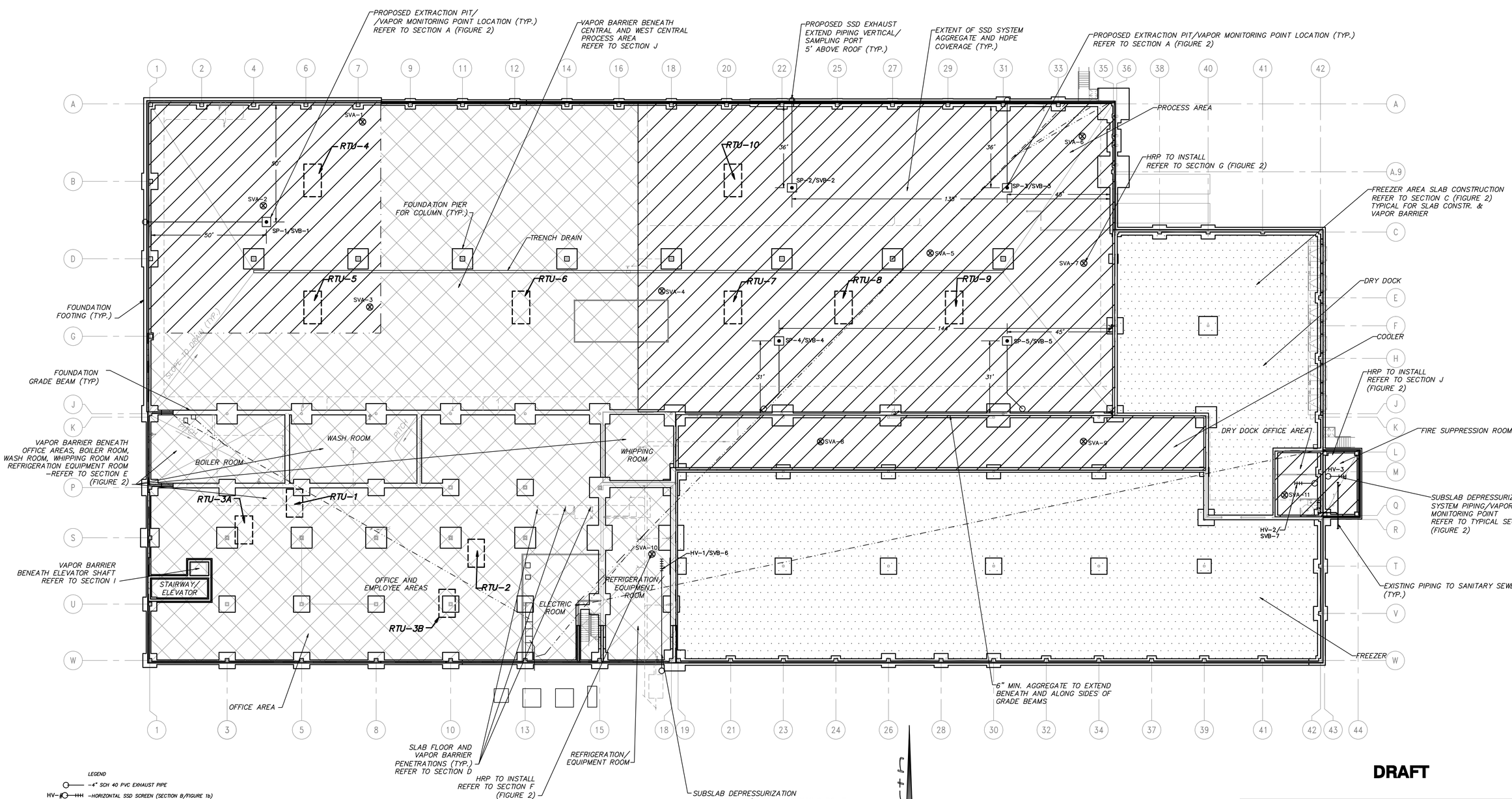
Ph:(860)674-9570 Fax:(860)674-9624
www.hrpassociates.com

SK DESIGNED	HSH APPROVED	1" = 50'± SCALE
FMS/BB DRAWN	8/7/07 DATE	PLATE A SHEET NO.
SK CHECKED	NEW4914.RA PROJECT NO.	



LEGEND

- –4" SCH 40 PVC EXHAUST PIPE
- HV–# –HORIZONTAL SSD SCREEN (SECTION B/FIGURE 1b)
- SP–# –PROPOSED PIT LOCATION
- SVB–# –PROPOSED VACUUM/SAMPLE POINT LOCATION – BELOW VAPOR BARRIER
- SVA–# –PROPOSED VACUUM/SAMPLE POINT LOCATION – ABOVE VAPOR BARRIER
- RTU –ROOFTOP AIR HANDLING UNIT (AIR INTAKES)
- –EXTENT OF SSD SYSTEM AND VAPOR BARRIER (10 MIL HDPE–GRIFFALYN®TYPE–65G)
- –EXTENT OF FREEZER AREA SLAB CONSTRUCTION AND VAPOR BARRIER (20 MIL HDPE–PERMALON®PLY X–210G)
- –EXTENT OF OFFICE AREA AND PROCESS AREA VAPOR BARRIER (20 MIL HDPE–PERMALON®PLY X–210G)
- –UNDERGROUND SANITARY/WASTEWATER LINES
- –UNDERGROUND ELECTRICAL LINES

NOTES:

- FOOTING TYPE FOUNDATION WALLS INCLUDE EXTERIOR, STAIRWELL/ELEVATOR AND FIRE SUPRESSION ROOM.
- GRADE BEAM TYPE FOUNDATION WALLS INCLUDE ALL REMAINING INTERIOR WALLS.

MAP REFERENCES:

1. BUILDING PLAN WAS OBTAINED FROM TRANSYSTEMS OF YORK, PA.
2. FOUNDATION PLAN OBTAINED FROM TRANSYSTEMS OF YORK, PA; TITLED "OVERALL FOUNDATION PLAN", SHEET NO. S–101, SCALE 1/16" = 1'–0"; DATED 05/15/07; PROJECT NUMBER P704070041.

20 0 10 20
APPROXIMATE SCALE (1" = 20')

DRAFT

REVISIONS

NO.	DATE	DESCRIPTION

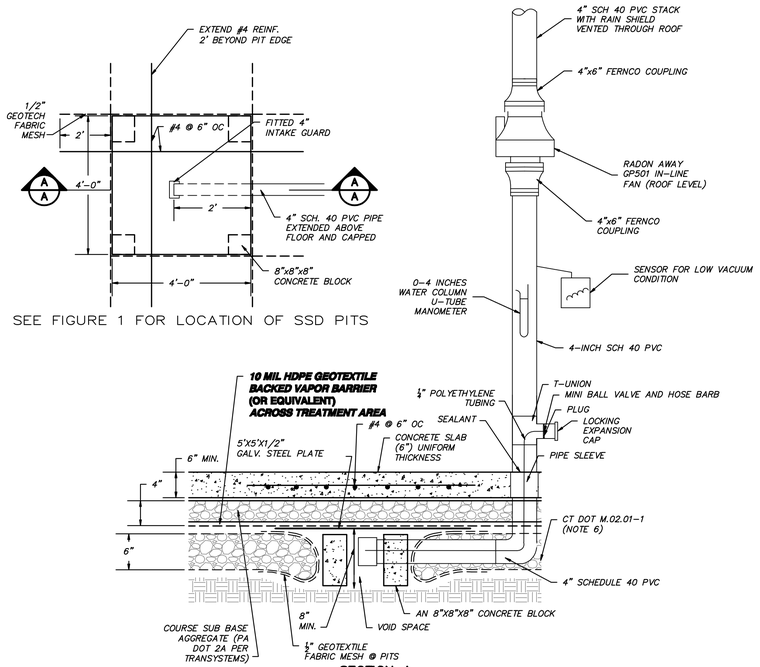
BUILDING PLAN WITH VAPOR BARRIER AND SUB-SLAB DEPRESSURIZATION SYSTEM DESIGN LAYOUT

CELEBRATION FOODS FORMER FAFNER BEARING

37 BOOTH ST.
NEW BRITAIN, CONNECTICUT

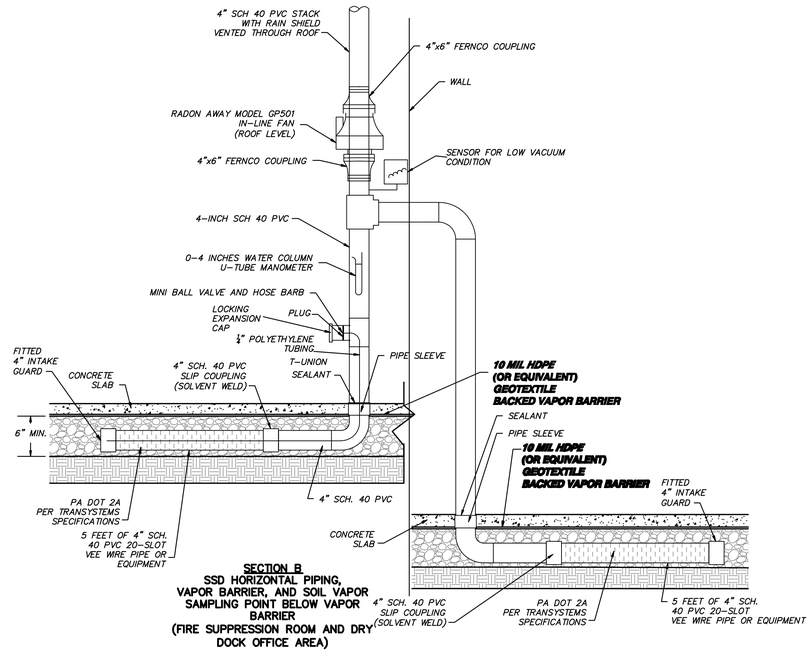
HRP Associates, Inc.
Environmental/Civil Engineering & Hydrogeology
Creating the Right Solutions Together
Connecticut, New York, Pennsylvania, South Carolina
197 Scott Swamp Road
Farmington, Connecticut 06032
Ph:(860)674-9570 Fax:(860)674-9824
www.hrpassociates.com

CLA DESIGNED	CLA APPROVED	1" = 20' SCALE	
DML DRAWN	JUNE 2007 DATE		FIG. 1
CLA CHECKED	NEW4914.RA PROJECT NO.		SHEET NO.

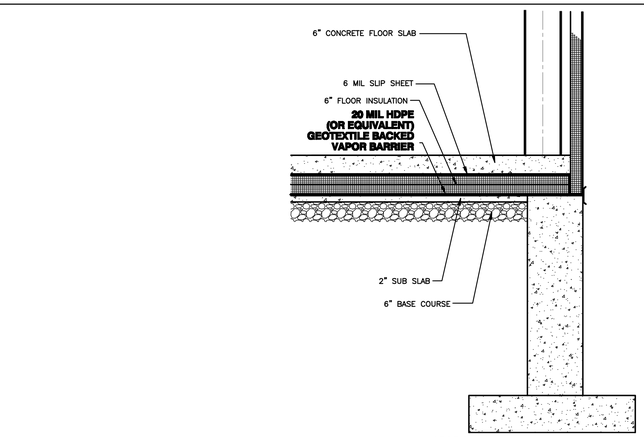


SEE FIGURE 1 FOR LOCATION OF SSD PITS

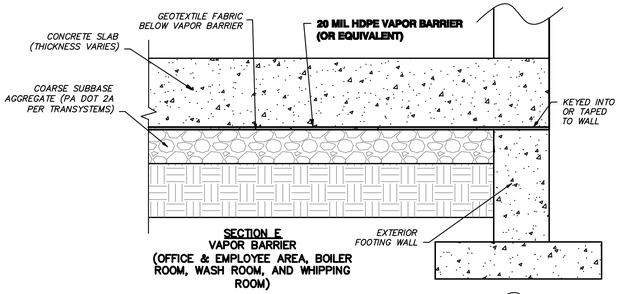
SECTION A
SSD PIT (TYPICAL), VAPOR BARRIER, AND SOIL VAPOR SAMPLING POINT BELOW VAPOR BARRIER (NORTHWEST PROCESS AREA, COOLER, AND NORTHEAST PROCESS AREA)



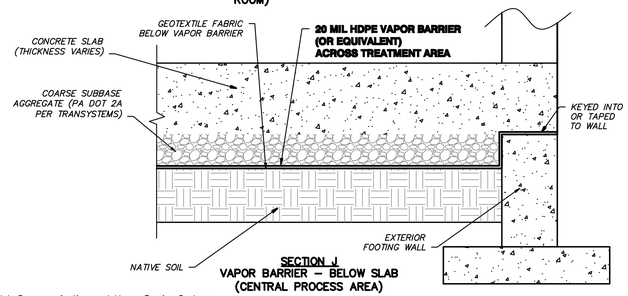
SECTION B
SSD HORIZONTAL PIPING, VAPOR BARRIER, AND SOIL VAPOR SAMPLING POINT BELOW VAPOR BARRIER (FIRE SUPPRESSION ROOM AND DRY DOCK OFFICE AREA)



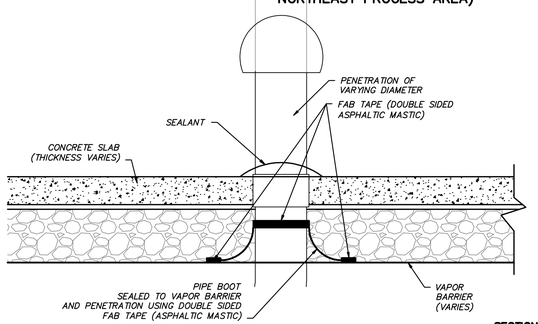
SECTION C
INSULATED SLAB FLOOR AND VAPOR BARRIER (FREEZER & DOCK AREA)



SECTION E
VAPOR BARRIER (OFFICE & EMPLOYEE AREA, BOILER ROOM, WASH ROOM, AND WHIPPING ROOM)

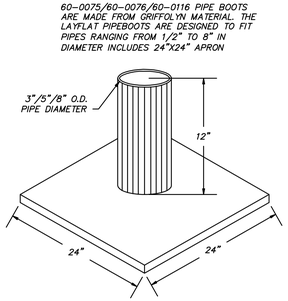


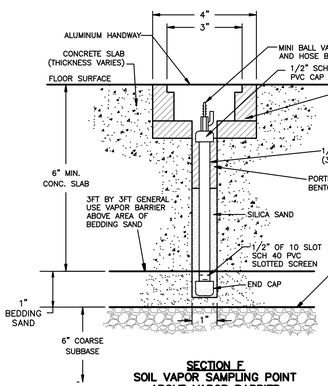
SECTION J
VAPOR BARRIER – BELOW SLAB (CENTRAL PROCESS AREA)



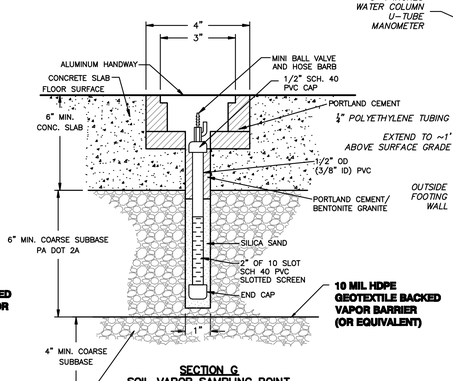
SECTION D
VAPOR BARRIER AT PENETRATIONS (TYP.)

PIPE BOOT: REEF INDUSTRIES PART NO. 60-0075/60-0076/60-0116 PIPE BOOTS ARE MADE FROM GRIFFOLYN MATERIAL. THE LAYFLAT PIPEBOOTS ARE DESIGNED TO FIT PIPES RANGING FROM 1/2" TO 8" IN DIAMETER INCLUDES 24"X24" APRON

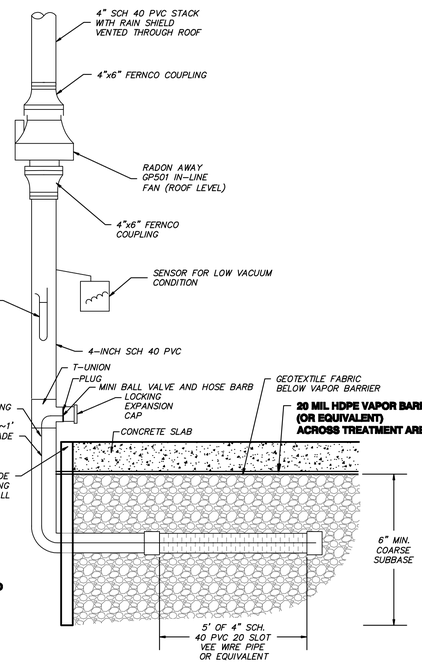




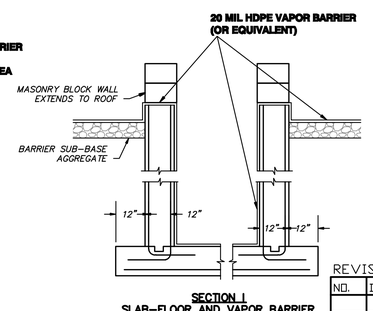
SECTION F
SOIL VAPOR SAMPLING POINT ABOVE VAPOR BARRIER (REFRIGERATION EQUIPMENT ROOM, FIRE SUPPRESSION ROOM AND DRY DOCK OFFICE AREA)



SECTION G
SOIL VAPOR SAMPLING POINT ABOVE VAPOR BARRIER (PROCESS AREA/SSD SYSTEM)



SECTION H
SSD HORIZONTAL PIPING, VAPOR BARRIER, AND SOIL VAPOR SAMPLING POINT BELOW VAPOR BARRIER (REFRIGERATION EQUIPMENT ROOM)



SECTION I
SLAB-FLOOR AND VAPOR BARRIER (WEST ELEVATOR SHAFT)

Notes on Sub-Slab Depressurization and Vapor Barrier System

1. The sub-slab depressurization (SSD) system consists of a crushed stone venting layer installed beneath a geotextile-backed HDPE vapor barrier and 4 low air pressure suction pits installed beneath the northeast portion of the proposed building and one suction pit beneath the northeast portion of the proposed building. The pits measures 4-feet square by 8-inches deep.
2. Install 4-inch sched. 40 PVC pipe in the center of the pit as shown on detail. Run pipe horizontally through the crushed aggregate installed below the concrete floor slab.
3. Extend the 4-inch sched. 40 PVC pipe vertically to above floor at a column or wall and cap. **Limit of total pipe length below slab to 40-ft, with a maximum of three 90-degree bends.** The horizontal section of pipe may exit the suction pit in any direction so as to minimize bends and make it easier to reach a pipe chase, column or other location suitable for vertical venting.
4. Seal all penetrations, joints, cracks, or other openings in the floor slab to prevent short-circuiting of the SSD system w/rope caulk or other approved caulk.
5. Future work may require the extension of the pipe so that the exhaust vent is a minimum of 25-feet from any air intake, window, or building entry point and extends no less than 5-feet above the roof. The maximum final pipe run shall be no more than 75-ft with a maximum of four 90-degree bends. A rain shield would be required at the top of the 4-inch vent.
6. Venting Layer Below Slab: Install and compact 6-inches **¾"** washed, crushed stone as a venting layer. This material shall conform to Section M.02.01 – 1 of Connecticut DOT Form 816, as amended, with the exception that the gradation shall conform to M.01.01 Gradation Table No.6. Extend the stone venting layer beneath the suction pit location. The concrete slab above the pit shall be appropriately supported.
7. Install a 10 or 20 mil geotextile backed HDPE vapor barrier where specified above the venting layer. Vapor barrier shall be keyed to foundation walls or wrapped up at wall and taped. **HDPE seams shall be overlapped a minimum of 1-foot and shall be installed over the top of interior footing walls, grade beams and column footings.** An equivalent to geotextile backed HDPE includes, but not limited to, HDPE liner and seperate non-woven geotextile.
8. At suction pit, wrap venting layer (exposed in suction pit) with ½" geotech fabric mesh to prevent migration of venting layer materials into suction pit.
9. **Seal all penetrations through the vapor barrier with an approved taping or jointing material. Duct tape and/or other general use tape is NOT acceptable!**
10. Comply with Federal and Local fire codes when installing the SSD system.
11. Submit for approval product specifications and literature on the following: vapor barrier, jointing tape, pipe, fittings, fan, alarm, manometer and crushed stone.
12. Vapor barriers will be inspected and smoke tested prior intallation of overlying materials. In general, access beneath the vapor for smoke tests will be at seams or along unsealed edges.
13. Any changes to the installation plan (design, specifications and details) must be approved by the CT DEP.

DRAFT

REVISIONS

NO.	DATE	DESCRIPTION

SUBSLAB DEPRESSURIZATION AND VAPOR BARRIER SYSTEM DETAILS

CELEBRATION FOODS FORMER FAFNER BEARING

37 BOOTH STREET NEW BRITAIN, CONNECTICUT

HRP Associates, Inc.
Environmental/Civil Engineering & Hydrogeology
Creating the Right Solutions Together
Connecticut, New York, Pennsylvania, South Carolina
197 Scott Swamp Road
Farmington, Connecticut 06032
Ph:(860)674-9570 Fax:(860)674-9824
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EJB	SK	
DESIGNED	APPROVED	SCALE: NOT TO SCALE
BOB	SEPT., 2007	
DRAWN	DATE	FIG. 2
TJM	NEW4914.RA	
CHECKED	PROJECT NO.	SHEET NO.

APPENDIX A
Owner-Occupant Acknowledgment Letter

August 6, 2008

Mr. Peter Hill
Permitting, Enforcement and Remediation Division
Connecticut Department of Environmental Protection
79 Elm Street
Hartford, CT 06106

RE: ACKNOWLEDGEMENT OF A SUB-SLAB DEPRESSURIZATION SYSTEM, FORMER TORRINGTON COMPANY FACILITY, 263 MYRTLE STREET (FORMERLY 37 BOOTH STREET), NEW BRITAIN, CONNECTICUT

Dear Mr. Hill:

A shallow ground water plume of volatile organic compounds (VOC) exists beneath the eastern section of the proposed building to be occupied by Celebration Foods at the above referenced site. This plume has adversely impacted the ground water quality of the site in this area and certain VOC constituents detected in the ground water (i.e. tetrachloroethene, trichloroethane, 1,1,1-trichloroethane, 1,1-dichloroethene and vinyl chloride) have exceeded Connecticut Department of Environmental Protection (CT DEP) Remediation Standard Regulations (RSR) for the industrial/commercial volatilization criteria (I/C VC). Also, VOCs were detected in shallow soils in the northwestern section of the proposed building during soil excavations in this area in July/August 2007.

As such, after construction, there is potential that volatile vapors emanating from sub-surface soil and ground water may enter and degrade the air quality in the building. Therefore, a vapor barrier and a sub-slab depressurization system (SSDS) will be installed to prevent this from occurring. The SSDS will be installed at discrete sub-slab areas of the building where VOCs are present in soil and ground water and a vapor barrier will be installed beneath the entire building to further assist in mitigating the potential of vapor intrusion. The SSDS will consist of suction pits surrounded by porous gravel overlain by a vapor barrier.

As part of the SSDS, several soil vapor monitoring points will be installed at various locations inside the building. These will be sampled for VOCs on a quarterly basis during the first year following system completion, to determine if the potential for VOC vapors to enter the building exists. If VOCs above RSR Criteria are present and confirmed above the vapor barriers, the system will be completed, operated, and monitored in accordance with the *Vapor Intrusion Mitigation Plan* for this site, dated July 10, 2008, until such time as demonstration with the RSR can be documented. The vapor barrier and SSDS will not be tampered with, damaged, or modified.

The CT DEP will be informed of the status and monitoring reports will be submitted quarterly over the course of the first year following building completion and annually thereafter.

Should you need additional information please don't hesitate to contact the undersigned, or HRP Associates, Inc.

Sincerely,

"see attached letter"

Bob Palczewski
Director of Engineering
Celebration Foods

Michael Lombardi
VP Design & Construction
Centerplan Development Co.

CELEBRATION FOODS

September 16, 2008

Mr. Peter Hill
Permitting, Enforcement and Remediation Division
Connecticut Department of Environmental Protection
79 Elm Street
Hartford, CT 06105

RE: Acknowledgement of a Sub-Slab Depressurization System, Former Torrington Company Facility/Former Fafnir Site, 263 Myrtle Street (Formerly 37 Booth Street), New Britain, CT

Dear Mr. Hill:

This letter responds to the request stated in Paragraph 12 of your August 30, 2007 letter to Dalesa Halgerson, Senior Risk Manager, Celebration Foods LLC, with regard the above captioned matter, for a letter from the occupant of the building referred to above. By this letter Celebration Foods LLC

- acknowledges that it has been provided with a copy of (a) the "Response to Comments for Design, Draft Sub-Slab Depressurization System Operation and Maintenance Plan, Former Fafnir Bearing, 37 Booth Street, New Britain, Connecticut," dated August 20, 2007 and received by the Department on August 24, 2007 and (b) the May 2, 2008 "Vapor Intrusion Mitigation Plan, Sub-Slab Depressurization System and Vapor Barrier Installation Plan & Sub-Slab Depressurization System and Barrier Operation and Maintenance Plan, Former Fafner Bearing Plant, 263 Myrtle Street (Formerly 37 Booth Street), New Britain, Connecticut" prepared for the City of New Britain, CT by HRP Associates, Inc. (both (a) and (b) above hereafter referred to as the "Plans");
- agrees to comply with all applicable Connecticut laws and regulations which pertain with regard to the Plans;
- agrees not to tamper with or modify the systems governed by Plans; and
- agrees to provide reasonable access, so as not to disturb normal business operations at the aforementioned building to authorized personnel of the persons or entities who are implementing and or monitoring the Plans.

Sincerely,

Robert A. Palczewski
Director of Engineering
Celebration Foods, LLC

APPENDIX B
Vapor Barrier Materials' Specification Data Sheets

GRIFFOLYN®
DIVISION OF REEF INDUSTRIES, INC.

Vapor Retarder Installation Instructions

These procedures have been prepared to assist the general contractor during installation of the vapor barrier system. The instructions are provided as guidelines and should be followed utilizing sound construction procedures.

The following information includes product identification, packaging, vapor barrier and pipe boot installation, splicing procedure and repair methods.

Griffolyn Type-65 G

Type-65G is a 3-ply, reinforced, high-density polyethylene composite which has been laminated to a non-woven geotextile which is fabricated in large panels for use as an underslab vapor barrier. (See Fig. 1)

Griffolyn Fab Tape

Fab Tape is an asphaltic mastic with release paper on both sides which is used to join multiple panels of Type-65G material and to seal the pipe boots to the Type-65G.

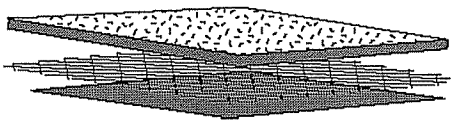


Fig. 1

Pipe Boots

Pipe boots or penetration boots are pieces of vapor barrier material which have been fabricated to fit over pipes or other obstructions which may extend through the vapor barrier. The pipe boots consist of a circular tube which is heat-sealed to a flat piece of material. (See Fig. 2) The circular section is secured around the pipe while the flat portion of the boot is sealed to the vapor barrier producing a vapor-tight seal around penetrations.

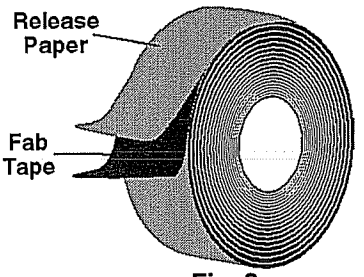


Fig. 2

Packaging

Vapor barriers will arrive at the construction site in cardboard boxes. Labels on the top and at least one side of the box will report the sales order number, the type of materials in the box, panel sizes for the vapor barriers, quantity, and date packaged. On a large project, several panels may be provided to

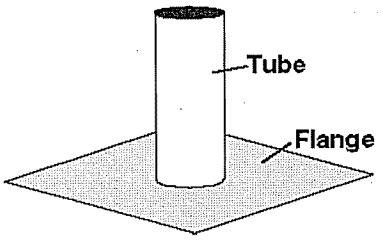
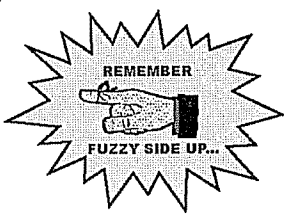


Fig. 3

Reef Industries Inc. P.O. BOX 750250 Houston, TX 77275-0250
800/231-6074 • 713/507-4200 • 713/507-4295
email ri@reefindustries.com
www.reefindustries.com



allow for easier vapor barrier installation. Section #'s may be provided by the contractor which correspond to specific areas in the building.

INSTALLATION

Part 3.1, Section 02 233 of the construction manual provides installation specifications for the vapor retarder. Complete the sub-base compaction as specified in the above section of the construction manual. Remove all construction debris, forms, stakes, and tools from the work area prior to placement of the vapor barrier.

STEP 1: Pipe Boot Placement

Inspect the area where the vapor barrier will be installed for pipes and other obstructions which will penetrate the barrier material. Place pipe boots over all obstructions. Install the pipe boot over the pipe with the flange placed flat against the compacted sub-base. Apply a strip of Fab Tape on the top of the flange forming a circle approximately six to eight inches in diameter. DO NOT remove the second layer of release paper at this time.

STEP 2: Vapor Barrier Installation

Once all penetrations have been covered, the Griffolyn Type-65G vapor barrier panels should be removed from the box and aligned along the length of the selected area.

Example: In a 60' x 130' area the vapor barrier should be placed to allow the material to be unrolled along the 130' length. Once unrolled, the vapor barrier can then be spread across the 60' width.

Install the vapor barrier with the white non-woven geotextile material (fuzzy side) facing UP to protect the integrity of the barrier material by preventing snags, tears or rips which could occur during the installation of the rebar and the pouring of cement.

Spread the main section of the vapor barrier evenly throughout the area allowing sufficient material to be placed on the sides and top of the stem walls. Cut small openings in the vapor barrier where it will be placed over the obstructions. Fit the material against the stem walls and lap over the top. Holes may be required on top of the stem wall due to anchor bolts. Allow sufficient slack in the vapor barrier to accommodate any shifting which may occur when the granular base is placed on the vapor barrier. Wrinkles or folds will NOT affect or degrade the performance of the vapor barrier. Lift the vapor barrier around all the previously installed pipe boots and remove the release paper from the Fab Tape. Lower the vapor barrier into place and apply pressure to seal the Fab Tape to the barrier material. (See Fig 4)

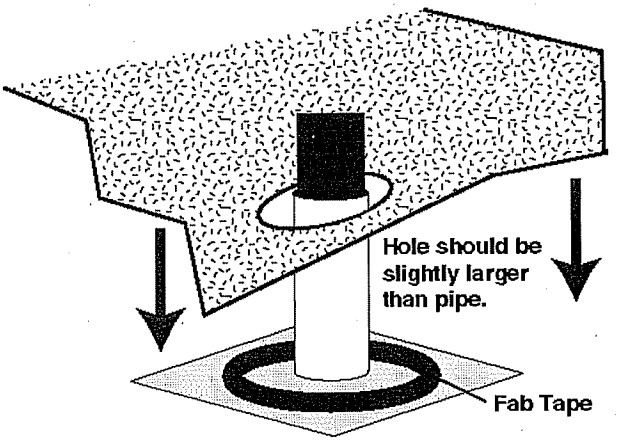


Fig. 4

STEP 3: Pipe Boot Sealing

Seal the pipe boot to the pipe. First, mark the approximate top edge of the pipe boot on the pipe. (See Fig 5) This point should be at, or slightly above, the anticipated slab grade level. Next, roll approximately four inches of the pipe boot down the pipe. Install a strip of Fab Tape around the pipe just below the mark. (See Fig 6) Remove.

the second layer of release paper and roll the pipe boot up over the Fab Tape and seal in place. For additional protection, a strip of pressure sensitive tape, a clamp or other tie-down can be used to secure the top edge of the pipe boot.

Note: Take care to seal the pipe boot where it will not interfere with the installation of additional plumbing fittings. It may be necessary to shorten the pipe boot or seal the pipe boot at a lower point on the pipe. The top of the boot however should be at, or slightly above, slab grade level.

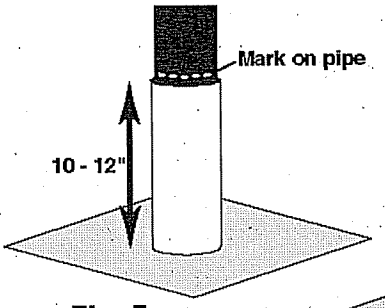


Fig. 5

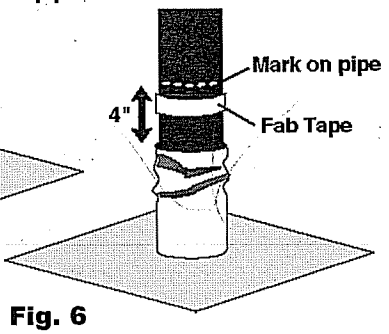


Fig. 6

SPLICING VAPOR BARRIER SECTIONS

Due to the unique construction of the Type 65G vapor barrier, simply overlapping several panels and applying a strip of tape between them will not provide a vapor-tight seal because the non-woven layer will leave gaps between itself and the tape, allowing moisture to penetrate. (See Fig. 7)

An effective seal can only be obtained by sealing two film surfaces together with the Fab Tape. All taped surfaces should be free of dirt and mud prior to applying the tape.

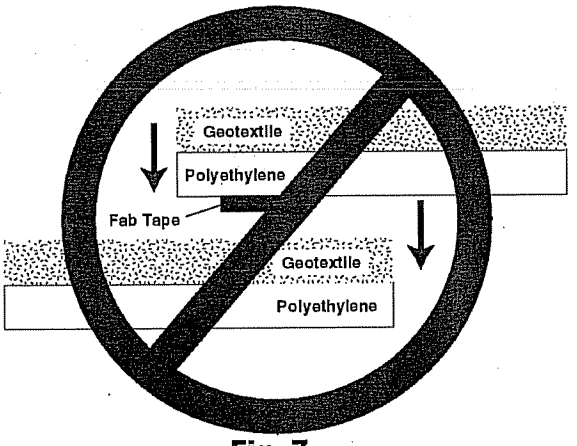


Fig. 7

Depending on how the vapor barrier is installed, one edge of the sheet may have an exposed plastic strip on the top edge. If so, a row of Fab Tape can be installed on this top edge, the release paper removed and the second panel placed over the tape and sealed in place.

Normally, panels will be sized and cut so that overlaps can occur on top of stem walls. If this is not possible, a 12 inch wide strip of Type-65G may be used to seal the panels

together. First, roll back the two edges of the vapor barrier to expose a two foot wide area. Clean the two folded back edges of dirt, mud or rocks. Place the 12 inch strip on the compacted subbase and apply a row of Fab Tape about one to two inches away from each edge. Remove the release paper from one row of Fab Tape and seal one edge of the vapor barrier to the 12 inch strip. Next, remove the release paper from the second row of Fab Tape and seal the second panel to the 12 inch strip. Remove excess material from the top panel to prevent tripping hazards or damage due to wind catching the loose edge.

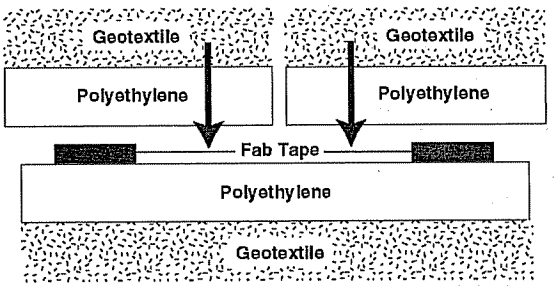


Fig. 8

REPAIR OF CUTS AND TEARS

Seal all openings, cuts or panel overlaps to prevent moisture from reaching the slab. Should damage to the vapor barrier occur due to incorrectly placed openings or other inadvertent cuts, patches may be made from Type-65G material. Place the patch beneath the hole area with the non-woven facing down and seal with Fab Tape. (See Fig. 9)

If you have any questions regarding these instructions or the vapor barrier you may contact Reef Industries at (800) 231-6074 or (713) 507-4200. Please reference the Sales order shown at the beginning of this document or on the packing slip.

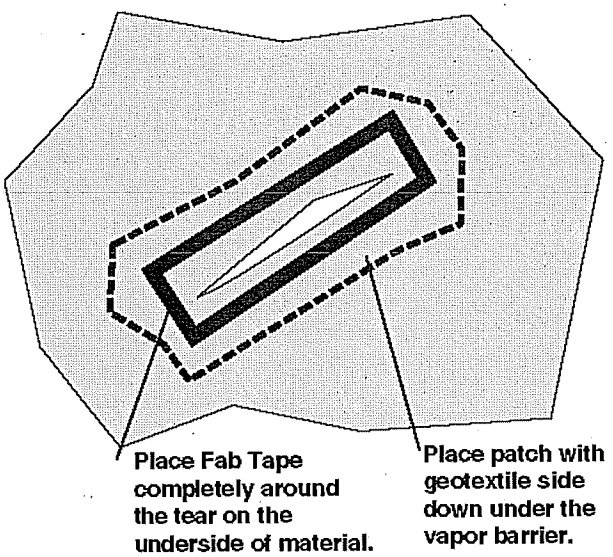
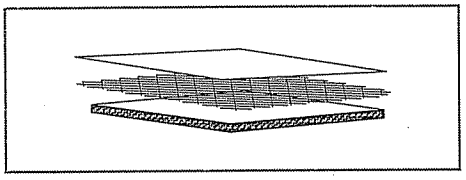


Fig. 9

GRIFFOLYN® TYPE-65 G



Griffolyn® Type-65 G is a 3-ply laminate combining two layers of high density polyethylene and a high-strength cord grid with a layer of non-woven geotextile fiber. It is specifically engineered to provide high strength and durability in a lightweight material.

PHYSICAL PROPERTIES AND TYPICAL VALUES			
PROPERTY	ASTM TEST METHOD	U.S. VALUE	METRIC VALUE
Weight	D-3776	76 LB/1000 FT^2	37.1 KG/100 M^2
3" Tensile Strength	D-882	190 LBF	845 N
Puncture Strength	D-4833	102 LBF	450 N
PPT Resistance	D-2582	56 LBF	249 N
Dart Impact Strength	D-1709	4.85 LBS	2200 g
Cold Impact Strength	D-1790	-40°F	-40°C
Permeance	E-96	0.038 Grain/Hr•Ft^2•in.Hg	2.125 NG/(PA•S•M^2)

FEATURES

- Multiple layers and cord reinforcement combined with the geotextile layer offer extremely high puncture and tear resistance.
- UV stabilization protects the material from degradation during extended exposure to sunlight.
- Cold-crack resistance eliminates failures in extremely cold temperatures.
- Low permeability greatly inhibits moisture transmission.
- Flexibility and light weight allow for easy handling and quick installation.
- Custom fabrication is available to meet your exact specifications.
- Class A, ASTM E-1745-97 Standard Specification for Water Vapor Retarders Used in Contact With Soil or Granular Fill Under Concrete Slabs.

SUGGESTED APPLICATIONS

Architectural vapor retarder under slab on grade.

TOLLFREE 1.800.231.6074
9209 Almeda Genoa Rd. • Houston, Texas 77075
P: 713.507.4251 • F: 713.507.4295
Email: ri@reefindustries.com

ORDERING INFORMATION

AVAILABLE COLORS:
Black

SIZES:
Standard rolls from 4' x 100' to 40' x 100' in increments of 4' widths are available for immediate shipment. Standard length and width tolerances are ± 1% (minimum 2")

Custom sizes up to 100' x 100' and custom fabrication are avaiable to meet your exact specifications.

USABLE TEMPERATURE RANGE:
Minimum: -25°F -31.6°C
Maximum: 170°F 77°C

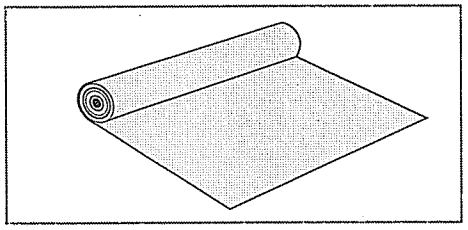
OUTDOOR EXPOSURE

Under normal continuous exposure the average life expectancy ranges from 18 to 30 months, depending on color.

TOLLFREE 1.800.231.6074

9209 Almeda Genoa Rd. • Houston, Texas 77075
P: 713.507.4251 • F: 713.507.4295
Email: ri@reefindustries.com

PERMALON® PLY X-210 G



PHYSICAL PROPERTIES AND TYPICAL VALUES

PROPERTY	ASTM TEST METHOD	U.S. VALUE	METRIC VALUE
Weight	D-5261	115 LB/1000 FT^2	56.1 KG/100 M^2
Thickness	D-5199	55 MIL	1.4 MM
Load @ Yield	D-882	70 LBF	311 N
Load @ Break	D-882	65 LBF	289 N
		1100 PSI	8 MPA
Elongation @ Break	D-882	525 %	525 %
Tongue Tear	D-5735	44 LBF	196 N
Trapezoidal Tear	D-4533	85 LBF	378 N
PPT Resistance	D-2582	62 LBF	276 N
Dart Impact Strength	D-1709	8.0 LBS	3.6 KG
Puncture Strength	D-4833	140 LBS	623 MPA

FEATURES

- High density, cross-laminated polyethylene with a geotextile fabric reinforcement layer that resists punctures and tears.
- UV stabilized to withstand prolonged exposure to sunlight.
- Ply X-210 is not prone to environmental stress-cracking (ESC) so it can endure repeated thermal expansion & contraction cycles.
- Meets ASTM standard D-3083 Soil Burial test performance requirements.

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PERMALON® PERMEABILITY PERFORMANCE

WATER VAPOR PERMEABILITY				
MATERIAL	PERMEANCE (perms*)	WVTR** gm/hr/m²	WVTR** Grains/hr/ft²	WVTR cm/sec
PERMALON X-150	0.0636	0.0184	0.0264	1.23×10^{-9}
PERMALON X-210	0.0310	0.00884	0.0127	6.0×10^{-10}
VAPORGUARD	0.0142	0.0041	0.0059	2.74×10^{-10}
VAPORGUARD FR	0.0142	0.0041	0.0059	2.74×10^{-10}

*perms= grains/hr/ft² in. Hg
**Environment 73 +/- 3°F 50% Relative Humidity (ASTM E-96)

METHANE PERMEANCE	
	PERMEANCE#
PERMALON X 150	1.09 X 103
PERMALON X 210	.710 X 103

#ASTM D-1434 AT 25°C (ml/m² day)

RADON PROTECTION			
	THICKNESS CM (INCHES)	RADON DIFFUSION COEFFICIENT	% REDUCTION IN RADON FLUX THRU SLAB†
PERMALON X 150	0.021(.0085)	4.5×10^{-7}	47
PERMALON X 210	0.044 (.018)	4.2×10^{-7}	67

† 10 cm slab with 1 x 10-3 cm²/s radon diffusion coefficient

grains/hr ft² x 0.696 = gm/hr m²
gm/hr m² x 6.45 x10-2 = gm/hr 100 in²
gm/hr 100in² x 24 = gm/24 hr 100 in²
1 gram = 15.44 grains
1 in Hg = .491 psi
1 m² = 10.76 ft²

PERMALON®
DIVISION OF REEF INDUSTRIES, INC.
Call today for technical assistance or to place your order
800/231-6074
9209 Almeda Genoa
Houston, TX 77075
Tel: 713.507.4251
Fax: 713.507.4255

FAB TAPE™

Fab Tape™ is a double sided asphaltic mastic tape. It is available in black.

PHYSICAL PROPERTIES AND TYPICAL VALUES		
PROPERTY	U.S. VALUE	METRIC VALUE
Thickness	35 Mils	.9 MM
Width	1.5 In.	38 MM
Roll Length	100 Ft.	30.5 M
Roll Weight	3.75 LBS	1.7 KG
Specific Gravity	1.4	1.4
Solubility in Water	Insoluble	Insoluble
T-55 Black 3" Peel	19 LBS	84.5 N
TX-1200 Black 3" Shear	31 LBS	138 N
Temperature for Testing Above	50° - 95° F	10° - 35° C

INSTALLATION

The surface to be taped should be clean and dry. The tape will not adhere if the surfaces are not properly prepared. Dirty or wet surfaces should be completely cleaned with water, paper towels, dry rags or other materials which will prepare the surface for the tape. Accumulations of dust should also be removed to insure a secure seam.

The product obtains optimum adhesion when the surfaces to be bonded are warm. The surfaces should be above 50-60°F to insure an acceptable bond. In order to obtain a bond at lower temperatures, external heat may be required. The use of an industrial style hot air blower is one recommended method. Extra care should be taken when attempting to install tape at temperatures below 32°F.

TOLLFREE 1.800.231.6074
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P: 713.507.4251 • F: 713.507.4295
Email: ri@reefindustries.com

MATERIAL SAFETY DATA SHEET

REEF INDUSTRIES, INC.

HMIS CODES:	
HEALTH:	0
FLAMMABILITY:	1
REACTIVITY:	0

FAB TAPE

PREPARED: 7/21/2006
SUPERSEDES: 1/28/2003

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: FAB TAPE – Double faced adhesive tape (waterproof type)
CHEMICAL FAMILY: Polyethylene reinforced Butyl Rubber adhesive

CONTACT ADDRESS: Reef Industries, Inc.
9209 Almeda Genoa Road
Houston, Texas 77075

EMERGENCY TELEPHONE NUMBERS: 713 507-4200 (24 Hours)

SECTION 2 HAZARDOUS INGREDIENTS / IDENTITY INFORMATION

This product is not hazardous as defined in 29 CFR1910.1200.

SECTION 3 PHYSICAL / CHEMICAL CHARACTERISTICS

Boiling Point:	NA	**Specific Gravity (Water = 1):**	1.4
Vapor Pressure (mm Hg.):	NA	**Melting Point:** °F	NA
Vapor Density (Air = 1):	NA	**Evaporation Rate:**	NA
Solubility in Water:	Insoluble	**Appearance and Odor:**	Black sticky tape with a petroleum odor.

SECTION 4 FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used):	>100 °F	**Flammable Limits:**	**LEL** NA	**UEL** NA

Extinguishing Media:
Water spray, Foam, Dry Chemical, or CO_2.

Special Fire Fighting Procedures:
Fire fighters should be equipped with self-contained breathing apparatus when fighting fires involving this material.

Unusual Fire and Explosion Hazards:
Fire may produce CO,CO2, and Various Hydrocarbons.

SECTION 5 REACTIVITY DATA

Stability:	Stable.	**Incompatibility (Materials to Avoid):** None.

Hazardous Decomposition or Byproducts:
CO_2 and CO when subjected to flames or excessive heat.

Hazardous Polymerization: Will not occur.

SECTION 6 HEALTH HAZARD DATA

Primary Route(s) of Entry: **Inhalation?** No **Absorption?** No **Ingestion?** No

Health Hazards (Acute and Chronic):
Inhalation: None at ambient temperatures (-18 to +38 degrees C).
Absorption: None.
Ingestion: No significant health hazards identified.

Carcinogenicity: **NTP?** None. **IARC Monographs?** None. **OSHA Regulated?** None.

Signs and Symptoms of Exposure:
Inhalation: N/A. Absorption: N/A. Ingestion: N/A.

Medical Conditions Generally Aggravated by Exposure:
Inhalation: None. Absorption: None. Ingestion: None.

Emergency and First Aid Procedures:
Inhalation: N/A. Absorption: N/A. Ingestion: None.

SECTION 7 PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to Be Taken in Case Material Is Released or Spilled: N/A. **Waste Disposal Method:** N/A.

Precautions to Be Taken in Handling and Storage: N/A.

Other Precautions: N/A.

SECTION 8 CONTROL MEASURES

Respiratory Protection: None.

Ventilation: None.

Protective Gloves: N/A. **Eye Protection:** N/A.

Other Protective Clothing and Equipment: N/A.

MATERIAL SAFETY DATA SHEET

REEF INDUSTRIES, INC.

HMIS CODES:	
HEALTH:	0
FLAMMABILITY:	1
REACTIVITY:	0

PREPARED: 7/21/2006
SUPERSEDES: 1/28/2003

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: GRIFFOLYN T-55, TX 1200, TX-1600, T-65, T-85, T-105, T-90
GENERAL OR GENERIC ID: Polyethylene Copolymer and Polyester
CHEMICAL FAMILY: Polyethylene Copolymer and Polyester

CONTACT ADDRESS: Reef Industries, Inc.
9209 Almeda Genoa Road
Houston, Texas 77075

EMERGENCY TELEPHONE NUMBERS: **(713) 507-4200 (24 Hours)**

SECTION 2 HAZARDOUS INGREDIENTS / IDENTITY INFORMATION

This product is not hazardous as defined in 29 CFR1910.1200
Chemicals subject to reporting requirements of SARA Title III section 313 are identified in this section

INGREDIENT:	CAS No:	% by WEIGHT:	PEL:	STEL:	NOTE:

SECTION 3 PHYSICAL / CHEMICAL CHARACTERISTICS

Boiling Point:	NA	**Specific Gravity (Water = 1):**	0.92 - 0.97
Vapor Pressure (mm Hg.):	NA	**Melting Point:** °F	250-320 °F
Vapor Density (Air = 1):	NA	**Evaporation Rate:**	NA

Solubility in Water: Insoluble

Appearance and Odor: Odorless plastic laminate-Polyester fiber reinforced

SECTION 4 FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used):	646 Deg. F ASTM E-136	**Flammable Limits:**	**LEL** NA	**UEL** NA

Extinguishing Media:
Water spray, Foam, Dry Chemical, or CO_2

Special Fire Fighting Procedures:
Fire fighters should be equipped with self-contained breathing apparatus when fighting fires involving this material.

Unusual Fire and Explosion Hazards:
Fire may produce toxic gases and dense smoke.

SECTION 5 REACTIVITY DATA

Stability:	Stable	Incompatibility (Materials to Avoid):	Avoid Strong Oxidizing Agents

Hazardous Decomposition or Byproducts:
CO_2, CO and small amounts of aliphatic and aromatic hydrocarbons when subjected to flames or excessive heat.

Hazardous Polymerization: Will not occur

SECTION 6 HEALTH HAZARD DATA

Primary Route(s) of Entry: **Inhalation?** No **Absorption?** No **Ingestion?** No

Health Hazards (Acute and Chronic):
Inhalation: None at ambient temperatures
Absorption: None
Ingestion: No significant health hazards identified

Carcinogenicity: **NTP?** None **IARC Monographs?** None **OSHA Regulated?** None

Signs and Symptoms of Exposure:
Inhalation: NA Absorption: NA Ingestion: NA

Medical Conditions Generally Aggravated by Exposure:
Inhalation: None Absorption: None Ingestion: None

Emergency and First Aid Procedures:
Inhalation: NA Absorption: NA Ingestion: NA

SECTION 7 PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to Be Taken in Case Material Is Released or Spilled: NA

Waste Disposal Method: In accordance with local, state and federal regulations.

Precautions to Be Taken in Handling and Storage: NA

Other Precautions: NA

SECTION 8 CONTROL MEASURES

Respiratory Protection: None

Ventilation: None

Protective Gloves: NA	Eye Protection: NA
Other Protective Clothing and Equipment: NA	

THE INFORMATION PROVIDED RELATES TO THE SPECIFIC MATERIAL DESIGNATED AND MAY NOT BE VALID FOR SUCH MATERIAL USED IN COMBINATION WITH ANY OTHER MATERIALS. INFORMATION PROVIDED IS TO THE BEST OF OUR KNOWLEDGE AND BELIEF, ACCURATE AND RELIABLE AS OF THE DATE PREPARED.
NO REPRESENTATION, WARRANTY OR GUARANTEE IS MADE AS TO ITS ACCURACY, RELIABILITY OR COMPLETENESS. IT IS THE USER'S RESPONSIBILITY TO DETERMINE FOR HIS/HERSELF THE SUITABILITY AND COMPLETENESS OF SUCH INFORMATION. REEF INDUSTRIES, INC. DOES NOT ACCEPT LIABILITY FOR ANY LOSS OR DAMAGE WHICH MAY OCCUR FROM THE USE OF THIS INFORMATION.

DEFINITIONS

SECTION I
PRODUCT IDENTIFICATION
GENERAL OR GENERIC ID: Chemical family or product description.
DOT HAZARD CLASSIFICATION: Product meets DOT criteria for hazards listed.

SECTION II
COMPONENTS

Components are listed in this section if they present a physical and/or health hazard and are present at or above 1% the mixture. If a component is identified as a carcinogen by NTP, IARC or OSHA as of the date on the MSDS, it will be listed and footnoted in this section when present at, or above 0.1% in the product. Negative conclusions concerning carcinogenicity are not reported. Additional health information may be found in Section V. Components subject to the reporting requirements of Section 313 of SARA Title III are identified in the footnotes in this section, along with typical percentages. Other components may be listed if deemed appropriate.

Exposure recommendations are for components. OSHA Permissible Exposure Limits (PELs) and American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs) appear on the line with the component identification. Other recommendations appear as footnotes.

SECTION III
PHYSICAL DATA

BOILING POINT: Of product. The lowest value of the components is listed for mixtures.
VAPOR PRESSURE: Of product. The highest value of the components is listed for mixtures.
SPECIFIC VAPOR DENSITY: AIR=1. If unknown, the Specific Vapor Density will be listed as lighter or heavier than air.
SPECIFIC GRAVITY: WATER=1. If unknown, the Specific Gravity will be listed as less than or greater than water. pH if applicable.
PER CENT VOLATILES: Percentage of material with initial boiling point below 425 degrees Fahrenheit.
EVAPORATION RATE: Indicated as faster or slower than Ethyl Ether, unless otherwise indicated.

SECTION IV
FIRE AND EXPLOSION HAZARD DATA
FLASH POINT: Method identified.

EXPLOSIVE LIMIT: For product if known. The lowest value of the components is listed for mixtures.
EXTINGUISHING MEDIA: Following National Fire Protection Association criteria.
HAZARDOUS DECOMPOSITION PRODUCTS.: Known or expected hazardous products resulting from heating, burning or other reactions.
FIREFIGHTING PROCEDURES: Minimum equipment to protect firefighters from toxic products of vaporization, combustion or decomposition in fire situations. Other fire fighting hazards may also be indicated.
SPECIAL FIRE AND EXPLOSION HAZARDS: State hazards not covered by other sections.
NFPA CODES: Hazard ratings assigned by the National Fire Protection Association.

SECTION V
HEALTH HAZARD DATA

PERMISSIBLE EXPOSURE LEVEL (PEL): For product.
THRESHOLD LIMIT VALUE (TLV): For product.
EFFECTS OF ACUTE OVEREXPOSURE: Potential local and systemic effects due to single or shorter overexposure to the eyes, skin or through inhalation or ingestion.
EFFECTS OF CHRONIC OVEREXPOSURE: Potential local and systemic effects due to repeated or long term overexposure to the eyes and skin or through inhalation or ingestion.

SECTION VI
REACTIVITY DATA

HAZARDOUS POLYMERIZATION: Conditions to avoid to prevent hazardous polymerization resulting in a large release of energy.
STABILITY: Conditions to avoid to prevent hazardous or violent decomposition.
INCOMPATIBILITY: Materials and conditions to avoid to prevent hazardous reactions.

SECTION VII
SPILL OR LEAK PROCEDURES

Reasonable precautions to be taken and methods of containment, clean-up and disposal. Consult Federal, State and Local regulations for accepted procedures and reporting notification requirements.

SECTION VII
PROTECTIVE EQUIPMENT TO BE USED

Protective equipment that may be needed when handling the product.

SECTION IX
SPECIAL PRECAUTIONS - OTHER COMMENTS

Covers any relevant points not previously mentioned.

MATERIAL SAFETY DATA SHEET

REEF INDUSTRIES, INC.
9209 Almeda Genoa Road
Houston, Texas 77075

EMERGENCY TELEPHONE NO.: (713) 507-4200

PREPARED: 20 Jul 2006
SUPERSEDES: 26 Apr 2006

PRODUCT NAME: **PERMALON (X-100, X-150, X-210)**

THIS MSDS COMPLIES WITH 29 CFR 1910.1200 (THE HAZARD COMMUNICATION STANDARD)

SECTION 1 PRODUCT IDENTIFICATION

GENERAL OR GENERIC ID:	Polyethylene
CHEMICAL FAMILY:	Polyethylene and polyethylene copolymers
DOT HAZARD CLASSIFICATION:	Not Regulated

SECTION II HAZARDOUS INGREDIENTS

If present, IARC, NTP and OSHA carcinogens and chemicals subject to the reporting requirements of SARA Title III Section 313, are identified in this section. See definition page for clarification.

INGREDIENT: None % BY WEIGHT: PEL: STEL: NOTE: D.N.A.
NOTES:

SECTION III PHYSICAL DATA

BOILING POINT (TCC):		N/A	
FREEZING/MELTING POINT:		257° C	
VAPOR PRESSURE:		N/A	
SPECIFIC VAPOR DENSITY:		Air = 1	N/A
SPECIFIC GRAVITY		Product	0.92-0.94 g/cm^3
SOLUBILITY IN WATER:		Insoluble	
APPEARANCE AND ODOR:		Odorless plastic reinforced laminate	
PER CENT VOLATILE:		< 1	
EVAPORATION RATE:	n-BuAc = 1	N/A	

SECTION IV FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (TCC):	N/A
EXPLOSIVE LIMIT - LOWER (LEL):	N/A
EXPLOSIVE LIMIT - UPPER (UEL):	N/A
EXTINGUISHING MEDIA:	Water, Carbon Dioxide,Foam,Dry Chemical
HAZARDOUS DECOMPOSITION PRODUCTS:	Combustion products similar to other organic materials producing mainly carbon dioxide, water and carbon monoxide.
SPECIAL PROCEDURES:	Self-Contained Breathing Apparatus recommended and full protective clothing.
FIREFIGHTING PROCEDURES:	Standard
SPECIAL FIRE AND EXPLOSION HAZARDS:	N/A

NFPA CODES: HEALTH - 0 FLAMMABILITY - 0 REACTIVITY - 0

SECTION V HEALTH HAZARD DATA

PERMISSIBLE EXPOSURE LEVEL:	N/A	
THRESHOLD LIMIT VALUE (TLV):	N/A	SEE SECTION II
EFFECTS OF ACUTE OVEREXPOSURE:	None	
Eyes	None	
Skin	None	
Inhalation	None	
Ingestion		

PRODUCT NAME: **PERMALON (X-100, X-150, X-210)**

SECTION V HEALTH HAZARD DATA (continued)

EFFECTS OF CHRONIC OVEREXPOSURE: None
Eyes
Skin
Inhalation
Ingestion

SECTION VI REACTIVITY DATA

HAZARDOUS POLYMERIZATION:	Will not occur
STABILITY:	Stable
INCOMPATIBILITY:	Strong oxidizing agents

SECTION VII SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A LEAK OR SPILL: Collect and remove, no special precautions required.

SMALL SPILL:
LARGE SPILL:

WASTE DISPOSAL METHOD: Refer to local regulations
SMALL SPILL:
LARGE SPILL:

SECTION VIII PROTECTIVE EQUIPMENT TO BE USED

RESPIRATORY PROTECTION:	N/A
VENTILATION:	N/A
PROTECTIVE GLOVES:	N/A
EYE PROTECTION:	Goggles
OTHER PROTECTIVE EQUIPMENT:	None required

SECTION IX SPECIAL PRECAUTIONS - OTHER COMMENTS

GOOD INDUSTRIAL PRACTICE IS RECOMMENDED THROUGHOUT THE HANDLING AND PROCESSING OF THESE PRODUCTS, AS IS CUSTOMARY AND APPROPRIATE FOR THE OPERATION BEING PERFORMED.

SECTION X TRANSPORTATION REGULATORY REQUIREMENTS

D.O.T PROPER SHIPPING NAME;	NOT REGULATED BY D.O.T.
OTHER REGULATORY CONTROLS:	NONE FOUND

SECTION XI CLASSIFICATION/LABEL

SARA HEALTH HAZARDS:
ACUTE: NO CHRONIC: NO FLAMMABILITY: NO PRESSURE: NO REACTIVITY: NO

THE INFORMATION PROVIDED RELATES TO THE SPECIFIC MATERIAL DESIGNATED AND MAY NOT BE VALID FOR SUCH MATERIAL USED IN COMBINATION WITH ANY OTHER MATERIALS. INFORMATION PROVIDED IS TO THE BEST OF OUR KNOWLEDGE AND BELIEF, ACCURATE AND RELIABLE AS OF THE DATE PREPARED. NO REPRESENTATION, WARRANTY OR GUARANTEE IS MADE AS TO ITS ACCURACY, RELIABILITY OR COMPLETENESS. IT IS THE USER'S RESPONSIBILITY TO DETERMINE FOR HIS/HERSELF THE SUITABILITY AND COMPLETENESS OF SUCH INFORMATION. REEF INDUSTRIES, INC. DOES NOT ACCEPT LIABILITY FOR ANY LOSS OR DAMAGE WHICH MAY OCCUR FROM THE USE OF THIS INFORMATION.

DEFINITIONS

SECTION I — PRODUCT IDENTIFICATION

General or generic ID: Chemical family or product description.
D.O.T. hazard classification: Product meets D.O.T. criteria for hazards listed.

SECTION II — COMPONENTS

Components are listed in this section if they are present a physical and/or health hazard and are present at or above 1% the mixture. If a component is identified as a carcinogen by HTP, IARC or OSHA as of the date on the MSDS, it will be listed and footnoted in this section when present at, or above 0.1% in the product. Negative conclusions concerning carcinogenicity are not reported. Additional health information may be found in Section V. Components subject to the reporting requirements of Section 313 of SARA Title III are identified in the footnotes in this section, along with typical percentages. Other components may be listed if deemed appropriate.

Exposure recommendations are for components. OSHA Permissible Exposure Limits (PELs) and American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs) appear on the line with the component identification. Other recommendations appear as footnotes.

SECTION III — PHYSICAL DATA

BOILING POINT: Of product. The lowest value of the components is listed for mixtures.
VAPOR PRESSURE: Of product. The highest value of the components is listed for mixtures.
SPECIFIC VAPOR DENSITY: AIR=1. If unknown, the Specific Vapor Gravity will be listed as less than or greater than water.
pH: if applicable.
PERCENT VOLATILES: Percentage of material with initial boiling point below 425 degrees Fahrenheit.
EVAPORATION RATE: Indicated as faster or slower than Ethyl Ether, unless otherwise indicated.

SECTION IV — FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: Method identified.
EXPLOSION LIMIT: For product if known. The lowest value of the components is listed for mixtures.
EXTINGUISHING MEDIA: Following National Fire Protection Association criteria.
HAZARDOUS DECOMPOSITION PRODUCTS: Known or expected hazardous products resulting from heating, burning or other reactions.
FIREFIGHTING PROCEDURES: Minimum equipment to protect firefighters from toxic products of vaporization, combustion or decomposition in fire situations. Other firefighting hazards may also be indicated.
SPECIAL FIRE AND EXPLOSION HAZARDS: States hazards not covered by other sections.
NFPA CODES: Hazard ratings assigned by the National Fire Protection Association.

SECTION V — HEALTH HAZARD DATA

PERMISSIBLE EXPOSURE LEVEL (PEL): For product.
THRESHOLD LIMIT VALUE (TLV): For product.
EFFECTS OF ACUTE OVEREXPOSURE: Potential local and systemic effects due to single or short term overexposure to the eyes and skin or through inhalation or ingestion.
EFFECTS OF CHRONIC OVEREXPOSURE: Potential local and systemic effects due to repeated or long term overexposure to the eye and skin or through inhalation or ingestion.

SECTION VI — REACTIVITY DATA

HAZARDOUS POLYMERIZATION: Conditions to avoid to prevent hazardous polymerization resulting in a large release of energy.
STABILITY: Conditions to avoid to prevent hazardous or violent decomposition.
INCOMPATIBILITY: Materials and conditions to avoid to prevent hazardous reactions.

SECTION VII — SPILL OR LEAK PROCEDURES

Reasonable precautions to be taken and methods of containment, clean-up and disposal. Consult Federal, State and Local regulations for accepted procedures and reporting notification requirements.

SECTION VII — PROTECTIVE EQUIPMENT TO BE USED

Protective equipment which may be needed when handling the product.

SECTION IX — SPECIAL PRECAUTIONS - OTHER COMMENTS

Covers any relevant points not previously mentioned.

INFOTHEK > Chemical Resistance

HOME
INFOTHEK
>> Chemical Resistance
Material Properties
ISO 9001
New Products
Press information
Prices
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Chemical resistance of plastics

A detailed list of resistances to 1600 media in Excel97-format (as ZIP-file) can be **downloaded**

Two values are given for each medium, left number = value at + 20°C, right number = value at
1 = resistant, **2** = practically resistant, **3** = partially resistant, **4** = not resistant, **0** = no data availa

The information provided represents recommendations only, no legal liability can be derived fro
provided.

Chemical	Concentration	Plastic										
		E-CTFE	FEP/ PFA	HDPE	LDPE	PA	PC	PMP	PP	PS	PTFE	PVC rigid
Acetaldehyde		2/3	1/1	3/3	2/4	2/0	4/4	2/4	3/4	4/4	0/1	4/4
Acetamide	saturated	1/1	1/1	1/1	1/1	1/0	4/4	1/1	1/1	1/1	1/1	4/4
Acetone		2/3	1/1	1/1	3/3	1/0	4/4	2/3	1/3	4/4	0/1	4/4
Acetonitrile		1/1	1/1	1/1	1/1	0/0	4/4	3/4	3/4	4/4	0/0	4/4
Acetophenone		0/1	0/0	0/0	1/0	0/0	0/0	0/0	0/3	0/4	0/1	4/4
Acetylene	100%	0/0	0/0	1/0	1/0	1/0	1/0	0/0	1/0	0/0	1/0	2/0
Acrylic nitrile		1/2	1/1	1/1	1/3	1/0	4/4	3/4	3/4	4/4	1/0	4/4
Adipic acid	saturated	1/1	1/1	1/1	1/2	0/0	1/1	1/1	1/1	1/1	1/1	1/3
Allyl alcohol	96%	1/1	1/1	1/3	3/3	3/0	2/3	1/2	1/1	2/4	1/1	2/3
Aluminum chloride	10%	2/2	0/0	1/1	1/2	1/0	1/0	1/1	1/1	1/1	1/1	1/1
Aluminum oxide	solid	0/0	0/0	1/0	1/0	0/0	0/0	0/0	1/0	0/0	1/0	1/0
Formic acid	98-100%	1/1	1/1	1/1	1/2	4/4	3/4	1/3	1/3	3/4	1/1	3/4
Amino acids		1/1	1/1	1/1	1/1	0/0	1/1	1/1	1/1	1/1	0/0	1/1
Ammonia	25%	1/1	1/1	1/1	1/1	4/4	4/4	1/1	1/1	2/3	1/1	1/2
Ammonium chloride	aqueous	1/1	0/0	1/1	1/1	1/0	1/0	1/1	1/1	1/1	1/1	1/3
Ammonium hydroxide	5%	1/1	1/1	1/1	1/1	0/0	3/4	1/1	1/1	1/3	0/0	1/1
Ammonium oxalate		1/1	1/1	1/1	1/2	0/0	1/1	1/2	1/2	1/1	0/0	1/1
Ammonium phosphate	every	0/0	0/0	1/1	1/0	1/0	0/0	1/0	1/1	1/0	1/1	1/1
Ammonium sulfide	every	0/0	0/0	1/1	1/1	0/0	4/4	1/1	1/1	0/0	1/1	1/3
Amyl acetate (pentyl acetate)	n-	1/1	1/1	1/2	2/3	2/0	4/4	2/3	3/4	4/4	1/1	4/4
Amyl alcohol		1/1	0/0	1/1	1/2	1/0	0/0	2/3	1/1	1/3	1/1	2/3
Aniline		2/4	1/1	1/2	1/3	3/0	3/4	2/3	2/3	4/4	1/1	4/4

Chemical	Concentration	Plastic										
		E-CTFE	FEP/ PFA	HDPE	LDPE	PA	PC	PMP	PP	PS	PTFE	PVC rigid
Barium chloride	saturated	0/0	0/0	1/0	1/1	1/0	1/0	1/1	1/1	1/1	1/1	1/3
Benzaldehyde		1/3	1/1	1/3	3/3	3/0	4/4	1/2	1/2	4/4	1/1	4/4
Benzene		1/1	1/1	2/3	3/4	1/0	3/3	2/3	3/4	4/4	1/1	2/4
Benzoic acid	saturated	1/1	1/1	1/1	1/1	0/0	4/4	1/2	1/2	2/2	1/1	1/2

Benzol		1/2	1/1	3/4	3/4	2/0	4/4	2/3	3/4	4/4	1/1	4/4
Benzyl alcohol		1/1	1/1	3/4	4/4	0/0	2/3	4/4	4/4	4/4	0/0	2/3
Hydrocyanic acid	aqueous	0/0	0/0	1/1	1/1	0/0	4/4	0/0	1/1	1/0	1/1	1/0
Lead acetate	aqueous	1/1	0/0	1/1	1/1	3/0	1/0	1/0	1/1	1/1	1/1	1/1
Boric acid	10%	1/1	0/0	1/1	1/1	1/0	1/1	1/1	1/1	1/2	1/1	1/3
Brake fluid		0/0	0/0	1/0	1/0	1/0	4/4	1/1	1/1	3/0	1/0	1/0
Bromine		1/2	1/1	4/4	4/4	4/4	4/4	4/4	4/4	4/4	1/1	2/4
Bromobenzene		2/4	1/1	3/4	4/4	0/0	4/4	4/4	4/4	4/4	0/0	4/4
Hydrobromic acid	50%	1/1	0/0	1/1	1/2	4/4	4/4	4/4	1/2	4/4	1/1	1/1
Butadiene		1/1	1/1	3/4	4/4	0/0	4/4	4/4	4/4	4/4	1/1	3/4
Butanol	technical grade	0/0	0/0	1/1	1/3	1/0	1/0	0/0	1/3	1/0	1/1	1/3
Butyric acid		1/1	1/1	3/4	4/4	3/3	4/4	4/4	4/4	4/4	1/1	2/4
Butyl acetate		1/2	1/1	1/2	2/3	1/0	4/4	3/3	3/4	4/4	1/1	4/4

Chemical	Concentration	Plastic										
		E-CTFE	FEP/ PFA	HDPE	LDPE	PA	PC	PMP	PP	PS	PTFE	PVC rigid
Calcium chloride	aqueous	1/1	0/0	1/1	1/1	1/0	1/0	1/1	1/1	1/1	1/1	1/3
Calcium hydroxide	conc.	1/1	1/1	1/1	1/1	1/0	4/4	1/1	1/1	2/2	1/1	1/1
Calcium hypochlorite	saturated	1/1	1/1	1/1	1/1	1/0	3/4	1/2	1/1	2/3	1/1	2/3
Calcium sulfate	saturated	0/0	0/0	1/0	1/1	1/0	1/0	1/1	1/1	1/0	1/1	1/3
Carbazole		1/1	1/1	1/1	1/1	0/0	4/4	1/1	1/1	1/1	0/0	4/4
Cellosolve acetate		1/2	1/1	1/1	1/2	0/0	3/4	1/2	1/2	4/4	0/0	3/4
Chlorine	10% wet	1/1	1/1	3/4	3/4	0/0	2/3	2/4	4/4	4/4	1/1	1/2
Chlorobenzene		1/1	0/0	3/4	3/4	4/4	4/4	3/4	4/4	4/4	1/1	4/4
Chloroform		2/3	1/1	3/4	4/4	3/3	4/4	3/4	2/3	4/4	1/1	4/4
Chlorinated water		1/1	0/0	3/0	0/4	4/4	0/0	0/4	3/4	4/4	1/1	3/0
Chromic acid	10%	1/1	1/1	1/1	1/1	0/0	2/3	1/1	1/1	1/1	1/1	1/2
Citric acid	10%	1/1	1/1	1/1	1/1	1/0	1/2	1/1	1/1	1/2	1/1	2/2
Cyclohexane		1/2	1/1	3/4	3/4	1/0	3/3	4/4	3/4	4/4	1/1	2/3

Chemical	Concentration	Plastic										
		E-CTFE	FEP/ PFA	HDPE	LDPE	PA	PC	PMP	PP	PS	PTFE	PV rig
Decahydronaphthalene (Decalin)		1/1	1/1	1/2	2/4	1/0	4/4	3/4	2/4	4/4	1/1	1/
Dibutyl phthalate		1/1	0/0	1/3	3/3	1/0	4/4	02	1/3	4/4	1/1	4/
Dichlorobenzene	o-	1/3	1/1	3/3	3/4	0/0	4/4	3/4	3/4	4/4	1/1	4/
Diethyl benzene		1/2	1/1	3/4	4/4	0/0	3/4	4/4	4/4	4/4	0/0	4/
Diethyl ether		1/2	1/1	3/4	4/4	0/0	4/4	4/4	4/4	4/4	1/1	3/
Dimethyl formamide		2/2	1/1	1/1	1/3	1/0	4/4	1/1	1/1	4/4	1/1	3/
Dioxin 1,4		1/3	1/1	2/2	2/3	1/0	4/4	2/3	3/3	4/4	1/1	3/

Chemical	Concentration	Plastic										
		E-CTFE	FEP/ PFA	HDPE	LDPE	PA	PC	PMP	PP	PS	PTFE	PVC rigid
Glacial acetic acid		1/1	1/1	1/1	1/2	4/4	4/4	1/3	1/2	4/4	0/0	1/2
Acetic acid	50%	1/2	1/1	1/1	1/1	0/0	1/2	1/1	1/1	2/2	0/0	1/2
Methyl acetate	100%	0/0	0/0	1/0	1/1	1/0	0/0	0/0	1/3	4/4	0/0	4/4
Ethanol	50%	0/0	0/0	1/1	1/1	1/0	1/0	1/0	1/0	1/0	1/0	1/0
Ether		1/2	1/1	3/4	4/4	1/1	4/4	4/4	4/4	4/4	1/1	3/4
Ethyl acetate		1/2	1/1	1/3	3/4	1/0	4/4	1/3	1/3	4/4	0/1	4/4
Ethyl acrylate	100%	0/0	0/0	4/4	4/4	1/0	0/0	0/0	4/4	0/0	1/0	4/4
Ethyl alcohol	96%	1/1	1/1	1/1	1/3	1/0	1/3	1/2	1/2	3/4	0/1	1/3
Ethyl benzene		2/3	1/1	2/3	3/4	0/0	4/4	3/4	3/4	4/4	1/0	4/4
Ethyl chloride		1/1	1/1	3/3	3/4	1/0	4/4	3/4	3/4	4/4	1/0	4/4
Ethylene cyanoacetate		1/1	1/1	1/1	1/1	0/0	3/4	1/1	1/1	2/4	0/0	3/4
Ethylene glycol		1/1	1/1	1/1	1/1	1/0	2/3	1/1	1/1	1/1	1/1	1/1
Ethylene oxide		1/1	1/1	2/3	3/3	0/0	3/4	3/4	3/3	4/4	0/0	3/4
Ethyl ether	technical grade	0/0	0/0	3/0	2/3	1/0	4/4	1/0	3/3	4/4	1/1	40

Chemical	Concentration	Plastic										
		E-CTFE	FEP/ PFA	HDPE	LDPE	PA	PC	PMP	PP	PS	PTFE	PVC rigid
Fluorine		1/3	1/2	4/4	4/4	1/0	2/3	3/3	4/4	4/4	1/1	1/2
Fluorides		1/1	1/1	1/1	1/1	0/0	1/1	1/1	1/1	2/2	0/0	1/1
Hydrofluoric acid	50%	1/1	1/1	1/1	1/1	4/4	4/4	1/1	1/1	4/4	1/1	2/3
Formaldehyde	40%	1/1	1/1	1/2	2/3	1/0	1/2	1/2	1/2	4/4	1/1	2/3
Photo developer		0/0	0/0	1/3	1/1	0/0	0/0	0/0	1/0	0/0	1/1	1/3
Photo fixing baths		0/0	0/0	1/0	1/1	0/0	0/0	0/0	1/1	0/0	1/1	1/3
Antifreeze (automobile)		0/0	0/0	1/0	1/0	0/0	0/0	0/0	1/1	1/1	1/0	0/0
Glucose	every	0/0	0/0	1/1	1/1	1/0	1/0	1/0	1/1	1/0	1/1	1/3
Glycerol	every	1/1	1/1	1/1	1/1	1/0	3/3	1/1	1/1	1/1	1/1	1/1
Ureas (carbamide, etc.)		1/1	1/1	1/1	1/1	1/0	4/4	1/2	1/1	1/2	1/1	2/4
Fuel oil		1/1	1/1	3/3	3/4	1/0	3/3	2/3	1/3	3/4	1/1	1/1
Heptane	n-	1/1	1/1	2/3	3/4	0/0	1/2	3/3	3/3	4/4	1/1	2/3
Hexane		1/1	1/1	2/3	4/4	1/0	3/4	3/4	2/3	4/4	1/1	2/4
Hydrazine hydrate	aqueous	0/0	0/0	1/1	1/0	0/0	0/0	0/0	1/1	0/0	1/0	1/0
Isopropanol (isopropyl alcohol)	technical grade	1/1	1/1	1/1	1/1	1/0	1/2	1/2	1/1	2/2	1/1	1/2
Isopropyl acetate		1/2	1/1	1/2	2/3	1/0	4/4	2/3	2/3	4/4	1/1	4/4

Iodine tincture		1/1	0/0	1/3	1/3	4/4	3/0	1/1	1/2	3/3	1/1	4/4

Chemical	Concentration	Plastic										
		E-CTFE	FEP/ PFA	HDPE	LDPE	PA	PC	PMP	PP	PS	PTFE	PVC rigid
Potash lye (potassium hydroxide)	50%	0/0	0/0	1/1	1/1	1/0	4/4	1/0	1/1	1/1	1/1	1/1
Potassium perchlorate	saturated	0/0	0/0	1/1	1/1	0/0	1/0	1/0	1/1	0/0	1/1	1/3
Potassium permanganate		1/1	0/0	1/3	1/1	4/4	1/0	1/1	1/1	1/3	1/1	1/3
Kerosine		2/3	1/1	2/2	3/4	0/0	4/4	2/3	3/3	4/4	0/0	1/1
Aqua regia		1/1	0/0	4/4	4/4	4/4	4/4	0/3	4/4	4/4	1/1	4/4
Carbon dioxide	technical grade	0/0	0/0	1/1	0/0	0/0	0/0	0/0	1/1	0/0	0/0	1/1
Cresol		1/2	1/1	3/4	4/4	4/4	4/4	4/4	2/3	4/4	1/1	4/4
Lanolin	technical grade	0/0	0/0	1/3	1/3	1/0	1/0	0/0	1/3	1/1	1/1	3/3
Machine oil	100%	0/0	0/0	0/0	14	0/0	0/0	0/0	1/3	0/0	1/1	0/0
Menthol	100%	0/0	0/0	1/3	3/4	3/0	3/4	0/0	1/3	4/4	1/1	0/0
Metal salts, dissolved		1/1	1/1	1/1	1/1	0/0	1/1	1/1	1/1	2/2	0/0	1/1
Methanol (methyl alcohol)		1/1	1/1	1/1	1/1	2/0	4/4	1/1	1/1	3/4	1/1	1/3
Methoxyethyl oleate		1/1	1/1	1/1	1/2	0/0	3/4	1/2	1/2	4/4	0/0	4/4
Methylene chloride		2/2	1/1	4/4	4/4	3/0	4/4	3/4	3/4	4/4	1/1	4/4
Methyl ethyl ketone		2/3	1/1	1/3	3/4	1/0	4/4	4/4	1/3	4/4	0/0	4/4
Lactic acid	85%	1/2	1/1	1/1	1/1	3/0	1/2	1/2	1/2	2/2	1/1	2/3
Mineral oil		1/1	1/1	1/1	2/4	0/0	1/2	1/2	1/3	1/1	0/0	1/2
Monochloroacetic acid		1/1	1/1	1/1	1/1	4/4	3/4	1/2	1/2	2/4	1/1	3/4
Sodium acetate	every	1/1	1/1	1/1	1/1	0/0	1/2	1/1	1/1	2/2	1/1	2/3
Sodium carbonate		0/0	0/0	1/1	1/1	1/0	1/0	1/0	1/1	1/1	1/1	1/1
Sodium chloride	every	0/0	0/0	1/1	1/1	1/0	1/0	1/0	1/1	1/1	1/1	1/3
Sodium dichromate		1/1	0/0	0/0	1/1	1/0	1/0	1/1	1/1	1/1	1/1	1/0
Sodium hydroxide	50%	1/1	1/1	1/1	1/1	1/0	4/4	1/1	1/1	2/2	1/1	1/2
Sodium hypochlorite	15%	1/1	1/1	2/3	1/1	4/4	2/3	1/1	1/1	1/1	1/1	1/1
Soda lye (sodium hydroxide)	30%	0/0	0/0	1/1	1/1	1/0	4/4	1/0	1/1	1/0	1/1	1/3
Nitrobenzene		1/2	1/1	3/4	4/4	4/4	4/4	4/4	4/4	4/4	1/1	4/4

Chemical	Concentration	Plastic										
		E-CTFE	FEP/ PFA	HDPE	LDPE	PA	PC	PMP	PP	PS	PTFE	PVC rigic
Octane	n-	1/1	1/1	1/1	1/1	0/0	2/3	1/1	1/1	4/4	1/1	3/4

Oils & fats, vegetable		0/0	0/0	1/3	1/3	0/0	0/0	0/0	1/3	3/0	1/1	1/1
Oxalic acid		1/1	0/0	1/1	1/1	3/0	1/0	1/1	1/1	1/1	1/1	1/1
Perchloroethylene		1/1	1/1	4/4	4/4	4/4	4/4	4/4	4/4	4/4	1/1	4/4
Perchloric acid		1/2	2/3	2/4	2/4	4/4	4/4	2/4	2/4	2/3	1/1	2/4
Petroleum	technical grade	0/0	0/0	1/3	3/4	1/0	3/0	0/0	1/3	3/4	1/1	1/0
Phenol	100%	1/1	1/1	2/3	3/3	4/4	4/4	1/1	1/1	4/4	1/1	4/4
Phenylhydrazine	technical grade	0/0	0/0	3/0	0/0	0/0	0/0	0/0	3/0	0/0	0/0	4/4
Phosphoric acid	85%	1/1	1/1	1/1	1/1	4/4	1/2	1/2	1/2	1/2	1/1	1/2
Neroli oil		1/1	1/1	2/3	3/4	0/0	3/3	3/3	2/3	4/4	0/0	3/4
Propane	gaseous	1/1	1/1	3/4	4/4	0/0	3/4	4/4	4/4	4/4	0/0	1/2
Propylene glycol		1/1	1/1	1/1	1/1	0/0	2/3	1/1	1/1	1/1	1/1	3/4
Propylene oxide		3/4	1/1	1/1	1/2	0/0	2/3	1/2	1/2	4/4	1/0	3/4
Pyridine		1/1	0/0	1/3	02	1/0	4/4	02	3/3	0/4	1/1	4/4
Mercury	pure	1/1	0/0	1/1	1/1	1/0	1/0	1/1	1/1	1/1	1/1	1/1
Mercury chlorides		1/1	0/0	1/1	1/1	4/4	1/0	1/1	1/1	1/3	1/1	1/3
Resorcin	saturated	1/1	1/1	1/1	1/1	4/4	2/3	1/1	1/1	2/3	1/0	3/4

Chemical	Concentration	Plastic										
		E-CTFE	FEP/ PFA	HDPE	LDPE	PA	PC	PMP	PP	PS	PTFE	PVC rigid
Salicylic aldehyde		14	1/1	1/1	1/2	0/0	2/3	1/2	1/2	4/4	0/0	3/4
Salicylic acid	saturated	1/1	1/1	1/1	1/1	0/0	1/2	1/1	1/1	1/2	1/1	2/3
Nitric acid	50%	1/1	1/1	2/4	3/4	4/4	4/4	2/4	3/4	4/4	1/1	2/3
Hydrochloric acid	20%	1/1	1/1	1/1	1/1	4/4	2/3	1/2	1/1	1/1	1/1	1/3
Lubricating oil		0/0	0/0	1/3	2/3	0/0	0/0	0/0	3/0	0/0	1/1	1/1
Sulfur dioxide	moist	1/1	1/1	1/1	1/1	0/0	1/2	1/1	1/1	3/4	0/0	1/2
Carbon disulfide		1/3	1/1	4/4	4/4	3/0	4/4	4/4	4/4	4/4	1/1	4/4
Sulfuric acid	95%	1/1	1/1	3/4	3/4	4/4	4/4	2/2	3/4	4/4	1/1	2/4
Silver acetate		1/1	1/1	1/1	1/1	0/0	1/2	1/1	1/1	2/2	0/0	2/2
Silver nitrate		1/1	1/1	1/1	1/2	1/0	1/1	1/1	1/2	2/3	1/1	1/2
Stearic acid	crystals	1/1	1/1	1/3	1/3	1/0	1/2	1/1	1/3	1/2	1/1	1/2
Sulfides		1/2	1/1	2/3	3/4	0/0	3/4	3/4	3/4	4/4	0/0	4/4
Terpentine oil		1/1	1/1	2/2	3/4	0/0	4/4	3/3	4/4	4/4	1/1	2/3
Carbon tetrachloride		1/1	1/1	3/4	4/4	1/0	4/4	4/4	4/4	4/4	1/1	2/3
Tetrahydrofuran		2/3	1/1	3/4	4/4	1/0	4/4	3/4	3/4	4/4	1/1	4/4
Thionyl chloride	technical grade	0/0	0/0	4/4	4/4	4/4	0/0	0/0	4/4	4/4	1/0	4/4
Trichloroethylene	100%	0/0	1/2	1/1	3/4	4/4	3/0	4/4	4/4	4/4	1/1	4/4
Vinyl chloride	technical grade	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	1/0	4/4
Plasticizers		0/0	0/0	1/3	1/3	0/0	0/0	0/0	1/3	0/0	1/1	0/0

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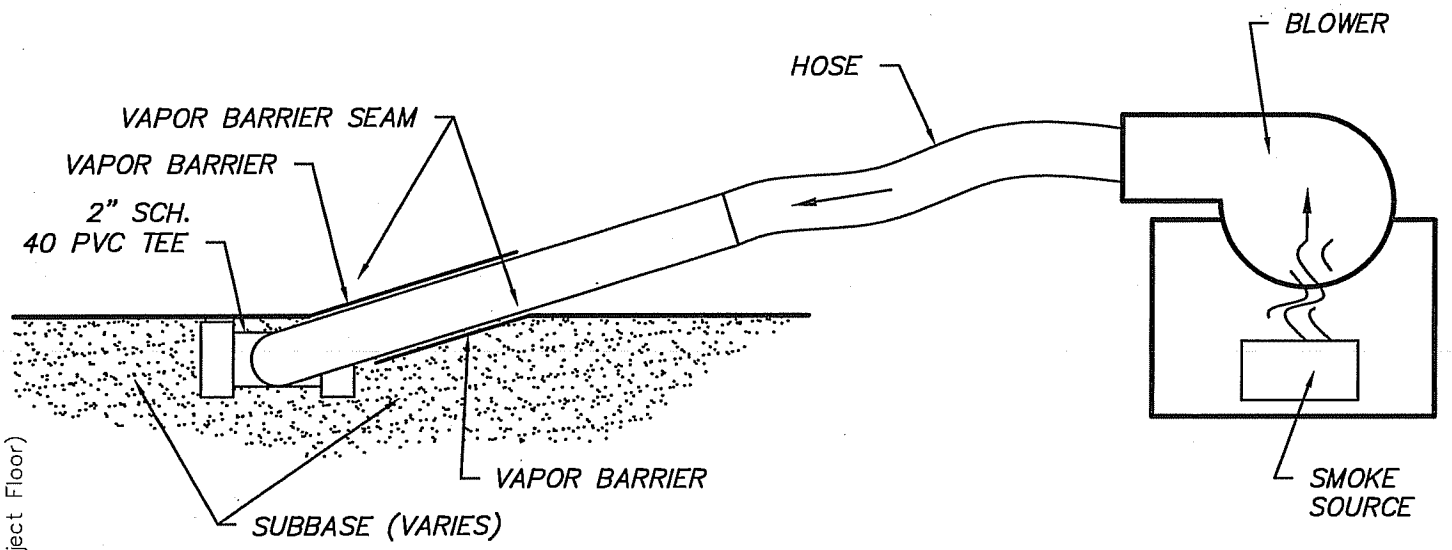
Editor: **Siteadmin**

APPENDIX C
Smoke Testing Information

APPENDIX C
SMOKE TEST DETAIL



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MATERIAL SAFETY DATA SHEET

SECTION 1: PRODUCT INFORMATION

Product Identifier	Superior® Smoke
Chemical Name	Screening Smoke
Product Use	Superior® Smoke for testing sanitary sewers
Manufacturer's information	SUPERIOR SIGNAL COMPANY, INC.

SECTION 2: PRODUCT INGREDIENTS (SMOKE)

Neither TLV nor PEL applicable because product is intended for use in short term tests.

	TLV	PEL	8-hour time weighted average
Hydrated Zinc Chloride	1 mg/m³	1 mg/m³	
Water Condensate	-	-	
Carbon Monoxide	55 mg/m³	55 mg/m³	

All other ingredients are present in negligible amounts and/or non-hazardous.

Concentrations of the various smoke components depend entirely on the size of solid(s) burned, volume of the space and ventilation of the space. They are not independently predictable or knowable.

Superior® Smoke products are available in various sizes that provide sufficient materials to create easily visible smoke at the concentration of 10 mg/m zinc chloride. Superior® #1A and #2B are recommended for testing house plumbing. Superior® #3C and #W3C are recommended for testing sanitary sewer collection systems.

SECTION 3: PHYSICAL DATA (SMOKE)

Boiling Point:	Not Applicable
Vapor Pressure:	Not Applicable
Vapor Density:	Not Applicable
Solubility in Water:	Soluble
pH:	No Data
Appearance and Odor:	Gray to white with an odor of burning paper.

SECTION 4: FIRE & EXPLOSION HAZARD DATA

(SMOKE): Flash Point (method used):	None
Autoignition:	Not Applicable
Flammable limits in air:	Not Applicable

(SOLID PRODUCT): Extinguishing Media: Use media suitable for surrounding fire.

(SMOKE/SOLID PRODUCT): Normal fire fighting protective equipment: self-contained breathing apparatus and full protective clothing.

(SMOKE/SOLID PRODUCT): Unusual fire and explosion hazards: None known

SECTION 5: REACTIVITY DATA (SOLID PRODUCT)

Stability: Stable under normal conditions
Hazardous decomposition products: See Section 2
Hazardous polymerization: None known

SECTION 6: HEALTH HAZARD ASSESSMENT (SMOKE)

General: Superior® Smoke can be used without hazard if applied as directed. The main effects of the smoke are some minimal irritation of the throat, an awareness of an odd odor, and the appearance of smoke. These effects act as a warning and are desirable to prevent voluntary overexposure. Individuals should be urged not to accept exposures that cause minor irritation, but to leave the area and ventilate well to dissipate the smoke.

Ingestion: Not a significant route of exposure.

Eye Contact: Acute exposure is not likely to induce eye irritation.

Skin Absorption: Not a significant route of exposure.

Inhalation: Acute exposure can cause irritation of the respiratory tract and mucous membranes. Irritation is a warning property of smoke materials; in itself irritation is not usually regarded as a toxic effect unless it is efficient to cause inflammation and then inflammation, not irritation, is the toxic effect.

Effects of Overexposure: Irritation of the respiratory passages; cough; nausea. Gross overexposure to dense smoke concentrations for periods of ten minutes or more could result in throat irritation and mucous membrane congestion requiring medical treatment. Coughs, chills, fever and pulmonary edema can result from overwhelming exposure. Increasingly severe overexposure is likely to result in increasingly severe irritation and inflammation to all mucous membranes contacted by the smoke with most severe effects usually appearing in the respiratory tract.

SECTION 7: EMERGENCY AND FIRST AID PROCEDURES

Remove victim to fresh air. If breathing is difficult, get medical attention.

SECTION 8: TOXICOLOGICAL PROPERTIES (SMOKE)

Carcinogen listed by: IARC (No) NTP (No) OSHA (No) OTHER (No)

SECTION 9: DISPOSAL METHOD

(SMOKE): Ventilate area: Use local exhaust to keep exposure to a minimum. The duration of smoke in the house or basement would be short and the length of exposure could be reduced further by opening doors and windows for a few minutes, if and when the smoke appears.

(SOLID PRODUCT): Disposal Method: Dispose in chemical disposal area in a manner that complies with local, state and federal regulations.

The information herein is given in good faith, but no warranty, expressed or implied, is made.

SECTION 10: PREPARATION OF THE MSDS

Prepared by: Frank Nichols, Jr.,

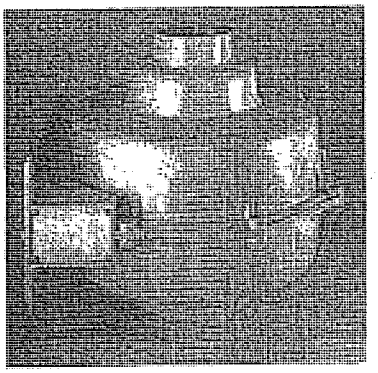
Date of preparation: October 13, 2000
Date of last revision: October 13, 2000

SD/2
Review date: 01/03/05

APPENDIX D
Sub-Slab Depressurization Equipment Specification Sheets

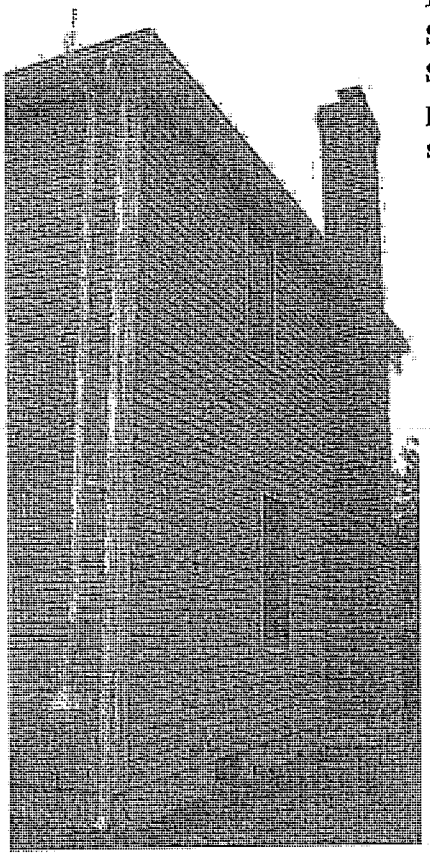
RadonAway™

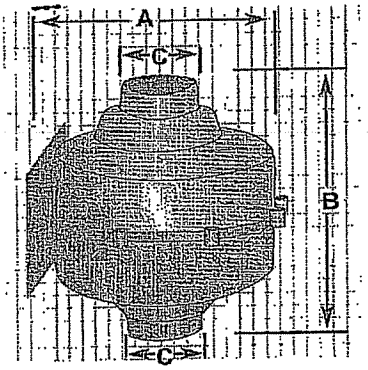
GP Series



Radon Mitigation Fans

Specially designed for radon mitigation, GP Series Fans provide a wide range of performance that makes them ideal for most subslab radon mitigation systems.





- **5-Year Warranty**
- **Mounts on duct pipe or with integral flange**
- **3" diameter ducts for use with 3" or 4" pipe**
- **Electrical box for hard wire or plug in**
- **ETL Listed - for indoor or outdoor use.**

Model	Dimensions		
	A	B	C Duct Size
GP series	12.5"	13"	3"

The following chart shows performance of GP Series fans:

Model	Watts	Maximum Pressure "WC	Typical CFM vs. Static Pressure WC						
			1.0"	1.5"	2.0"	2.5"	3.0"	3.5"	4.0"
GP201	40-60	2.0	82	58	5				
GP301	55-90	2.6	92	77	45	10	-	-	-
GP401	60-110	3.4	93	82	60	40	15		
GP501	70-140	4.2	95	87	80	70	57	30	10

Choice of model is dependent on certain building characteristics including sub-slab materials and should be made by a radon professional.

For Further Information Contact:

0902
P/N 02002

SECTION 350—SUBBASE

350.1 DESCRIPTION—This work is preparation of subgrade, as specified in Section 210, and construction of a compacted aggregate subbase.

350.2 MATERIAL—

(a) Aggregates. Type C or better, No. 2A and No. OGS, as specified in Section 703.2 and 703.5.

350.3 CONSTRUCTION—

(a) Equipment.

1. Spreaders. Section 320.3(a)3

2. Compaction Equipment. Sections 108.05(c)3.a, 3.b, 3.e

(b) General. Prepare the subgrade as specified in Section 210 before placing subbase. Do not place subbase material on soft, muddy, or frozen areas.

If directed, correct unsatisfactory subbase conditions developing ahead of the base and paving operations by scarifying, reshaping, and recompacting, or by replacing the subbase.

(c) Mixing. Use acceptable methods to mix materials and water before delivery to the project. Use a blend of materials from different sources only if allowed. Use material containing enough moisture to prevent segregation during stockpiling, hauling, and placing, and to minimize water added during compaction. Maintain No. OGS aggregate in a well-moistened condition from before placement to compaction.

(d) Placement. Before placing open-graded subbase, construct berms to confine the subbase material. Place the subbase before paving and as shown on the Standard Drawings. Control the subbase elevation and depth as specified in Section 210.3(c); except do not use templates if the subbase is trimmed using an automatic grading machine. Place the material on the subgrade using spreaders and without causing segregation. In areas where using mechanical spreaders is impractical, use an acceptable method to spread the material.

For rigid pavement and shoulders, place a course of No. 2A aggregate to a minimum compacted depth of 75 mm (3 inches) directly on the subgrade and place a course of No. OGS aggregate to a minimum compacted depth of 100 mm (4 inches) on top of the No. 2A aggregate.

For flexible pavement and shoulders, place the indicated type of aggregate courses at the position and depth indicated the pavement structure. Place each layer of No. 2A aggregate to a minimum compacted depth of 75 mm (3 inches) and place each layer of No. OGS aggregate to a minimum compacted depth of 100 mm (4 inches). Construct subbase in layers not more than 200 mm (8 inches) in compacted depth; however, when granulated slag is used, limit each layer to not more than 100 mm (4 inches) in compacted depth. If permitted and when using granulated slag, the Contractor may place a maximum compacted layer of 150 mm (6 inches) when the full layer depth is compacted as specified in this Section.

If the subbase is constructed in widths less than the full pavement width, neatly trim the edge of completed subbase before placing the abutting subbase.

For simultaneous construction of more than one pavement course, complete and maintain the subbase at least 460 m (1,500 linear feet) in advance of placing the succeeding pavement course.

In areas inaccessible to spreaders or in special areas, and if permitted, deposit the subbase material on the prepared area. Spread, in a manner not causing segregation, to a uniform full depth of the layer being placed.

(e) Compaction and Density. Compact No. 2A aggregate to at least 100% of the maximum dry-mass (dry-weight) density, determined according to PTM No. 106, Method B. At locations directed by the Representative, determine the in-place density for each 2500 m^2 (3,000 square yards), of each layer according to AASHTO T 191 or T 310.

If the retained is 20% or more for the 19.0 mm (3/4-inch) sieve or if the subbase material is No. OGS, the Representative will accept compaction when the material does not move under the compaction equipment.

Compact from the sides to the center, with each pass uniformly overlapping the previous pass.

If necessary, to obtain the minimum density of No. 2A aggregate or adequate compaction of No. OGS aggregate, remix, add water, reconstruct, or replace the subbase.

(f) Surface Tolerance. Section 210.3(c)

(g) Test for Depth. At each density test location and after completing the density test, carefully dig one test hole to the full depth of the completed subbase.

The Representative will measure the depth of the finished subbase.

If the subbase depth is deficient by 13 mm (1/2 inch) or more from the depth indicated, the subbase is defective. The Representative may require additional test holes to determine the limits of the defective area. Scarify the subbase to a depth of 75 mm (3 inches), blend in additional material, and recompact. After recompacting, the Representative may require test holes to verify the subbase depth is within 13 mm (1/2 inch) of the indicated depth.

Backfill the test holes with subbase material and compact.

(h) Maintenance and Traffic. Section 320.3(j) and as follows:

Do not allow traffic, including construction traffic, on a subbase constructed of No. OGS aggregate. If a subbase constructed of No. 2A aggregate is used as a haul road or if a subbase is exposed to weather in excess of 60 calendar days, retest for surface irregularities and depth and correct deficiencies as specified in Section 210.3(c) and 350.3(g).

350.4 MEASUREMENT AND PAYMENT—Square Meter (Square Yard)

The Department will not pay the entire quantity of subbase complete in place until the base course or pavement is constructed over the subbase. However, the Department will pay for up to 75% of the estimated quantity of subbase placed in advance of the succeeding operations, if the Contractor satisfactorily completed and is properly maintaining the subbase.

TABLE C
Size and Grading Requirements for Coarse Aggregates
(Based on Laboratory Sieve Tests, Square Openings)

AASHTO Number	Total Percent Passing													
	100 mm (4")	90 mm (3 1/2")	63 mm (2 1/2")	50 mm (2")	37.5 mm (1 1/2")	25.0 mm (1")	19.0 mm (3/4")	12.5 mm (1/2")	9.5 mm (3/8")	4.75 mm (No. 4)	2.36 mm (No. 8)	1.18 mm (No. 16)	150 µm (No. 100)	75 µm (No. 200) ***
1	100	90-100	25-60		0-15		0-5							
3			100	90-100	35-70	0-15		0-5						
467				100	95-100		35-70		10-30	0-5				
5					100	90-100	20-55	0-10	0-5					
57					100	95-100		25-60		0-10	0-5			
67						100	90-100		20-55	0-10	0-5			
7							100	90-100	40-70	0-15	0-5			
8								100	85-100	10-30	0-10	0-5		
10									100	85-100			10-30	
2A**				100			52-100		36-70	24-50	16-38*	10-30		
OGS**				100			52-100		36-65	8-40		0-12		

* Applies only for bituminous mixtures.
** PENNDOT Number
*** For 75 µm (No. 200), see Table D.

Note A: A combination of No. 7 and No. 5 may be substituted for No. 57, provided that not more than 50% or less than 30% of the combination is No. 7 size.

Note B: Provide No. OGS material that has a minimum average coefficient of uniformity of 4.0. The average coefficient of uniformity is defined as the average of the sublots within each lot. Determine the coefficient of uniformity according to PTM No. 149 each time the gradation is determined. The required minimum coefficient of uniformity for individual samples is 3.5. If the coefficient of uniformity of any sample falls below 3.5, reject the lot. Do not use the coefficient of uniformity in the multiple deficiency formula.

SECTION M.02

GRANULAR FILL
SUBBASE
GRANULAR BASE AND SURFACES
STONE BASE
PERVIOUS STRUCTURE BACKFILL
FREE-DRAINING MATERIAL
CRUSHER-RUN STONE

M.02.01—Granular Fill: For this purpose, the material shall consist of broken or crushed stone, gravel, reclaimed miscellaneous aggregate or a mixture thereof.

1. Broken or crushed stone shall be the product resulting from the artificial crushing of rocks, boulders or large cobblestones, substantially all faces of which have resulted from the crushing operation. Broken or crushed stone shall consist of sound, tough, durable stone, reasonably free from soft, thin, elongated, laminated, friable, micaceous or disintegrated pieces, mud, dirt or other deleterious material and shall be sized to meet the requirements of grading "A," Article M.02.06.

2. Bank or crushed gravel shall consist of sound, tough, durable particles of crushed or uncrushed gravel, free from soft, thin, elongated or laminated pieces and vegetable or other deleterious substances. It shall meet Grading "A" and the requirements for plasticity and resistance to abrasion indicated in Article M.02.06. Crushed gravel shall be the manufactured product resulting from the deliberate mechanical crushing of gravel with at least 50% of the gravel retained on the No. 4 (4.75-millimeter) sieve having at least one fractured face.

3. Reclaimed Miscellaneous Aggregate material shall consist of sound, tough, durable particles of crushed reclaimed waste. It shall be free of soft disintegrated pieces, mud, dirt, glass or other injurious materials and contain no more than 2% by weight (mass) of asphalt cement.

This reclaimed miscellaneous material shall meet Grading "A" and the requirements for plasticity and resistance to abrasion, which are set forth in M.02.06. It shall be tested for soundness in accordance with M.02.06 when directed by the Director of Research and Materials.

M.02.02—Subbase: Materials for this work shall conform to the following requirements:

1. Bank or crushed gravel shall consist of sound, tough, durable particles of crushed or uncrushed gravel, free from soft, thin, elongated or laminated pieces and vegetable or other deleterious substances. It shall be hard and durable enough to resist weathering, traffic abrasion and crushing. It shall be subject to testing for soundness in accordance with Article M.02.06 when directed by the Director of Research and Materials. It shall meet Grading "B" and the requirements for plasticity and resistance to abrasion indicated in Article M.02.06.

2. Crusher-Run Stone shall consist of sound, tough, durable broken stone. It shall be reasonably free from soft, thin, elongated, laminated, friable, micaceous or disintegrated pieces, mud, dirt or other deleterious material.

(a) Loss on Abrasion: The crusher-run stone shall show a loss on abrasion of not more than fifty percent using AASHTO Method T 96.

(b) Grading: The crusher-run stone shall meet Grading "A" and the requirements for plasticity indicated in Article M.02.06.

3. Reclaimed Miscellaneous Aggregate shall consist of sound, tough, durable particles of crushed reclaimed waste. It shall be free from soft, disintegrated pieces, mud, dirt, glass or other injurious material, and contain no more than 2% by weight (mass) of asphalt

cement.

This reclaimed miscellaneous material shall meet Grading "B" and the requirements for plasticity and resistance to abrasion, which are set forth in M.02.06. It shall be tested for soundness in accordance with M.02.06 when directed by the Director of Research and Materials.

M.02.03—Granular Base, Rolled Bank Gravel Surface and Traffic Bound Gravel Surface: The materials for the "Rolled Granular Base" shall consist of sound, tough, durable particles of bank or crushed gravel, or reclaimed miscellaneous aggregate, or mixtures thereof with the resultant uniform blend containing no more than 2% by weight (mass) of asphalt cement. The materials for the Rolled Bank Gravel Surface and Traffic-Bound Gravel Surface shall consist of sound, tough, durable particles of bank or crushed gravel. All materials shall be free from thin or elongated pieces, lumps of clay, loam, or vegetable matter. Binder may be added and incorporated by approved methods as specified elsewhere. It shall meet Grading "A" except that the top course of the rolled bank gravel surface shall conform to Grading "C." It shall be subject to testing for soundness in accordance with Article M.02.06 when directed by the Director of Research and Materials. It shall also meet the requirements for plasticity and resistance to abrasion which, with grading, are indicated in Article M.02.06.

M.02.04—Gravel Shoulders: The materials for this work shall consist of sound, tough, durable particles of crushed or uncrushed gravel free from soft, thin, elongated or laminated pieces, vegetable or other deleterious substances. Gravel shall meet Grading "A" except that the upper 3 inches (75 millimeters) shall conform to Grading "C." It shall be subject to testing for soundness in accordance with Article M.02.06 when directed by the Director of Research and Materials. It shall also meet the requirements for plasticity and resistance to abrasion which, with grading, are indicated in Article M.02.06.

M.02.05—Pervious Structure Backfill: Pervious structure backfill shall consist of broken or crushed stone, broken or crushed gravel, or reclaimed miscellaneous aggregate containing no more than 2% by weight (mass) of asphalt cement or mixtures thereof.

Materials for this work shall conform to the following requirements:

1. Broken or crushed stone shall consist of sound, tough, durable stone, reasonably free from soft, thin, elongated, friable, laminated, micaceous or disintegrated pieces, mud, dirt or other deleterious material and shall be sized to meet the requirements of Grading "B," Article M.02.06. It shall meet the requirements of loss on abrasion indicated in Subarticle M.02.02-2(a).

2. Bank or crushed gravel shall consist of sound, tough, durable particles of crushed or uncrushed gravel free from soft, thin, elongated or laminated pieces and vegetable or other deleterious substances. It shall be subject to testing for soundness in accordance with Article M.02.06 when directed by the Director of Research and Materials. It shall meet Grading "B" and the requirements for plasticity and resistance to abrasion indicated in Article M.02.06.

3. Reclaimed Miscellaneous Aggregate shall consist of sound, tough, durable particles of crushed reclaimed waste. It shall be free of soft disintegrated pieces, mud, dirt, glass or other injurious material, and contain no more than 2% by weight (mass) of asphalt cement. It shall meet Grading "B" and the requirements for plasticity, resistance to abrasion and soundness indicated in M.02.06.

M.02.06—Gradation, Plasticity, Resistance to Abrasion and Soundness Requirements:

1. Gradation:

	Grading		
	A	B	C
Square Mesh Sieves	Percent passing by weight (mass)		
Pass 5 inch (125 mm)		100	
Pass 3 1/2 inch (90 mm)	100	90-100	
Pass I 1/2 inch (37.5 mm)	55-100	55-95	100
Pass 3/4 inch (19 mm)			45-80
Pass 1/4 inch (6.3 mm)	25-60	25-60	25-60

Pass #10 (2.0 mm)	15-45	15-45	15-45
Pass #40 (425 µm)	5-25	5-25	5-25
Pass #100 (150 µm)	0-10	0-10	0-10
Pass #200 (75 µm)	0-5	0-5	0-5

The grading percentages specified in the above table shall apply to the material after it has been delivered to the construction site as well as when tested at the pit or other source of supply.

When the fraction of the dry sample passing the No. 100 (150-µm) mesh sieve is greater than 8% by weight (mass), the sample will be washed as indicated. The amount obtained from washing shall be added to that obtained by dry sieving; and the total amount passing each sieve shall meet the above gradation.

2. Plasticity:

(a) When the fraction of the dry sample passing the No. 100 (150-µm) mesh sieve is 4% or less by weight (mass), no plastic limit test will be made.

(b) When the fraction of the dry sample passing the No. 100 (150-µm) mesh sieve is greater than 4% and not greater than 8% by weight (mass), that fraction shall not have sufficient plasticity to permit the performing of the plastic limit test using AASHTO Method T 90.

(c) When the fraction of the dry sample passing the No. 100 (150-µm) mesh sieve is greater than 8% by weight (mass), the sample will be washed; and the additional material passing the No. 100 (150-µm) mesh sieve shall be determined by AASHTO Method T 146, except that the No. 100 (150-µm) mesh sieve will be substituted for the No. 40 (425-µm) mesh sieve where the latter is specified in AASHTO Method T 146. The combined materials that passed the No. 100 (150-µm) mesh sieve shall not have sufficient plasticity to permit the performing of the plastic limit test using AASHTO Method T 90.

3. Test for Resistance to Abrasion. Gravel materials shall show a loss on abrasion of not more than 50% using AASHTO Method T 96.

4. Soundness: When tested with magnesium sulfate solution for soundness using AASHTO Method T 104, coarse aggregate shall not have a loss of more than 15% at the end of five cycles.

M.02.07—Free-Draining Materials: Free-draining material shall consist of sand, gravel, rock fragments, quarry run stone, broken stone, reclaimed miscellaneous aggregate containing no more than 2% by weight (mass) of asphalt cement or mixtures thereof. This material, or the material from any one source of a mixture, shall not have more than 70%, by weight (mass), passing the No. 40 (425 µm) mesh sieve and not more than 10%, by weight (mass), passing the No. 200 (75 µm) mesh sieve.

APPENDIX E
Sub-Slab Depressurization Monitoring Equipment Specification Sheets


Radon Supplies
Radon Supplies VM2
INSTALLATION
Instructions

Radon Supplies VM2

INSTALLATION INSTRUCTIONS

1) Determine location on PVC pipe where adjustable manometer is to be installed. Pipe surface should be dry and clean.
2) While holding manometer in an upright position remove both plugs.
3) Still holding VM2 upright, remove the paper backing from the foam tape on the printed portion of the center piece and press firmly in place on the PVC pipe. Let the VM2 sit on the pipe for approximately 10 minutes to let all the fluid on the inside of the upper of the tubes to settle to the bottom.
4) VM2 tube can now be adjusted up or down to line up the fluid with the zero on the scale in the white center piece.
5) Carefully remove the paper backing from the top part of the center piece to secure the gauge as adjusted .
6) Drill a 3/16" hole in the PVC pipe approximately 2" above the VM2
7) Insert one end of vinyl tube into either open tube on top of manometer. Insert other end of vinyl tubing into the 3/16"hole drilled into pipe. Use caulk if necessary to ensure hose is airtight.
8) Peel backing off radon label and place on PVC pipe next to VM2, making sure that the long horizontal arrow on the label is lined up with the zero on the VM2 scale.

Manufactured By:

Radon Supplies
1 Eighth Street, Suite 6
Frenchtown NJ 08825
888-800-5955
www.radonsupplies.com

Radon Supplies

CAUTION

Radon Removal System in Operation

Do not disconnect this pipe or turn off the radon fan.
The fan should be operated at all times.
Radon systems should be serviced by qualified personnel only.

If both columns are at zero call installer for service

Date Installed ___/___/___

Installer_____

Phone_____

Notice to homeowner/user:
Even though this radon vacuum indicator indicates that the radon system is functioning properly, periodic testing of the home for radon levels is still recommended. This device does not measure the amount of radon or other radioactive elements, and does not guarantee system performance. It is the user's responsibility to check this gauge periodically and also the fan or other device to which this gauge and pipe is connected.

Manometer Manufactured by: RadonSupplies
www.radonsupplies.com

ASHTEAD Technology RENTALS

Phone: 800-242-3910
www.ashtead-technology.com

Omniguard IV

The Omniguard 4 is a differential pressure recorder in a completely self-contained package, designed from the beginning to be extremely flexible yet easy to use. The included accessories, owner's manual, hose, a spare roll of paper and AC cord, store easily in the lid. There's no AC adapter to keep track of and it's easy to find a convenient spot to place the unit since the Omniguard 4 is not position sensitive and can be hung by a nail. Accurate measurements continue even if the unit is dropped or moved.
The backlit graphics display provides the easiest setup possible, pressure is indicated with large easy to read characters and alarm setpoints are always displayed. Screen icons show the monitoring, printer and audible alarm status with a glance. Detailed information for job setup, feature settings and operating instructions are available on-screen at any time by pressing the Help key. Troubleshooting topics are also covered.
Pressure readings are time stamped and logged into memory once containment has been established. Audible and visual alarms activate whenever the pressure reaches the alarm setpoints.

Key Features

Real time monitoring of differential pressure and/or vacuum level

Configuration report prints current settings and monitoring status for easy review

Technical Specifications

Title	Value
Operating Range	+/- 0.250 inches Water Column (+/- 6.35 mm WC, +/- 62.5 Pascals)
Resolution	0.001 inches Water Column (+/- 0.05 mm WC, +/- 0.5 Pascals)
Accuracy	+/- 0.003 inches Water Column or +/- 1% of reading whichever is greater
Pressure Units Displayed	"WC (inches Water Column), mmWC (millimeters Water Column), Pa (Pascals)
Burst Pressure	3 psi (20 kPa) on either port
Data Storage Capacity	128,000 characters, 30+ days of readings (over 4000 logged events) in non-volatile memory (no battery required) (29500 characters, 7+ days of readings, 30 data data retention for Omniguard III)
Display	Graphic Liquid Crystal Display (LCD) with adjustable backlight and over 3.5 sq. inch viewing area
Printer	20 character wide thermal printer (uses 2.2" wide thermal paper)
Printing/Logging Rates	Normal Operation -- highest and lowest pressure readings printed/logged at intervals of 5, 15, 30 minutes or OFF Alarm Condition -- current pressure reading printed/logged at intervals of 15, 30, 60 or 120 seconds for first 10 minutes of alarm condition, increasing to 15 minute intervals thereafter
Pressure Inlets	Two 3/16" OD barbed hose connectors, 10 ft of hose provided
Power	115 VAC 60Hz with 6 ft power cord (220 VAC 50Hz optional, 6VDC battery pack optional)

Dimensions

Title	(mm)	(inch)	(kg)	(lbs)
	23.49 x 19.05 x 11.43 cm	9.25" x 7.5" x 4.5"	2.72 kg	6 lbs

APPENDIX F
Sub-Slab Depressurization Inspection Form

HRP Associates, Inc. 197 Scott Swamp Road Farmington, CT 06062 (860) 674-9570	**Sub-Slab Depressurization System Operation & Maintenance** SSD and Slab Floor Inspection Form Celebration Foods 37 Booth Street, New Britain, Connecticut

➢This inspection addresses the _____ area, which is subject to on-going sub-slab depressurization. (area inspected)

➢A separate inspection form should be completed for each active SSD areas.

1) Check in-line Fans for operation. Note any abnormalities, deficiencies, damage, replacements, repairs, etc.

2) Check all accessible transfer and stack piping (including air hissing or water noise). Note any damage, previous repairs, required repairs, sagging, condensate accumulation, repairs performed, etc.

3) Inspection of roof vents:

Check for: -building air intakes are minimum of 25 ft from SSD exhaust stack
-new air intakes and verify they conform to 25 ft set back
-roof stack damage or infestation

Provide sketch of roof if relocation of exhaust stacks has occurred

4) Visually inspection concrete slab or finished flooring above the active SSD area.

Check for: -unsealed cracks
-integrity of seals in existing cracks
-integrity of seals around floor penetrations
-integrity of seals in expansion joints
-new concrete floor, patches, etc.

5) Measure Vent Line Vacuum; record location and U-Tube manometer reading.

Location	Reading (inches of H_2O)

Comments:

6) Measure Sub-Slab Vacuum; record location and vacuum reading.

Location	Reading (inches of H_2O)

Comments, Observations, or Repairs:

Name of Inspector: _____ (print and initial) Date of Inspection: _____

Copy Provided to Facility: _____ (initial and date)