STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION
17 STATE HOUSE STATION AUGUSTA, MAINE 04333-0017

DEPARTMENT ORDER

IN THE MATTER OF

BEAL'S LINEN SITE	)	
	)	DESIGNATION OF
Auburn, Androscoggin County, Maine	)	UNCONTROLLED HAZARDOUS
PROCEEDING UNDER 38 M.R.S. § 1365,	)	SUBSTANCE SITE
UNCONTROLLED HAZARDOUS SUBSTANCE	)	AND ORDER
SITES LAW	)	

Jurisdiction

This Designation of an Uncontrolled Hazardous Substance Site is made pursuant to the authority vested in the Commissioner of the State of Maine Department of Environmental Protection (Commissioner) under the ***Uncontrolled Hazardous Substance Sites Law*, 38 M.R.S. §§ 1361-1371.**

Findings of Fact

1. The "Beals Linen Site" is located at 7 Chestnut Street in the City of Auburn, Androscoggin County, Maine, and is described in a deed recorded in the Androscoggin County Registry of Deeds at Book 5488 Page 202 and is generally depicted in the City of Auburn's tax records as Lot 335 on Tax Map 250 (hereinafter referred to as the Site).

2. The Site consists of three parcels totaling approximately 0.6 acres of land zoned as residential. The Site is rectangular and located at the Southeastern corner of the intersection of Chestnut Street and Webster Street. The Site is improved with one building (the "Site Building"), which is utilized as a multi-unit apartment building. The Site Building is a one and two-storied structure, occupying an approximate footprint of 8,800 square feet, and constructed on concrete slab with no basement. The building is partitioned into 15 residential apartments and a shared laundry room. The Site Building has been connected to municipal water and sanitary sewer services, and is heated by wall-mounted, natural gas-fired heaters, located in the living room area of each apartment. The Northwestern and Western portions of the Site consist of asphalt-paved tenant parking areas. The Eastern and Southeastern portions of the Site consist of overgrown vegetated/wooded areas.

3. The Site is located in an urban, primarily residential area. Nearby residences are served by City sewer and water. The Site it bordered by residential properties to the North and South and a school and City owned play ground to the East and West.

4. Based on available information, the Western portion of the Site was originally improved with two residential dwellings from circa 1873 to circa 1914. These residential dwellings were located along Webster Street (formerly Manley Street) and were identified as 45 & 47 Manley Street. A laundry facility (Everett Laundry) reportedly operated at the back of the residence at 47 Manley Street from approximately 1914 to 1948. The residence and laundry

facility were demolished and the Beal's Linen and Malo Cleaners buildings were constructed at the Site around 1950. The residence at 45 Manley Street was reportedly demolished around 1981 and its property was utilized as a parking lot for Beal's Linen. Malo Cleaners and Beal's Linen operated as dry cleaners from approximately 1950 to 1986 and a commercial linen service also operated at the Beal's property at the same time. The Malo Cleaners and Beal's Linen buildings were demolished in 1986 and the existing residential apartment building was constructed in 1987. The Site has been utilized as a residential apartment since that time.

5. In 2013 and 2014, the Department of Environmental Protection ("Department") conducted soil vapor and indoor air assessments at the Site, adjoining properties, and along the utility corridor beneath Chestnut Street to the north of the Site. Elevated concentrations of volatile organic compounds (VOCs) associated with dry cleaning, specifically TCE (Trichloroethylene) and PCE (Perchloroethylene), were detected at concentrations in the samples that posed a health risk to occupants of the Site Building.

6. The Contaminants of Concern ("COC") at this site are PCE, TCE, and their breakdown products including cis-1,2-dichloroethylene (cis-1,2-DCE), trans-1,2-dichloroethylene (trans-1-2-DCE), and Vinyl Chloride (VC). The COCs are typical of dry cleaning operations. They are extremely long lived once released to soil and groundwater. All the lines of evidence from site investigations indicate that the COCs came to be located at the Site during dry cleaning operations conducted at the Site, which was prior to 1986.

7. Since the initial sampling in 2013, several investigations into the extent of contamination at the Site have been completed on behalf of the Department. These investigations identified a contaminant source area on the Eastern portion of the Site. A trench drain and sump structure has been identified in this area, which appears to have discharged fluids from the dry cleaning operation to the municipal sewer system along Chestnut Street. Significantly elevated concentrations of TCE and PCE were detected in the soil/sludge material excavated from the trench drain and sump structure. Evaluation of the sewer lines in Chestnut Street and Webster Street determined that the sewer in this area is constructed of clay pipe. COCs were historically transported by the sewer system and leaked into the subsurface along Chestnut Street and Webster Street. TCE and PCE have been detected in groundwater samples obtained from temporary groundwater monitoring wells located throughout the Site.

8. In April of 2014 a sub - slab depressurization system (SSDS) was installed by the Department on the apartment building to prevent the migration of COCs into the apartments from the TCE and PCE contamination in Site soil and groundwater. The Department has been operating and maintaining the SSDS since its installation. This has been necessary to reduce and maintain concentrations of TCE and PCE in the indoor air of the onsite apartment building to levels that are protective of public health.

BEAL'S LINEN SITE Auburn, Androscoggin County, Maine PROCEEDING UNDER 38 M.R.S. § 1365, UNCONTROLLED HAZARDOUS SUBSTANCE SITES LAW	)))))))	DESIGNATION OF UNCONTROLLED HAZARDOUS SUBSTANCE SITE

9. Maine's *Uncontrolled Hazardous Substance Site*s law, 38 M.R.S. §§ 1361–1371 (Uncontrolled Sites Law), § 1362(1), defines "hazardous substance" as:

   A. Any substance identified by the Board of Environmental Protection (Board) under 38 M.R.S. § 1319-0 [hazardous waste and waste oil];

   B. Any substance identified by the Board under 38 M.R.S. § 1319 [hazardous matter];

   C. Any substance designated pursuant to the *United States Comprehensive Environmental Response, Compensation and Liability Act of 1980*, Public Law 96-510, §§ 101 and 102 [Superfund];

   D. Any toxic pollutant listed under the *United States Federal Water Pollution Control Act*, § 307(a);

   E. Any hazardous air pollutant listed under the *United States Clean Air Act*, § 112;

   F. Any imminently hazardous chemical substance or mixture with respect to which the Administrator of the United States Environmental Protection Agency has taken action pursuant to the *United States Toxic Substances Control Act*, § 7; and

   G. Waste oil as defined in 38 M.R.S. § 1303-C.

10. PCE, TCE, cis-1,2-DCE, trans-1-2-DCE, and VC are designated by EPA as Hazardous Substances pursuant to the *United States Comprehensive Environmental Response, Compensation and Liability Act* of 1980, Public Law 96-510, §§ 101 and 102.

11. Substances listed in paragraphs 6 and 10 above are hazardous substances within the meaning of 38 M.R.S. § 1362(1). These substances have been stored, spilled or disposed of at the Site in such a manner that they have been or are being released or discharged into indoor air, the soil and ground water.

12. TCE and PCE were found to be present at the Site soil at concentrations significantly above the residential and commercial Maine Remedial Action Guidelines[1] for direct exposure to soil. TCE and PCE were found to be present in the indoor air of the building at the Site above Maine Remedial Action Guidelines.

13. The Uncontrolled Sites Law at 38 M.R.S. § 1362(2) defines Responsible Party as any one or more of the following persons:

[1] Maine Remedial Action Guidelines (RAGs) for Sites Contaminated with Hazardous Substances. Effective February 5, 2016, (Maine Department of Environmental Protection, 28 SHS, Augusta, ME 04333-0017, available at: http://www.maine.gov/dep/spills/publications/guidance/index.html)

BEAL'S LINEN SITE Auburn, Androscoggin County, Maine PROCEEDING UNDER 38 M.R.S. § 1365, UNCONTROLLED HAZARDOUS SUBSTANCE SITES LAW	)))))))	DESIGNATION OF UNCONTROLLED HAZARDOUS SUBSTANCE SITE

A. The owner or operator of the uncontrolled site;

B. Any person who owned or operated the uncontrolled site from the time any hazardous substance arrived there;

C. Any person who arranged for the transport or handling of a hazardous substance, provided that the substance arrived at the uncontrolled site; and

D. A person who accepted a hazardous substance for transport, if substance arrived at the uncontrolled site. After April 1, 1992, a person who accepts a hazardous substance for transport and delivers that substance to a licensed hazardous waste storage, treatment or disposal facility according to the manifest signed by the generator is not a responsible party.

14. The Site has been owned by Sultan Corp. since 2003 (Androscoggin Registry of Deeds, Book 5488, Page 202). Sultan Corp. is a Maine Business Corporation (charter number 19941603 D) that operates a Property Management Company with its principal location in Lewiston. Debra Sullivan is the Registered Agent for Sultan Corp.

15. The Site was previously owned by Atlantic Holdings, LLC beginning on June 13, 2002 (Book 5467, Page 257). In 2003, Atlantic Holdings LLC merged with ATL Holdings, LLC. ATL Holdings LLC is a Limited Liability Company (Foreign) (charter number 20040232FC) in good standing that operates a Holding Company with its principal location in Florida. Susan K. LaBrie is ATL Holdings Registered Agent.

16. The Site was previously owned by Parkview Apartments, LLC, beginning on July 21, 2000 (Book 4475, Page 254). Parkview Apartments, LLC (charter number 20001312DC) has been administratively suspended.

17. The Site was previously owned by Parkview Associates, beginning on October 31, 1985 (Book 1873, Page 110). Parkview Associates is no longer an organized company in Maine.

18. The Site was previously owned by Beal's Laundry, Inc., beginning on March 31, 1980 (Book 1454, Page 207). Beal's Laundry, Inc is no longer an organized company in Maine.

19. The Site was previously owned by Laurier P. Malo, beginning on December 6, 1968 (Book 997, Page 604). Laurier P. Malo is deceased.

20. As a result of the Department's inspection and the Department's investigation of the hazardous substances' discharges, the surrounding site and hydrogeological conditions, and the contamination found in the soil on the Site, the Department identifies Sultan Corp. as a

responsible party for release of hazardous substances and for the associated contamination of soil within the meaning of 38 M.R.S. §§ 1362(2) and 1367-B.

21. Under 38 M.R.S. § 1365 and other laws[2], responsible parties may be obligated to undertake and complete response actions deemed necessary by the Department at the Site to protect the public health, safety, or the environment.

22. Under 38 M.R.S. § 1367, each responsible party is also jointly and severally liable for all costs incurred by the Department in responding to any release or threatened release of hazardous substances at the base. Such costs may include, but are not limited to, cost for the abatement, cleanup, or mitigation of the threats or hazards posed or potentially posed by an uncontrolled site. In addition, responsible parties are liable for damages for injury to, destruction of, loss of or loss of use of natural resources, including the costs to assess such damages.

23. As of March 30, 2018, the Department has incurred costs of approximately $317,745.48 at the Site.

Conclusions

Based on the above Findings of Fact, the Commissioner concludes:

1. Hazardous substances as defined in 38 M.R.S. § 1362(1) have come to be located at the Beals Linen Site, located in Auburn, Maine. These substances entered the soil, groundwater and indoor air at the Site.

2. Hazardous substances located at and released from the Site pose a potential threat or hazard to the public health, safety or welfare, or a threat to the natural environment.

3. There is a continued potential danger to the public health or safety of any person or to the environment as a result of the release of hazardous substances at the Site.

4. Remedial action was, and continues to be, necessary to abate the threat, danger, or hazard to public health or safety and to the environment posed by the Site.

5. As of March 30, 2018, the Department has incurred costs of at least $317,745.48 at the Site.

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2 Other laws include, without limitation, DEP's general Organization and Powers authority, 38 M.R.S. §§ 341-349-B, and the Maine Hazardous Waste, Septage and Solid Waste Management Act, 38 M.R.S. § 1301-1319-Y.

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SITES LAW	)	

6. Sultan Corp. is the owner of the property where hazardous substances have come to be located and is a responsible party as defined in 38 M.R.S. § 1362(2)(A).

7. Responsible Parties are jointly and severally liable for all costs for the abatement cleanup or mitigation of threats posed by the Site, pursuant to 38 M.R.S. § 1367.

THEREFORE, pursuant to 38 M.R.S. § 1365(A) the Commissioner hereby DESIGNATES the BEAL'S LINEN SITE in Auburn, Maine an Uncontrolled Hazardous Substance Site.

ORDER

Sultan Corp. is hereby ordered and directed to:

1. Within 45 days of the signing of this Order, hire a consultant approved of by the Department to operate and maintain the SSDS installed on the Site building by the Department, as outlined in the Attached SSDS O & M Manual, January 11, 2018, prepared by Ransom Environmental. Such plan may be modified from time to time upon approval of the Department. At all times the SSDS must maintain indoor concentrations of Site contaminants below health based guidelines established by the Department.

2. Submit a plan for remediation of the Site following *Alternative E: Air Sparging and Soil Vapor Extraction (SVE) System,* identified and outlined in the attached letter report titled "Conceptual Mitigation Alternative Analysis" Dated May 28, 2015 by Ransom Consulting, Inc., within 60 days of this order. The plan will be implemented as approved by the Department within 10 days of notice of approval.

3. Allow the Department, their agents and contractors access to the Site for completion of any investigative or remedial tasks necessary for investigation and remediation of the Site, including oversight of activities conducted by Sultan Corp., their agents and contractors, and any other entity that may be identified by the Department as a potential responsible party, including their agents and contractors.

4. "Approved" or "Approval" means approved, approved with conditions or modified by the Department as set forth in this paragraph of this Order. The Work conducted under this Order is subject to approval by the Department. Sultan Corp. shall provide all appropriate and necessary information to assess Site conditions and evaluate alternatives to the extent necessary to select and implement a remedy that will be consistent with all applicable Maine Statutes, Department rules, guidance, policies, and procedures, and that will attain clean-up levels protective of public health, safety, and the environment. Before undertaking work, Sultan Corp. shall submit a work plan for Department approval as detailed below. Once approved,

Sultan Corp. shall undertake the work in accordance with the plan and approved schedule, as detailed below.

A. Sultan Corp. Submission: Sultan Corp. shall submit all portions of any plan, report, or other deliverable pursuant to provisions of this Order.

B. Department Decision: After review of any plan, report or other item which is required to be submitted for approval pursuant to this Order, the Department shall:

i. approve, in whole or in part, the submission;

ii. approve the submission upon specified conditions;

iii. modify the submission to cure the deficiencies;

iv. disapprove, in whole or in part, the submission, directing that Sultan Corp. modify the submission; or

v. any combination of the above.

C. Sultan Corp. Implementation: In the event of approval, approval upon conditions, or modification by the Department, pursuant to subparagraph 4.B above, Sultan Corp. shall proceed to implement the plan, report, or other item, as approved or modified by the Department, in accordance with the schedule approved or modified by the Department.

D. Deficient Submissions: Upon receipt of a notice of disapproval pursuant to subparagraph 4.B.iv. , Sultan Corp. shall, within 14 days or such other time as specified by the Department in such notice, correct the deficiencies and resubmit the plan, report, or other item for approval. Notwithstanding the receipt of a notice of disapproval pursuant to subparagraph 4.B.iv. , Sultan Corp. shall proceed, at the direction of the Department, to take any action required by any non-deficient portion of the submission. If upon re-submission, a plan, report, or item is disapproved or modified by the Department, Sultan Corp. shall be deemed to have failed to submit such a plan, report, or item timely and adequately.

E. Enforceability: All plans, reports, and other items required to be submitted to the Department under this Order shall, upon approval or modification by the Department, be enforceable under this Order. In the event the Department approves, conditions or modifies a portion of a plan, report, or other item

required to be submitted to the Department under this Order, the approved, conditioned or modified portion shall be enforceable under this Order.

F. Modifications to Approved Plans: Sultan Corp. may submit to the Department for approval modifications to approved work plans to incorporate new information. Approved modifications shall clearly state that this version replaces the previous version. Proposed modifications to plans will be reviewed in accordance with the procedures in this paragraph.

5. Within 60 days, pay to the Department's Uncontrolled Sites Fund $317,745.48 for the Department's past costs through March 30, 2018 at this Site.

DONE AND DATED AT AUGUSTA, MAINE THIS 10th DAY OF MAY 2018.

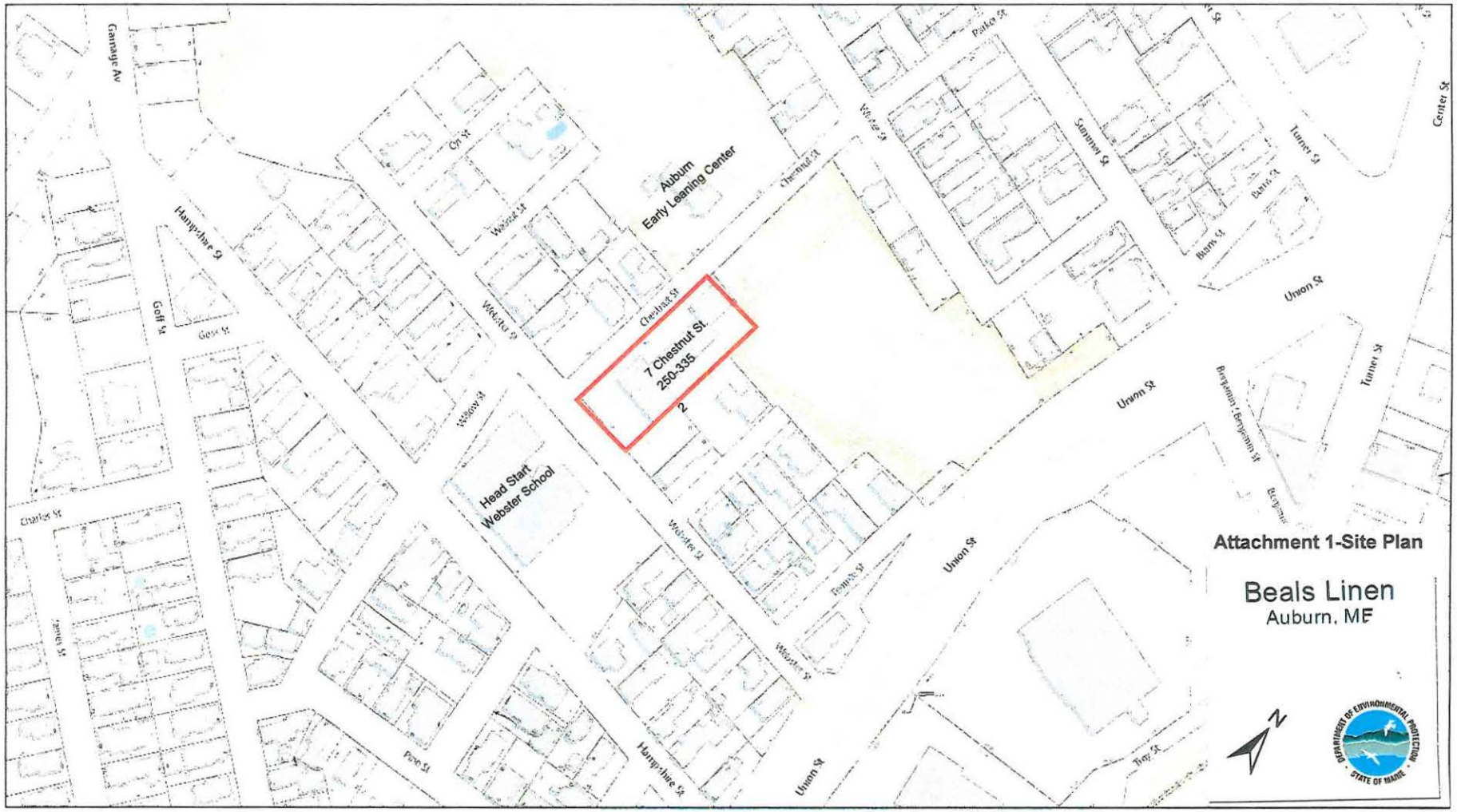
DEPARTMENT OF ENVIRONMENTAL PROTECTION

BY: Melanie Loyzim for
Paul Mercer
Commissioner

Appeals from this order must be filed within 10 days of receipt of this order with the Board of Environmental Protection (38 M.R.S. § 1365(4)). Attn: Chair, James W. Parker; c/o Ruth Ann Burke, 17 State House Station, Augusta, Maine 04333-0017.

This order prepared by Ted Wolfertz, Bureau of Remediation and Waste Management

Auburn Parcel Map



May 2, 2018

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ContourLines

1:2,257

0 110 220 440 ft

0 30 60 120 m

Esri, HERE, Garmin, INCREMENT P, USGS, EPA, USDA, COA, Assessing Department

City of Auburn
Esri, HERE, Garmin, FAO, NOAA, USGS, EPA, NPS | COA, Assessing Department |

Androscoggin Sheriffs Office

Civil Division
2 Turner St. Unit 9
Auburn, ME 04210
Phone: 207-753-2568

Invoice For Service: Civil Notice

DEPARTMENT OF ENVIROMENTAL PROTECTION
ATTN: TED WOLFERTZ
17 STATE HOUSE STATION
AUGUSTA, ME 04330

Amount Due: 14.76
Invoice Number: 18ASO-2474-CP
Invoice Date: 05/24/2018

207-629-8130

Please include invoice number on check ***BE SURE TO FILE YOUR PAPERWORK WITH THE COURT***
DEPT OF ENVIROMENTAL PROTECTION vs SULTAN CORP

PERSON(S) SERVED & METHOD	DATE	TIME	SERVED BY
SULTAN CORP Authorized Officer	05/23/2018	12:18pm	Deputy Chaloux

SERVICE FEES	QTY	PRICE	TOTAL
Non Est Fee	0	0.00	0.00
Service Fee	1	10.00	10.00
MISC FEES	**QTY**	**PRICE**	**TOTAL**
Postage / Handling	1	2.00	2.00
Cellular Phone Fee	1	1.00	1.00
Mileage			1.76
Total Cost			14.76
Payments Made On This Invoice			0.00
Grand Total For Invoice #: 18ASO-2474-CP Invoiced: 05/24/2018			**14.76**

Make checks payable to County Treasurer

ANDROSCOGGIN COUNTY
SHERIFF'S DEPARTMENT

2 TURNER ST. UNIT 9
AUBURN, ME 04210
207-753-2500

ERIC G. SAMSON
SHERIFF

WILLIAM GAGNE
CHIEF DEPUTY

RETURN OF SERVICE AFFIDAVIT

ASO Control #: 18ASO-2474-CP

Case: Department of Environmental Services
Vs
Debra Sullivan

Address: 11 Ryder St
Lewiston, Maine 04240

On May 23, 2018, at 1218, I Deputy Jason Chaloux served the above paper for Department of Environmental Services, to Debra Sullivan a Civil Notice in the case.

_____, Deputy
Deputy Jason R. Chaloux

Fees:	
Service:	$10.00
Travel:	$1.76
Pos/Hnd:	$2.00
Cell:	$1.00
Total:	**$14.76**

Subscribed and sworn to me this 24 day of May 2018

_____
Notary Public

ROBERT M LEVESQUE JR
NOTARY PUBLIC
STATE OF MAINE
My Commission Expires Jan. 19, 2019

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PAUL R. LEPAGE
GOVERNOR

PAUL MERCER
COMMISSIONER

May 22, 2018

Sultan Corp.
Attn: Debra Sullivan
PO Box 7065
11 Ryder St.
Lewiston, ME 04243-7065

Re: Designation of Uncontrolled Hazardous Substance Site and Order

Ms. Sullivan:

The enclosed document is notifying you that the Maine Department of Environmental Protection's Uncontrolled Sites Program has designated your property located at 7 Chestnut Street, Auburn Maine in Androscoggin County as an Uncontrolled Hazardous Substance Site.

The Designation of an Uncontrolled Hazardous Substance Site is made pursuant to the authority vested in the Commissioner of the State of Maine Department of Environmental Protection (Commissioner) under the Uncontrolled Substance Sites Law, 38 M.R.S.A. § §1361-1371.

The Maine Department of Environmental Protection has concluded that there has been hazardous substances located and released on your property that pose an actual or potential danger, threat or hazard to the public health, safety or welfare, or a threat to the environment. The Department of Environmental Protection has conducted necessary remedial action to abate the threat, danger, or hazard to public health and safety and to the environment. As of March 30, 2018, DEP has incurred at least $317,745.48 for the remedial actions of your property. As the current property owner you are potentially liable for all costs associated with this site.

Pursuant to 38 M.R.S. § 1365(4): The person to whom the order is directed shall comply immediately and may apply to the board for a hearing on the order if the application is made within 10 working days after receipt of the order by a responsible party. Within 15 working days after receipt of the application, the board shall hold a hearing, make findings of fact and vote on a decision that continues, revokes or modifies the order. That decision must be in writing and signed by the board chair using any means for signature authorized in the department's rules and published within 2 working days after the hearing and vote. The nature of the hearing before the board is an appeal. At the hearing, all witnesses must be sworn and the commissioner shall first establish the basis for the order and for naming the person to whom the order is directed. The burden of going forward then shifts to the person appealing to demonstrate, based upon a preponderance of the evidence, that the order should be modified or rescinded. The decision of the board may be appealed to the Superior Court in accordance with Title 5, chapter 375, subchapter 7.

AUGUSTA
17 STATE HOUSE STATION
AUGUSTA, MAINE 04333-0017
(207) 287-7688 FAX: (207) 287-7826

BANGOR
106 HOGAN ROAD, SUITE 6
BANGOR, MAINE 04401
(207) 941-4570 FAX: (207) 941-4584

PORTLAND
312 CANCO ROAD
PORTLAND, MAINE 04103
(207) 822-6300 FAX: (207) 822-6303

PRESQUE ISLE
1235 CENTRAL DRIVE, SKYWAY PARK
PRESQUE ISLE, MAINE 04769
(207) 764-0477 FAX: (207) 760-3143

website: www.maine.gov/dep

Please read the enclosed document carefully. If you need further explanation or have additional questions, please bring them to my attention. I can be reached at 207-629-8130 or emailed at ted.wolfertz@maine.gov .

Sincerely,

Ted Wolfertz
Uncontrolled Sites Program
Division of Remediation

enc: Designation of Uncontrolled Hazardous Substance Site and Order
Cc: Beal's Linen File

RANSOM
Consulting, Inc.

Consulting
Engineers
and Scientists

May 28, 2015

Project 101.06074.012

Ms. Becky Blais
Maine Department of Environmental Protection
17 State House Station
Augusta, Maine 04333

RE: Conceptual Mitigation Alternatives Analysis
Former Beal's Linen
7 Chestnut Street
Auburn, ME
REM ID: 02284

Dear Ms. Blais:

On June 25, 2014, Ransom Consulting, Inc. (Ransom) met with Maine Department of Environmental Protection (MEDEP) personnel to discuss the status of on-going investigation and remediation activities at the former Beal's Linen property located at 7 Chestnut Street in Auburn, Maine (the "Site"). The purpose of the meeting was to identify mitigation measures that may be necessary to further protect public health in the area of the Site. Specifically, several potential mitigation options were identified and discussed during the meeting, as outlined below. On September 3, 2014 Ransom and the MEDEP met again to discuss additional mitigation alternatives. During the discussion key data gaps were identified that impacted the evaluation of mitigation measures. Additional data was collected in October 2014 based on the review of possible mitigation alternatives discussed with MEDEP. This document provides a summary of mitigation alternatives discussed with MEDEP over several months and incorporates all the data collected to date. This document will be used in the future as a basis for a feasibility study of alternatives and for making decisions regarding future data collection. The objective of this document is to evaluate the potential benefits and limitations of each of the proposed remedial options relative to mitigating previously identified contamination and source areas at the Site. The evaluation includes a discussion of the degree of effectiveness for mitigating short-term and long-term risks and a conceptual cost estimate for each option. At the request of the MEDEP, this document has been prepared by Ransom for the purpose of presenting a screening-level evaluation of potential mitigation and/or remediation alternatives. Following review of the conceptual alternatives outlined in this document, Ransom recommends that a full evaluation of alternatives and remedial approach be conducted as part of a future feasibility study.

BACKGROUND

The Site is being investigated as part of the MEDEP's Dry Cleaner Initiative, which was established to evaluate and mitigate potential human health risks at former dry cleaner sites. As part of the Dry Cleaner

Initiative, several investigations have been conducted at the Site and surrounding properties, as listed below:

1. On October 31, 2013, three soil vapor samples (SG-1 through SG-3) were collected by the MEDEP within the Chestnut Street right-of-way along utility trenches adjacent to the Site;

2. On March 3 and 4, 2014, a sub-slab vapor sample, a near-slab vapor sample, and two indoor air samples were collected by the MEDEP from the Site property;

3. On March 20 and 21, 2014, indoor air samples were collected by Ransom and the MEDEP from 13 of the apartment units within the Site building, and one indoor air sample was collected from the neighboring Webster School apartment building and child care center. The March 2014 sampling activities are documented in the "Results of Indoor Air Quality Assessment" letter report, dated April 18, 2014, prepared by Ransom;

4. From April 3 to April 8, 2014, indoor air samples, sub-slab vapor samples and/or near-slab vapor samples were collected from nearby off-site properties including 14 Chestnut Street, 16 Chestnut Street, 24 Chestnut Street, 37 Webster Street, 12 Bearce Street, and 18 Winter Street. Findings from the April 2014 sampling events are documented in the "Results of Area Receptor Assessment" letter report, dated April 29, 2014, prepared by Ransom;

5. On April 15, 2014, a Phase I Environmental Site Assessment (ESA) was completed for the Site property by Ransom. Findings from the Phase I ESA are documented in the "ASTM Phase I Environmental Site Assessment, 7 Chestnut Street, Auburn, Maine" report dated April 15, 2014, prepared by Ransom;

6. On April 17, 2014, a temporary sub-slab depressurization system ("Primary SSDS") was put into operation to mitigate contaminant vapors beneath the slab foundation of the Site building. Monthly operation and maintenance activities have been performed to ensure the proper operation of the Primary SSDS and monitor system parameters;

7. From May 19 to 29, 2014, a Remedial Investigation was completed by Ransom and the MEDEP, which included installation of a series of groundwater wells at the Site and surrounding properties, and collection of soil, groundwater, and soil vapor samples from locations representing on-site and off-site properties as well as underground utility corridors. In conjunction with the Remedial Investigation, an additional round of indoor air samples was collected from six of the apartment units within the Site building;

8. Between October 2014 and January 2015, Ransom completed additional Remedial Investigation and site monitoring activities to address data gaps and document current conditions at the Site and surrounding properties. The additional investigation activities included the exploration of subsurface features including: a trench drain and sump structure, installation of additional groundwater monitoring wells, video exploration of

the nearby sewer infrastructure, and collection of soil, groundwater, soil vapor, and indoor air samples from the Site and surrounding properties. A "Remedial Investigation and Data Gaps Assessment" report, dated March 10, 2015, has been prepared and submitted to the MEDEP; and

9. Based on the results of the October 2014 indoor air sampling event, an individual (stand-alone) sub-slab vapor mitigation system ("Auxiliary SSDS") was designed and installed to provide additional vacuum influence beneath Apartment Unit #1 (northeast portion) of the Site building. Results of the January 2015 sampling event indicate that the Auxiliary SSDS is successfully mitigating the effects of vapor intrusion for Apartment Unit #1.

CURRENT STATUS AND SITE CONDITIONS

Findings from the previous investigations confirmed the presence of contaminants of concern including tetrachloroethylene (PCE) and its breakdown products in soil vapor and groundwater at the Site and surrounding properties. Dissolved-phase contaminants appear to be migrating with the prevailing groundwater flow direction to the east of the site. Vapor-phase contaminants appear to be migrating independently of groundwater concentrations in utility corridors in Chestnut Street, Webster Street, Bearce Street, Walnut Street, and to a limited extent along Winter Street.

Indoor air conditions within the Site building were determined to be impacted as a result of vapor intrusion into the building. The contaminant concentrations initially detected in the Site building suggested the potential for human health risk, and occupants of the building were notified and relocated as necessary. The Primary SSDS system installed at the Site in April 2014 appears to be mitigating the potential for vapor intrusion to the majority of the building (all apartment units except Unit #1). As discussed above, an Auxiliary SSDS system was designed and constructed to mitigate vapor intrusion into Apartment Unit #1 of the Site building. Indoor air samples collected within the Site building following installation of the Primary SSDS and the Auxiliary SSDS systems indicate contaminant concentrations in the indoor air of the Site building have been reduced to concentrations which are not anticipated to represent a health risk as confirmed by the Maine Center of Disease Control (MECDC).

Indoor air concentrations of contaminants of concern detected in surrounding property buildings do not appear to represent a health risk at this time. However, continued off-site contaminant migration presents the potential for vapor intrusion and impacts to indoor air in the off-site properties in the future. The Primary SSDS and Auxiliary SSDS systems are expected to have little, if any, influence on off-site vapor-phase contaminant migration. Findings from the Remedial Investigation activities identified a potential source area on the eastern side of the Site, and suggest that contaminants were likely discharged to the sanitary sewer system. The contaminants are anticipated to have leaked from the sewer system and impacted soil, groundwater, and soil vapor conditions in the area of the sewer system. Unidentified source area(s) may also be located beneath the foundation of the existing Site building.

Prior to the completion of a full feasibility study, additional investigation may be necessary to confirm the current understanding of Site conditions, identify additional source areas of contamination, and provide details on contaminant distribution in the subsurface. Similarly, additional investigation may be

necessary to fully evaluate the potential exposure risks to off-site receptors. The potential exposure risks may be influenced by fluctuations of contaminant concentrations at off-site receptors due to changes over time and pressure gradients within the off-site receptor buildings. In order to further evaluate the risk to off-site receptors, an indoor air sampling and building pressure manipulation event should be conducted at each off-site receptor location using methods that are capable of collecting real-time laboratory quality data, such as the HAPSITE field-portable gas chromatograph/mass spectrometer.

GENERAL APPROACH FOR EVALUATING ALTERNATIVES

In general, human health risks from vapor intrusion are produced from contaminated vapors in the subsurface when they enter an occupied space at concentrations exceeding risk criteria based on exposure duration. After the release of volatile contaminants that generated the vapors has ended, the presence of vapors in the subsurface can continue for many decades. The persistence of the vapors in the subsurface is a result of continued volatilization from non-aqueous phase liquid **(**NAPL**)** present in the subsurface, volatilization from contamination sorbed on subsurface soil/fill (including lint or other discarded materials), and volatilization from contaminated groundwater in the subsurface. All three conditions are considered sources of vapors in the subsurface. To date, investigations have identified areas of groundwater contamination capable of generating subsurface vapors (MW-102, MW-104, MW-105). Additionally, investigations have identified two areas of elevated subsurface vapors in the proximity of suspected subsurface vapor sources (PID102, 103, and B125). However, the source(s) of the elevated subsurface vapors has not been confirmed. The conceptual site model (CSM) indicates that both areas of elevated subsurface soil vapors are related to disposal of contamination into the sewer drains. It is not known if the releases to the sewer drains are directly related to dissolved phase contamination at MW-102, MW-104, and MW-105. The need to confirm the sources of soil vapors and dissolved phase contamination will depend on the selected remedy. Therefore, additional source area investigation is anticipated once the remedy is selected. Furthermore, it should be recognized that the overall effectiveness of any remedial remedy is reduced by the presence of the apartment building that covers the footprint of the former dry cleaner and associated contaminant source areas.

For the purpose of this document, the alternatives for addressing the residual Site contamination can be categorized as “Mitigation Alternatives” or “Remediation Alternatives”. The Mitigation alternatives evaluated below target subsurface vapor contamination directly in the vapor migration pathway closest to the human receptor(s), but do not target the sources generating the vapors. Therefore, projected project durations for the mitigation alternatives are considered to be greater than 20 years.

The Remediation alternatives evaluated below target both the vapor migration pathway closest to the receptor and the source(s) generating the vapors. Therefore, projected project durations for remediation alternatives are considered to be less than 20 years.

Remedial alternatives that address vapor phase contamination exclusively are limited by diffusion rates from the source(s) to the vapor phase. These alternatives are also limited by the areas being targeted by the remedy. Therefore, projected project durations are considered less than 20 years, but greater than 10 years.

Remedial alternatives that address vapor phase contamination in addition to dissolved phase, NAPL phase, and sorbed contamination have projected project durations of less than 10 years.

POTENTIAL MITIGATION & REMEDIATION ALTERNATIVES

Potential exposure mitigation alternatives are discussed below and summarized in the attached Table 1.

Exposure Mitigation Alternatives

Alternative A: Long-Term Monitoring and SSDS Operation

This alternative would involve the operation and maintenance of the Primary SSDS and the Auxiliary SSDS systems in their current configuration (i.e., without expanding the extraction area, radius of influence, or increasing the capacity of the systems), until such time as the contaminant vapors no longer pose a health risk to occupants of the Site building or surrounding properties.

Initial sampling and monitoring activities are anticipated to include the following: field screening of sub-slab soil vapor conditions and vacuum influence beneath the slab foundation of the Site building; field screening of soil vapor conditions at four off-site locations (PID102, PID103, PID119, and PID121); and recording groundwater elevations in area monitoring wells. Monitoring would be performed on a monthly basis throughout 2015, a quarterly basis in 2016, and a bi-annual basis thereafter. The monitoring schedule assumes the current SSDS systems would be equipped with remote telemetry capability to reduce the amount of monitoring visits. Off-site monitoring would also include collection of indoor air samples and sub-slab soil vapor samples at 14 Chestnut St., 16 Chestnut St., 37 Webster St., 11 Bearce St., and 12 Bearce St. The off-site air sampling would be conducted bi-annually during 2015 and 2016. The indoor air samples and sub-slab vapor samples collected from off-site properties would be submitted for laboratory analysis of contaminants of concern. Anticipating satisfactory results, this alternative assumes the off-site air sampling activities could be discontinued after 2016.

Since the current vapor mitigation systems are not targeting the source area and due to the relatively small amount of contaminant mass anticipated to be removed by the current systems, this alternative is expected to remain operational into the future. If the results of the monitoring activities indicate a continued risk to off-site receptors, additional mitigation measures, such as those discussed below, may be necessary.

Anticipated costs associated with Alternative A are outlined in Table 2. For the purposes of this analysis, we have assumed a timeframe of 20 years for Alternative A.

Alternative B: SSDS System Modification and Operation

In addition to preventing vapor intrusion into the Site building, this alternative would involve the modification of the current SSDS systems to mitigate the off-site migration of vapor-phase contaminants.

The modifications to the current system would likely include the following:

1. A horizontal vapor extraction trench would be constructed along the northwestern property boundary, adjacent to Chestnut Street. The vapor extraction trench would be manifolded into the existing Primary SSDS;

2. Two vertical extraction points would be constructed on the eastern side of the building, in the vicinity of the trench drain and sump structure identified in this area. The vertical extraction points would also be manifolded into the existing Primary SSDS.

This alternative is anticipated to be more protective to human health by addressing potential off-Site receptors, as well as the on-Site receptors, and may reduce the short-term environmental risks in a shorter time period than Alternative A. However, this alternative assumes that the Primary SSDS system (in conjunction with the Auxiliary SSDS system) will be effective at maintaining vapor mitigation control beneath the slab foundation of the Site building, as well as mitigating the off-Site contaminant migration towards Chestnut Street and Bearce Street.

This alternative will require periodic monitoring of soil vapor conditions and indoor air conditions at the Site and off-Site properties to evaluate the effectiveness of the SSDS system modifications. Initial sampling and monitoring activities are anticipated to include the following: field screening of sub-slab soil vapor conditions and vacuum influence beneath the slab foundation of the Site building; field screening of soil vapor conditions at four off-site locations (PID102, PID103, PID119, and PID121); and recording groundwater elevations in area monitoring wells. Monitoring would be performed on a monthly basis throughout 2015, a quarterly basis in 2016, and a bi-annual basis thereafter. The monitoring schedule assumes the current SSDS systems would be equipped with remote telemetry capability to reduce the amount of monitoring visits. Off-site monitoring would also include collection of indoor air samples and sub-slab soil vapor samples at 14 Chestnut St., 16 Chestnut St., 37 Webster St., 11 Bearce St., and 12 Bearce St. The off-site air sampling would be conducted bi-annually during 2015 and 2016. The indoor air samples and sub-slab vapor samples collected from off-site properties would be submitted for laboratory analysis of contaminants of concern. Anticipating satisfactory results, this alternative assumes the off-site air sampling activities could be discontinued after 2016.

If the system demonstrates acceptable effectiveness, the periodic monitoring requirements may be reduced and/or the time of mitigation may be reduced in comparison to Alternative A. However, if the modifications to the SSDS disrupt the system's ability to mitigate exposure risks to the Site building, and/or prove to be ineffectual at preventing off-site migration of vapor-phase

contaminants, then separate soil vapor extraction systems may need to be constructed at off-site properties as outlined in Alternative C.

Anticipated costs associated with Alternative B are outlined in Table 3. Because Alternative B does not address the contaminant source, we have assumed a timeframe of 20 years for Alternative B.

Alternative C: Off-Site SSDS Systems for Neighboring Properties

In addition to the on-Site vapor mitigation systems, this alternative would include potentially four additional SSDS systems located off-Site on neighboring properties most affected by the Site's contaminants. Similar to the on-site vapor mitigation systems, the off-site SSDS systems would vent soil vapor directly to the atmosphere without the need for treatment of the discharged vapor. The off-site SSDS systems would be in place until such time as the contaminant vapors no longer pose a health risk to occupants of the surrounding properties. This alternative is anticipated to be more protective to human health by addressing potential off-Site receptors and may reduce the short-term environmental risks in a shorter time period than Alternatives A or B.

This alternative will require periodic monitoring of soil vapor conditions and indoor air conditions at the Site and off-Site properties to evaluate the effectiveness of the additional SSDS systems. Initial sampling and monitoring activities are anticipated to include field screening of sub-slab soil vapor conditions and vacuum influence beneath the slab foundation of the chosen neighboring Site buildings in addition to the Site building itself. Monitoring would be performed on a monthly basis throughout 2015, a quarterly basis in 2016, and a bi-annual basis thereafter. The monitoring schedule assumes the on-site and off-site SSDS systems would be equipped with remote telemetry capability to reduce the amount of monitoring visits. Assuming the off-site SSDS systems are effective at preventing vapor intrusion, this alternative would eliminate the need for continued indoor air sampling at the off-site properties.

Due to the foundation construction variability's in the off-site structures, foundation sealing will likely be required in the off-site structures to enable successful SSDS treatment.

If the systems demonstrate acceptable effectiveness, the periodic monitoring requirements may be reduced and/or the time of mitigation may be reduced in comparison to Alternative A.

Anticipated costs associated with Alternative C are outlined in Table 4. Because Alternative C does not address the contaminant source, we have assumed a timeframe of 20 years for Alternative C.

Source Area Remediation Alternatives

Potential source area remediation alternatives are discussed below and summarized in the attached Table 1.

Alternative D: Sub-slab Depressurization System and Soil Vapor Extraction System

This alternative would involve the construction of a separate Soil Vapor Extraction (SVE) system to control vapor-phase contaminant migration from the Site property to neighboring properties. The SVE system would be operated in conjunction with, but separate from, the Primary SSDS and the Auxiliary SSDS systems currently operating at the Site. The SVE system would initially be constructed to target contaminant migration to the east and northwest of the Site, as described in Alternative B, but could potentially be modified in the future to accommodate multiple extraction points, as dictated by the overall effectiveness and subsurface influence of the system to prevent and/or capture off-Site migration.

This alternative would also require long-term monitoring of potential receptors and SSDS/SVE system operation and maintenance. Initial sampling and monitoring requirements are anticipated to be similar to those outlined in Alternative B. If the mitigation systems prove to be effective at eliminating exposure risks and reducing off-Site contaminant migration, the long-term monitoring requirements may be reduced in comparison to Alternatives A, B and C.

Anticipated costs associated with Alternative D are outlined in Table 5. Alternative D does not specifically address the source area of contamination. However, based on the potential for a separate, more robust mitigation system to remove a larger volume of contaminants, we have assumed a timeframe of 15 years for Alternative D.

Alternative E: Air Sparging and Soil Vapor Extraction (SVE) System

Based on the information available to date, a dual-phase remediation system would likely be required, which would involve sparging of contaminated groundwater ("air sparging"), in conjunction with the soil vapor extraction (SVE) system addressed in Alternative D. These systems would be operated independently from the existing SSDS systems at the Site, which would also continue operation until the contaminant source has been removed.

In addition to monitoring the current SSDS systems, this alternative would require frequent monitoring of soil vapor and groundwater conditions at the time of system startup to ensure that contaminants are not mobilized toward a potential receptor. Monitoring may be necessary every other day for several weeks, then weekly for several months, and then monthly thereafter. Off-site monitoring would also include collection of indoor air samples and sub-slab soil vapor samples at 14 Chestnut St., 16 Chestnut St., 37 Webster St., 11 Bearce St., and 12 Bearce St. The off-site air sampling would be conducted bi-annually during 2015 and 2016. The indoor air samples and sub-slab vapor samples collected from off-site properties would be submitted for laboratory analysis of contaminants of concern. Anticipating satisfactory results, this alternative assumes the off-site air sampling activities could be discontinued after 2016. Additional monitoring may be necessary to calculate contaminant mass removal rates and determine the effectiveness of the remediation system(s).

Assuming a specific source area can be identified and delineated, full remediation of the contaminant source would eliminate the risk of exposure to Site occupants and surrounding

property occupants in a much shorter time-frame than the four previous Alternatives discussed above. This alternative may also result in reduced costs associated with long-term monitoring of Site and surrounding property conditions. However, access to the contaminant source area may be limited by the location of the current Site building, underground utilities, and/or other physical features in the area of the Site. Substantial expenses may be incurred in order to gain access to, and fully remediate, the source area. Furthermore, the air sparging activities may cause increased mobilization of contaminants resulting in additional impacts to indoor air conditions at the Site or surrounding properties.

Anticipated costs associated with Alternative E are outlined in Table 6. Assuming that Alternative E would be successful at remediating the source of the contamination, we have assumed a timeframe of 5 years for Alternative E.

Alternative F: Multi Phase Extraction and Treatment System

This alternative would introduce a high-vacuum multi-phase extraction and treatment (MPET) system for in-situ removal and treatment of combined groundwater, soil vapor, and free-phase contaminants (i.e. LNAPLS, DNAPLS). These systems would be operated independently from the existing SSDS systems at the Site, which would also continue operation until the contaminant source has been removed.

Extraction wells would be installed to best target the source area(s). The extraction wells would be connected to a packaged treatment trailer that houses the high-vacuum extraction pump and treatment equipment. The high-vacuum technology of the MPET system enhances the recovery of soil vapors by lowering the water table (dewatering) and increasing the volume of unsaturated soil available for soil vapor extraction (SVE). Since mass transfer rates are usually greater in SVE applications (vapor-phase transport) than groundwater extraction techniques (liquid-phase transport) greater contaminant mass recovery rates can be achieved using high vacuum-enhanced SVE techniques.

The MPET system would be powered by a remote high-vacuum, liquid-ring-type, extraction pump housed within the treatment trailer. The treatment system would likely consist of the following major components:

1. Air/liquid separator;
2. Potential DNAPL/LNAPL/water separator for separating chlorinated compounds, petroleum product and water this is discharged from the air/liquid separator;
3. Product recovery/collection tank connected to the liquid separator;
4. Bag filters for filtering sediment, precipitated iron, and other larger grain sized particulate matter;
5. Two transfer pumps for processing liquids through the treatment system

6. Liquid-phase granular activated carbon (LGAC) units for treatment of the groundwater that is discharged from the oil/water separator; and

7. Vapor-phase granular activated carbon (VGAC) units for treatment of contaminated soil vapor and contaminated air volatilized from contaminated groundwater and/or free-phase product.

This alternative would require continued monitoring of soil vapor and indoor air conditions to confirm the effectiveness of the current SSDS system and monitor off-site contaminant migration. At this time, the proposed monitoring is expected to include the following: field screening of sub-slab soil vapor conditions and vacuum influence beneath the slab foundation of the Site building; field screening of soil vapor conditions at four off-site locations (PID102, PID103, PID119, and PID121); and recording groundwater elevations in area monitoring wells. Monitoring would be performed on a monthly basis throughout 2015, a quarterly basis in 2016, and a bi-annual basis thereafter. The monitoring schedule assumes the current SSDS systems would be equipped with remote telemetry capability to reduce the amount of monitoring visits. Off-site monitoring would also include collection of indoor air samples and sub-slab soil vapor samples at 14 Chestnut St., 16 Chestnut St., 37 Webster St., 11 Bearce St., and 12 Bearce St. The off-site air sampling would be conducted bi-annually during 2015 and 2016. The indoor air samples and sub-slab vapor samples collected from off-site properties would be submitted for laboratory analysis of contaminants of concern. Anticipating satisfactory results, this alternative assumes the off-site air sampling activities could be discontinued after 2016. Additional monitoring may be necessary to calculate contaminant mass removal rates and determine the effectiveness of the remediation system(s).

Anticipated costs associated with Alternative F are outlined in Table 7. Assuming that Alternative F would be successful at remediating the source of the contamination, we have assumed a timeframe of 10 years for Alternative F.

Alternative G: In-situ Chemical Oxidation

Chemical oxidation is a process that involves the injection of reactive chemical oxidants into groundwater and/or soil for the primary purpose of rapid contaminant breakdown and/or destruction. Based on Site characteristics and discussions with product vendors, Ransom recommends the application of a sodium persulfate-based chemical oxidizer, such as PersulfOx® developed by Regenesis Inc. PersulfOx® contains a built-in catalyst which activates the persulfate component and generates contaminant-destroying free radicals without the need for the addition of a separate activator.

For this alternative, the sodium persulfate product would be mixed in solution and injected by a direct-push drill rig across the treatment area. Based on the data currently available, Ransom anticipates a treatment area extending from Webster Street adjacent to the southwestern property boundary to the northeastern property boundary, and from Chestnut Street adjacent to the northwestern property boundary to the southeastern property boundary of the Site. Injection points would be located on an approximately 15-foot grid throughout the treatment area. The

vertical treatment interval for groundwater and vadose-zone soils would vary from approximately 12 feet on the southwestern portion of the Site to approximately 25 feet on the northeastern portion of the Site, with an average depth of approximately 20 feet below grade. The chemical oxidation alternative would require two applications of product, with approximately 10 to 12 weeks between applications.

Similar to the previous alternatives, this alternative would require continued monitoring of soil vapor and indoor air conditions to confirm the effectiveness of the current SSDS systems and monitoring of off-site contaminant migration. However, assuming this treatment alternative is highly effective, the time required for monitoring and operation of the on-site SSDS systems may be greatly reduced to potentially two to 3 years.

Ransom is available to further discuss the potential benefits and limitations of the alternatives presented above. We appreciate the opportunity and look forward to working with you on this project.

Sincerely,

RANSOM CONSULTING, INC.

Eriksen Phenix, C.G.
Project Geologist

Peter J. Sherr, P.E.
Senior Project Manager

EPP/JLM/PJS:lrk

Attachments: Table 1: Conceptual Mitigation Alternatives
Table 2: Summary of Estimated Remediation Costs for Alternative A
Table 3: Summary of Estimated Remediation Costs for Alternative B
Table 4: Summary of Estimated Remediation Costs for Alternative C
Table 5: Summary of Estimated Remediation Costs for Alternative D
Table 6: Summary of Estimated Remediation Costs for Alternative E
Table 7: Summary of Estimated Remediation Costs for Alternative F
Table 8: Summary of Estimated Remediation Costs for Alternative G
Table 9: Comparison of Mitigation Monitoring Costs, Remedial System Capitol Costs, and Remedial System Annual Operation Costs

Table 1: Conceptual Mitigation Alternatives
Former Beal's Linen
7 Chestnut Street, Auburn, Maine

	Mitigation Alternatives			Remediation Alternatives			
	Alternative A	**Alternative B**	**Alternative C**	**Alternative D**	**Alternative E**	**Alternative F**	**Alternative G**
	Monitoring & Mitigate 7 Chestnut	**Monitoring with Experimental Extraction**	**Off-Site SSDS**	**Soil Vapor Extraction (SVE) System**	**Air Sparging & SVE System**	**Multi Phase Extraction and Treatment (MPET) System**	**In-situ Chemical Oxidation**
Task 1	Operate and monitor current vapor mitigation systems for 7 Chestnut (Monitoring 2015 monthly, 2016 quarterly, 2017 forward bi-annually). Install remote telemetry to reduce site visits.	Operate and monitor current vapor mitigation systems for 7 Chestnut (Monitoring 2015 monthly, 2016 quarterly, 2017 forward bi-annually). Install remote telemetry to reduce site visits.	Operate and monitor current vapor mitigation systems for 7 Chestnut (Monitoring 2015 monthly, 2016 quarterly, 2017 forward bi-annually). Install remote telemetry to reduce site visits.	Operate and monitor current vapor mitigation systems for 7 Chestnut (Monitoring 2015 monthly, 2016 quarterly, 2017 forward bi-annually). Install remote telemetry to reduce site visits.	Operate and monitor current vapor mitigation systems for 7 Chestnut (Monitoring 2015 monthly, 2016 quarterly, 2017 forward bi-annually). Install remote telemetry to reduce site visits.	Operate and monitor current vapor mitigation systems for 7 Chestnut (Monitoring 2015 monthly, 2016 quarterly, 2017 forward bi-annually). Install remote telemetry to reduce site visits.	Operate and monitor current vapor mitigation systems for 7 Chestnut (Monitoring 2015 monthly, 2016 quarterly, 2017 forward bi-annually). Install remote telemetry to reduce site visits.
Task 2	Monitor PID102, PID103, PID119, PID 121 with ppbRAE (2015 May to December, 2016 April & November only, none thereafter)	Monitor PID102, PID103, PID119, PID 121 with ppbRAE (2015 May to December, 2016 April & November only, none thereafter)	Install potentially four (4) additional SSDS systems at neighboring properties	Monitor PID102, PID103, PID119, PID 121 with ppbRAE (2015 May to December, 2016 April & November only, none thereafter)	Indoor and Subslab sampling bi-annually at 14 Chestnut, 16 Chestnut, 37 Webster, 12 Bearce, and 11 Bearce	Monitor PID102, PID103, PID119, PID 121 with ppbRAE (2015 May to December, 2016 April & November only, none thereafter)	Monitor PID102, PID103, PID119, PID 121 with ppbRAE (2015 May to December, 2016 April & November only, none thereafter)
Task 3	Indoor and Subslab sampling bi-annually in 2015 and 2016 at 14 Chestnut, 16 Chestnut, 37 Webster, 12 Bearce, and 11 Bearce	Indoor and Subslab sampling bi-annually in 2015 and 2016 at 14 Chestnut, 16 Chestnut, 37 Webster, 12 Bearce, and 11 Bearce		Indoor and Subslab sampling bi-annually in 2015 and 2016 at 14 Chestnut, 16 Chestnut, 37 Webster, 12 Bearce, and 11 Bearce	Complete a Source Area investigation for full characterization of source both vertical and lateral extent in groundwater, soil, and air	Indoor and Subslab sampling bi-annually in 2015 and 2016 at 14 Chestnut, 16 Chestnut, 37 Webster, 12 Bearce, and 11 Bearce	Indoor and Subslab sampling bi-annually in 2015 and 2016 at 14 Chestnut, 16 Chestnut, 37 Webster, 12 Bearce, and 11 Bearce
Task 4		Install air extraction points with liner in area of trench drain and sump structure, and tie into current system		Install air extraction points with liner in area of trench drain and sump structure, behind 7 Chestnut St.	Install remedial system(s) to remediate source(s)	Complete a Source Area investigation for full characterization of source both vertical and lateral extent in groundwater, soil, and air	Advance temporary injection points for 2 applications of chemical oxidation product
Task 5		Install air extraction trench parallel to Chestnut Street at 7 Chestnut and tie into current system		Install air extraction trench parallel to Chestnut Street at 7 Chestnut	Conduct additional monitoring as necessary to document soil vapor and groundwater conditions and ensure that contaminants are not mobilized towards receptors	Install remedial system(s) to remediate source(s)	
Task 6				Add separate extraction system in the trailer to handle additional extraction of vapors			
Task 7				Add air treatment for vapors extracted prior to discharge			

Table 2: Summary of Estimated Remediation Costs for Alternative A
Continued Monitoring and Mitigation of 7 Chestnut Street

Operate/Monitor VMS (Assume 20 year Operating Life)	**Estimated Costs**
Ransom Labor and Expenses	
Vapor Mitigation System Inspection ($580/event; monthly in 2015, quarterly in 2016, bi-annually thereafter)	$ 30,150.00
Collect Water Level Readings ($408/event; quarterly for 2015, none thereafter)	$ 1,650.00
Collect Soil Vapor Reading from PID-102, -103, -119 and -121 ($720/event; 8 events in 2015, 2 events in 2016, none thereafter)	$ 7,200.00
Indoor Air and Sub-Slab Soil Vapor Sampling ($1,463/event; 2 events in 2015, 2 events in 2016, none thereafter)	$ 5,850.00
Monitoring and O&M Reporting (Air Sampling Reports, 2 in 2015, 2 in 2016; O&M reports quarterly in 2015, bi-annuall thereafter).	$ 23,050.00
Laboratory Fees: Indoor Air/Sub-slab Sampling ($360/sample, 14 samples per event; 2 events in 2015, 2 events in 2016, none thereafter)	$ 20,150.00
Abandonment of Off-site Monitoring Wells	$ 4,500.00
Remote Telemetry System Installation & Monthly Fees	$ 14,400.00
Vapor Mitigation System Equipment Repair and Upkeep ($250/year)	$ 5,000.00
Electricity Expenses ($1,340/year)	$ 26,800.00
Condensate Sampling and Disposal ($360/year)	$ 7,200.00
Contingency (Additional Samples, Upkeep, Monitoring)	$ 10,000.00
TOTAL:	**$ 155,950.00**

Table 3: Summary of Estimated Remediation Costs for Alternative B
Additional Piping Utilizing Existing Equipment

Operate/Monitor VMS (Assume 20 year Operating Life)	**Estimated Costs**
Ransom Labor and Expenses	
Vapor Mitigation System Inspection ($580/event; monthly in 2015, quarterly in 2016, bi-annually thereafter)	$ 30,150.00
Collect Water Level Readings ($408/event; quarterly for 2015, none thereafter)	$ 1,650.00
Collect Soil Vapor Reading from PID-102, -103, -119 and -121 ($720/event; 8 events in 2015, 2 events in 2016, none thereafter)	$ 7,200.00
Indoor Air and Sub-Slab Soil Vapor Sampling ($1,463/event; 2 events in 2015, 2 events in 2016, none thereafter)	$ 5,850.00
Monitoring and O&M Reporting (Air Sampling Reports, 2 in 2015, 2 in 2016; O&M reports quarterly in 2015, bi-annuall thereafter).	$ 23,050.00
Laboratory Fees: Indoor Air/Sub-slab Sampling ($360/sample, 14 samples per event; 2 events in 2015, 2 events in 2016, none thereafter)	$ 20,150.00
Abandonment of Off-site Monitoring Wells	$ 4,500.00
Remote Telemetry System Installation & Monthly Fees	$ 14,400.00
Vapor Mitigation System Equipment Repair and Upkeep ($250/year)	$ 5,000.00
Electricity Expenses ($1,340/year)	$ 26,800.00
Condensate Sampling and Disposal ($360/year)	$ 7,200.00
Contingency (Additional Samples, Upkeep, Monitoring)	$ 10,000.00
Subtotal:	**$ 155,950.00**
Additional Piping Utilizing Existing Equipment	
Anticipated Contractor Costs	$ 22,600.00
Engineering Design and Construction Oversight (25% of Contractor Costs)	$ 5,700.00
Startup and Testing	$ 2,500.00
Subtotal:	**$ 30,800.00**
TOTAL:	**$ 186,750.00**

Table 4: Summary of Estimated Remediation Costs for Alternative C
Design and Construction of Off-site SSDS Systems

Operate/Monitor VMS (Assume 20 year Operating Life)	**Estimated Costs**
Ransom Labor and Expenses	
Vapor Mitigation System Inspection ($770/event; monthly in 2015, quarterly in 2016, bi-annually thereafter)	$ 40,050.00
Collect Water Level Readings ($408/event; quarterly for 2015, none thereafter)	$ 1,650.00
Collect Soil Vapor Reading from PID-102, -103, -119 and -121 (not necessary if off-site SSDS systems are effective)	(none)
Indoor Air and Sub-Slab Soil Vapor Sampling (not necessary if off-site SSDS systems are effective)	(none)
Monitoring and O&M Reporting	$ 18,750.00
Laboratory Fees: Indoor Air Sampling (not necessary if off-site SSDS systems are efffective)	(none)
Abandonment of Off-site Monitoring Wells	$ 4,500.00
Remote Telemetry System Installation & Monthly Fees	$ 14,400.00
Vapor Mitigation System Equipment Repair and Upkeep ($250/year)	$ 5,000.00
Electricity Expenses ($1,340/year)	$ 26,800.00
Condensate Sampling and Disposal ($360/year)	$ 7,200.00
Contingency (Additional Samples, Upkeep, Monitoring)	$ 15,000.00
Subtotal:	**$ 133,350.00**
Additional SSDS Design and Construction	
Anticipated Capital Costs For Additional SSDS Systems	
Equipment and Materials	$ 30,000.00
Electrical Subcontractor	$ 5,000.00
Structural Subcontractors (Shed/Trailer)	$ 10,000.00
Additional Costs for Piping (As Described in Alt. B)	$ 22,600.00
Anticipated Annual Costs for Additional SSDS Systems	
Vapor Mitigation System Equipment Repair and Upkeep ($250/year)	$ 3,800.00
Electricity Expenses ($1,340/year)	$ 20,100.00
Condensate Sampling and Disposal ($360/year)	$ 5,400.00
Carbon Disposal Costs	$ -
Contingency (Additional Samples, Upkeep, Monitoring)	$ 7,500.00
Engineering Design and Construction Oversight (25% of Contractor Costs)	$ 16,900.00
Startup and Testing	$ 3,500.00
Subtotal:	**$ 124,800.00**
TOTAL:	**$ 258,150.00**

Table 5: Summary of Estimated Remediation Costs for Alternative D
Design and Construction of Additional SVE System

Operate/Monitor VMS (Assume 15 year Operating Life)	**Estimated Costs**
Ransom Labor and Expenses	
Vapor Mitigation System Inspection ($770/event; monthly in 2015, quarterly in 2016, bi-annually thereafter)	$ 32,350.00
Collect Water Level Readings ($408/event; quarterly for 2015, none thereafter)	$ 1,650.00
Collect Soil Vapor Reading from PID-102, -103, -119 and -121 ($720/event; 8 events in 2015, 2 events in 2016, none thereafter)	$ 7,200.00
Indoor Air and Sub-Slab Soil Vapor Sampling ($1,463/event; 2 events in 2015, 2 events in 2016, none thereafter)	$ 5,850.00
System Construction, Monitoring, and O&M Reporting (System Construction Report, 1 in 2015; Air Sampling Reports, 2 in 2015, 2 in 2016; O&M reports quarterly in 2015, bi-annuall thereafter).	$ 23,750.00
Laboratory Fees: Indoor Air/Sub-slab Sampling ($360/sample, 14 samples per event; 2 events in 2015, 2 events in 2016, none thereafter)	$ 20,150.00
Remote Telemetry System Installation & Monthly Fees	$ 11,400.00
Vapor Mitigation System Equipment Repair and Upkeep ($250/year)	$ 3,800.00
Electricity Expenses ($1,340/year)	$ 20,100.00
Condensate Sampling and Disposal ($360/year)	$ 5,400.00
Contingency (Additional Samples, Upkeep, Monitoring)	$ 15,000.00
Subtotal:	**$ 146,650.00**
Additional SVE System Design and Construction	
Source Area Investigation	$ 25,000.00
Anticipated Capital Costs For Additional Vapor Mitigation System	
Equipment and Materials	$ 30,000.00
Electrical Subcontractor	$ 5,000.00
Structural Subcontractors (Shed/Trailer)	$ 10,000.00
Additional Costs for Piping (As Described in Alt. B)	$ 22,600.00
Anticipated Annual Costs for Additional Vapor Mitigation System	
Vapor Mitigation System Equipment Repair and Upkeep ($250/year)	$ 3,800.00
Electricity Expenses ($1,340/year)	$ 20,100.00
Condensate Sampling and Disposal ($360/year)	$ 5,400.00
Carbon Disposal Costs	$ 185,000.00
Contingency (Additional Samples, Upkeep, Monitoring)	$ 7,500.00
Engineering Design and Construction Oversight (25% of Contractor Costs)	$ 16,900.00
Startup and Testing	$ 3,500.00
Subtotal:	**$ 334,800.00**
TOTAL:	**$ 481,450.00**

Table 6: Summary of Estimated Remediation Costs for Alternative E
Air Sparging and Soil Vapor Extraction (AS/SVE System)

Operate/Monitor VMS (Assume 5 year Operating Life)	**Estimated Costs**	
Ransom Labor and Expenses		
Vapor Mitigation System Inspection ($770/event; monthly for the life of the system)	$	46,200.00
Collect Water Level Readings ($408/event; quarterly for 2015, none thereafter)	$	1,630.00
Collect Soil Vapor Reading from PID-102, -103, -119 and -121 ($720/event; 8 events in 2015, 2 events per year thereafter)	(none)	
Indoor Air and Sub-Slab Soil Vapor Sampling ($1,463/event; 2 events per year)	$	14,650.00
System Construction, Monitoring, and O&M Reporting (System Construction Report, 1 in 2015; Air Sampling Reports, 2 in 2015, 2 in 2016; O&M reports quarterly in 2015, bi-annuall thereafter).	$	15,850.00
Laboratory Fees: Indoor Air/Sub-slab Sampling ($360/sample, 14 samples per event; 2 events per year)	$	50,400.00
Remote Telemetry System Installation & Monthly Fees	$	5,400.00
Vapor Mitigation System Equipment Repair and Upkeep ($250/year)	$	1,250.00
Electricity Expenses ($1,340/year)	$	6,700.00
Condensate Sampling and Disposal ($360/year)	$	1,800.00
Contingency (Additional Samples, Upkeep, Monitoring)	$	2,500.00
Subtotal:	**$**	**146,380.00**
Additional AS/SVE System Design and Construction		
Source Area Investigation	$	25,000.00
Anticipated Capital Costs For Full Mitigation System		
Equipment and Materials, Including Piping	$	125,000.00
Electrical Subcontractor	$	10,000.00
Structural Subcontractors (Shed)	$	7,500.00
Anticipated Annual Costs for Full Mitigation System		
Vapor Mitigation System Equipment Repair and Upkeep ($500/year)	$	2,500.00
Electricity Expenses ($2,500/year)	$	12,500.00
Condensate Sampling and Disposal ($720/year)	$	3,600.00
Carbon Disposal Costs	$	125,000.00
Contingency (Additional Samples, Upkeep, Monitoring)	$	10,000.00
Engineering Design and Construction Oversight (25% of Contractor Costs)	$	35,600.00
Startup and Testing	$	5,000.00
Subtotal:	**$**	**361,700.00**
TOTAL:	**$**	**508,080.00**

Table 7: Summary of Estimated Remediation Costs for Alternative F
Multi Phase Extraction and Treatment (MPET) System

Operate/Monitor VMS (Assume 10 year Operating Life)	**Estimated Costs**
Ransom Labor and Expenses	
Vapor Mitigation System Inspection ($770/event; monthly in 2015, quarterly in 2016, bi-annually thereafter)	$ 24,650.00
Collect Water Level Readings ($408/event; quarterly for 2015, none thereafter)	$ 1,650.00
Collect Soil Vapor Reading from PID-102, -103, -119 and -121 ($720/event; 8 events in 2015, 2 events in 2016, none thereafter)	$ 7,200.00
Indoor Air and Sub-Slab Soil Vapor Sampling ($1,463/event; 2 events in 2015, 2 events in 2016, none thereafter)	$ 5,850.00
System Construction, Monitoring, and O&M Reporting (System Construction Report, 1 in 2015; Air Sampling Reports, 2 in 2015, 2 in 2016; O&M reports quarterly in 2015, bi-annuall thereafter).	$ 20,150.00
Laboratory Fees: Indoor Air/Sub-slab Sampling ($360/sample, 14 samples per event; 2 events in 2015, 2 events in 2016, none thereafter)	$ 20,150.00
Remote Telemetry System Installation & Monthly Fees	$ 8,400.00
Vapor Mitigation System Equipment Repair and Upkeep ($250/year)	$ 2,500.00
Electricity Expenses ($1,340/year)	$ 13,400.00
Condensate Sampling and Disposal ($360/year)	$ 3,600.00
Contingency (Additional Samples, Upkeep, Monitoring)	$ 5,000.00
Subtotal:	**$ 112,550.00**
Additional MPET System Design and Construction	
Source Area Investigation	$ 25,000.00
Anticipated Capital Costs For MPET System	
Equipment and Materials, Including Piping	$ 75,000.00
Electrical Subcontractor	$ 7,500.00
Structural Subcontractors (Shed)	$ 7,500.00
Anticipated Annual Costs for MPET System	
MPET System Equipment Repair and Upkeep ($375/year)	$ 3,800.00
Electricity Expenses ($1,875/year)	$ 18,800.00
Condensate Sampling and Disposal ($720/year)	$ 7,200.00
Carbon Disposal Costs	$ 175,000.00
Contingency (Additional Samples, Upkeep, Monitoring)	$ 7,500.00
Engineering Design and Construction Oversight (25% of Contractor Costs)	$ 22,500.00
Startup and Testing	$ 5,000.00
Subtotal:	**$ 354,800.00**
TOTAL:	**$ 467,350.00**

Table 8: Summary of Estimated Remediation Costs for Alternative G In-situ Chemical Oxidation		
Operate/Monitor VMS (Assume 3 year Operating Life)	**Estimated Costs**	
Ransom Labor and Expenses		
Vapor Mitigation System Inspection ($580/event; monthly in 2015, quarterly in 2016, bi-annually thereafter)	$	10,450.00
Collect Water Level Readings ($408/event; quarterly for 2015, none thereafter)	$	1,650.00
Collect Soil Vapor Reading from PID-102, -103, -119 and -121 ($720/event; 8 events in 2015, 2 events in 2016, none thereafter)	$	7,200.00
Indoor Air and Sub-Slab Soil Vapor Sampling ($1,463/event; 2 events in 2015, 2 events in 2016, none thereafter)	$	5,850.00
Monitoring, and O&M Reporting (Air Sampling Reports, 2 in 2015, 2 in 2016; O&M reports including groundwater/ soil vapor monitoring quarterly in 2015, bi-annuall thereafter).	$	23,050.00
Laboratory Fees: Indoor Air/Sub-slab Sampling ($360/sample, 14 samples per event; 2 events in 2015, 2 events in 2016, none thereafter)	$	20,150.00
Remote Telemetry System Installation & Monthly Fees	$	4,200.00
Vapor Mitigation System Equipment Repair and Upkeep ($250/year)	$	750.00
Electricity Expenses ($1,340/year)	$	4,000.00
Condensate Sampling and Disposal ($360/year)	$	1,100.00
Contingency (Additional Samples, Upkeep, Monitoring)	$	1,500.00
Subtotal:	**$**	**79,900.00**
In-situ Chemical Oxidation Treatment and Monitoring		
Supplemental Source Area Investigation and/or Pilot Study	$	25,000.00
Anticipated Capital Costs Chemical Oxidation Treatment (includes 2 applications)		
Regenesis PersulfOx Product, 136,000 pounds (includes taxes and shipping)	$	325,000.00
Drilling Contractor, mixing and injection equipment	$	180,000.00
Anticipated Groundwater and Soil Vapor Monitoring (quarterly first year, semi-annual after)		
Consultant Labor & Expenses	$	16,600.00
Analytical Costs	$	30,800.00
Engineering Design and Construction Oversight (25% of Contractor Costs)	$	45,000.00
Subtotal:	**$**	**622,400.00**
TOTAL:	**$**	**702,300.00**

Table 9: Comparison of Mitigation Monitoring Costs, Remedial System Capital Costs, and Remedial System Annual Operation Costs				
Alternative	**Total**	**Operate Current Mitigation System**	**Remedial System Capital Costs**	**Remedial System Annual Costs**
A	$ 155,950.00	$ 155,950.00	NA	NA
B	$ 186,750.00	$ 155,950.00	$ 30,800.00	NA
C	$ 258,150.00	$ 133,350.00	$ 88,000.00	$ 36,800.00
D	$ 481,450.00	$ 146,650.00	$ 113,000.00	$ 221,800.00
E	$ 508,080.00	$ 146,380.00	$ 208,100.00	$ 153,600.00
F	$ 467,350.00	$ 112,550.00	$ 474,800.00	$ 212,300.00
G	$ 702,300.00	$ 79,900.00	$ 575,000.00	$ 47,400.00

OPERATIONS AND MAINTENANCE MANUAL
SUB-SLAB DEPRESSURIZATION SYSTEM
BEALS LINEN SITE
7 CHESTNUT STREET
AUBURN, MAINE
MEDEP REMEDIATION ID: 02284

Prepared for:

Maine Department of Environmental Protection
Division of Remediation
17 State House Station
Augusta, Maine

Prepared by:

Ransom Consulting, Inc.
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Portland, Maine 04101
(207) 772-2891

Project R101.06074.012
January 11, 2018

TABLE OF CONTENTS

1.0 INTRODUCTION, PURPOSE AND BACKGROUND

The following Operation and Maintenance (O&M) Manual presents general information, operational and maintenance (procedures, and standard inspection and sampling protocols associated with the sub-slab depressurization system, which was installed at the former Beals Linen Site, located at 7 Chestnut Street in the City of Auburn, Androscoggin County, Maine (the "Site"). This O&M Manual was prepared in conjunction with and on behalf of the Maine Department of Environmental Protection (MEDEP) Bureau of Remediation and Waste Management (BRWM) Division of Technical Services, Vapor Intrusion Investigation and Data Analysis program, as part of their ongoing vapor intrusion and indoor air quality investigation at the Site and vicinity.

1.1 Site Description and History

The 0.6 acres Site is currently improved with an 8,800 square foot, slab-on-grade building (Site Building), which was constructed in 1987 and has been used as a 15-unit multi-family apartment building since that time. The Site Building has been connected to municipal water and sanitary sewer services since its construction, and is heated by wall-mounted, natural gas-fired heaters, located in the living room area of each apartment.

According to historical reports, a laundry facility (Everett Laundry) operated onsite from circa 1914 to circa 1948. This laundry facility was demolished and the Beals Linen and Malo Cleaners buildings were constructed at the Site circa 1950. Malo Cleaners and Beals Linen reportedly operated as dry cleaners from circa 1950 to circa 1986 and a commercial linen service also operated at the Beals property during the same timeframe. The Malo Cleaners and Beals Linen buildings were demolished in 1986.

1.2 Project Background

From October 2013 to May 2014, the MEDEP conducted preliminary sub-slab soil vapor and indoor air assessments at the Site, adjoining properties, and along the utility corridor beneath Chestnut Street to the north of the Site to evaluate the extent and exposure risk of chlorinated volatile organic compounds (CVOCs) that have likely originated from dry cleaning solvent releases at the Site. Based on the results of their investigation, elevated concentrations of CVOCs, specifically trichloroethene (TCE) and tetrachloroethene (PCE), were detected in the samples at concentrations that potentially posed a health risk to occupants of the Site Building. Based on the preliminary results, the MEDEP is conducting on-going monitoring activities at the Site and surrounding properties. MEDEP has assigned Remediation ID: 02284 (Beals Linen) to this investigation.

A temporary sub-slab depressurization system (Primary SSDS) was constructed and put into operation at the Site on April 17, 2014, in order to mitigate known impacts to indoor air quality from vapor intrusion of CVOCs likely originating from historic dry cleaning solvent releases at the Site. Based on initial system performance monitoring data, a second SSDS was constructed in January, 2015, to exert additional influence in the area of apartment unit #1 (SSDS Apt. 1).

2.0 SUB-SLAB DEPRESSURIZATION SYSTEM DESCRIPTION

In April of 2014, MAI Environmental, of South Portland, Maine, installed the Primary SSDS at the Site. As outlined in their installation memo, the Primary SSDS is comprised of five 4-inch diameter sub-slab extraction points, one in each for the following apartment unit locations: Apt. 2, Apt 4, Apt 6, Apt, 8, and Apt 12. With the exception of Apt. 2, the extraction points are individually piped above the apartment ceilings to co-located exit points outside the gable end of Apt. 12. The extraction point installed in Apt. 2 is not currently used, but could be retrofitted as a future extraction point or a vacuum monitoring point, if necessary. See Figure 1 for a Site plan showing a layout of sub-slab vapor extraction points and piping runs.

The four separate polyvinyl chloride (PVC) extraction pipes that exit the gable end of Apt. 12 each include exterior knife valves for adjusting air flow and vacuum monitoring ports. The extraction pipes are then manifolded together into a single 4-inch diameter PVC extraction pipe that enters the extraction trailer. Prior to entering the trailer, there is also a capped condensate drain.

Inside the extraction trailer, air enters a 30-gallon knockout tank/drum, equipped with a water level alarm, which is wired to shut down the Primary SSDS if condensate builds up in the tank. See Appendix A for a system wiring schematic showing the operation of this alarm. After leaving the knockout tank, the air enters a particulate filter, which is equipped with pressure gauges on the inlet and outlet of the filter. The particulate filter is a Rotron inline filter, Model 515256, which utilizes an 8-10 micron Rotron particle filter, Model 517889. The pressure gauges are Magnehelic gauges with a range of 0 to 60 inches of water (0 to 4.5 inches of mercury).

After passing through the particulate filter, air passes through an extraction blower before being discharged to the ambient environment through an exhaust stack. The extraction blower is a 3,450 revolutions per minute (RPM) Rotron regenerative blower, Model EN505AX58ML with a 2.0 HP, 60 Hz, explosion-proof motor. The extraction blower exhaust stack is piped and discharges to a point several feet above the gable end roof-line of Apt. 12, which corresponds to the highest point of the building.

See Figure 2 for a basic schematic Process and Instrumentation Diagram (P&ID) for the Primary SSDS. Please also see Appendix A for manufacturer's equipment cut sheets and service and parts manuals.

Initial sub-slab vacuum monitoring of the Primary SSDS in 2014 indicated low or reduced vacuum pressures in the area of Apartment Unit #1. Based on these observations, a second SSDS (SSDS Apt. 1) was constructed on January 26, 2015, to enhance and provide additional sub-slab vacuum pressures beneath Apartment Unit #1. The SSDS Apt. 1 consists of a horizontal extraction point penetrating through the frost wall foundation, connected to 4-inch diameter PVC vapor extraction piping and an in-line mechanical fan.The SSDS Apt. 1 is designed to extract vapors from directly beneath the slab of Apartment Unit #1 and vent the vapors above the peak of the apartment unit roof. The location of SSDS Apt. 1 is shown on Figure 1.

3.0 INSPECTION PROCEDURES

The following procedures shall be generally conducted on a routine basis. See Appendix B for copies of the Site inspection logs to be utilized for recording and documenting the required inspection data.

3.1 Inspection Procedures

1. Using a vacuum pressure guage reading in hundredths of inches of water, record sub-slab vacuum readings from vaccum monitoring point locations VP-1 through VP-4, associated with the Site building, as identified on Figure 1. Attach pressure guage to dedicated tubing at each location and record vacuum reading in inches of water. Re-seal end of vacuum tubing following measurement to prevent preferential sub-slab air flow pathways.

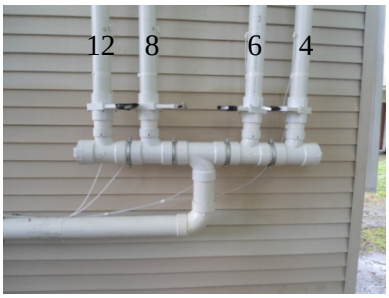
VP-4

2. Inspect general conditions exterior of the Primary SSDS trailer, piping, and connections. Note adverse conditions, and if any disturbance or damage is observed. Make note of any items which require attention/repair.

    1. Note reading on exterior electrical box.

    2. Note knife/gate valve positions (shown at right). Initial settings are:

        - Valve #4: Normally Open
        - Valve #6: Normally Closed
        - Valve #8: Normally ¼ Open
        - Valve #12: Normally Closed

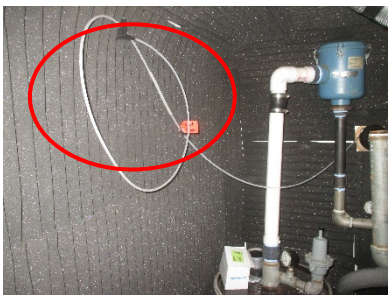


3. Inspect general conditions inside of Primary SSDS trailer, equipment, and piping. Note adverse conditions.

    1. Is system running? If not, note why and reason for shutdown (e.g., high level alarm shutoff, lack of power, etc.)

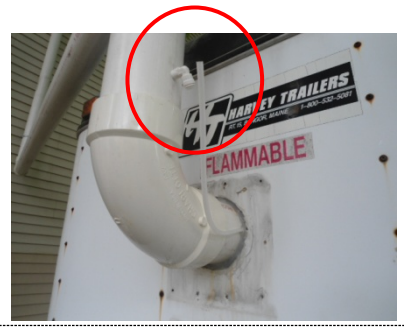
    2. Note number of operation hours on instrument panel.

4. Measure air concentration in exhaust line with a photoionization detector (PID) by using a tedlar bag and/or PVC/plastic tee (if necessary) connected to the exhaust sample port (shown at right). Note reading on sample inspection log. If collecting confirmatory laboratory samples from the exhaust line (SP-E), connect sample canister to the exhaust sample port, and collect sample in accordance with Section 4.1 of this manual.



5. Using the TSI "VelociCalc" 9565 Air Velocity and Pressure Meter and the exhaust sample port (shown in item 4, above); collect a vacuum pressure reading from the exhaust line. Note reading on sample inspection log.

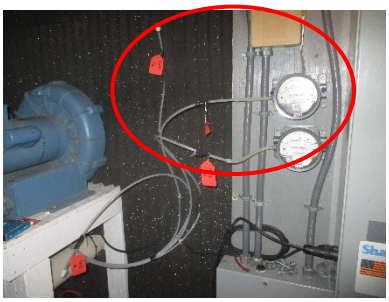
6. Using an air velocity meter, measure air velocity in the exhaust pipe by disconnecting sample tube from the exhaust line sample fitting (shown at right) and taking measurement directly from exhaust pipe. Note reading on sample inspection log. Be sure to secrurely re-connect sampling tubing.



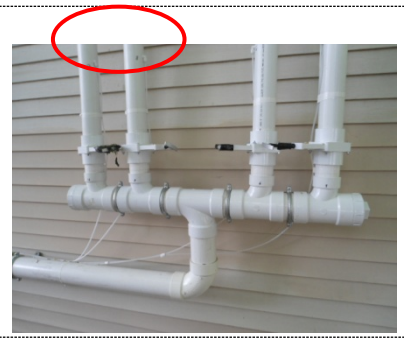
7. Record pressure readings from the two in-line pressure gauges (shown at right); one on the liquid knock-out tank and one on the inlet to the extraction blower. Note readings on sample inspection log.

    If a large differential pressure is observed, remove particulate filter, shake out/clean filter, and/or replace filter, as necessary.

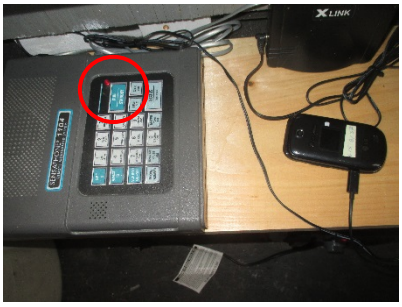
8. Using the inlet sample ports (shown at right), check and record the vacuum pressure readings from each inlet vacuum extraction line from the apartment units, using the on-Site hand-held magnehelic vacuum pressure gauges (shown in item 5, above). Use different ranges of gauges as needed. Note readings on sample inspection log. If collecting PID field readings or confirmatory laboratory samples from the individual inlet lines (SP-4 and SP-8), connect the PID or peristaltic pump and sample canister to each inlet vacuum extraction line, and collect sample in accordance with Section 4.1 of this manual.



9. Using an air velocity meter, measure air velocity in each inlet pipe by disconnecting sample tube from the inlet line sample fitting (shown at right) and taking measurement directly from inlet pipe. Note readings on sample inspection log. Be sure to secrurely re-connect sampling tubing.



10. Prior to draining condensate from the inlet extraction header pipe, turn off the Sensaphone® Model 1104 remote monitoring system by pushing the "run/standby" button (shown at right). Then shut down the SSDS using the on/off power switch on the control panel.



11. Drain condensate from exterior pipes using the condensate drain port (shown at right). When collecting condensate from the pipes, place the secondary containment bucket (located in the trailer) beneath the condensate collection bottle to avoid spills or accidental releases. The condensate must be collected in an appropriate bottle; and may be stored in the trailer (within secondary containment), until which time the bottle is full and can be properly disposed at an off-site disposal facility. Note volume of condensate collected and record on the inspection log. Close drain securely.

12. Drain condensate from interior pipes using the condensate drain/makeup air intake valve (shown at right). Follow the same collection procedures outlined in item 11, above.

13. Check liquid level in drum. If necessary, drain liquid into an appropriate container via drum drain and discard liquid properly at an off-site disposal facility. *[It should be noted that at this time, a drum drain is proposed and has not yet been installed.]*

14. To restart system:

    1. Open the makeup air intake/condensate drain;
    2. Turn the blower back on using the on/off power switch located on the control panel.
    3. Slowly close makeup air intake/condensate drain until full vacuum is applied to the desired open vacuum extraction points.
    4. Push the "run/standby" button on the Sensaphone® Model 1104 remote monitoring system to reactivate the auto-dial feature.

15. If a significant amount of condensate was removed from the pipes (greater than one pint), re-record pressure readings from the two in-line pressure gauges (see item 7, above); the four individual inlet vacuum extraction lines (see item 8, above); and the extraction blower exhaust line (see item 5, above). Note readings on sample inspection log. If less than one pint of condensate is removed from the pipes, this step may be omitted.

16. Inspect general conditions of SSDS Apt. 1. Note adverse conditions, and if any disturbance or damage is observed. Make note of any items which require attention/repair.

17. Using an air velocity meter and the sample port shown at right, measure air velocity in the exhaust pipe of SSDS Apt. 1. Measure PID reading in SSDS Apt. 1 using same sample port. Note readings on sample inspection log. If collecting confirmatory laboratory samples from the exhaust line (SP-E Apt. 1), connect sample canister to the exhaust sample port, and collect sample in accordance with Section 4.1 of this manual. Be sure to secrurely cover sample port after readings/samples are obtained.

3.2 General Equipment Needs

- Camera
- Inspection Log(s)
- Condensate Collection Bottle
- PID Meter
- Magnehic pressure gauges of varying ranges (located in trailer)
- Pipe Wrench
- TSI "VelociCalc" 9565 Air Velocity Meter
- Step ladder to reach sample port of SSDS Apt. 1.

4.0 CONFIRMATORY LABORATORY SAMPLING

4.1 Laboratory Sampling

During the system inspection activities, confirmatory laboratory air sampling will be completed on the Primary SSDS exhaust pipe (SP-E), and on the activated inlet pipes from the individual apartment units (SP-4 and SP-8). A laboratory sample will also be collected from the SSDS Apt. 1 exhaust pipe (SP-E Apt.1). Additionally, it may be necessary to collect sub-slab vapor samples at points throughout the Site building, if requested by the MEDEP.

Because the SSDS exhaust pipes are under positive pressure, a confirmatory laboratory sample may be collected by connecting a laboratory-prepared SUMMA® passivated stainless steel canister equipped with flow control valve (air flow of 200 mL/min) directly to the sample port (SP-E or SP-E Apt. 1), using a plastic tee, if necessary.

The sample ports associated with the individual inlet pipes (SP-4, and SP-8) are under negative pressure; as such, it may be necessary to utilize peristaltic pumps to collect the sample. The pump would be connected directly to the flexible plastic sample port, using a plastic tee, as necessary, to fill the laboratory-prepared SUMMA® passivated stainless steel canisters equipped with flow control valves set for 200 mL/min.

See Appendix C for a full Standard Operating Procedure (SOP) for collecting confirmatory laboratory air samples. This SOP is specific to collection from sub-slab sample locations; however, the piping, sample collection and basic air sampling principals are the same for each sampling location.

4.2 Mass Removal

To calculate total mass removal of the system, the laboratory air sampling results from collected from the exhaust pipe shall be used along with recorded exhaust velocity and run times as follows:

(Measured Air Velocity in Exhaust Pipe (fps)) **X** (Area of 4" Ø Exhaust Pipe: 0.09 SF) = **Calculated Exhaust Air Flow (cfs)**

(VOC Concentration in Exhaust (µg/m3)) **X** (Calculated Exhaust Air Flow (cfs)) **X** (Conversion Factor: 5.4 E –6) = **Mass Removal (lbs/day)**

*With input Measured Air Velocity in Exhaust Pipe in feet per second.

(Measured Air Velocity in Exhaust Pipe (fpm)) **X** (Area of 4" Ø Exhaust Pipe: 0.09 SF) = **Calculated Exhaust Air Flow (cfm)**

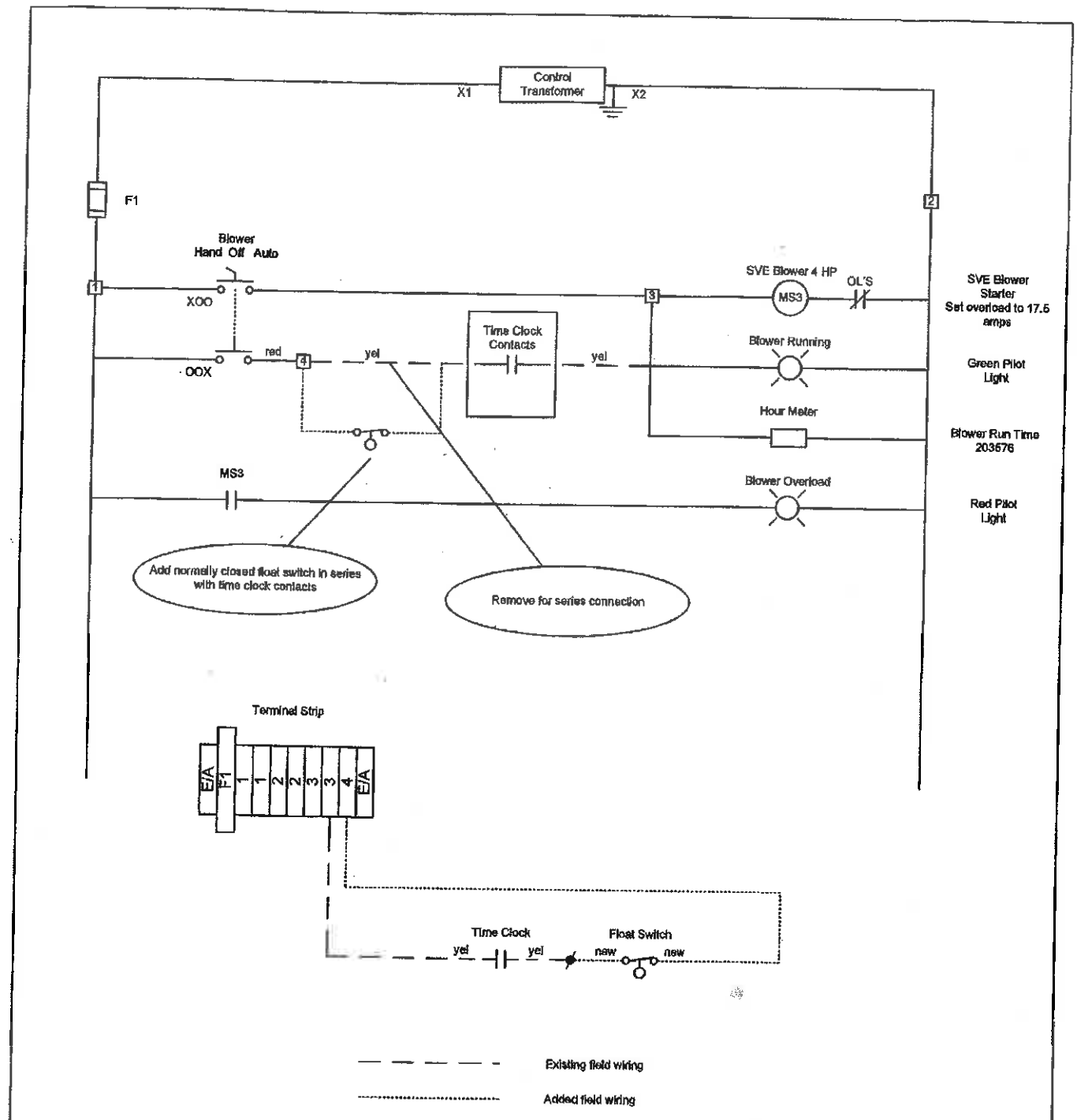
(VOC Concentration in Exhaust (µg/m3)) **X** (Calculated Exhaust Air Flow (cfm)) **X** (Conversion Factor: 8.9 E –8) = **Mass Removal (lbs/day)**

*With input Measured Air Velocity in Exhaust Pipe in feet per minute.

APPENDIX A

Equipment Cut Sheets and Service & Parts Manuals

Sub-Slab Depressurization System
Operations and Maintenance Manual
Beals Linen Site
7 Chestnut Street, Auburn, Maine
MEDEP REM ID: 02284

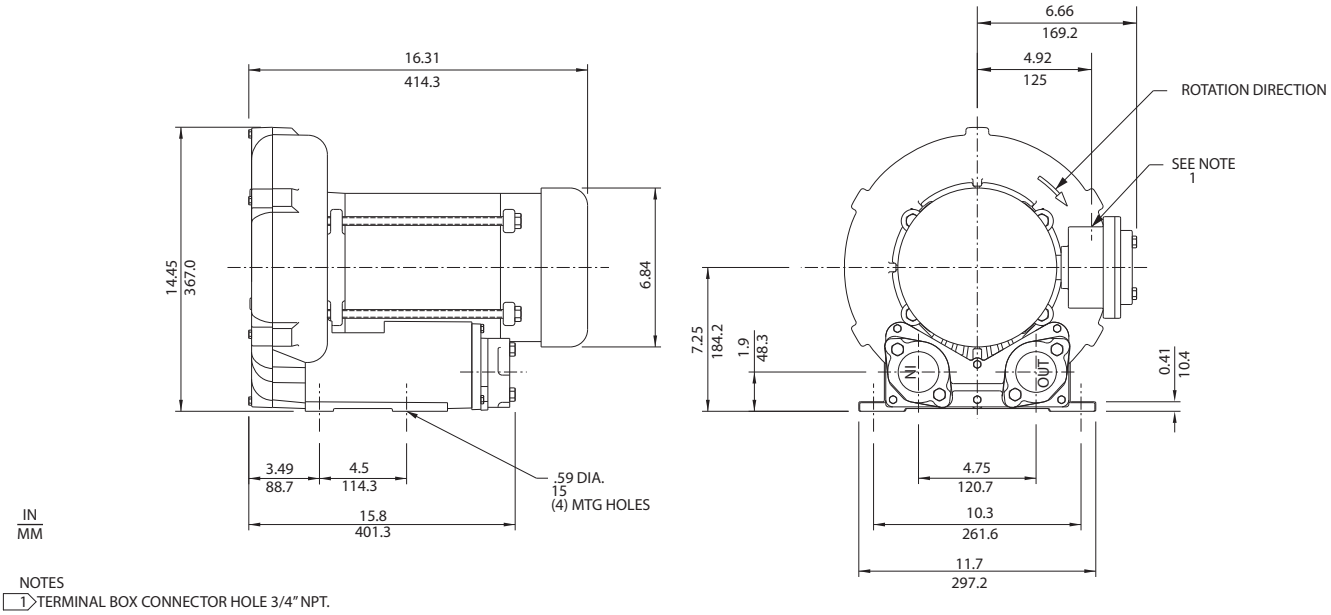


DESCRIPTION	TITLE	SCALE	DATE
SVE Trailer – field install float switch	XP10 Trailer Control Panel	none	9/3/2012
	FILENAME		

EN 505 & CP 505

ROTRON®

2.0 / 2.5 HP Sealed Regenerative w/Explosion-Proof Motor



NOTES
1. TERMINAL BOX CONNECTOR HOLE 3/4" NPT.
2. DRAWING NOT TO SCALE, CONTACT FACTORY FOR SCALE CAD DRAWING.
3. CONTACT FACTORY FOR BLOWER MODEL LENGTHS NOT SHOWN.

		Part/ Model Number			
		EN505AX58ML	EN505AX72ML	CP505FS58MLR	CP505FS72MLR
Specification	Units	038177	038178	080655	038962
Motor Enclosure - Shaft Mtl.	-	Explosion-proof-CS	Explosion-proof-CS	Chem XP-SS	Chem XP-SS
Horsepower	-	2.0	2.0	2.0	2.0
Phase - Frequency	-	Single-60 hz	Three-60 hz	Single-60 hz	Three-60 hz
Voltage	AC	115/230	230/460	115/230	230/460
Motor Nameplate Amps	Amps (A)	22/11	5.8/2.9	22/11	5.8/2.9
Max. Blower Amps	Amps (A)	24/12	6.4/3.2	24/12	6.4/3.2
Inrush Amps	Amps (A)	112/56	56/28	112/56	56/28
Service Factor	-	1.0	1.0	1.0	1.0
Starter Size	-	1/0	0/0	1/0	0/0
Thermal Protection	-	Class B - Pilot Duty	Class B - Pilot Duty	Class B - Pilot Duty	Class B - Pilot Duty
XP Motor Class - Group	-	I-D, II-F&G	I-D, II-F&G	I-D, II-F&G	I-D, II-F&G
Shipping Weight	Lbs	92	84	92	84
	Kg	41.7	38.1	41.7	38.1

Voltage - ROTRON motors are designed to handle a broad range of world voltages and power supply variations. Our dual voltage 3 phase motors are factory tested and certified to operate on both: **208-230/415-460 VAC-3 ph-60 Hz** and **190-208/380-415 VAC-3 ph-50 Hz**. Our dual voltage 1 phase motors are factory tested and certified to operate on both: **104-115/208-230 VAC-1 ph-60 Hz** and **100-110/200-220 VAC-1 ph-50 Hz**. All voltages above can handle a ±10% voltage fluctuation. Special wound motors can be ordered for voltages outside our certified range.

Operating Temperatures - Maximum operating temperature: Motor winding temperature (winding rise plus ambient) should not exceed 140°C for Class F rated motors or 120°C for Class B rated motors. Blower outlet air temperature should not exceed 140°C (air temperature rise plus inlet temperature). Performance curve maximum pressure and suction points are based on a 40°C inlet and ambient temperature. Consult factory for inlet or ambient temperatures above 40°C.

Maximum Blower Amps - Corresponds to the performance point at which the motor or blower temperature rise with a 40°C inlet and/or ambient temperature reaches the maximum operating temperature.

XP Motor Class - Group - See Explosive Atmosphere Classification Chart in Section I

AMETEK TECHNICAL & INDUSTRIAL PRODUCTS
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Customer Service Fax: +1 215.256.1338
www.ametektip.com

AMETEK® TECHNICAL & INDUSTRIAL PRODUCTS

Environmental / Chemical Processing Blowers

EN 505 & CP 505

ROTRON®

2.0 / 2.5 HP Sealed Regenerative w/Explosion-Proof Motor

FEATURES

- Manufactured in the USA - ISO 9001 and NAFTA compliant
- Maximum flow: 150 SCFM
- Maximum pressure: 75 IWG
- Maximum vacuum: 70 IWG
- Standard motor: 2.0 HP, explosion-proof
- Cast aluminum blower housing, impeller , cover & manifold; cast iron flanges (threaded); teflon® lip seal
- UL & CSA approved motor with permanently sealed ball bearings for explosive gas atmospheres Class I Group D minimum
- Sealed blower assembly
- Quiet operation within OSHA standards

MOTOR OPTIONS

- International voltage & frequency (Hz)
- Chemical duty, high efficiency, inverter duty or industry-specific designs
- Various horsepowers for application-specific needs

BLOWER OPTIONS

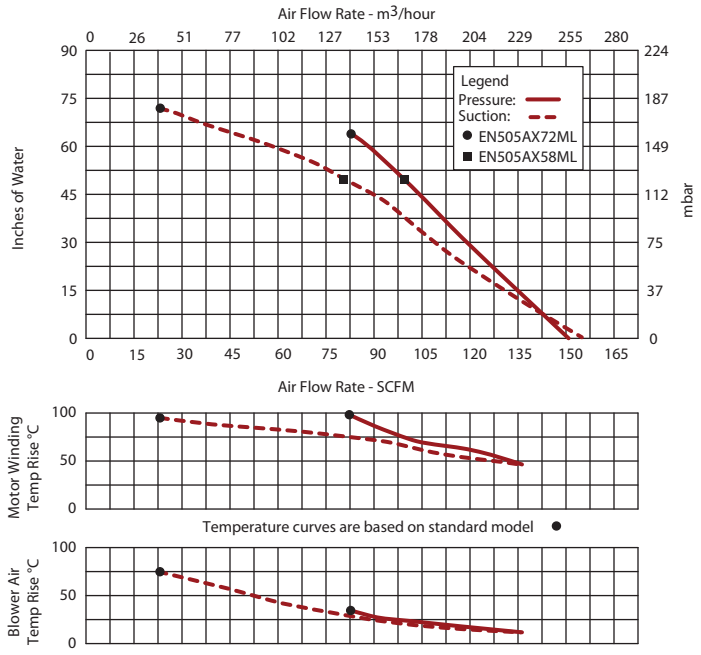
- Corrosion resistant surface treatments & sealing options
- Remote drive (motorless) models
- Slip-on or face flanges for application-specific needs

ACCESSORIES

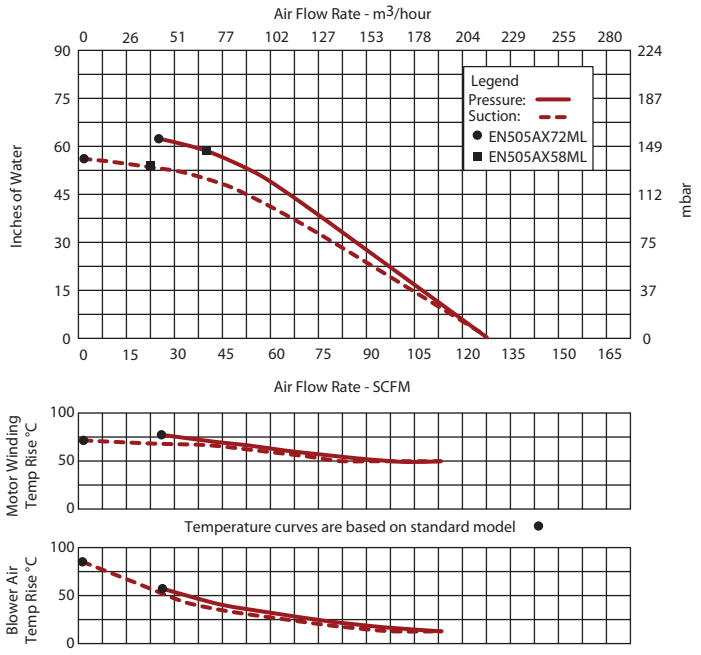
- Flowmeters reading in SCFM
- Filters & moisture separators
- Pressure gauges, vacuum gauges, & relief valves
- Switches - air flow, pressure, vacuum, or temperature
- External mufflers for additional silencing
- Air knives (used on blow-off applications)
- Variable frequency drive package

Blower Performance at Standard Conditions

60 Hz



50 Hz



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AMETEK® TECHNICAL & INDUSTRIAL PRODUCTS

SERVICE AND PARTS MANUAL FOR BLOWER MODEL

EN454 – EN656

ROTRON Industrial Products
627 lake Street, Kent, ohio 44240 U.S.A.
Telephone: 330-673-3452 Fax: 330-677-3306
e-mail: rotronindustrial@ametek.com
internet: www.ametektip.com

Your Choice. Our Commitment.™

WARRANTY, INSTALLATION, MAINTENANCE AND TROUBLESHOOTING INSTRUCTIONS

TECHNICAL AND INDUSTRIAL PRODUCTS
627 Lake Street, Kent, Ohio 44240 USA
Telephone: 330-673-3452 Fax: 330-677-3306
e-mail: rotronindustrial@ametek.com web site: www.ametektip.com

1. AMETEK Rotron DR, EN and HiE regenerative direct drive blowers are guaranteed for one full year from the date of installation (limited to 18 months from the date of shipment) to the original purchaser only. Should the blower fail we will evaluate the failure If failure is determined to be workmanship or material defect related, we will at our option repair or replace the blower.

2. AMETEK Rotron Minispiral, Revaflow, Multiflow, Nautilair, remote drive blowers, moisture separators, packaged units, CP blowers, Nasty Gas™ models and special built (EO) products are guaranteed for one full year from date of shipment for workmanship and material defect to the original purchaser only. Should the blower fail, If failure is determined to be workmanship or material defect related, we will at our option repair or replace the blower.

3. **Parts Policy** - AMETEK Rotron spare parts and accessories are guaranteed for three months from date of shipment for workmanship and material defect to the original purchaser only. If failure is determined to be workmanship or material defect related we will at our option repair or replace the part.

Corrective Action - A written report will be provided indicating reason(s) for failure, with suggestions for corrective action. Subsequent customer failures due to abuse, misuse, misapplication or repeat offense will not be covered. AMETEK Rotron will then notify you of your options. Any failed unit that is tampered with by attempting repair or diagnosis will void the warranty, unless authorized by the factory.

Terms and Conditions - Our warranty covers repairs or replacement of regenerative blowers only, and will not cover labor for installation, outbound and inbound shipping costs, accessories or other items not considered integral blower parts. Charges may be incurred on products returned for reasons other than failures covered by their appropriate warranty. Out-of-warranty product and in warranty product returned for failures determined to be caused by abuse, misuse, or repeat offense will be subject to an evaluation charge. Maximum liability will in no case exceed the value of the product purchased. Damage resulting from mishandling during shipment is not covered by this warranty. It is the responsibility of the purchaser to file claims with the carrier. Other terms and conditions of sale are stated on the back of the order acknowledgement.

Installation Instructions for SL, DR, EN, CP, and HiE Series Blowers

1. **Bolt It Down** - Any blower must be secured against movement prior to starting or testing to prevent injury or damage. The blower does not vibrate much more than a standard electric motor.

2. **Filtration** - All blowers should be filtered prior to starting. Care must be taken so that no foreign material enters the blower. If foreign material does enter the blower, it could cause internal damage or may exit at extremely high velocity.

   Should excessive amounts of material pass through the blower, it is suggested that the cover(s) and impeller(s) be removed periodically and cleaned to avoid impeller imbalance. Impeller

imbalance greatly speeds bearing wear, thus reducing blower life. Disassembling the blower will void warranty, so contact the factory for cleaning authorization.

3. **Support the Piping** - The blower flanges and nozzles are designed as connection points only and are not designed to be support members.

   Caution: Plastic piping should not be used on blowers larger than 1 HP that are operating near their maximum pressure or suction point. Blower housing and nearby piping temperatures can exceed 200ºF. Access by personnel to the blower or nearby piping should be limited, guarded, or marked, to prevent danger of burns.

4. **Wiring** - Blowers must be wired and protected/fused in accordance with local and national electrical codes. All blowers must be grounded to prevent electrical shock. Slo-Blo or time delay fuses should be used to bypass the first second of start-up amperage.

5. **Pressure/Suction Maximums** - The maximum pressure and/or suction listed on the model label should not be exceeded. This can be monitored by means of a pressure or suction gage (available from Rotron), installed in the piping at the blower outlet or inlet. Also, if problems do arise, the Rotron Field representative will need to know the operating pressure/suction to properly diagnose the problem.

6. **Excess Air** - Bleed excess air off. DO NOT throttle to reduce flow. When bleeding off excess air, the blower draws less power and runs cooler.

   Note: Remote Drive (Motorless) Blowers - Properly designed and installed guards should be used on all belts, pulleys, couplings, etc. Observe maximum remote drive speed allowable. Due to the range of uses, drive guards are the responsibility of the customer or user. Belts should be tensioned using belt gauge.

Maintenance Procedure

When properly piped, filtered, and applied, little or no routine maintenance is required. Keep the filter clean. Also, all standard models in the DR, EN, CP, and HiE series have sealed bearings that require no maintenance. Bearing should be changed after 15,000 to 20,000 hours, on average. Replacement bearing information is specified on the chart below.

Bearing Part Number	Size	Seal Material	Grease	Heat Stabilized
510217 510218 510219	205 206 207	Polyacrylic	Nye Rheotemp 500 30% +/- 5% Fill	Yes – 325 F
510449 516440 516648	203 202 307	Buna N	Exxon Polyrex Grease	NO
516840 516841 516842 516843 516844 516845 516846 516847	206 207 208 210 309 310 311 313	Buna N	Exxon Polyrex Grease	NO

Troubleshooting

		POSSIBLE CAUSE	OUT OF WARRANTY REMEDY ***
IMPELLER DOES NOT TURN	Humming Sound	1. * One phase of power line not connected 2. * One phase of stator winding open 3. Bearings defective 4. Impeller jammed by foreign material 5. Impeller jammed against housing or cover 6. ** Capacitor open	1. Connect 2. Rewind or buy new motor 3. Change bearings 4. Clean and add filter 5. Adjust 6. Change capacitor
	No Sound	1. * Two phases of power line not connected 2. * Two phases of stator winding open	1. Connect 2. Rewind or buy new motor
IMPELLER TURNS	Blown Fuse	1. Insufficient fuse capacity 2. Short circuit	1. Use time delay fuse of proper rating 2. Repair
	Motor Overheated Or Protector Trips	1. High or low voltage 2. * Operating in single phase condition 3. Bearings defective 4. Impeller rubbing against housing or cover 5. Impeller or air passage clogged by foreign material 6. Unit operating beyond performance range 7. Capacitor shorted 8. * One phase of stator winding short circuited	1. Check input voltage 2. Check connections 3. Check bearings 4. Adjust 5. Clean and add filter 6. Reduce system pressure/vacuum 7. Change capacitor 8. Rewind or buy new motor
	Abnormal Sound	1. Impeller rubbing against housing or cover 2. Impeller or air passages clogged by foreign material 3. Bearings defective	1. Adjust 2. Clean and add filter 3. Change bearings
	Performance Below Standard	1. Leak in piping 2. Piping and air passages clogged 3. Impeller rotation reversed 4. Leak in blower 5. Low voltage	1. Tighten 2. Clean 3. Check wiring 4. Tighten cover, flange 5. Check input voltage

*** 3 phase units**

**** 1 phase units**

***** Disassembly and repair of new blowers or motors will void the Rotron warranty. Factory should be contacted prior to any attempt to field repair an in-warranty unit.**

Blower Disassembly:

WARNING: Attempting to repair or diagnose a blower may void Rotron's warranty. It may also be difficult to successfully disassemble and reassemble the unit.

1) Disconnect the power leads. **CAUTION:** Be sure the power is disconnected before doing any work whatsoever on the unit.

2) Remove or separate piping and/or mufflers and filters from the unit.

3) Remove the cover bolts and then the cover. **NOTE:** Some units are equipped with seals. It is mandatory that these seals be replaced once the unit has been opened.

4) Remove the impeller bolt and washers and then remove the impeller. **NOTE:** Never pry on the edges of the impeller. Use a puller as necessary.

5) Carefully note the number and location of the shims. Remove and set them aside. NOTE: If the disassembly was for inspection and cleaning the unit may now be reassembled by reversing the above steps. If motor servicing or replacement and/or impeller replacement is required the same shims may not be used. It will be necessary to re-shim the impeller according to the procedure explained under assembly.

6) Remove the housing bolts and remove the motor assembly (arbor/.housing on remote drive models).

7) Arbor disassembly (Applicable on remote drive models only):
   a) Slide the bearing retraining sleeve off the shaft at the blower end.
   b) Remove the four (4) screws and the bearing retaining plate from the blower end.
   c) Lift the shaft assembly far enough out of the arbor to allow removal of the blower end snap ring.
   d) Remove the shaft assembly from the arbor.
   e) If necessary, remove the shaft dust seal from the pulley end of the arbor.

Muffler Material Replacement:

1) Remove the manifold cover bolts and them manifold cover.

2) The muffler material can now be removed and replaced if necessary. On blowers with fiberglass acoustical wrap the tubular retaining screens with the fiberglass matting before sliding the muffler pads over the screens.

3) Reassemble by reversing the procedure.

NOTE: On DR068 models with tubular mufflers it is necessary to remove the cover and impeller accessing the muffler material from the housing cavity.

Blower Reassembly:

1) Place the assembled motor (assembled arbor assembly for remote drive models) against the rear of the housing and fasten with the bolts and washer.

2) To ensure the impeller is centered within the housing cavity re-shim the impeller according to the procedure outlined below.

3) If blower had a seal replace the seal with a new one.

4) Place the impeller onto the shaft making sure the shaft key is in place and fasten with the bolt, washer and spacer as applicable. Torque the impeller bolt per the table below. Once fastened carefully rotate the impeller to be sure it turns freely.

5) Replace the cover and fasten with bolts.

6) Reconnect the power leads to the motor per the motor nameplate.

Bolt Size	**Torque** **Pound-Force-Foot**
1/4-20	**6.25 +/- 0.25**
5/16-18	**11.5 +/- 0.25**
3/8-16	**20.0 +/- 0.5**
½-13	**49.0 +/- 1**
5/8 –11	**90.0 +/- 2**

Impeller Shimming Procedure:

WARNING: This unit may be difficult to shim. Extreme care may be exercised.

Tools Needed: Machinist's Parallel Bar
Vernier Caliper with depth measuring capability
Feeler gauges or depth gauge

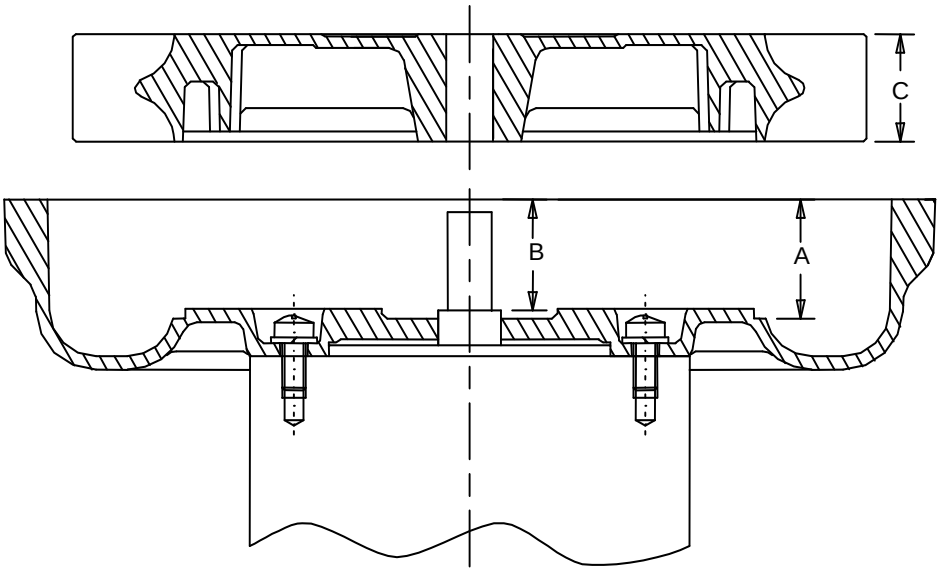
Measure the Following:

Distance from the flange face to the housing (A)
Distance from the flange face to the motor shaft shoulder (B)
Impeller Thickness (C)

Measurements (A) and (B) are made by laying the parallel bar across the housing flange face and measuring to the proper points. Each measurement should be made at three points, and the average of the readings should be used.

Shim Thickness = B – (A+C)/2

After the impeller installation (step #4 above) the impeller/cover clearance can be checked with feeler gauges, laying the parallel bar across the housing flange face. This clearance should nominally be (A-C)/2.



ROTRON TECHNICAL MOTOR DIVISION
REGENERATIVE BLOWER GROUP

75 North Street
Saugerties, New York 12477
Phone: (845) 246-3401
Fax: (845) 246-3802

EXPLOSION-PROOF BLOWERS

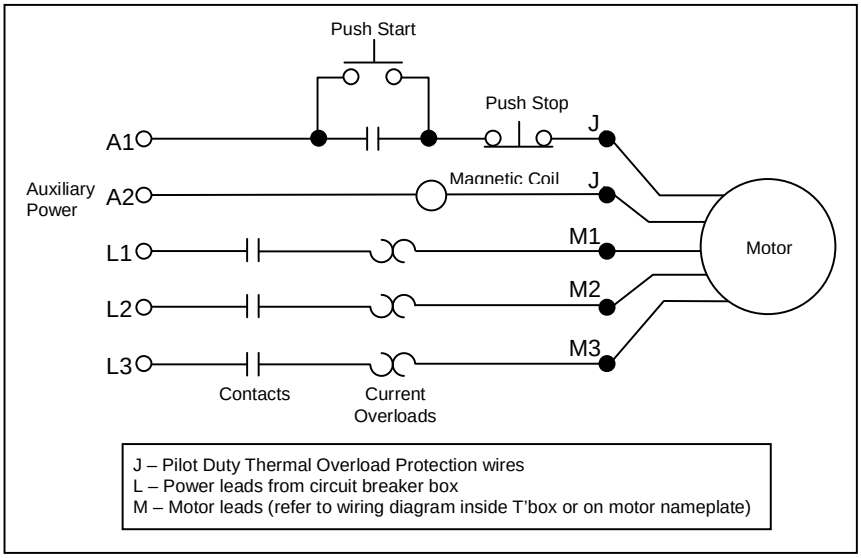
IMPORTANT: Read before wiring this Explosion-proof Blower

This AMETEK Rotron Explosion-proof Regenerative Blower may be equipped with Pilot Duty Thermal Overload (PDTO) or Automatic Thermal Overload (ATO) protection. When properly wired to a motor starter, this protection limits the motor winding temperature rise per the National Electric Code (NEC) article 500. Failure to properly wire this blower is an NEC violation and could cause an explosion. AMETEK Rotron assumes no responsibilities for damages incurred by negligent use of this product, and will not warranty a blower on which the PDTO is not properly connected. Some blowers 1 HP and under do not require PDTO and have built in ATO. Consult the factory if verification of wiring connections is required.

In all cases, follow the motor controller manufacturer's instructions. The following schematic is for conceptual understanding only, and may not apply to all motor/controller combinations.

The manufacturer's wiring diagram found on the motor takes precedent over reference diagrams supplied by AMETEK Rotron Technical Motor Division.

Schematic



The schematic is shown for a three phase motor. For a single phase motor disregard L3 and M3. Pushing the START button completes the auxiliary control circuit, allowing current to flow through the magnetic coil. The contacts are magnetically closed, starting the motor and latching the auxiliary circuit. The motor will continue to run until the STOP push button is depressed, the motor reaches the overload temperature, or the current sensing overloads trip out.

If you have any questions, contact AMETEK Rotron at 914-246-3401 for the location of your area representative.

POLICY REGARDING INSTALLATION OF AMETEK ROTRON REGENERATIVE BLOWERS IN HAZARDOUS LOCATIONS

AMETEK Rotron will not knowingly specify, design or build any regenerative blower for installation in a hazardous, explosive location without the proper NEMA motor enclosure. AMETEK Rotron does not recognize sealed blowers as a substitute for explosion-proof motors. Sealed units with standard TEFC motors should never be utilized where local, state, and/or federal codes specify the use of explosion-proof equipment.

AMETEK Rotron has a complete line of regenerative blowers with explosion-proof motors. Division 1 & 2, Class I, Group D; Class II, Groups F & G requirements are met with these standard explosion-proof blowers.

AMETEK Rotron will not knowingly specify, design or build any regenerative blower for installation in a hazardous, corrosive environment without the proper surface treatment and sealing options.

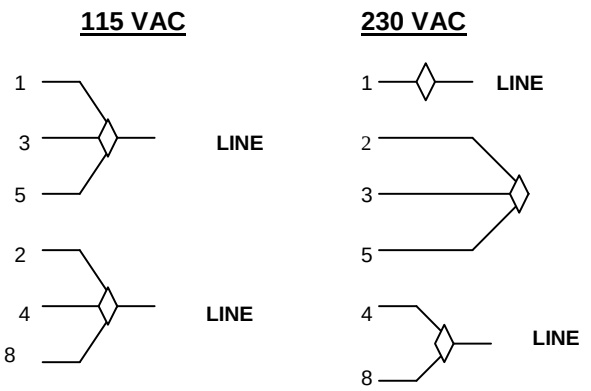
AMETEK Rotron has a complete line of Chemical Processing and Nasty Gas™ regenerative blowers with Chem-Tough™, stainless steel parts, and seals.

AMETEK Rotron offers general application guidance; however, suitability of the particular blower selection is ultimately the responsibility of the purchaser, not the manufacturer of the blower.

FS2 Rev B 3/10/98

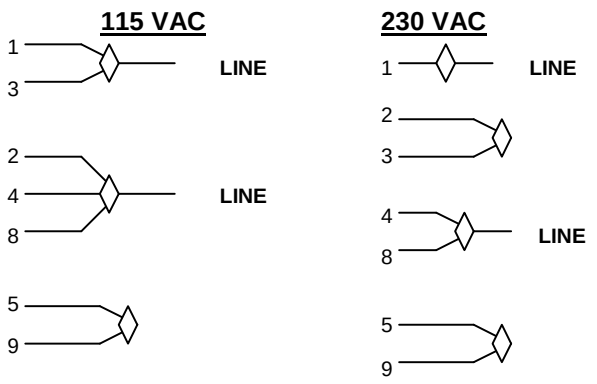
WIRING DIAGRAMS, XP MOTORS

H. 1Ø, 6 WIRE



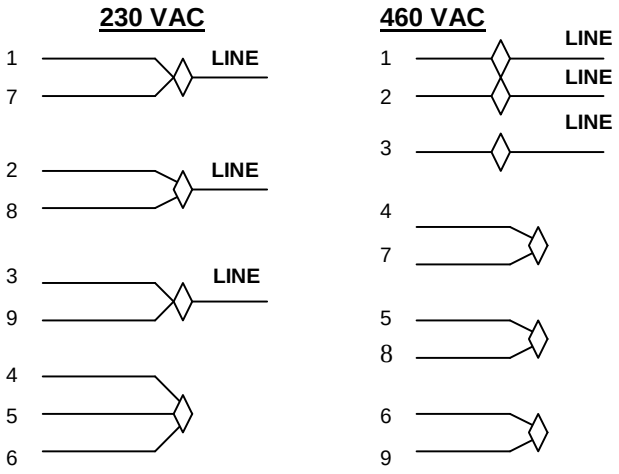
INTERCHANGE LEADWIRES 5 & 8 to REVERSE ROTATION

I. 1Ø, 7 WIRE



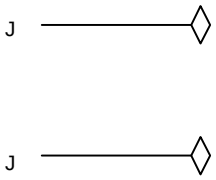
INTERCHANGE LEADWIRES 5 & 8 to REVERSE ROTATION

K. 3Ø, 9 WIRE



INTERCHANGE ANY TWO LEAD LINES TO REVERSE ROTATION

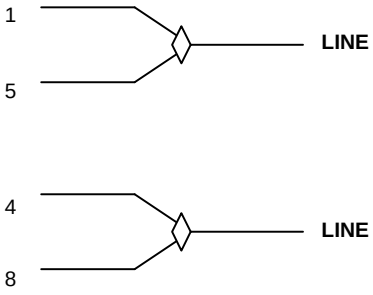
L. PILOT DUTY THERMAL OVERLOADS



HOOK J LEADS TO CONTROL CIRCUITRY

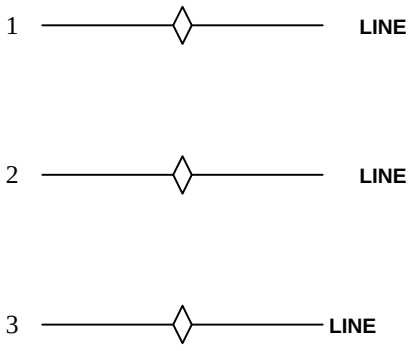
M. 1Ø 230 VAC

SINGLE VOLTAGE



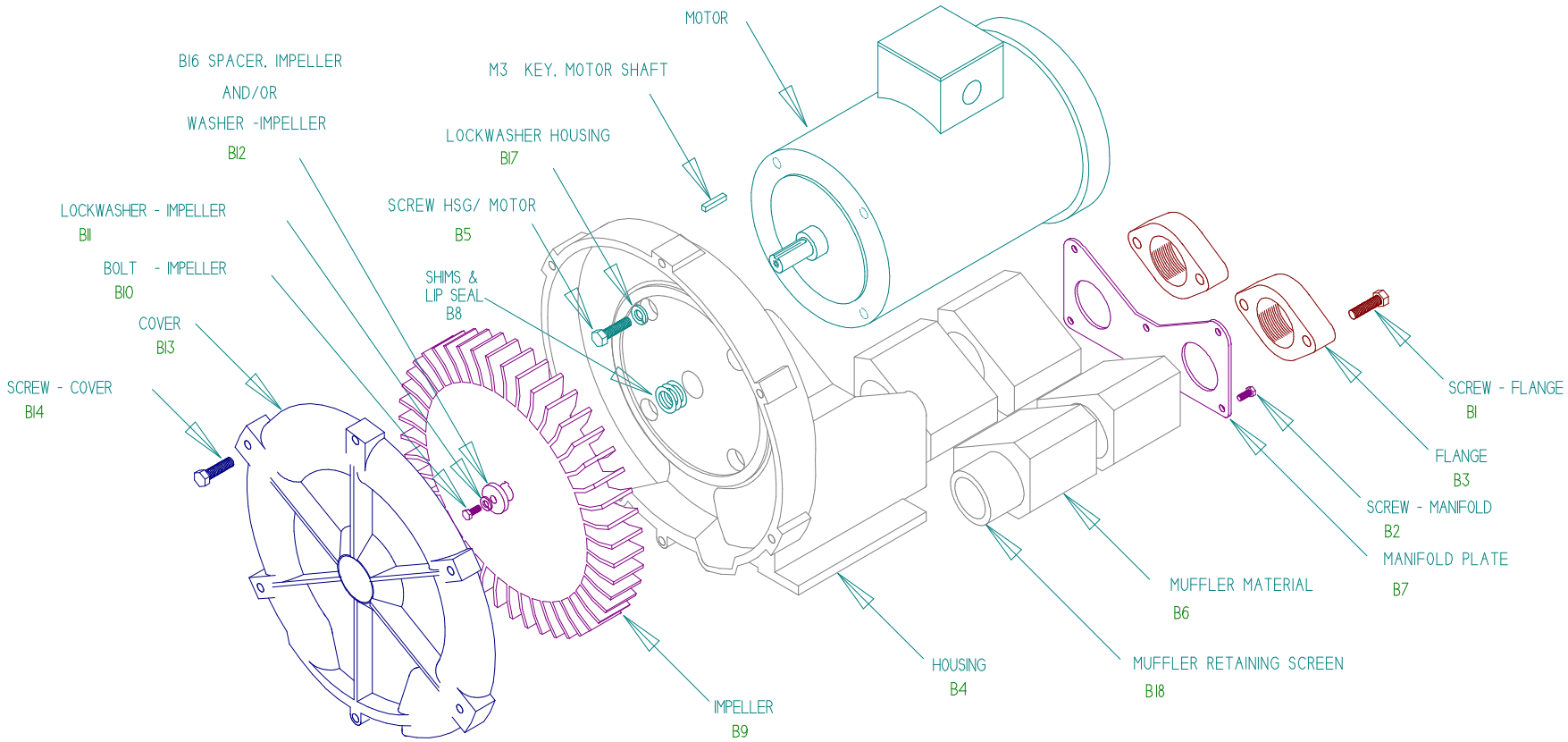
INTERCHANGE LEADWIRES 5 & 8 TO REVERSE ROTATION

N. 3Ø 575 VAC



INTERCHAGE ANY TWO LEAD LINES TO REVERSE ROTATION

ASSEMBLY DIAGRAM
EN454 EN513 EN523 EN505
EN555 EN606 EN656



Parts Breakdown

Item No.	Qty. Req'd	Description	EN454 038175 038176	EN454 080487 080488 080916	EN513 038183 038037	EN523 038223 038184	EN505 038177 038178 038445	EN555 038045	EN606 038179 038222 038437 038536 038538
M3	1	Key Motor Shaft	510629	510629	510629	155099	510629	510629	510629
B1	4	Screw, Flange	120162	120162	120162	120162	120162	120162	155095
B2	6	Screw, Manifold	155496	155170	(10 pcs) 120214	(10 pcs) 120214	155170	155496	155176
B3	2	Flange	510354	510354	510354	510354	510354	510354	511480
B4	1	Housing	515737	551001	523419	523420	See Next Page	516721	See Next Page
B5	4	Screw, Hsg /Motor	251791	155128	251791	251791	155128	251791	251791
B6	4	Muffler Material	515743	515743	516560	516560	(6 pcs) 515743	515743	See Next Page
	2	Muffler Insert	Not Used	551006	Not Used	Not Used	Not Used	Not Used	Not Used
B7	1	Manifold Plate	516410	516410	529868	529868	517460	515482	516392
B8	*	Shim .002"	510356	510356	510356	500664	510356	510356	510356
	*	Shim .005"	510357	510357	510357	500665	510357	510357	510357
	*	Shim .010"	510358	510358	510358	500666	510358	510358	510358
	*	Shim .020"	510359	510359	510359	500667	510359	510359	510359
	*	Shim .030"	Not Used	Not Used	Not Used	510292	Not Used	Not Used	Not Used
B9	1	Impeller	515675	551067	516557	(2 pcs) 516562	517433	516678	511272
B10	1	Bolt, Impeller	120214	120214	120325	120214	120214	120262	120325
B11	1	Lockwasher, Impeller	120203	120203	120203	120203	120203	120203	120203
B12		Washer, Impeller	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
B13	1	Cover	517807	551065	516559	516559	517808	516675	511274
B14	6	Screw, Cover	155236	155129	(8 pcs) 120255	(8 pcs) 155098	155236	(7 pcs) 155236	155236
B16	1	Spacer, Impeller Bolt	510355	510355	510355	510355	510355	510355	510355
B17		Lockwasher, Housing	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
B18	1	Screen, Muffler Retaining, Right (**)	510362	551087	511718	511718	See Next Page	510362	See Next Page
	1	Screen, Muffler Retaining, Left (**)	510362	551087	511718	511718	See Next Page	510362	See Next Page
B19		Bolt, Muffler Hsg/Hsg	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
B20		Muffler Housing	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
		Bolt, Motor/Muffler	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
		Lockwasher, Motor/Muffler	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
		Washer, Motor/Muffler	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
		Spacer, Motor/Muffler	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
B23		Bolt, Mounting Rail	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
B24		Lockwasher, Rail	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
B25		Nut, Rail	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
B26		Rail Mounting	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used	Not Used
	1	Lip Seal	516587	516587	516587	516587	516587	516587	516587

Model	Part No.	Motor	Wiring Diagram	Specific Parts	Bearing, Rear (M1)
EN454W58L	038175	515747	H + L		
EN454W72L	038176	515746	K + L		
EN454W58ML	080487	515747	H + L		
EN454W72ML	080488	515746	K + L		
EN454W86ML	080916	517391	N + L		510449
EN513W58L	038183	515747	H + L		
EN513W72L	038037	515746	K + L		
EN523M72L	038184	517675	K + L		
EN523M5L	038223	551373	M + L	B13 516555 1 pc Center Annulus	510217
EN505AX58ML	038177	510326	H + L		
EN505AX72ML	038178	510325	K + L	B4 517419 B18 517435 2 pcs	510449
EN505CJ5ML	038445	529622	M + L	B4 529654 B18 517436 2 pcs	
EN555M72L	038045	516687	K + L		
EN606M72L	038179 ***	516687	K + L	B4 511276 1 pc	510449
EN606M5L	038222 **	551366	M + L	B6 511285 4 pcs	510217
EN606M86L	038437	529630	N + L	B4 529790 1 pc	510449
EN606M72ML	038536	516687	K + L	B6 529781 4 pcs	
EN606M5ML	038538	551366	M + L	B18 529782 2 pcs	510217
EN656M86XL	080058	529630	N + L		510449
EN656M72XL	080059	516687	K + L		
EN656M5XL	080060	551366	M + L	B7 Muffler extension 551974 1 pc	510217

*As needed **Viewed looking at inlet/outlet ports ***Not currently in production; superseded by model listed below

	EN656 080058 080059 080060
510629	
120255	
155170	
511480	
550195	
251791	
(10 pcs.) 551585	
Not Used	
See Next Page	
510356	
510357	
510358	
510359	
Not Used	
550305	
120325	
120203	
Not Used	
550249	
(8 pcs) 155236	
510355	
Not Used	
517436	
517436	
Not Used	
Not Used	
Not Used	
Not Used	
Not Used	
Not Used	
Not Used	
Not Used	
Not Used	
Not Used	
516587	

*As needed **Viewed looking at inlet/outlet ports ***Not currently in production; superseded by model listed below

Bearing, Impeller End (M2)
510217
510218
510217
510217
510218
510217
510218
510217
510218

*As needed **Viewed looking at inlet/outlet ports ***Not currently in production; superseded by model listed below

Filtration - Inline Filter (Dual Connection)

ROTRON®

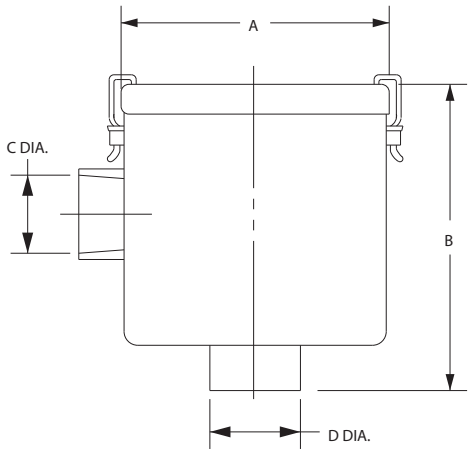
Inline Filters protect the blower from harmful dust and other particles that may be drawn into the blower through the air distribution system. Normally used in vacuum systems.

SPECIFICATIONS:

HOUSING – Steel
MEDIA – Polyester
EFFICIENCY – 97-98% (8 to 10 micron particle size)
FILTER ELEMENT – Replaceable (see filter elements)
NOTE: "Z" MEDIA (1 to 3 micron particle size) available

* Feature 1/4" threaded tap for gauge connection on inlet and outlet

Inline filter PN 271200 is a straight through design
Inlet is directly opposite of outlet



		Part/Model Number							
Specification	**Units**	**271200**	**516461**	**515254**	**515255**	**515256**	**516463***	**516465***	**517611***
Filter Element	-	A	B	C, D	E	F	G	H	H
Ref Blower Model	-	271078	516434	516434	516435	516435	515135	515135	516515
Inlet Connection	-	1.75 SO	1.00 NPSC-F	1.50 NPSC-F	2.00 NPSC-F	2.50 NPSC-F	3.00 NPT-M	4.00 NPT-M	6.00 NPT-M
Outlet Connection	-	2.00 SO	1.00 NPSC-F	1.50 NPSC-F	2.00 NPSC-F	2.50 NPSC-F	3.00 NPT-M	4.00 NPT-M	6.00 NPT-M
Dimension A	Inches	5.25	7.25	7.00	8.00	8.00	14.00	14.00	18.00
	mm	133.4	184.2	177.8	203.2	203.2	355.6	355.6	457.2
Dimension B	Inches	8.31	6.50	6.50	10.25	10.25	26.50	27.00	28.00
	mm	211.1	165.1	165.1	260.4	260.4	673.1	685.8	711.2
Dimension C	Inches	2.00	1.00	1.50	2.00	2.50	3.00	4.00	6.00
	mm	50.8	25.4	38.1	50.8	63.5	76.2	101.6	152.4
Dimension D	Inches	1.75	1.00	1.50	2.00	2.50	3.00	4.00	6.00
	mm	44.5	25.4	38.1	50.8	63.5	76.2	101.6	152.4
Z Media Filter PN	-		517886	517887	517888	517889	517890	517891	517892

Blower Model Reference Key	
A = SPIRAL	E = DR/EN/CP 656, 6, 633, S7
B = DR/EN/CP 068, 083, 101, 202	F = DR/EN/CP 757, 808, 858, S9, P9 (Inlet Only)
C = DR/EN/CP 303, 312, 313, 353	G = DR/EN/CP 833, S13, P13 (Inlet Only)
D = DR/EN/CP 404, 454, 513, 505, 555, 523	H = DR/EN/CP 909, 979, 1233, 14, S15, P15 (Inlet Only)

AMETEK TECHNICAL & INDUSTRIAL PRODUCTS
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Customer Service Fax: +1 215.256.1338
www.ametektip.com

AMETEK®
TECHNICAL & INDUSTRIAL PRODUCTS

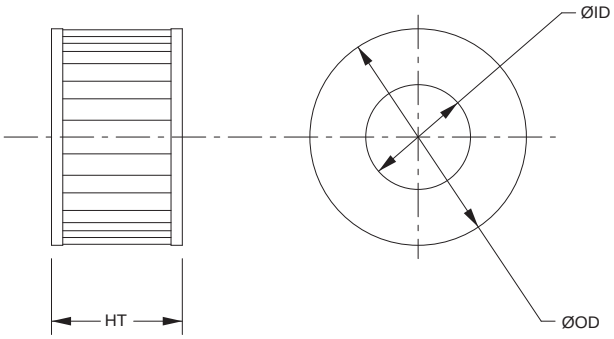
Filtration - Filter Element

ROTRON®

All ROTRON Air Filters and Filter/Silencers have replaceable filter elements. The filter media is polyester designed for high efficiency over a wide spectrum of industrial applications. See filter element cross reference table. Filter elements supplied with foam pre-filter.

Standard Replacement Filter Element Cross Reference Table

Filter	Element	Filter	Element	Filter	Element
271200	271078	515158	515134	516489	515132
477411	271078	515254	516434	516491	515133
515122	515132	515255	516435	516493	515134
515123	515133	515256	516435	516495	515134
515124	515134	516461	516434	516497	515134
515125	515134	516463	515135	516499	515135
515145	515134	516465	515135	516511	516515
515151	515135	516466	515132	516513	516515
515157	515133	516487	515132	517611	516515



For DR Blower Models

		Part/Model Number						
Specification	**Units**	**515132**	**515133**	**515134**	**515135**	**516434**	**516435**	**516515**
Z Media Filter PN	-	517873	517874	517875	517876	517893	517894	517877
Dimension ID	Inches	3.00	3.63	3.5	4.75	2.56	3.50	8.00
	mm	76.2	92.2	88.9	120.7	65	88.9	203.2
Dimension OD	Inches	4.38	5.88	5.88	7.88	5.00	5.88	11.75
	mm	111.3	149.4	149.4	200.2	127	149.4	298.5
Area	Sq/Ft	4.75	4.75	9.50	9.63	4.75	8.75	9.63
	Sq/M	0	0	1	1	0	1	1
Dimension HT	Inches	1.5	2.3	4.5	8.3	2.0	4.5	19.0
	mm	38.1	58.4	114.3	210.8	50.8	114.3	482.6

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SENSAPHONE®

Model 1104

User's Manual

including CottageSitter, BusinessSitter, RemoteControl & 1114 Line Seizure editions

Version 1.43

PHONETICS, INC.

Every effort has been made to ensure that the information in this document is complete, accurate and up-to-date. PHONETICS, INC. assumes no responsibility for the results of errors beyond its control. PHONETICS, INC. also cannot guarantee that changes in equipment made by other manufacturers, and referred to in this manual, will not affect the applicability of the information in this manual.

Revised Edition, version 1.43, November, 2004

Written and produced by Phonetics. Inc.

Please address all comments on this publication to:

PHONETICS, INC.
901 Tryens Road
Aston, PA 19014
www.sensaphone.com

IMPORTANT SAFETY INSTRUCTIONS

Your Model 1104 has been carefully designed to give you years of safe, reliable performance. As with all electrical equipment, however, there are a few basic precautions you should take to avoid hurting yourself or damaging the unit:

- Read the installation and operating instructions in this manual carefully. Be sure to save it for future reference.
- Read and follow all warning and instruction labels on the product itself.
- To protect the Model 1104 from overheating, make sure all openings on the unit are not blocked. Do not place on or near a heat source, such as a radiator or heat register.
- Do not use your Model 1104 near water, or spill liquid of any kind into it.
- Be certain that your power source matches the rating listed on the AC power transformer. If you're not sure of the type of power supply to your facility, consult your dealer or local power company.
- Do not allow anything to rest on the power cord. Do not locate this product where the cord will be abused by persons walking on it.
- Do not overload wall outlets and extension cords, as this can result in the risk of fire or electric shock.
- Never push objects of any kind into this product through ventilation holes as they may touch dangerous voltage points or short out parts that could result in a risk of fire or electric shock.
- To reduce the risk of electric shock, do not disassemble this product, but return it to Sensaphone Customer Service, or other approved repair facility, when any service or repair work is required. Opening or removing covers may expose you to dangerous voltages or other risks. Incorrect reassembly can cause electric shock when the unit is subsequently used.
- If anything happens that indicates that your Model 1104 is not working properly or has been damaged, unplug it immediately and follow the procedures in Appendix D for having it serviced. Return the unit for servicing under the following conditions:

1. The power cord or plug is frayed or damaged.
2. Liquid has been spilled into the product or it has been exposed to water.
3. The unit has been dropped, or the cabinet is damaged.
4. The unit doesn't function normally when you're following the operating instructions.

- Avoid using a telephone (other than a cordless type) during an electrical storm. There may be a remote risk of electric shock from lightning.
- Do not use the telephone to report a gas leak in the vicinity of the leak.

CAUTION

To Reduce the Risk of Fire or Injury to Persons, Read and Follow these Instructions:

1. Use only the following type and size batteries: Alkaline, size D.
2. Do not dispose of the batteries in a fire. The cell may explode. Check with local codes for possible special disposal instructions.
3. Do not open or mutilate the batteries. Released electrolyte is corrosive and may cause damage to the eyes or skin. It may be toxic if swallowed.
4. Exercise care in handling batteries in order not to short the battery with conducting materials such as rings, bracelets, and keys. The battery or conductor may overheat and cause burns.
5. Do not mix old and new batteries in this product.

FCC Requirements

Part 68: The Sensaphone® Model 1104 complies with Part 68 of the FCC rules. On the back of the unit there is a label that contains, among other information, the FCC Registration Number and the Ringer Equivalence Number (REN) for this equipment. You must, upon request, provide this information to your local telephone company.

The REN is useful to determine the quantity of devices that you may connect to your telephone line and still have all of those devices ring when your telephone number is called. In most, but not all areas, the sum of the REN's of all devices connected to one line should not exceed five (5.0). To be certain of the number of devices that you may connect to your line, you may want to contact your local telephone company to determine the maximum REN for your calling area.

This equipment may not be used on coin service provided by the telephone company. Connection to party lines is subject to state tariffs.

Should the Model 1104 cause harm to the telephone network, the telephone company may discontinue your service temporarily. If possible, they will notify you in advance. But if advance notice isn't practical, the telephone company may temporarily discontinue service without notice and you will be notified as soon as possible. You will be informed of your right to file a complaint with the FCC. The telephone company may make changes in its facilities, equipment, operations, or procedures where such action is reasonably required in the operation of its business and is not inconsistent with the rules and regulations of the FCC that could affect the proper functioning of your equipment. If they do, you will be notified in advance to give you an opportunity to maintain uninterrupted telephone service.

If you experience trouble with this equipment, or you need information on obtaining service or repairs, please contact:

PHONETICS, INC.

901 Tryens Road, Aston, PA 19014

610-558-2700 Fax: 610-558-0222

The telephone company may ask that you disconnect this equipment from the network until the problem has been corrected or until you are sure that the equipment is not malfunctioning.

Part 15: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits a designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/television technician for help.

Canadian Department of Communications Statement

Notice: The Canadian Department of Communications label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective operational and safety requirements. The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, where the company's inside wiring is associated with a single line, individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

CAUTION: Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

The Load Number (LN) assigned to each terminal device denotes the percentage of the total load to be connected to a telephone loop which is used by the device to prevent overloading. The termination on loop may consist of any combination of devices subject only to the requirement that the total of the Load Numbers of all the devices does not exceed 100. For the Sensaphone® Model 1104, the Load Number is 8.

1 YEAR LIMITED WARRANTY

PLEASE READ THIS WARRANTY CAREFULLY BEFORE USING THE PRODUCT.

THIS LIMITED WARRANTY CONTAINS SENSAPHONE'S STANDARD TERMS AND CONDITIONS. WHERE PERMITTED BY THE APPLICABLE LAW, BY KEEPING YOUR SENSAPHONE PRODUCT BEYOND THIRTY (30) DAYS AFTER THE DATE OF DELIVERY, YOU FULLY ACCEPT THE TERMS AND CONDITIONS SET FORTH IN THIS LIMITED WARRANTY.

IN ADDITION, WHERE PERMITTED BY THE APPLICABLE LAW, YOUR INSTALLATION AND/OR USE OF THE PRODUCT CONSTITUTES FULL ACCEPTANCE OF THE TERMS AND CONDITIONS OF THIS LIMITED WARRANTY (HEREINAFTER REFERRED TO AS "LIMITED WARRANTY OR WARRANTY"). IF YOU DO NOT AGREE TO THE TERMS AND CONDITIONS THIS WARRANTY, INCLUDING ANY LIMITATIONS OF WARRANTY, INDEMNIFICATION TERMS OR LIMITATION OF LIABILITY, THEN YOU SHOULD NOT USE THE PRODUCT AND SHOULD RETURN IT TO THE SELLER FOR A REFUND OF THE PURCHASE PRICE. THE LAW MAY VARY BY JURISDICTION AS TO THE APPLICABILITY OF YOUR INSTALLATION OR USE ACTUALLY CONSTITUTING ACCEPTANCE OF THE TERMS AND CONDITIONS HEREIN AND AS TO THE APPLICABILITY OF ANY LIMITATION OF WARRANTY, INDEMNIFICATION TERMS OR LIMITATIONS OF LIABILITY.

1. **WARRANTOR**: In this Warranty, Warrantor shall mean "Dealer, Distributor, and/or Manufacturer."

2. **ELEMENTS OF WARRANTY**: This Product is warranted to be free from defects in materials and craftsmanship with only the limitations and exclusions set out below.

3. **WARRANTY AND REMEDY**: One-Year Warranty — In the event that the Product does not conform to this warranty at any time during the time of one year from original purchase, warrantor will repair the defect and return it to you at no charge.

This warranty shall terminate and be of no further effect at the time the product is: (1) damaged by extraneous cause such as fire, water, lightning, etc. or not maintained as reasonable and necessary; or (2) modified; or (3) improperly installed; or (4) misused; or (5) repaired or serviced by someone other than Warrantors' authorized personnel or someone expressly authorized by Warrantor's to make such service or repairs; (6) used in a manner or purpose for which the product was not intended; or (7) sold by original purchaser.

LIMITED WARRANTY, LIMITATION OF DAMAGES AND DISCLAIMER OF LIABILITY FOR DAMAGES: THE WARRANTOR'S OBLIGATION UNDER

THIS WARRANTY IS LIMITED TO REPAIR OR REPLACEMENT OF THE PRODUCT, AT THE WARRANTOR'S OPTION AS TO REPAIR OR REPLACEMENT. IN NO EVENT SHALL WARRANTORS BE LIABLE OR RESPONSIBLE FOR PAYMENT OF ANY INCIDENTAL, CONSEQUENTIAL, SPECIAL AND/OR PUNITIVE DAMAGES OF ANY KIND, INCLUDING BUT NOT LIMITED TO ANY LABOR COSTS, PRODUCT COSTS, LOST REVENUE, BUSINESS INTERRUTPION LOSSES, LOST PROFITS, LOSS OF BUSINESS, LOSS OF DATA OR INFORMATION, OR FINANCIAL LOSS, FOR CLAIMS OF ANY NATURE, INCLUDING BUT NOT LIMITED TO CLAIMS IN CONTRACT, BREACH OF WARRANTY OR TORT, AND WHETHER OR NOT CAUSED BY WARRANTORS' NEGLIGENCE. IN THE EVENT THAT IT IS DETERMINED IN ANY ADJUDICATION THAT THE LIMITED WARRANTIES OF REPAIR OR REPLACEMENT ARE INAPPLICABLE, THEN THE PURCHASER'S SOLE REMEDY SHALL BE PAYMENT TO THE PURCHASER OF THE ORIGINAL COST OF THE PRODUCT, AND IN NO EVENT SHALL WARRANTORS BE LIABLE OR RESPONSIBLE FOR PAYMENT OF ANY INCIDENTAL, CONSEQUENTIAL, SPECIAL AND/OR PUNITIVE DAMAGES OF ANY KIND, INCLUDING BUT NOT LIMITED TO ANY LOST REVENUE, BUSINESS INTERRUTPION LOSSES, LOST PROFITS, LOSS OF BUSINESS, LOSS OF DATA OR INFORMATION, OR FINANCIAL LOSS, FOR CLAIMS OF ANY NATURE, INCLUDING BUT NOT LIMITED TO CLAIMS IN CONTRACT, BREACH OF WARRANTY OR TORT, AND WHETHER OR NOT CAUSED BY WARRANTORS' NEGLIGENCE.

WITHOUT WAIVING ANY PROVISION IN THIS LIMITED WARRANTY, IF A CIRCUMSTANCE ARISES WHERE WARRANTORS ARE FOUND TO BE LIABLE FOR ANY LOSS OR DAMAGE ARISING OUT OF MISTAKES, NEGLIGENCE, OMISSIONS, INTERRUPTIONS, DELAYS, ERRORS OR DEFECTS IN WARRANTORS' PRODUCTS OR SERVICES, SUCH LIABILITY SHALL NOT EXCEED THE TOTAL AMOUNT PAID BY THE CUSTOMER FOR WARRANTORS' PRODUCT AND SERVICES OR $250.00, WHICHEVER IS GREATER. YOU HEREBY RELEASE WARRANTORS FROM ANY AND ALL OBLIGATIONS, LIABILITIES AND CLAIMS IN EXCESS OF THIS LIMITATION.

INDEMNIFICATION AND COVENANT NOT TO SUE: YOU WILL INDEMNIFY, DEFEND AND HOLD HARMLESS WARRANTORS, THEIR OWNERS, DIRECTORS, OFFICERS, EMPLOYEES, AGENTS, SUPPLIERS OR AFFILIATED COMPANIES, AGAINST ANY AND ALL CLAIMS, DEMANDS OR ACTIONS BASED UPON ANY LOSSES, LIABILITIES, DAMAGES OR COSTS, INCLUDING BUT NOT LIMITED TO DAMAGES THAT ARE DIRECT OR INDIRECT, INCIDENTAL, SPECIAL OR CONSEQUENTIAL, AND INCLUDING ATTORNEYS FEES AND LEGAL COSTS, THAT MAY RESULT FROM THE INSTALLATION, OPERATION, USE OF, OR INABILITY TO USE WARRANTORS' PRODUCTS AND SERVICES, OR FROM THE FAILURE OF THE WARRANTORS' SYSTEM TO REPORT A GIVEN EVENT OR CONDITION, WHETHER OR NOT CAUSED BY WARRANTORS' NEGLIGENCE.

YOU AGREE TO RELEASE, WAIVE, DISCHARGE AND COVENANT NOT TO SUE WARRANTORS, THEIR OWNERS, DIRECTORS, OFFICERS, EMPLOYEES, AGENTS, SUPPLIERS OR AFFILIATED COMPANIES, FOR ANY AND ALL LIABILITIES POTENTIALLY ARISING FROM ANY CLAIM, DEMAND OR ACTION BASED UPON ANY LOSSES, LIABILITIES, DAMAGES OR COSTS, INCLUDING BUT NOT LIMITED TO DAMAGES THAT ARE DIRECT OR INDIRECT, INCIDENTAL, SPECIAL OR CONSEQUENTIAL, AND INCLUDING ATTORNEYS FEES AND LEGAL COSTS, THAT MAY RESULT FROM THE INSTALLATION, OPERATION, USE OF, OR INABILITY TO USE WARRANTORS' PRODUCTS AND SERVICES, OR FROM THE FAILURE OF THE WARRANTORS' SYSTEM TO REPORT A GIVEN EVENT OR CONDITION, WHETHER OR NOT CAUSED BY WARRANTORS' NEGLIGENCE, EXCEPT AS NECESSARY TO ENFORCE THE EXPRESS TERMS OF THIS LIMITED WARRANTY.

EXCLUSIVE WARRANTY: THE LIMITED WARRANTY OR WARRANTIES DESCRIBED HEREIN CONSTITUTE THE SOLE WARRANTY OR WARRANTIES TO THE PURCHASER. ALL IMPLIED WARRANTIES ARE EXPRESSLY DISCLAIMED, INCLUDING: THE WARRANTY OF MERCHANTIBILITY AND THE WARRANTY OF FITNESS FOR A PARTICULAR USE AND THE WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE AND THE WARRANTY OF NON-INFRINGEMENT AND/OR ANY WARRANTY ARISING FROM A COURSE OF DEALING, USAGE, OR TRADE PRACTICE.

It must be clear that the Warrantors are not insuring your premises or business or guaranteeing that there will not be damage to your person or property or business if you use this Product. You should maintain insurance coverage sufficient to provide compensation for any loss, damage, or expense that may arise in connection with the use of products or services, even if caused by Warrantors' negligence. The warrantors assume no liability for installation of the Product and/or interruptions of the service due to strikes, riots, floods, fire, and/or any cause beyond Seller's control, further subject to the limitations expressed in any License Agreement or other Agreement provided by Warrantors to purchaser.

The agreement between the Warrantors and the Purchaser, including but not limited to the terms and conditions herein shall not be governed by the Convention for the International Sale of Goods. Where applicable, the Uniform Commercial Code as adopted by the State of Delaware shall apply.

4. **PROCEDURE FOR OBTAINING PERFORMANCE OF WARRANTY**: In the event that the Product does not conform to this warranty, the Product should be shipped or delivered freight prepaid to a Warrantor with evidence of original purchase.

5. **LEGAL REMEDIES AND DISCLAIMER**: Some jurisdictions may not allow, or may place limits upon, the exclusion and/or limitation of implied warranties, incidental damages and/or consequential damages for some types of goods or products sold to consumers and/or the use of indemnifi-

cation terms. Thus, the exclusions, indemnification terms and limitations set out above may not apply, or may be limited in their application, to you. If the implied warranties can not be excluded, and the applicable law permits limiting the duration of implied warranties, then the implied warranties herein are to be limited to the same duration as the applicable written warranty or warranties herein. The warranty or warranties herein may give you specific legal rights that will depend upon the applicable law. You may also have other legal rights depending upon the law in your jurisdiction.

6. **CHOICE OF FORUM AND CHOICE OF LAW**: In the event that a dispute arises out of or in connection with this Limited Warranty, then any claims or suits of any kind concerning such disputes shall only and exclusively be brought in either the Court of Common Pleas of Delaware County, Pennsylvania or the United States District Court for the Eastern District of Pennsylvania.

Regardless of the place of contracting or performance, this Limited Warranty and all questions relating to its validity, interpretation, performance and enforcement shall be governed by and construed in accordance with the laws of the State of Delaware, without regard to the principles of conflicts of law.

Effective date 05/01/2004
PHONETICS, INC. d.b.a. SENSAPHONE
901 Tryens Road
Aston, PA 19014
Phone: 610.558.2700 Fax: 610.558.0222
www.sensaphone.com

TABLE OF CONTENTS

Chapter 1: Introduction

The Sensaphone® Model 1104 is a fully-programmable, environmental monitoring system that offers extensive on-site and remote monitoring capability to small businesses, private homes, farms, greenhouses, computer rooms, and remote facilities. Designed for desktop or wall mounting, the Model 1104 is simple to install, program and operate; no changes to standard electrical or telephone service are required. Connected to a telephone line, it will respond to an alarm by dialing up to four separate telephone numbers. When the call is answered, an "Alert Condition" message is delivered in digitized speech.

The Model 1104 features built-in sensors to monitor a variety of conditions:

- High sound level
- AC electric power failure
- Battery backup
- Temperature*

*__Note__: While technically not a "built-in" sensor, temperature is factory installed on input 1, and if left installed will limit your additional inputs as listed below to 3.

1104 is equipped with 4 alert inputs. Additional sensors* can be added to extend monitoring capabilities to include:

- Intrusion or unauthorized entry
- Water leaks and seepage
- Temperature
- Humidity
- Equipment operation
- Many other conditions that may require unique monitoring solutions

* Refer to Appendix D for information on additional sensors (available separately from Sensaphone) best suited to your application.

The status of each monitored condition is readily obtained at the unit's installation site, or remotely by telephone. At the close of every Status Report, time is provided for listening to on-site sounds.

To ensure reliable operation, the Model 1104 features power backup capability; in the event of AC power failure, six D-cell batteries (not included) will continue to power the unit for approximately 24 hours.

This manual comprises the instructions and commands for installing and operating the Model 1104. The Quick Start chapter is included to speed understanding of programming and operation. Communication and Alarm Programming chapters demonstrate step-by-step methods for utilizing the full range of available features. The Troubleshooting chapter provides assistance in the event that problems are encountered.

Chapter 8 covers the features, operation and programming of special Model 1104 versions: CottageSitter, BusinessSitter, RemoteControl, and 1114 "Line Seizure" edition.

Technical Support

If any questions arise upon installation or operation of the Model 1104, please contact Sensaphone Technical Service Department, at the number shown below, and have the following information:

- Date of Purchase _____
- Serial number of your Model 1104 _____

Technical Support is available from 8:00AM to 5:00PM EST.

Phonetics, Inc.

901 Tryens Road

Aston, PA 19014

610-558-2700

Fax: 610-558-0222

www.sensaphone.com

Chapter 2: Installation

Correctly installing the Model 1104 will ensure proper functioning of the unit. Please read the entire chapter before starting the installation process.

Within the packaging will be a Warranty Registration Card. Please take the time to fill this out and mail. The One Year Limited Warranty is explained in the back of this manual.

2.1 Operating Environment

The Model 1104 should be installed and operated in a clean, dry area that provides space for wiring sensors to the screw terminals, near an AC power source and telephone line. Operating temperature ranges from 32° Fahrenheit (0° Celsius) to +120° Fahrenheit (+49° Celsius).

NOTE

The Model 1104 is a sensitive electronic device. Do not install the Model 1104 near strong electrostatic, electromagnetic or radioactive fields. Do not expose to humid environments, fumes, or corrosive vapors.

2.2 Mounting

Flat Mount: Place the Model 1104 on top of a desk or other horizontal surface. Wall Mount: Mount on a wall with two screws using the keyholes on the back panel of the unit. Place the screws or bolts 3 13/16" apart at the desired height from the floor. Hook the unit over the screws and toward the floor. Refer to Figure 2-1.

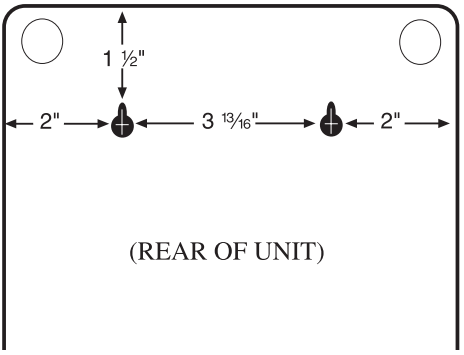


Figure 2-1. Wall Mount

2.3 Power Surge Protection

The Model 1104 can be damaged by power surges and lightning through the telephone line and the 120 VAC power supply. Although the Model 1104 has built-in surge protection, we recommend that additional protection be obtained for the unit and for any electronic equipment that is attached to your power supply and telephone lines. Power surge protection is especially important if you live in a lightning-prone area. The ISOTEL Surge Protector Model IB-4 is available through Phonetics, Inc. See Appendix D.

2.4 Power Supply and Battery Backup

The Model 1104 is provided with an AC power transformer that will plug into any standard 120 VAC outlet and a battery backup (batteries not included) that enables the unit to continue functioning if AC power is removed (due to electric power disruption or failure). The Model 1104 uses six, D-cell alkaline batteries. Do not use rechargeable nicad batteries.

NOTE

Be sure that the AC transformer is plugged into an outlet before installing batteries.

To install the batteries, open the battery compartment hatch located underneath the unit, align batteries according to the diagram shown in Figure 2-2, and replace the hatch.

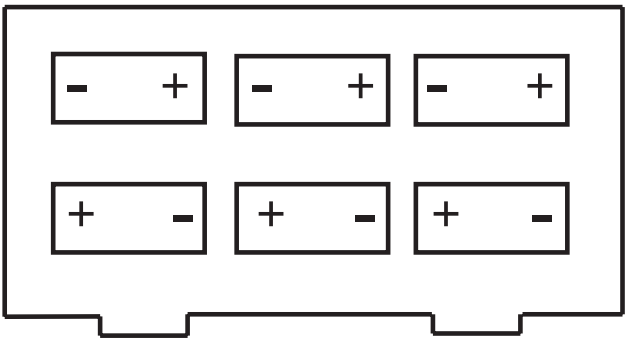


Figure 2-2. Battery Installation

2.5 Starting the Model 1104

When the AC power transformer is first plugged into the electrical outlet, the Model 1104 automatically starts in RUN mode. The red LED light will begin to glow. The unit will respond with,"Hello, this is Sensaphone 1104."

2.6 Run Mode and Standby Mode

Pressing the RUN/STANDBY key on the Model 1104 keypad will alternately activate or deactivate the unit. If the unit is activated and in RUN mode, the red LED (small red light on the upper right of the unit's front panel) glows steadily. In STANDBY mode, the red LED goes out, but will blink every few seconds to indicate that power is still supplied to the unit.

In RUN mode, the Model 1104 is able to receive incoming calls and to dial out automatically in the event of an alarm on one of the monitored conditions. To enter STANDBY mode, press RUN/STANDBY.

As soon as the Model 1104 enters STANDBY mode, it responds with "Have a good day." The red light immediately goes out and then resumes with a blink every few seconds. While in STANDBY mode, all functions are disabled, but programmed memory is preserved. Upon exiting STANDBY mode, any currently existing alert conditions will be announced.

NOTE

STANDBY mode is not equivalent to "power off"—an electrical source, such as the 120 VAC, or the battery backup, continues to provide full power to the unit. If the unit is placed in STANDBY mode, unplugged from the 120 VAC outlet, and placed in storage, the batteries will continue to power the Model 1104, discharging until they fail. Consequently, batteries should always be removed from the unit following disconnection from any 120 VAC outlet, prior to storage.

Press the RUN/STANDBY key again to return to RUN mode.

Figure 2-3. The RUN/STANDBY Key

2.7 Telephone Line

The Model 1104 will operate with all standard telephone systems that accept pulse or tone dialing. The Model 1104 cannot be used on an extension line to dial its own telephone number. Also, it may not be installed on a party line or pay telephone line.

Certain private telephone systems and public switching equipment may not accept the Model 1104 dialing or may generate an unacceptable ring signal. In those cases, a dedicated line may be required. Consult the supplier of your telephone system if you encounter problems.

If you do not have a modular telephone extension at the Model 1104's location, you must contact your local telephone company to have one installed (there is a charge for this service). If you have four-pin jacks, adapters are available to convert them to the modular plugs. Contact your local telephone company or electronics parts store.

CAUTION

Never install telephone wiring during a lightning storm. Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations. Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface. Use caution when installing or modifying telephone lines.

To install the telephone line, plug the modular telephone jack provided into any standard RJ11 phone outlet.
Refer to Figure 2-4.

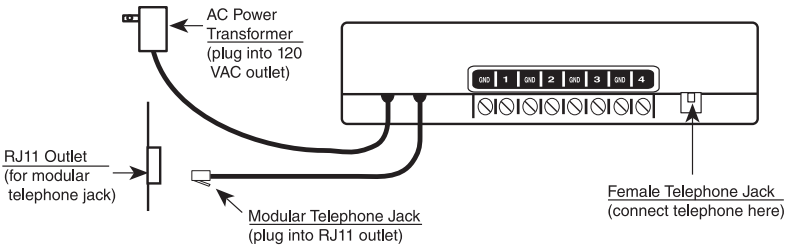


Figure 2-4. Installing the Telephone Line

On the back of the Model 1104 is a female telephone jack. This is provided so that a telephone or other answering device may be used on the same line as the unit. It is not necessary to hook up a telephone for the Model 1104 to operate.

2.8 The Microphone

The Model 1104 is provided with a built-in microphone which is used to monitor high sound levels produced near the installation site. The sensitivity of the microphone is configurable and will detect a continuous as well as a pulsating alarm. Note that beeping alamrs that have a half second or more of silence between beeps will not be detected.

Other programming options that apply to the microphone include setting the length of time before a high sound causes an alarm.

If this sound level exists for 8 consecutive seconds (default) or for the programmed length of time, the Model 1104 will dial out with an alarm message.

NOTE

The proximity of the audible alarm to the microphone is extremely important.

Normally, the Model 1104 and the audible alarm must be in the same room. The maximum distance can vary considerably depending on the alarm, the acoustics, and the size of the room.

During an alarm dial-out, the microphone allows four-second intervals to listen-in to sounds at the Model 1104's location.

When calling for a Status Report, the microphone permits listening to on-site sounds for a programmed time interval.

2.9 Alert Inputs

The Model 1104 can monitor up to 4 inputs (represented by the numbered terminal screws shown in Figure 2-5, below).

Figure 2-5. Alert Inputs

Inputs are configured as either dry contact or temperature. An input configured as dry contact can be used with any normally open (N.O.) or normally closed (N.C.) device. "Open" refers to an opened circuit path; if conditions cause the circuit to close, an alert condition occurs. "Closed" refers to a continuous circuit path; if a closed circuit is opened, an alert condition occurs. The Model 1104 determines the way inputs are configured by the type

of sensor connected to each alert input (refer to Chapter 5, Section 5.1).

An input configured as "temperature" is designed to evaluate a range of settings. The Model 1104 will read the temperature at the sensor's location and compare that value to programmed high and low temperature limits. Temperature inputs must be used with Sensaphone's Remote Temperature Sensor.

NOTE

Before wiring, it is advisable to disable the inputs to prevent accidentally tripping an alarm. See Chapter 5, Section 5.2.

Important Note regarding Ultra-Low temperature freezers:

If you are connecting the Sensaphone to an ultra-low temperature freezer (i.e. Revco, Thermo Forma, Fisher Scientific, etc...) be aware that the Sensaphone can only monitor temperatures between -20 and 150 degrees Fahrenheit. As a result, you can *only* monitor these freezers if they are supplied with the appropriate alarm terminals/contacts. Please refer to your Freezer owner's manual for proper connection.

2.10 Installing the Sensor

After you have selected the sensor, loosen the screw of the alert input and its corresponding ground. Two wire leads are used to connect any monitoring sensor. Fasten one lead to the numbered screw and the other lead to GND. Tighten both screws. If the input was not disabled, the Model 1104 may recite its "Alert Condition Exists" message as you connect the sensor. If it does, just press any key to stop it. Re-enable the input after wiring. Refer to Figures 2-6 and 2-7 for connecting a sensor to an alert input.

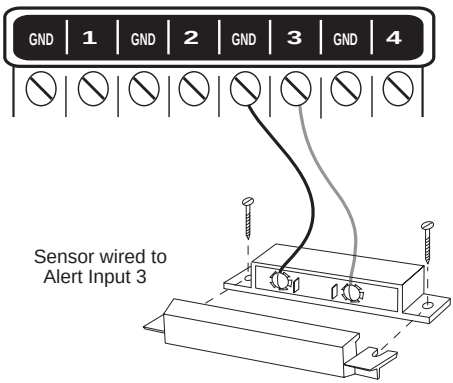


Figure 2-6. Sensor Connected to an Alert Input

Any sensor can be attached to the Model 1104 using 22-gauge wire. The sensor can be several hundred feet from the unit, as long as the total resistance of the circuit is not greater than 50 ohms. Use wire appropriate for the application.

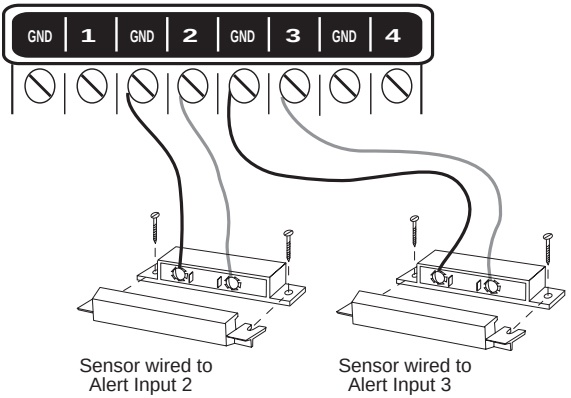


Figure 2-7. Two Sensors Wired to Adjacent Inputs

NOTE

Do not use sensors, switches, or relays that supply any voltage or current to the Model 1104. Be aware of proximity to other electrical wires or components when placing wires that lead from the sensors to the unit. Avoid running the wires near electrical devices that use high voltage or current, such as motors, heavy machinery, etc. This voltage may be inductively coupled into the sensor wiring and could result in damage to the the Model 1104's circuitry. Try to place wires at least 6 inches from other electrical wiring or devices.

2.11 Multiple Sensors

The Model 1104 may have more than one sensor connected to the same alert input, as long as the normal condition for each sensor on the same alert input is identical (either all N.O. or all N.C.). However, only one remote temperature sensor can be used on each input.

When wiring several normally closed sensors on one input, they must be connected in series. Connect one lead from the first sensor to the numbered screw of the alert input. Next, take the other lead from the first sensor and connect it to one lead from the next sensor. Continue connecting sensors end-to-end until you

have connected all of your sensors. Take the second lead from the last sensor and connect it to the ground screw on the Model 1104. See Figure 2-8. Multiple N.C. sensors are typically magnetic reed switches to monitor the security of windows and doors.

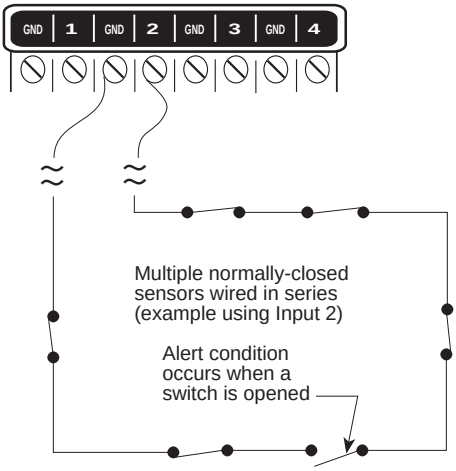


Figure 2-8. Multiple Normally Closed Sensors

To wire several normally open sensors to one alert input, connect them in parallel. To do this, take one lead from each sensor and attach it to the numbered terminal. Then, take the second lead from each sensor and attach each to the corresponding ground screw. Refer to Figure 2-9.

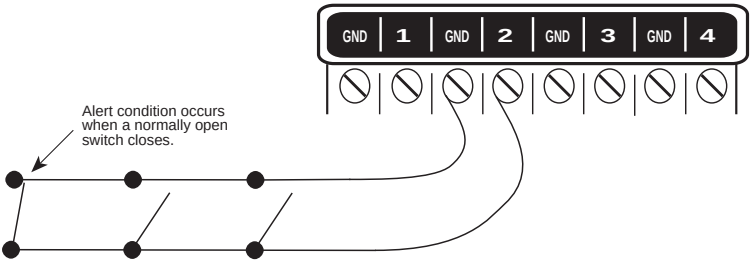


Figure 2-9. Multiple Normally Open Sensors

2.12 Outdoor Wiring

When wiring sensors outdoors, DO NOT allow exposed wires to run freely in open air; under such conditions, the Model 1104 is susceptible to serious damage during a lightning storm.

Depending upon the distance outdoor wiring must travel, consideration should be given to the use of shielded wire inside a metal conduit. Both shield and conduit should be connected to an earth ground. This prevents stray voltage from entering the unit.

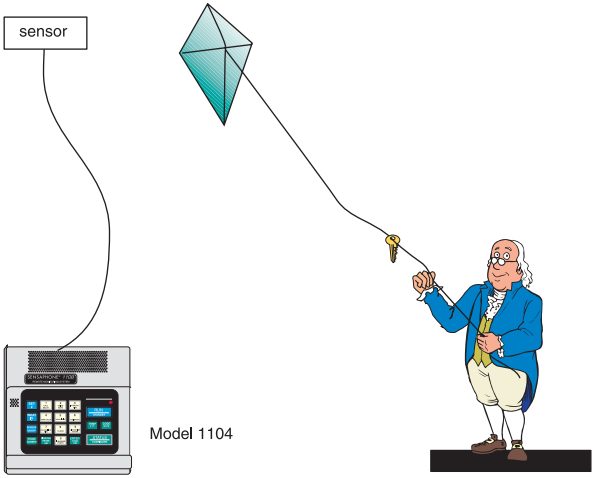


Figure 2-10. Potential Sensor Damage from Stray Electrical Noise

2.13 Disconnecting the Model 1104 for Storage or Seasonal Use.

If you plan to employ the Model 1104 as a seasonal "watchdog" for a few months during the year, **you must disconnect all wires from the unit completely to avoid damage to the circuitry when the unit is not in use**. If the unit is unplugged but left in place with all the sensors still connected, the wires act as antennae that draw in any stray "electrical noise" from such devices as fans, blowers, microwaves, etc.

Additionally, it is important to remove the batteries, or they will discharge until they fail.

Preserve your Model 1104 during the off-season, or when not in use:

- Remove the sensor wires at the screw terminals
- Remove the batteries
- Unplug the unit and store in a safe place

Chapter 3: Quick Start

This section presents a useful guide for first-time programming of the Model 1104. Follow instructions for installation before attempting to program the Model 1104. Refer to Chapter 2: Installation.

3.1 The Local Keypad

Programming is accomplished using the local keypad (shown below, Figure 3-1). Notice that a single key has several functions assigned to it; programming results are determined by the order in which keys are pressed.

Individual keystrokes are illustrated to show programming steps in the correct order. If you make a mistake by entering the wrong key, do not press another key until you hear the message *"Error 1."* Then, start over with the first key in the programming sequence.

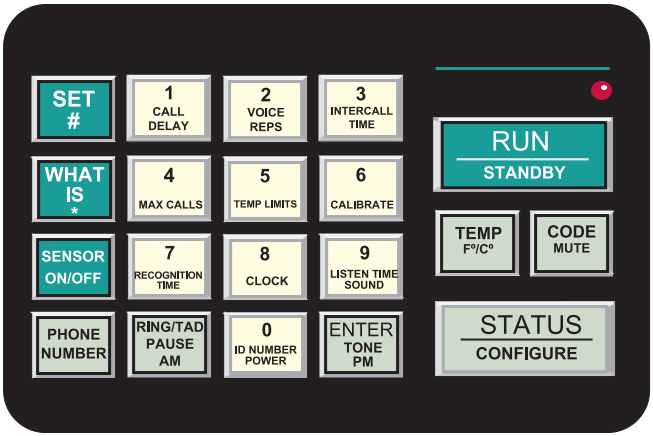


Figure 3-1. The Model 1104 Keypad

3.2 Preparation for Programming

Read complete instructions in Chapter 2: Installation, and make sure to follow these three steps first:

1. Plug the AC adaptor into the 120 VAC outlet.
2. Install the batteries.

3. Connect the Model 1104 to a telephone line.

When these steps are completed, the Model 1104 is fully operational and able to monitor temperature, high sound, AC power failure and battery backup condition; it can also be called on the telephone for a Status Report or used for listening to on-site sounds from any remote location. Now, the unit is ready for programming.

3.3 Quick-Start Programming Steps

Step 1: Set Configuration of Inputs

The Model 1104 will scan the 4 external inputs and determine if they are N.O. (normally open), N.C. (normally closed), or Temperature. If external sensors are added, make sure they are in their normal positions before proceeding—refer to Chapter 5, Section 5.1.

1. Press STANDBY to place the Model 1104 in Standby mode.

2. If you have external sensors available, wire the sensors to the inputs on the back of the Model 1104 (see Chapter 2, Section 2.10). Otherwise, skip this step and move to step 3.

3. Press RUN. The red light glows when the Model 1104 returns to Run mode.

4. Press SET.

5. Press CONFIGURE.

6. The Model 1104 will audibly recite the new configuration for each of the four inputs, responding with "*OK*," if it detects N.O. (normally open), "*beep-OK*," if it detects N.C (normally closed) or "*Temperature*," if it detects temperature (regardless of whether all the inputs have attached sensors or not). If an input is unused, it is treated as normally open.

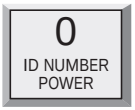
Step 2: Set the ID Number

It is recommended that you set the ID number to reflect the telephone number on which the Model 1104 is installed.

1. Press SET

.

2. Press ID NUMBER.



3. Using the number keys, enter the digits (up to 16 are permitted) for the ID number. The Model 1104 will recite the digits as they are pressed.

4. Press ENTER. The 1104 will respond: "*Enter.*"

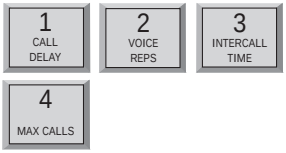
Step 3: Set Dial-Out Telephone Numbers

To program dial-out telephone numbers:

1. Press SET.

2. Press PHONE NUMBER.

3. Select which telephone number to program. Press any unassigned number key (from 1 to 4) to represent the new telephone number entry. Model 1104 will respond: "Enter number."



4. Enter the complete telephone number using the number keys.

The Model 1104 will recite the digits as they are pressed.

5. Press ENTER. The unit will respond: "*Enter.*"

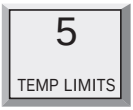
6. Repeat above procedure to program up to four separate telephone numbers.

Step 4: Set Temperature Limits

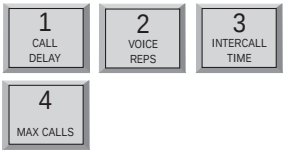
High and low temperature limits can be separately programmed for each input that is configured as temperature. Limits can range from –20° to +150° Fahrenheit, or from –30° to 65° Celsius. Default settings are: 10° F for low temperature and 100° F for high temperature. Do not set temperature limits too close to normal room temperature, since minor fluctuations could result in frequent and unnecessary alarm dialouts.

1. Press SET.

2. Press TEMP LIMITS.



3. From the number keys, press a number (from 1 to 4) that corresponds to the temperature input being programmed.



The Model 1104 responds: "*Enter low temperature limit.*"

4. Using the number keys, enter a value for low temperature limit. The Model 1104 will recite the digits as they are pressed. If a negative number is required, first press PAUSE, then enter the number.

5. Press ENTER.

The Model 1104 responds: "*Enter high temperature limit.*"

6. Using the number keys, enter the value for high temperature limit. The Model 1104 will recite the digits as they are pressed.

7. Press ENTER. The Model 1104 responds: "*Enter.*"

This concludes minimum programming to achieve normal operation of the Model 1104. In additon to the programming just accomplished, default settings for many more features take effect when the unit is first powered. You will be able to reprogram most of these factory-set defaults to suit your application.

For a complete explanation of each feature (with illustrations of keystrokes), refer to Chapter 4: Communications Programming and Chapter 5: Alarm Programming.

To gain a basic understanding of how the alarm dial-out feature works, refer to this chapter, Section 3-4. For extended information regarding dial-out and related programmable parameters, refer to Chapter 7: Operation.

3.4 Summary of the Alarm Dial-Out Process

Action—Response	Programmable Feature
1. THE MODEL 1104 DETECTS AN ALERT CONDITION An alert condition is not the same as a valid alarm—the condition must continue for the programmed time period, or ***Recognition Time***, before it is recognized as a valid alarm.	• **Recognition Time** This is the programmed waiting period to determine if an alert condition has persisted long enough to be considered a valid alarm. If the sensor returns to normal within recognition time, then no alarm will occur.
2. A VALID ALARM IS CONFIRMED An audible, on-site alarm message begins and continues until the alarm is acknowledged. (If the Mute feature is turned on, there is no on-site message.) ***Call Delay*** is activated.	• **Call Delay** This is the programmed waiting period, before the first telephone number is called, to report an alarm.
3. DIAL-OUT BEGINS Dial-out begins by calling telephone number 1 to report an alarm. If there is no acknowledgment, the Model 1104 waits the programmed ***Intercall Time*** before dialing subsequent telephone numbers. Dial-out continues in this manner, cycling through the remaining telephone numbers, for the programmed ***Max Calls***.	• **Intercall Time** This is the programmed waiting period, in between sequential dialing of telephone numbers, to report an alarm. • **Max Calls** This is the total number of telephone calls that will be dialed in response to any valid alarm. Telephone numbers are dialed sequentially, and continue to cycle until the maximum number of calls is reached. If no acknowledgment occurs, then at the completion of Max Calls, all alarms are automatically acknowledged.
4. THE ALARM IS ACKNOWLEDGED When the alarm is acknowledged, the dial-out process is cancelled and the audible, on-site alarm message stops.	

Chapter 4: Communications Programming

This chapter explains the keypad commands for communications programming of the Model 1104, including interrogation and resetting of the following:

- The Unit ID Number
- Dial-out Telephone Numbers
- Tone or Pulse Dialing
- Special Dialing with Pagers, Beepers and Access Numbers.
- Rings Until Answer and Telephone Answering Device Compatibility
- Listen-in Time
- Call Delay
- Local Voice Mute
- Voice Repetitions
- Intercall Time
- Maximum Number of Calls
- The Clock
- Security Code

4.1 The Unit ID Number

The Unit ID Number is the identification number of the Model 1104. This number may be the same as the telephone number where the unit is installed, or it may be designated using any number that best suits your application.

The purpose of the Unit ID Number is to immediately provide the source of any alarm, especially when using multiple Model 1104 units in a complex monitoring system. When the Model 1104 is called from a remote location, it always begins its message with the identification number:

"Hello, this is telephone number (Unit ID Number)."

4.1.1 Programming the ID Number

To program the ID Number:

1. Press SET.

2. Press ID NUMBER.

3. Using the number keys, enter up to 16 digits for the ID number. The Model 1104 will recite the digits as they are pressed.

4. Press ENTER. The Model 1104 will respond: "*Enter.*"

4.1.2 Interrogating the ID Number

To interrogate the ID numbers:

1. Press WHAT IS.

2. Press ID NUMBER. The Model 1104 will recite the Unit ID Number programmed.

4.2 Dial-out Telephone Numbers

The Model 1104 can store up to four 32-digit phone numbers. These are the numbers that will be called during dial-out. In the event of an alarm, the numbers are dialed sequentially, 1 through 4. Begin programming the first telephone number by assigning it to the key labeled with the number 1 on the keypad, and continue to assign any other telephone numbers in numerical order. ***A pause, pound*** or ***asterisk*** can be added to an individual phone number to access different phone and beeper systems. See *Special Dialing, Section 4.4.*

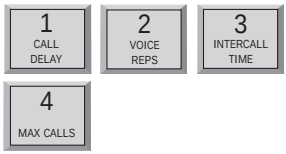
4.2.1 Programming Dial-out Telephone Numbers

To program dial-out telephone numbers:

1. Press SET.

2. Press PHONE NUMBER.

3. Select which telephone number to program. Press any unassigned number key (from 1 to 4) to represent the new telephone number entry. The Model 1104 will respond: *"Enter number."*



4. Enter the complete telephone number using the number keys.

5. Press ENTER. The unit will respond with "*Enter.*"

6. Repeat above procedure to program up to four separate telephone numbers.

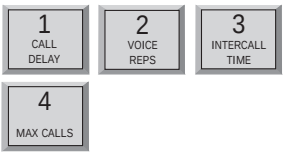
4.2.2 Interrogating a Dial-out Telephone Number

To interrogate dial-out telephone numbers:

1. Press WHAT IS.

2. Press PHONE NUMBER.

3. Press a number key (from 1 to 4).



Model 1104 will recite the corresponding telephone number. If there is no number programmed for a particular key, the unit will respond: "*No number.*"

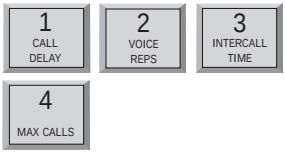
4.2.3 Erasing a Telephone Number

To erase a telephone number:

1. Press SET.

2. Press PHONE NUMBER.

3. Press the number key (from 1 to 4) representing the telephone number you want to erase.



4. Press ENTER. The Model 1104 will say "*Enter.*"

4.3 Tone or Pulse Dialing

The Model 1104 can dial out in pulse or Touch Tone™. Select the type of dialing, in either pulse or tone, depending upon the type of service provided by your telephone company. The default is tone.

To program for either pulse or tone:

1. Press the SENSOR ON/OFF key.

2. Press TONE.

The Model 1104 will respond: "*Off*" to indicate that tone dialing is off and pulse is enabled, or "*On*" to indicate that tone dialing is on and pulse is disabled.

3. Repeat key sequence to switch between settings.

4.4 Special Dialing

The Model 1104 has provisions for special dialing sequences. Special dialing sequences allow:

- Dialing that requires an access number to connect with an outside line.
- Dialing that requires the pound (#) or asterisk (*).
- Dialing to a beeper or pager.

4.4.1 Special Dialing Keys

The following designated keys represent special functions when used with PHONE NUMBER entries:

1. *Pause*

PAUSE represents a four-second pause in dialing. It can be used when an access number is required before dialing to an outside line. (For example, in some cases a "9" or other number, must be dialed first, in order to get a dial tone for an outside line.) When interrogating telephone numbers, PAUSE is audibly represented by a "*beep*."

2. *Pound (#)*

A pound may be required when calling some phone or beeper systems. When interrogating telephone numbers, pound (#) is audibly represented by the word "*twelve.*"

3. *Asterisk (*)*

An asterisk may be required when calling some phone or beeper systems. When interrogating telephone numbers, asterisk (*) is audibly represented by the word "*eleven.*"

4. *Code*

CODE instructs the Model 1104 to wait until the call is answered before continuing. When interrogating telephone numbers, CODE is audibly represented by the word "*fourteen*."

NOTE

Each time a pause, pound (#) or asterisk (*) is incorporated in a programming sequence, it is counted as one digit toward the total of 32 digits allowed.

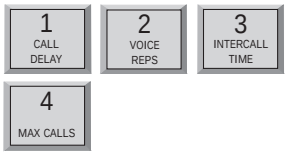
4.4.2 Incorporating a Pause

Incorporate PAUSE to access an outside telephone line:

1. Press SET.

2. Press PHONE NUMBER.

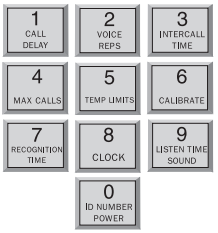
3. Press any unassigned number key (from 1 to 4) to represent the new telephone number entry. Model 1104 will respond: "*Enter number.*"



4. From the number keys, enter the access digit (i.e., 9). The Model 1104 will recite the digit.

5. Press PAUSE. The Model 1104 will "*beep*."

6. Enter the complete telephone number (1 + area code) using the number keys. The Model 1104 will recite the digits as they are pressed.



7. Press ENTER. The Model 1104 will say "*Enter*."

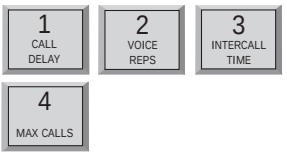
4.4.3 Incorporating a Pound (#) or Asterisk (*)

Incorporate a pound or asterisk if it is normally included in telephone number:

1. Press SET.

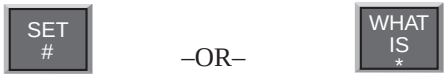
2. Press PHONE NUMBER.

3. Press any unassigned number key (from 1 to 4) to represent the new telephone number entry. Model 1104 will respond: "*Enter number*."



4. Enter the telephone number using the number keys. The Model 1104 will recite the digits as they are pressed.

5. Position the pound (#) or asterisk (*) within the telephone number where required by pressing SET (where the pound is located) or WHAT IS (where the asterisk is located). The Model 1104 will *"beep"* each time pound or asterisk is pressed.



6. Enter any remaining digits of the telephone number.
7. Press ENTER. The Model 1104 will say *"Enter."*

4.4.4 Special Dialing to a Beeper or Pager

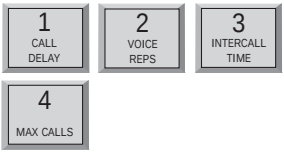
The following example demonstrates just one solution to programming the Model 1104 for dialing to a beeper or pager. Many other key sequences will also work. Start with steps 1–3 below; next, enter special dialing keys where required for your beeper or pager service.

To incorporate a pound or asterisk:

1. Press SET.

2. Press PHONE NUMBER.

3. Press any unassigned number key (from 1 to 4) to represent the new telephone number entry.



4. Enter the complete telephone number using the number keys. The Model 1104 will recite the digits as they are pressed.

5. Press CODE. This instructs the Model 1104 to wait for the telephone call to be answered by the beeper or pager service. (A voice message will not occur—only digital tones are used.) Note that CODE may not work with beepers where there is no ring before the beeper connects. If that proves to be the case for your particular beeper, skip the CODE step and proceed from Step 4 to Step 6.

6. Now press PAUSE once to activate a four second delay. This assumes the call is answered by a beeper/pager service that immediately delivers a prerecorded voice message. PAUSE may be pressed more than once to program more time for the beeper/pager service to finish its message. Each press of PAUSE allocates four additional seconds. The Model 1104 will *"beep"* with each press.

7. Enter a telephone number or custom code number that will identify the Model 1104 as the caller to your beeper or pager. A code may consist of any number(s) you designate. Many users find it convenient to use the telephone number to which the Model 1104 is connected.

8. A pound or asterisk may be required in some dialing situations. If required, position the pound (#) or asterisk (*) within the telephone number where required by pressing SET (where the pound is located) or WHAT IS (where the asterisk is located). The Model 1104 will *"beep"* each time pound or asterisk is pressed. Enter any remaining digits of the telephone number.

–OR–

9. Press ENTER. The Model 1104 will say "*Enter.*"

Example 1 (using CODE key):

1-203-555-1123 - CODE - 621-9977-#
(beeper number) *(unit ID number)*

Example 2 (without using CODE key):

1-203-555-1123 - PAUSE - PAUSE - 621-9977-#
(beeper number) *(unit ID number)*

4.5 Rings Until Answer

Rings Until Answer is the programmed number of times the telephone rings before the Model 1104 will answer an incoming call. This can be set from 1 to 15 rings. The default value is 4.

4.5.1 Programming Rings Until Answer

To program Rings Until Answer:

1. Press SET.

2. Press RING/TAD. The Model 1104 will respond: "*Enter number.*"

3. Using the number keys, enter a value.

4. Press ENTER. The Model 1104 will respond: "*Enter.*"

4.5.2 Interrogating Rings Until Answer

To interrogate Rings Until Answer:

1. Press WHAT IS.

2. Press RING/TAD.

4.5.3 Double Ring Compatibility

In countries that utilize a double-ring pattern, you must enable Double Ring Compatibility in order to have the unit properly answer on the programmed number of rings.

To enable/disable Double Ring Compatibility:

1. Press SET.

2. Press SENSOR ON/OFF.

3. Press 0 to Enable or press 1 to Disable.

4. Press ENTER. The Model 1104 will respond : "*Enter.*"

4.5.4 Interrogating Double Ring Compatibility

To interrogate Double Ring Compatibility:

1. Press WHAT IS.

2. Press SENSOR ON/OFF. The model 1104 will say *"0"* if Double Ring Compatibility enabled and *"1"* if it is disabled.

4.6 TAD (Telephone Answering Device)

The TAD feature is especially useful because it integrates the operation of the Model 1104 with your telephone answering device in a way that retains the full flexibility of each system. This allows you to have on-demand telephone access to the Model 1104, for obtaining a Status Report, or for issuing call-in commands, while your telephone answering device is set to receive outside calls. Programming for use with a telephone answering device (TAD) is always used in conjunction with Rings Until Answer, detailed in section 4.5.

NOTE

The TAD feature only applies to answering devices connected to the same telephone line as the Model 1104.

4.6.1 TAD Enable/Disable

To enable/disable the TAD feature:

1. Press SENSOR ON/OFF.

2. Press RING/TAD.

The Model 1104 will respond: "*On.*" (If the Model 1104 says "*Off,*" repeat steps 1 and 2 to reactivate TAD.)

4.6.2 Using the TAD Feature

1. Make sure the TAD feature is enabled on the Model 1104. (The default setting is disabled, so you must enable it first.)
2. Determine the number of rings your telephone answering device uses to answer the telephone. (Most answering devices require 4 rings; others are selectable.)
3. On the Model 1104, program Rings Until Answer to a greater number than the number of rings set on your answering machine.

Example:

Telephone answering device, rings = 4

Model 1104, Rings Until Answer = 6

Using the procedure just outlined, all incoming calls will be answered by the telephone answering device, allowing it to operate normally. With the programming just accomplished, the Model 1104 can be accessed remotely, by telephone, to obtain the Status Report.

1. Dial the telephone number of the Model 1104.
2. Let the telephone ring once and then hang up.
3. Wait approximately ten seconds
4. Call the Model 1104 back.

It will answer the telephone on the first ring.

Explanation: The pattern of one ring, followed by a second call (within 30 seconds), signals the Model 1104 to answer your incoming call, excluding the telephone answering device.

NOTE

Special Case: If the Model 1104 shares the same line with a telephone answering device, and during certain time periods, frequent, incoming calls are expected on that line, then you may want to temporarily disable the TAD feature. If you leave the TAD enabled, it will not adversely affect normal operation, but if two outside telephone calls are received within the same 30-second time window, the Model 1104 will interpret this pattern as a signal to answer the telephone. If this occurs, press any key on the Model 1104 to hang up.

4.6.3 No TAD In Use

If a telephone answering device is not used on the same telephone line as the Model 1104, make sure that the TAD feature is disabled, or turned off. Only Rings Until Answer programming will determine how incoming calls are answered. For example, if you program Rings Until Answer to 3, incoming calls will be answered in 3 rings.

4.7 Listen-in Time

The Listen-in Time is the amount of time you can listen to sounds from the Model 1104's built-in microphone at its installation site. When you call in for a Status Report, the Model 1104 announces Listen-in Time at the end of its first round of status readings, saying, "*Listen to the sound level for (programmed time entered).*" The programmable range is from 0 to 255 seconds (or up to 4.17 minutes). The default value is 15 seconds.

NOTE

The microphone is also used to monitor high sound level. See Chapter 5, Section 5.10 through Section 5.11.1.

4.7.1 Programming the Listen-in Time

To program the Listen-in Time:

1. Press SET.

2. Press LISTEN TIME. The Model 1104 will respond: "*Enter seconds.*"

3. Using the number keys, enter the seconds. The Model 1104 will recite the digits as they are pressed.

4. Press ENTER. The Model 1104 will respond: "*Enter.*"

4.7.2 Interrogating the Listen-in Time

To interrogate the Listen-in Time:

1. Press WHAT IS.

2. Press LISTEN TIME. The Model 1104 will recite the listen time in seconds programmed.

4.8 Call Delay

Call Delay is the programmed length of time the Model 1104 waits, following detection of an alarm, before it begins the dial-out sequence. This applies only to the first call. (Delay time between calls is also programmable: refer to Intercall Time,

Section 4-11.)

The purpose for Call Delay is to allow time for personnel at the Model 1104's installation site to respond to and cancel an alarm before dial-out begins. During this time, the Model 1104 will audibly repeat its *"alert condition"* message (unless the Local Voice Mute feature has been activated—refer to Section 4.9). The default for Call Delay is 30 seconds. Call Delay can be programmed from 0 seconds to 60 minutes (1 hour).

4.8.1 Programming the Call Delay

To program the Call Delay:

1. Press SET.

2. Press CALL DELAY.

The Model 1104 will respond: "*Enter minutes.*"

3. Using the number keys, enter the minutes.

The Model 1104 recites the digits as they are pressed.

4. Press ENTER. The Model 1104 responds: "*Enter seconds.*"

5. Using the number keys, enter the seconds. The Model 1104 recites the digits as you press them.
6. Press ENTER. The Model 1104 responds: "*Enter.*"

4.8.2 Interrogating Call Delay

To interrogate Call Delay:

1. Press WHAT IS.

2. Press CALL DELAY.

The Model 1104 will recite the programmed Call Delay.

4.9 Local Voice Mute

When the Model 1104 dials out to report an alarm, it also audibly recites the alarm message at its installation site. The Local Voice Mute command allows you to turn off the voice at the Model 1104's site during alarm dialouts and status call-ins. This feature is used to prevent intruders or unauthorized persons from hearing the alarm dial-out message or from hearing the Status Report during an off-site call.

4.9.1 Enable/Disable Local Voice Mute

To enable/disable Local Voice Mute:

1. Press SENSOR ON/OFF.

2. Press MUTE.

The Model 1104 will say *"On"* to indicate that Local Voice Mute is enabled, or *"Off"* to indicate that it is disabled.

3. Repeat key sequence to switch between enabled or disabled Local Voice Mute.

4.10 Voice Repetitions

The Voice Repetitions feature allows programming of the number of times the alarm message is delivered *per phone call* during alarm dial-out.

The maximum repetitions may be set to 10; the default is

3 repetitions.

4.10.1 Programming Voice Repetitions

To program Voice Repetitions:

1. Press SET.

2. Press VOICE REPS.

The Model 1104 will respond: "*Enter number.*"

3. Using the number keys, enter a value from 0 to 10.

4. Press ENTER. The Model 1104 will respond: "*Enter.*"

4.10.2 Interrogating Voice Repetitions

To interrogate Voice Repetitions:

1. Press WHAT IS.

2. Press VOICE REPS.

The Model 1104 will recite the number programmed.

4.11 Intercall Time

The Intercall Time is the programmable period of time the Model 1104 waits in calling subsequent telephone numbers. Intercall Time is activated ***only after alarm dial-out to the first telephone number fails to be acknowledged***. This period can be programmed from 10 seconds to 60 minutes. The default intercall time is 1 minute.

If an incoming telephone call is made to the Model 1104 during Intercall Time (in between its dialing of subsequent telephone numbers to report an alarm), it will answer the incoming call and immediately report any existing alarms. The manner in which the incoming call is answered depends upon whether or not TAD is enabled or disabled:

- If TAD (Telephone Answering Device) is enabled, Rings Until Answer will be 1.
- If TAD is disabled, Rings Until Answer will be 10.

Refer to Section 4.5, Rings Until Answer; and Section 4.6, TAD (Telephone Answering Device).

4.11.1 Programming Intercall Time

To program Intercall Time:

1. Press SET.

2. Press INTERCALL TIME.

The Model 1104 will respond: "*Enter minutes.*"

3. Using the number keys, enter the minutes.

The Model 1104 recites the digits as you press them.

4. Press ENTER. The Model 1104 will respond: "*Enter seconds.*"

5. Using the number keys, enter the seconds. The Model 1104 recites the digits as you press them.

6. Press ENTER. The Model 1104 responds: "*Enter.*"

4.11.2 Interrogating Intercall Time

To interrogate Intercall Time:

1. Press WHAT IS.

2. Press INTERCALL TIME.

The Model 1104 will recite the programmed Intercall Time.

4.12 Maximum Number of Calls (Max Calls)

The Max Calls feature controls the total number of repeated calling attempts by the Model 1104 in the event of an alarm. When an alarm occurs, the dial-out process begins, and continues to cycle through your programmed telephone numbers until a maximum number of calls is reached. The Max Calls setting regulates the number of calls that will be made as a result of any alarms; if more than one alarm is detected at once, or if a second alarm occurs during dial-out on the first alarm, the Max Calls setting will start the calling process from zero, until the programmed number of calling attempts are completed.

The default setting for Max Calls is 100, but it may be programmed from 0 to 255 calls. Max Calls is cancelled when an alarm is acknowledged. If the maximum number of calls is completed and no alarm acknowledgement has occurred, the Model 1104 will automatically acknowledge any alarm and stop the dial-out.

NOTE

If only one telephone number is programmed, the Model 1104 will dial out a maximum of 15 times to report an alarm.

4.12.1 Programming Max Calls

To program Max Calls:

1. Press SET.

2. Press MAX CALLS.

The Model 1104 will respond: "*Enter number.*"

3. Using the number keys, enter a value. The Model 1104 will recite the digits as you press them.

4. Press ENTER. The Model 1104 responds: "*Enter.*"

4.12.2 Interrogating Max Calls

To interrogate Max Calls programmed:

1. Press WHAT IS.

2. Press MAX CALLS.

The Model 1104 will recite the value set for Max Calls.

4.13 The Clock

The Model 1104 has a built-in clock. The power-up time is 12 AM. The clock will keep time from 12 AM until you program the current time. It will then keep time from your programmed time. If the AC power fails, the clock will continue to keep time until the battery back-up fails. It will then reset to 12 AM when power is restored. ***An incorrect time is a good indication that the power has failed and the batteries have been expended.***

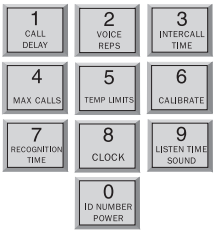
4.13.1 Setting the Clock

To set the clock:

1. Press SET.

2. Press CLOCK.

3. Using the number keys, enter the correct time. The Model 1104 will recite the digits as they are pressed.



4. If the time is AM, press the AM key. The Model 1104 will *"beep."* (If the time is PM , there is no key to press—the clock will be automatically set to PM if AM is not set.)

5. Press ENTER. The Model 1104 will say *"Enter."*

Example: You want to set the clock to 9:45 AM. Press the following keys in the order shown:

SET…CLOCK…0…9…4…5…AM…ENTER.

4.13.2 Interrogating for the Current Time

To interrogate the Model 1104 for the current time:

1. Press WHAT IS.

2. Press CLOCK. The Model 1104 will recite the programmed time.

4.14 The Security Code

The Security Code is the last step after setting all other programming parameters for the Model 1104. The code consists of a 4-digit number you select and will effectively prevent unauthorized changes to the Model 1104's programming. When the Security Code is activated, all keyboard programming is inaccessible. The Model 1104 may be interrogated using the WHAT IS key, but the keyboard must be unlocked, via the Security Code, before any additional programming is possible.

4.14.1 Locking the Keypad

To program the Security Code:

1. Press SET.

2. Press CODE.

The Model 1104 will say "*Enter security code.*"

3. Using the number keys, enter 4 digits. The Model 1104 says, "*OK.*" The keyboard is now locked.

If unauthorized persons attempt to set a parameter, an error message, "*Error 2,*" is returned. Whenever any operation except WHAT IS takes place without entering the security code first, this error message occurs.

4.14.2 Unlocking the Keypad

To unlock the keyboard:

1. Press WHAT IS.

2. Press CODE.

The Model 1104 will say "*Enter Security Code.*"

3. Using the number keys, enter the digits for the code.

If the correct code is entered, the Model 1104 will say "*OK*." If the wrong code is entered, the Model 1104 will say "*Error 2*."

Chapter 5: Alarm Programming

This chapter explains the alarm programming and monitoring capabilities of the Model 1104, with specific instructions for the following features:

- Configure inputs as dry contact or temperature
- Enable/disable inputs
- Program alarm Recognition Time for each input
- Program high and low temperature limits
- Disable alarm response to high or low temperature
- Program temperature in Fahrenheit or Celsius scale
- Calibrate temperature
- Obtain current temperature
- Program AC power-failure Recognition Time
- Enable/disable AC power monitoring
- Program sound level sensitivity
- Program high sound Recognition Time
- Disable alarm response to high sound
- Use Exit Delay via Status Report

5.1 Input Configuration

In preparing the Model 1104 to sense an alert condition, the inputs must be configured as dry contact (either open or closed) or as temperature inputs. The default setting for input 1 is temperature; for inputs 2-4, the default is dry contact and open. To configure input normality, sensors are first wired to the terminal strip at the back of the unit. (Refer to Chapter 2, Section 2.9–2.12, for an explanation on wiring inputs.)

The configuration process directs the Model 1104 to initialize the 4 inputs and establish normal settings. Any change in the status of an input (for example, from a normally open contact to a suddenly closed contact) is recognized as an ***alert condition***. In the case of a temperature input, an alert condition is recognized when established temperature limits are exceeded.

NOTE

Before starting keyboard commands to configure input normality on the Model 1104, ***it is very important to check that the sensors you have wired to the unit are set in their normal, non-alarm positions.***

For example, if a magnetic reed switch (a normally-closed sensor used to detect unauthorized entry) has been wired to the Model 1104, make sure that the door or window to be monitored is shut before configuring the input. If a motion-detector is wired to the unit, it is advisable to block all sources of motion from the sensor before and during configuration.

5.1.1 Programming Input Configuration

1. Press STANDBY to place the Model 1104 in Standby mode.

2. Wire sensors to the inputs to the back of the Model 1104 (see Chapter 2, Section 2.10).

3. Press RUN. The red light glows when the Model 1104 returns to Run mode.

4. Press SET.

5. Press CONFIGURE.

6. The Model 1104 audibly recites the configuration for each of the four inputs:

- If the input is ***normally open***, the Model 1104 recites the number of the input and says *"OK."*
- If the input is ***normally closed***, the Model 1104 recites the number of the input, followed by a *"beep"* and *"OK."*
- If the input is configured as ***temperature***, the Model 1104 recites the number of the input, followed by *"Temperature."*

5.1.2 Verifying Input Configuration

Input configuration can be verified when interrogating the Model 1104 for a complete Status Report. Refer to Chapter 6 for a more detailed description of the Status Report.

5.2 Enable/Disable Inputs

This function allows you to enable or disable an input's response to an alert condition. An enabled input will respond to an alert condition and allow dial-out. A disabled input will cause dial-out to be suppressed, but any existing alert conditions will be revealed during the Status Report. Enable/disable programming is useful during wiring of inputs (see Chapter 2) or when a condition needs to be monitored, but is not critical enough to be programmed for dial-out reporting. It is important to verify input status after performing any task that requires disabling. The default setting for all inputs is enabled (ON).

If an alert condition exists when inputs are re-enabled,

Recognition Time will restart—refer to Section 5.3.

5.2.1 Changing Enabled/Disabled Input Status

1. Press SENSOR ON/OFF.

2. Press the number (1 to 4) of the selected input to enable/disable. The Model 1104 says *"Off"* to indicate disabled or *"On"* to indicate enabled.

5.2.2 Verifying Enabled/Disabled Input Status

1. Press WHAT IS.

2. Press STATUS.

The Model 1104 audibly recites the current status of every input. In a Status Report, each input is first identified by its input number, followed by a report that specifies parameters currently affecting that input. ***If an input is disabled, the word "Off" immediately follows the number recited for that input.***

For example, input 3 is configured as a normally open, dry contact input. During the Status Report:

- ***If disabled***, the Model 1104 recites: "*Number 3—**Off**—OK,*" for input 3.
- ***If enabled***, the Model 1104 recites: "*Number 3—OK,*" for input 3.

In another example, input 2 is configured as a temperature input. The current temperature is 76 degrees. During a Status Report:

- ***If disabled***, the Model 1104 recites: "*Number 2—**Off**—76 degrees—OK.*"
- ***If enabled***, the Model 1104 recites: "*Number 2—76 degrees—OK.*"

5.3 Input Recognition Time

The Input Recognition Time is the length of time an alert condition must be present before a valid alarm exists and dial- out is activated. This time period is programmable, from 0 minutes, 0 seconds (for immediate response) up to a period of 272 minutes, 0 seconds. If an alert condition begins and then clears within the established Recognition Time, no dial-out will occur. When an alert condition continues beyond the programmed Recognition Time, the Model 1104 initiates dial-out. The default setting for Input Recognition Time is 0 minutes, 3 seconds.

5.3.1 Programming Input Recognition Time

1. Press SET.

2. Press RECOGNITION TIME.

3. Press the number (1 to 4) of the selected input to be programmed.

The Model 1104 responds: "*Enter minutes.*"

4. Using the number keys, enter the minutes. For example, to set a Recognition Time of five minutes, simply press "*5*" on the keypad. The Model 1104 recites the digits as they are pressed.

5. Press ENTER. The Model 1104 responds: "*Enter seconds.*"

6. Using the number keys, enter the seconds. The Model 1104 recites the digits as they are pressed.

7. Press ENTER. The Model 1104 responds: "*Enter.*"

5.3.2 Interrogating Input Recognition Time

1. Press WHAT IS.

2. Press RECOGNITION TIME.

3. Press the corresponding input key (1 to 4).

The Model 1104 recites the programmed Recognition Time for that input.

5.4 Establishing High and Low Temperature Limits

High and low temperature limits can be separately programmed for each input configured as temperature. Limits can range from –20° to +150° Fahrenheit, or from –30° to 65° Celsius.

When temperature limits exceed high or low settings, the Model 1104 will dial out with an alarm message. Default settings are: 10° F for low temperature and 100° F for high temperature.

5.4.1 Programming Temperature Limits for a Selected Input

1. Press SET.

2. Press TEMP LIMITS.

3. From the number keys, press a number (from 1 to 4) that corresponds to the temperature input being programmed.

The Model 1104 responds: "*Enter low temperature limit.*"

4. Using the number keys, enter a value for low temperature limit. The Model 1104 will recite the digits as they are pressed. If a negative number is required, first press PAUSE, then enter the number.

5. Press ENTER.

The Model 1104 responds: "*Enter high temperature limit.*"

6. Using the number keys, enter the value for high temperature limit. The Model 1104 recites the digits as they are pressed.

7. Press ENTER. The Model 1104 responds: "*Enter.*"

NOTE

Do not set temperature limits too close to normal room temperature. Minor temperature fluctuations could result in frequent and unnecessary alarm dialouts.

5.4.2 Disabling Alarm Response to High or Low Temperature

To disable alarm response to either high or low temperature settings exclusively, enter the maximum temperature limit when programming the selected input. (The Model 1104 will not respond to temperatures encountered at maximum settings or beyond.) Begin by following the key sequence shown in Section 5.4.1, and when prompted to enter the high or low temperature value:

- Set high temperature to either +150º F or +65º C (high temperature limit) to prevent the Model 1104 from responding to a high temperature alarm.
- Set low temperature to either -20° F or -30° C to prevent the Model 1104 from responding to a low temperature alarm.

5.4.3 Interrogating High and Low Temperature Limits

1. Press WHAT IS.

2. Press TEMP LIMITS.

3. Press the number key corresponding to the selected temperature input.

5.5 Temperature Scale

Temperature inputs may be set in either Fahrenheit or Celsius degrees. The default temperature scale is Fahrenheit. To change to Celsius:

1. Press SENSOR ON/OFF.

2. Press TEMP. The Model 1104 responds: "*Off,*" indicating Celsius scale has replaced Fahrenheit scale.

3. To return to Fahrenheit scale, repeat the key sequence. The Model 1104 responds: "*On,*" indicating Fahrenheit scale is in effect.

NOTE

When switching from Fahrenheit to Celsius, or vice versa, the change applies to all inputs configured to read temperature. When switching temperature scales it is important to reset high and low temperature limits on all temperature inputs. Refer to Section 5.4.1 to reset temperature limits.

5.6 Temperature Calibration

To compensate for minor variances in sensor accuracy, an offset may be programmed for each temperature input. The amount of offset is measured in degrees Fahrenheit or degrees Celsius. Adjustments are possible within a range from -10 degrees to +10 degrees. For example, if input 3 is sensing temperature and is reading 1 degree too high, then the calibration for input 3 is set at -1 to obtain an accurate reading.

5.6.1 Programming Temperature Calibration

1. Press SET.

2. Press CALIBRATE.

3. Press the number (1 to 4) of the selected temperature input to be calibrated.

4. Enter the number required to offset the current temperature reading so a correct reading is obtained.

- To program a positive offset number (up to +10 degrees), enter the number on the keypad. The Model 1104 recites the digits as they are pressed.
- To program a negative offset number (up to –10 degrees), first press PAUSE. The unit responds with a "*beep*." Next, enter the number on the keypad. The unit recites the digits as they are pressed.

5. Press ENTER. The Model 1104 responds: "*Enter.*"

NOTE

If you find that your calibration offset exceeds more than + 5 or –5 degrees, other complicating factors could be affecting normal operation of the Model 1104. Call Sensaphone for technical assistance.

5.6.2 Interrogating Temperature Calibration

1. Press WHAT IS.

2. Press CALIBRATE.

3. Press the number key corresponding to the selected temperature input.

If a "*beep*" precedes the number as it is recited, then a negative offset is indicated.

5.7 Obtaining Current Temperature

Current temperature readings for each temperature input may be accessed at any time. The Model 1104 recites the input number, and the actual temperature detected by the attached sensor, for all inputs configured as temperature. To obtain current temperature:

1. Press WHAT IS.

2. Press TEMP.

5.8 AC Power Monitoring Enable/Disable

The Model 1104 monitors AC power failure. This command enables or disables the power failure detection feature.When enabled, the Model 1104 will monitor power and dial out when AC power failure exceeds a programmable span of time (refer to AC Power Failure Recognition Time, Section 5.9).

The default setting for AC power monitoring is enabled (on). When disabled, the Model 1104 will not dial-out to report power failure.

5.8.1 Enabling/Disabling the AC Power Alarm

1. Press SENSOR ON/OFF.

2. Press POWER.

   - The Model 1104 will say *"Off"* to indicate that the power alarm is disabled, or
   - The Model 1104 will say *"On"* to indicate that the power alarm is enabled.

3. Repeat key sequence to change settings.

5.9 AC Power Failure Recognition Time

The AC Power Failure Recognition Time is the length of time that AC electric power is off before a valid alarm is recognized and dial-out begins. The default setting is 5 minutes, 0 seconds, but is programmable from 0 seconds to a maximum of 272 minutes.

When AC power failure occurs, and throughout the programmed Recognition Time, the Model 1104 steadily repeats the message *"the electricity is off"* at the unit's installation site. There is no Call Delay programming available for AC power failure. Immediately following Recognition Time, the Model 1104 begins the dial-out process to report power failure.

To cancel the power-failure message locally at the keypad (during or after Recognition Time) press any key on the Model 1104

keypad. This action also cancels the dial-out process. The AC power failure alarm may also be cancelled remotely, by telephone acknowledgment (see Chapter 6, Section 6.1).

5.9.1 Programming Power Failure Recognition Time

1. Press SET.

2. Press RECOGNITION TIME.

3. Press POWER. The Model 1104 responds: "*Enter minutes.*"

4. Using the number keys, enter the number of minutes. The Model 1104 will recite the digits as they are pressed.

5. Press ENTER. The Model 1104 responds: "*Enter seconds.*"

6. Using the number keys, enter the number of seconds. The Model 1104 will recite the digits as they are pressed.

7. Press ENTER. The Model 1104 responds: "*OK.*"

5.9.2 Interrogating Power Failure Recognition Time

1. Press WHAT IS.

2. Press RECOGNITION TIME.

3. Press POWER.

The Model 1104 will recite the power Recognition Time.

5.10 Sound Alarm Monitoring

This feature allows you to program the level and duration of sound that will cause the Model 1104 to respond to an alarm and dial-out. It may be useful to desensitize the Model 1104 to sound if it is installed in an area with a relatively high noise level, or where a loud noise occurs frequently but is not associated with an alarm. In some applications, it may be desirable to increase sound sensitivity to low sound levels.

5.10.1 Programming Sound Alarm Sensitivity

The sensitivity setting for sound alarm monitoring ranges from 1 to 255. A value of 1 makes the microphone the MOST sensitive to changes in sound. The value 255 makes the microphone the LEAST sensitive to sound. The default value is **32**.

1. Press SET.

2. Press CALIBRATE.

3. Press SOUND. The Model 1104 responds*:* "*Enter number.*"

4. Using the number keys, enter a value for sound sensitivity.

The Model 1104 recites the digits as you press them.

5. Press ENTER. The Model 1104 responds: "*Enter.*"

5.10.2 Interrogating Sound Sensitivity

1. Press WHAT IS.

2. Press CALIBRATE.

3. Press SOUND. The Model 1104 recites the programmed sound sensitivity level.

5.10.3 Programming High Sound Alarm Recognition Time

The Recognition Time for sound alarm monitoring ranges from 2 seconds to 59 seconds. The default value is **8** seconds.

1. Press SET.

2. Press RECOGNITION TIME.

3. Press SOUND. The Model 1104 responds: *"Enter seconds."*

4. Using the number keys, enter the number of seconds. The Model 1104 will recite the digits as they are pressed.

5. Press ENTER.

5.11 High Sound Alarm Enable/Disable

The Model 1104 monitors sound through the built-in microphone. When the sound level suddenly exceeds the programmed high sound limit, the Model 1104 will respond to an alert condition. The increased sound level must continue throughout the programmed recognition time. The default for high sound alarm is enabled (on).

NOTE

The microphone is also used for listening to on-site sounds. Refer to Chapter 4, Section 4.7. Disabling the sound alarm does not affect listen-in capability.

5.11.1 Changing Enabled/Disabled High Sound Alarm

1. Press SENSOR ON/OFF.

2. Press SOUND. The Model 1104 will say *"Off"* to indicate disabled or *"On"* to indicate enabled.

3. Repeat key sequence to change settings.

5.12 Exit Delay

When tripping an alarm is unavoidable, yet a true alert condition has not actually occurred, the alarm response, including dial-out, can be temporarily suppressed.

The Model 1104 is able to suppress and then reset its dial-out function automatically through use of the Status Report. This is especially convenient when an alert condition is created upon exiting a monitored door, and there is no way to cancel from the local keypad.

Example: You are planning to exit through a monitored door. Prior to exiting, you initiate a Status Report recitation at the Model 1104 keypad by pressing WHAT IS, followed by STATUS, (key sequence shown below). This allows you approximately 30 seconds to exit without activating the Model 1104's programmed response to an alarm. At the conclusion of the status report, normal alarm response is reactivated.

To use exit delay, initiate the Status Report.

1. Press WHAT IS.

2. Press STATUS. The Model 1104 recites the full Status Report; during this time, you are able to exit the monitored area without tripping an alarm.

Chapter 6: Acknowledgment, Status Report & Remote Access

In addition to communication and alarm monitoring capabilities, the Model 1104 will also respond to your instructions and provide you with access to information on monitored conditions at all times.

By issuing commands to the unit, either at the installation site or over standard telephone lines, the following features may be activated:

- Acknowledgment of existing alarms
- The Status Report on all monitored conditions.

6.1 Alarm Acknowledgment

When the Model 1104 dials out with an alarm message, it will request acknowledgment before hanging up. Acknowledgment indicates to the unit that the alarm message has been received. Upon acknowledgment, the Model 1104 will cancel the dial-out sequence.

There are three ways* that an alarm is acknowledged directly:

- Local Acknowledgment
- Touch-Tone™ Acknowledgment
- Callback Acknowledgment

* A fourth method of alarm acknowledgment is indirect. Refer to Max Calls, Chapter 4, Section 4.12 for an example of automatic alarm acknowledgment.

6.1.1 Local Acknowledgment

To acknowledge an alarm locally (directly at the installation site of the Model 1104), press any key.

6.1.2 Touch-Tone™ Acknowledgment

This method of remote alarm acknowledgment works with a Touch-Tone™ telephone.

Example: You receive a call from the Model 1104, reporting that an alarm exists. The message concludes: "*Indicate you have received warning message.*" Now, or at any time during this call, you may acknowledge the alarm with the code **"555"** if you are using a Touch-Tone™ telephone.

- To enter "555," press the number (5) key on the Touch-Tone™ phone keypad three times. The Model 1104 will respond: * ***"Warning message received by telephone number (last number dialed)."*** The Model 1104 will hang up and the dial-out sequence, including any further response to the alarm, will be cancelled.
- If you enter the wrong code or do not enter it within 10 seconds following the conclusion of the message, the Model 1104 will respond: ***"Dial telephone number (the programmed unit phone number) within (Intercall Time)."*** Then, the Model 1104 will hang up. The alarm is still not acknowledged until you call back. The alarm is still not acknowledged until you call back. You have a period equal to the programmed Intercall Time to call the unit back and enter the "555" acknowledgment code. If you are calling from a pulse or rotary telephone, refer to Callback Acknowledgment, Section 6.1.3, below.

6.1.3 Callback Acknowledgment

Callback Acknowledgement is a feature that allows you to acknowledge an alarm without entering Touch-Tones. This feature is disabled by default and must be enabled by entering the key sequence below. When Callback Acknowledgment is enabled, simply call the unit back and allow the line to ring 10 times. The unit will then answer the call, recite a Status Report, then say *"Warning message received by telephone number ..."* and recite the telephone number last dialed. This indicates that the alarm has been acknowledged.

To enable or disable Callback Acknowledgement:

1. Press SENSOR ON/OFF.

2. Press PHONE NUMBER.

The Model 1104 will say *"On"* to indicate that Callback Acknowledgment is Enabled, or *"Off"* to indicate that Callback Acknowledgement is Disabled. This method of remote alarm acknowledgment works with any telephone: pulse, rotary, or Touch-Tone.

Example: The Model 1104 calls you with an alarm message. You answer the call with a rotary or pulse telephone, and do the following:

- You listen to the message and hang up.
- Then you call the Model 1104 back on any telephone. You must wait for 10 rings—this signals the Model 1104 to answer your telephone call. (Make sure to call back within the programmed setting for Intercall Time—refer to Chapter 4, Section 4.11.)

When the Model 1104 answers your return call, it gives a Status Report (refer to Section 6.2). Then it says: "*Warning message received by* ..." and recites the telephone number last dialed. This indicates that the alarm has been acknowledged.

NOTE

If you have the TAD feature (telephone answering device) enabled, the Model 1104 will answer the telephone on the first ring. If it is disabled, the telephone must be allowed to ring 10 times. This serves as a precaution against a random alarm acknowledgment. Refer to Chapter 4, Section 4.6, for complete information on using the TAD feature.

6.2 Status Report

The Status Report allows access to complete information on all monitored conditions either locally, from the keypad, or by telephone, from any location. The Model 1104 will answer an incoming telephone call following the programmed Rings Until Answer (refer to Chapter 4, Section 4.5). Included with the Status Report are messages related to alarm conditions, AC power, battery backup and sound level. It also provides an opportunity for listening to on-site sounds (refer to Listen-in Time, Chapter 4, Section 4.7).

To initiate the Status Report:

1. Press WHAT IS.

2. Press STATUS.

Sections 6.2.1, 6.2.2, and 6.2.3 demonstrate two different Status Report recitations. The Status Report starts with:

"Hello. This is telephone number 555-1234 (or the programmed ID)."
"The time is 12:15PM (or the current time)."

The Model 1104 proceeds with a separate report for each input. Each input identifies itself by reciting the input number.

6.2.1 Example: Status Report, No Alarms

Inputs 2, 3, and 4 are configured as dry contact and input 1 is configured as temperature. No alarms exist. The Status Report begins by saying, *"Hello, this is telephone number 555-1234; the time is 12:15PM."*

Following this introduction, the report continues:

"Number 1, 74 degrees, OK."

"Number 2, OK."

"Number 3, OK."

"Number 4, OK."

"The electricity is ON." This refers to AC power.

"Battery condition, OK." Other possible responses: *"Battery condition low"* or *"Replace batteries."* (Refer to Section 6.2.4 for additional information regarding battery condition.)

"Sound level, OK."

"Listen to the sound level for 10 seconds." In this case, the programmed Listen-in Time is set at 10 seconds. (This feature is not available when obtaining the Status Report on-site, directly at the keypad.)

The Status Report repeats once more and the Model 1104 concludes the call, saying: *"Have a good day."* (The Status Report will not repeat if obtained at the keypad; *"Have a good day,"* is also not recited.)

The phrase *"no number"* at the end of a Status Report indicates that no dial-out phone numbers have been programmed.

6.2.2 Example: Status Report, Existing Alarms

Inputs 2, 3,and 4 are configured as dry contact and input 1 is configured as temperature. An emergency situation is at hand: a

fire in a greenhouse has tripped a smoke alarm and electrical power has been disrupted. In addition to high sound and AC power alarms, separate alarms exist on inputs 1, 2, 3, and 4. You happen to call in for the Status Report, which begins with, "*Hello, this is telephone number 555-1234; the time is 12:15PM.*" Following this introduction, the report continues:

"*Number 1, 110 degrees, HIGH.*"

"*Number 2, EXISTS.*"

"*Number 3, EXISTS.*"

"*Number 4, EXISTS.*"

"*The electricity is OFF.*"

"*Battery condition, OK.*"

"*Sound level, HIGH.*"

"*Warning message received by ...(last telephone number dialed*).*"

"*Listen to the sound level for 10 seconds.*"

The Status Report repeats once more and the Model 1104 concludes the call by saying: "*Have a good day.*"

* The "*last telephone number dialed*" refers to any one of the programmed, dial-out telephone numbers through which the Model 1104 was able to receive alarm acknowledgment, prior to your call for a Status Report; this could also refer to the Model 1104's I.D. Number (identification number), if the alarms are acknowledged at the keypad by someone present at the site.

6.2.3 Example: Status Report, Disabled Inputs

If an input is disabled, the dial-out feature for that input is deactivated, but all other programmed parameters remain in effect. In the example below, all 4 inputs are disabled, although inputs 1 and 3 are detecting alarms. AC power and Sound Level is also disabled for dial-out. (Note that to indicate disabled status, only AC power will return two audible "*beeps*," rather than the word "*OFF.*") When you call the Model 1104 for a Status Report, you hear the following:

"*Hello, this is telephone number 555-1234.*

"*The time is 12:15PM.*"

"Number 1, OFF, 96 degrees, HIGH."

"Number 2, OFF, 74 degrees, OK."

"Number 3, OFF, EXISTS."

"Number 4, OFF, OK."

"The electricity is (beep, beep) ON." If the electricity is off, or the AC adaptor is disconnected, you will hear: *"The electricity is (beep, beep) OFF."*

"Battery condition, OK."

"Sound level OFF, OK." If the sound level is high you will hear: *Sound level OFF, HIGH."*

"Listen to the sound level for 10 seconds."

The Status Report repeats once more and the Model 1104 concludes the call, saying: *"Have a good day."*

6.2.4 Battery Condition

During a Status Report, you may hear one of three possible messages regarding battery power. The Model 1104 determines the appropriate message by measuring battery voltage. Depending upon the remaining voltage, it may respond:

- *"Battery Condition OK,"* if over 8.2 Volts.
- *"Battery Condition low,"* if between 7.2 and 8.2 Volts.
- *"Replace batteries,"* if below 7.2 Volts.

6.2.5 Remote Access by Touch-Tone™ Telephone

Calling the Model 1104 for a Status Report provides the opportunity to access other functions, using Touch-Tone™ push-button commands. Remote telephone commands include:

- Disabling/enabling any input.
- Disabling/enabling High Sound Alarm monitoring.
- Disabling/enabling AC Power monitoring.
- Activation of Listen-In Time.
- Activation of the Status Report.

To issue commands by telephone, first dial the number of the Model 1104 to access the Status Report. The Status Report will be followed by the programmed Listen-In Time. If you remain on the telephone, the Status Report will be repeated, followed by a 10

second waiting period and hang-up. During this 10 second waiting period, or ***at any time during the call, other commands may by accessed by pressing any push button on the telephone.***

If a Security Code is in effect, the Model 1104 will prompt you with: "*Enter Security Code.*" If no Security Code is set, then it will say "*O.K.*"

- Enter your Security Code (4 digits) with the telephone push buttons. If the code you enter is correct, the Model 1104 will respond: "*OK.*"
- If you enter the wrong Security Code, the Model 1104 says, "*Error. Have a good day,*" and hangs up.

Disabling/enabling inputs – If an input is set to detect an alert condition, it can be disabled to prevent the Model 1104 from dialing out, or re-enabled at any time.

This feature allows the convenience of disabling an input, even if you are away from the site of the Model 1104. One such application may involve an input programmed to detect unauthorized entry. You are in another locale, but must allow someone else temporary access to the area monitored by the Model 1104. Using a Touch-Tone™ telephone, you can disable the appropriate input (thereby disabling any alarm dial-out response). The input remains disabled until you issue the same command, which effectively returns it to its former, enabled state.

Press the following push-buttons on the Touch-Tone™ telephone to execute the desired command:

*** (asterisk), 1**

...equal to Sensor On/Off, for input 1. To re-enable the input, repeat the same Touch-Tone™ button sequence used for disabling.

*** (asterisk), 2**

...equal to Sensor On/Off for input 2, and so on, for inputs up to 4. To re-enable the input, repeat the same Touch-Tone™ button sequence used for disabling.

Disabling/enabling High Sound Monitoring –

*** (asterisk), 9**

...equal to SENSOR ON/OFF for High Sound Alarm monitoring. To re-enable High Sound Alarm, repeat the command.

Disabling/enabling AC Power –

*** (asterisk), 0**

...equal to Sensor On/Off for AC Power monitoring. To re-enable AC Power monitoring , repeat the command.

Activating Listen-In Time –

 # (pound), 1

...initiates Listen-In Time for listening to on-site sounds for the programmed time available.

Activating Status Report –

 # (pound), 2

...initiates a full recitation of the Status Report.

Exiting –

 # (pound), # (pound)

...forces exit. The 1104 says, "*Have a good day,*" and hangs up.

Chapter 7: Operation

After installation and programming is completed, the Model 1104 is fully operational. This chapter explains the sequence of events that occur during an alarm dialout to illustrate how the Model 1104 operates.

7.1 Alarm Detection, Dial-out and Acknowledgment

Generally, an alarm event is structured in the following manner:

I. The Model 1104 detects an alert condition due to a change at the sensor.
II. A valid alarm is recognized.
III. Dial-out begins.
IV. The alarm is acknowledged.

Often, an alarm does not proceed through all stages: either an alert condition does not persist long enough to be considered valid, or a valid alarm is cancelled.

The table on the following pages explains the alarm detection, dial-out and acknowledgment features and lists important variable factors affecting their operation.

I.Model 1104 Detects a Change at the Sensor	Variable Factors
• Model 1104 detects a change in the monitored condition (from the sensor wired to one of the inputs). This is considered an alert condition, and does not qualify as a valid alarm at this point. • The condition continues throughout the programmed Recognition Time. If the condition (or sensor) reverts to its normal state before the Recognition Time is reached, no alarm will occur.	*Input Type: (1) An open circuit closes, (2) a closed circuit opens, or (3) temperature limits are exceeded.* *Recognition Time: Activated*
II. A Valid Alarm Is Recognized	**Variable Factors**
• The condition must persist long enough to meet or exceed the programmed Recognition Time. When Recognition Time has expired, but the alert condition continues, the Model 1104 will determine that a valid alarm exists.	*Recognition Time: Expired*
• When a valid alarm is determined, Call Delay is activated, forcing the Model 1104 to wait for a programmed period of time before starting the dial-out process. Call Delay applies to the period just prior to dial-out, before the first telephone call is made.	*Valid Alarm: Exists* *Call Delay: Activated*
• Call Delay provides the opportunity to cancel a valid alarm at the Model 1104's installation site, before dial-out occurs. An audible voice message indicates which of the inputs is in alarm. If on-site personnel acknowledge the alarm within the Call Delay time, the Model 1104 will not dial out. (Local Voice Mute is disabled, so that alarm messages can be heard at the site.)	*Alarm Message: Audible, On-site Activated* *Local Voice Mute: Disabled*

III. Dial-out Begins	Variable Factors
• The dial-out process is activated as soon as the Call Delay time expires (if the alarm has not been cancelled at the Model 1104's installation site.) The dial-out begins with telephone number 1 and proceeds sequentially, through the remaining telephone numbers.	*Call Delay: Expired*
• If the alarm is not acknowledged with the first dial-out telephone call, the Model 1104 waits the duration of Intercall Time before dialing the next telephone number. Intercall Time is the programmed waiting period in between each dial-out telephone call.	*Intercall Time: Activated*
• When the telephone is answered, the programmed Voice Repetitions determine the number of times per call the Model 1104 recites the alarm message.	*Voice Repetitions: Activated*
• Call Progress, an automatic feature, enables the Model 1104 to detect whether or not the telephone call is answered. After 8 rings, or if a busy signal is encountered, the Model 1104 will hang up, wait the programmed Intercall Time, and proceed to dial the next telephone number.	*Call Progress: Activated*
• If no telephone calls are answered, the Model 1104 dials out sequentially, through the remaining telephone numbers and continues to cycle until the programmed Maximum Number of Calls is reached.	*Max Calls: Activated*
• When the telephone is answered, the Model 1104 will immediately begin reciting a message that indicates which of the inputs is in alarm. At the same time, the alarm message is repeating at the Model 1104's installation site. The Model 1104 will request acknowledgment, if it has not yet occurred.	*Alarm Messages: By Telephone and On site*

IV. The Alarm Is Acknowledged	Variable Factors
• At any time after a valid alarm is determined, the alarm may be acknowledged at the Model 1104's installation site, by pressing any key.	*Local, On-site Acknowledgment*
• When the Model 1104 dials out and the call is answered via Touch-Tone telephone, any alarm may be instantly acknowledged by pressing "555."	*Touch-Tone Acknowledgment: Fast Code 555*
• If the alarm message repeats for the number of programmed Voice Repetitions, and "555" has not been entered, the Model 1104 will say:	
"*Indicate that you have received warning message.*"	
The Model 1104 waits 10 seconds for the Touch-Tone code "555" to be entered. If the code is entered within 10 seconds, it responds:	*Touch-Tone Acknowledgment: Normal Code 555*
Warning message received by telephone number...(the dialed phone number)."	
The alarm is considered acknowledged and the dialout concludes.	
• If the Model 1104 does not receive the Touch-Tone code within 10 seconds, it recites the following and then hangs up:	*Tone or Pulse Callback Acknowledgment: Within Intercall Time*
"*Dial telephone number (gives the Unit ID Number) within...(the programmed Intercall Time.)*"	
The recipient of this message must call the Model 1104 back within the period programmed for Intercall Time, in order to acknowledge the alarm. If Local Voice Mute is off, the unit will beep at the installation site while waiting for this call.	
• Callback: The Model 1104 waits 10 rings before answering to guard against random acknowledgment. If an	

IV. The Alarm Is Acknowledged	Variable Factors
answering device is connected to the same line as the Model 1104 (and TAD is enabled), the Model 1104 will answer on the first ring. First, it recites the Status Report, followed by: "*Warning message received by telephone number...(the last number dialed).*" "*Have a good day.*"	*Tone or Pulse Callback Acknowledgment: TAD Enabled*
When the Model 1104 hangs up, the alarm is acknowledged and dial-out stops.	
• If calls remain unanswered, or if they are received by an answering machine or FAX, the Model 1104 continues the dialout sequence; it waits the Intercall Time and proceeds to dial the next telephone number. Telephone numbers are dialed sequentially, and this cycle continues for the number of Max Calls programmed. If no acknowledgment occurs, then at the completion of Max Calls, the alarm is automatically acknowledged and the dial-out process is terminated.	*Max Calls Acknowledgment*

NOTE

Acknowledging the alarm does not correct the situation! The alarm condition will still exist until the sensor is restored to its normal state.

7.2 Example: A Dial-out Telephone Call

The following parameters are selected for demonstration purposes:

- Model 1104 Unit ID Number is set to 555-5674. It is currently installed at your place of business.
- Dial-out Telephone Number 1 is programmed to 555-1234, your home telephone number.
- Voice Repetitions are set to 4.

The Model 1104 is detecting an alarm on input 2.

The telephone rings at 555-1234, your home number.

You answer the telephone and hear the following message:

"*Hello, this is telephone number 555-5674. The time is 8.30PM Alert condition two exists.*"
(4-seconds to hear on-site sound from unit's microphone.)

"*Hello, this is telephone number 555-5674. The time is 8.30PM Alert condition two exists.*"
(4-seconds to hear on-site sound from unit's microphone.)

"*Hello, this is telephone number 555-5674. The time is 8.30PM Alert condition two exists.*"
(4-seconds to hear on-site sound from unit's microphone.)

"*Hello, this is telephone number 555-5674. The time is 8.30PM Alert condition two exists.*"
(4-seconds to hear on-site sound from unit's microphone.)

"*Indicate you have received warning message.*"

NOTE

It is important that your dial-out telephone numbers be answered by you or other authorized personnel in order to ensure adequate response to an alarm.

Chapter 8: Model 1104 Special Editions

The Sensaphone Model 1104 also comes in three editions with additional special features: the CottageSitter, BusinessSitter, RemoteControl, and Model 1114 Line Seizure models. If you have purchased one of these versions of the 1104, please refer to this chapter for additional information specific to the operation of your unit.

8.1 Sensaphone 1104 CottageSitter Edition

The Sensaphone 1104 CottageSitter allows you to monitor and check on the status of your cottage or cabin from any cellular or ordinary telephone. The Sensaphone 1104 CottageSitter also allows you to turn a device on or off using the 1104 keypad or using your touch-tone telephone. You can also inquire about the status of the device during a voice status report.

This Sensaphone contains a relay contact on the rear of the unit *(see Figure 1)*. The relay contact supports both a normally open and a normally closed contact, commonly referred to as a "double throw" relay.

When the Sensaphone relay is turned ON, a connection is made between the ON and C (common) terminals and the connection to the OFF terminal is disconnected. When the Sensaphone relay is turned OFF, a connection is made between the OFF and the C (common) terminals and the connection between the ON and C (common) is disconnected *(See Figure 1)*. When the Sensaphone unit is put in standby mode, the relay remains in its last known state. If the Sensaphone is completely shut down by removing the batteries and unplugging it from power, the relay returns to an OFF state, connecting the OFF terminal to the C (common).

The Sensaphone relay is a low voltage relay. Only voltages less than 30 volts AC 2AMPS, or 30 volts DC 2 AMPS may be switched. For higher voltages, an additional high-voltage relay would be required.

Always enlist the services of a licensed electrician when working with high voltages. Improper wiring can cause harm to you or your property.

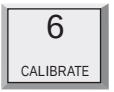
> **NOTE:** For safety reasons it is highly recommended that the unit only be used to switch low voltage signals (30 volts or less). If you intend to control higher voltages you must install the unit in an NEC approved electrical panel or enclosure and have wiring performed by a qualified electrician.

8.1.1 Switching the Output using the Keypad

To switch the output **ON** from the keypad:

1. Press STATUS.

2. Press 6.



To switch the output **OFF** from the keypad:

1. Press STATUS.

2. Press 3.

8.1.2 Switching the Output over the Telephone

1. Call the Sensaphone. When the unit answers, it will begin reciting a status report. At any time during the call, press a touch-tone. The unit will respond with "*OK*." The Sensaphone is now ready to accept touch-tone commands.
2. On your phone, press # 6 to turn **ON** the output. The Sensaphone will respond "*ON*."

3. Press pound # 3 to turn **OFF** the output. The Sensaphone will respond "*OFF*."

4. To check the present state of the relay press # 2.

This initiates a full recitation of the Status Report. At the end of the status report, the Sensaphone will say "*Number five On/Off.*"

8.1.3 Heating up your Cottage or Cabin Remotely

If you keep your cottage or cabin open all year around, or if you do not drain your pipes and antifreeze your plumbing, you likely keep your furnace active when you are away but at a very low temperature. The Sensaphone will provide an invaluable service to you by keeping you updated to any change in the status of your furnace operation. Prior to your arrival at your cottage or cabin, you can remotely use your phone to instruct the furnace to increase the heat.

Most furnaces use a typical 4-wire (heat/cooling) or 3-wire (heat only) thermostat. The Sensaphone can easily control these types of thermostats. ***If your heating source consists of high voltage electric baseboard heaters, you should consult a qualified electrician or heating professional for proper installation of the Sensaphone remote control facility.*** Electric baseboard heaters may utilize either a low voltage (2-wire) thermostat or a direct control high voltage thermostat. Only the low voltage thermostat may be directly connected to the Sensaphone.

8.1.4 The Dual Thermostat Concept

When a three or four wire low voltage thermostat is used, it is easy to connect the Sensaphone to your furnace with the addition of a secondary thermostat. One thermostat is set to your preferred "away" temperature and the other thermostat is set to your preferred "home" temperature. With your Sensaphone CottageSitter, you will be able to switch between these two thermostats.

Ideally, the "away" thermostat would be in your pump or furnace room. Remember that your "away" thermostat will be the only thermostat that keeps your cottage or cabin at minimal heat while you are away. It should not be located near a window or where direct sunlight might warm it, near a furnace radiator or vent, or any heat source such as a pilot light.

The second thermostat, the one pre-set for your preferred temperature when you arrive at your cottage or cabin, should be located in your normal living space. This would likely be your existing thermostat, already located in a suitable location by your heating professional at the time your furnace was installed.

By connecting these two thermostats together in a parallel fashion, and by passing the low voltage supply through the Sensaphone *(See Figure 1)*, you can remotely or locally decide which thermostat is in control of your furnace.

It is recommended that the "away" thermostat be connected to the OFF terminal while the "home" thermostat be connected to the ON terminal of the Sensaphone. This way, it's easy to understand which state your furnace is in: *ON = Home* and *OFF = Away*. The supply voltage from your furnace (typically the wire labeled R or 24VAC), should always be connected to the C (Common) terminal on the CottageSitter.

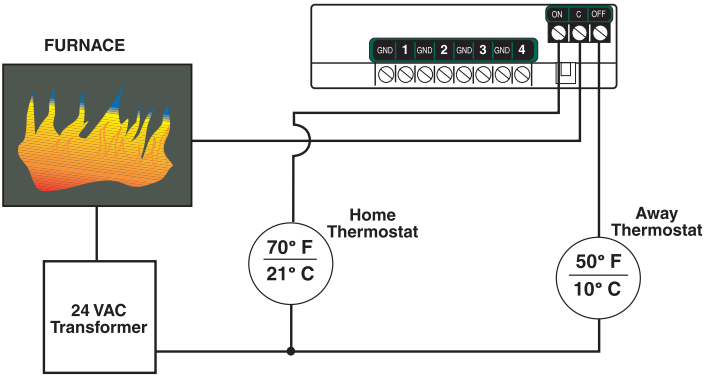


Figure 1: Dual Thermostat Setup

Note: This is a typical configuration when using standard single-zone heat/cool thermostats. For ease-of-use it is recommended that both thermostats be the same model. Note also that all thermostats may not be compatible with the dual-thermostat wiring diagram. Consult your heating/cooling professional for installation assistance.

8.1.5 Controlling Lights or other devices

Using X10 technology, you can remotely activate any electrical device or appliance in your home through your Sensaphone. X10 technology is a suite of control modules that plug into your existing electrical outlets and transmit coded signals to lamps, lights, and appliances to turn them on or off (See Figure 2).

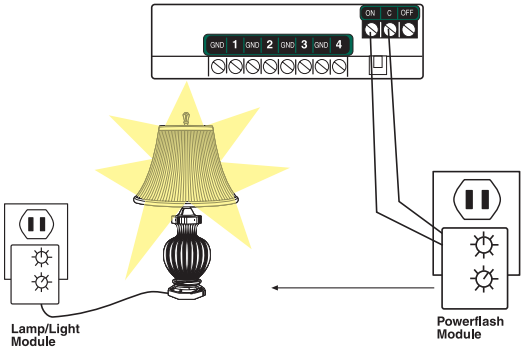


Figure 2: X10 Lighting Control Setup

Sensaphone supports these devices through use of the popular X10 Powerflash relay interface. To learn more about this technology, consult X10 products on the web at www.x10.com or visit your local electronics shop such as Radio Shack.

Such applications may include turning on a lamp or exterior lights remotely from your cellular telephone when arriving at your cottage or cabin late at night. Or you can use the X10 Powerflash Module (set to momentary contact) in conjunction with the X10 Universal Module to remotely control your electric garage door opener over the telephone—an ideal way of letting in your cottage or cabin service personnel without being on-site. You may also use the X10 technology to send the ON/OFF signal to a furnace or heater if your thermostat is not easy to wire directly.

Finally, in addition to remotely controlling devices, X10 technology lets you extend the reach of certain Sensaphone sensors such as door contacts, motion sensors, or water sensors. This of great benefit where it is impossible to wire directly from your sensors to your Sensaphone. Consult a qualified electrician or your heating professional for assistance with locating your remote sensors or contact your Sensaphone dealer.

8.1.6 Relay Output Specifications

Rated Load:	2 A at 30 VAC 2 A at 30 VDC
Max. Operating Voltage:	30 VAC 30 VDC
Max. Operating Current:	2 A
Max. Switching Capacity:	60 VA 60 W

8.2 Sensaphone 1104 BusinessSitter Edition

The Sensaphone 1104 BusinessSitter allows you to monitor and check on the status of your facility from any cellular or ordinary telephone. The Sensaphone 1104 BusinessSitter turns a device on when an alarm occurs. You can also inquire about the status of the device during a voice status report.

This Sensaphone edition contains a relay contact on the rear of the unit *(see Figure 3)*. The relay contact supports a normally open relay.

When the Sensaphone detects an alarm condition, it closes this relay, which then activates the device attached to the relay. The relay remains closed throughout the alarm process, even while the Sensaphone is making its alarm-response telephone calls out to you. Reset of the alarm relay may occur either locally or remotely via the telephone. This is discussed further in following sections.

The Sensaphone relay is a low voltage relay. Only voltages less than 30 volts AC 2AMPS, or 30 volts DC 2 AMPS may be switched. For higher voltages, an additional high-voltage relay would be required.

Always enlist the services of a licensed electrician when working with high voltages. Improper wiring can cause harm to you or your property.

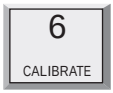
NOTE: For safety reasons it is highly recommended that the unit only be used to switch low voltage signals (30 volts or less). If you intend to control higher voltages you must install the unit in an NEC approved electrical panel or enclosure and have wiring performed by a qualified electrician.

8.2.1 Switching the Output using the Keypad

To switch the output **ON** from the keypad:

1. Press STATUS.

2. Press 6.



To switch the output **OFF** from the keypad:

1. Press STATUS.

2. Press 3.

8.2.2 Switching the Output over the Telephone

1. Call the Sensaphone. When the unit answers it will begin reciting a status report. At any time during the call, press a touch-tone. The unit will respond with *"OK."* The Sensaphone is now ready to accept touch-tone commands.
2. On your phone, press # 6 to turn **ON** the output. The Sensaphone will respond *"ON."*

3. Press # 3 to turn **OFF** the output. The Sensaphone will respond *"OFF."*

4. To check the present state of the relay press # 2.

This initiates a full recitation of the Status Report. At the end of the status report, the Sensaphone will say, *"Number five On/Off."*

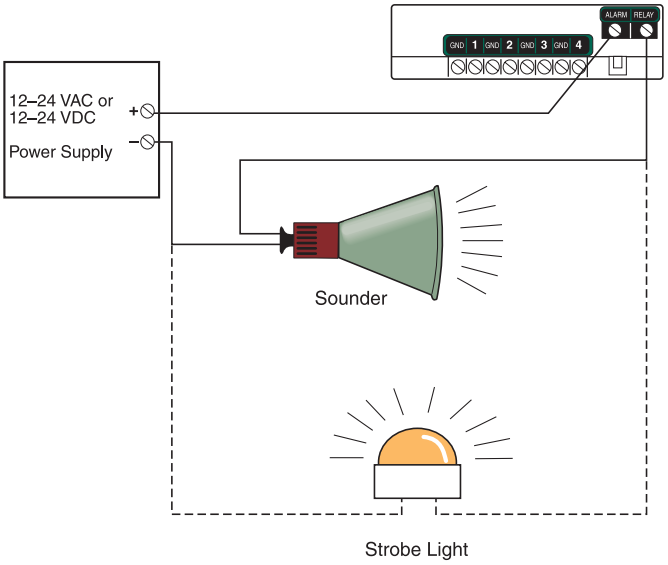


Figure 3: Activating a Sounder or Strobe on Alarm

8.2.3 Relay Output Specifications

Rated Load:	2 A at 30 VAC 2 A at 30 VDC
Max. Operating Voltage:	30 VAC 30 VDC
Max. Operating Current:	2 A
Max. Switching Capacity:	60 VA 60 W

8.3 Sensaphone 1104 RemoteControl Edition

The Sensaphone 1104 RemoteControl allows you to monitor and check on the status of your facility from any cellular or ordinary telephone. The Sensaphone 1104 RemoteControl also allows you to turn a device on or off using the 1104 keypad or using your touch-tone telephone. You can also inquire about the status of the device during a voice status report.

This Sensaphone contains a relay contact on the rear of the unit *(See Figure 4)*. The relay contact supports both a normally open and a normally closed contact, commonly referred to as a "double throw" relay.

When the Sensaphone relay is turned ON, a connection is made between the ON and C (common) terminals and the connection to the OFF terminal is disconnected. When the Sensaphone relay is turned OFF, a connection is made between the OFF and the C (common) terminals and the connection beetween the ON and C (common) is disconnected *(See Figure 4)*. When the Sensaphone unit is put in standby mode, the relay remains in its last known state. If the Sensaphone is completely shut down by removing the batteries and unplugging it from power, the relay returns to an OFF state, connecting the OFF terminal to the C (common).

The Sensaphone relay is a low voltage relay. Only voltages less than 30 volts AC 2AMPS, or 30 volts DC 2 AMPS may be switched. For higher voltages, an additional high-voltage relay would be required.

Always enlist the services of a licensed electrician when working with high voltages. Improper wiring can cause harm to you or your property.

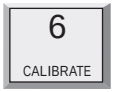
> **NOTE:** For safety reasons it is highly recommended that the unit only be used to switch low voltage signals (30 volts or less). If you intend to control higher voltages you must install the unit in an NEC approved electrical panel or enclosure and have wiring performed by a qualified electrician.

8.3.1 Switching the Output using the Keypad

To switch the output **ON** from the keypad:

1. Press STATUS.

2. Press 6.



To switch the output **OFF** from the keypad:

1. Press STATUS.

2. Press 3.

8.3.2 Switching the Output over the Telephone

1. Call the Sensaphone. When the unit answers it will begin reciting a status report. At any time during the call, press a touch-tone. The unit will respond with "*OK*." The Sensaphone is now ready to accept touch-tone commands.
2. On your phone, press # 6 to turn **ON** the output. The Sensaphone will respond "*ON*."

3. Press # 3 to turn **OFF** the output. The Sensaphone will respond "*OFF*."

4. To check the present state of the relay press # 2.

This initiates a full recitation of the Status Report. At the end of the status report, the Sensaphone will say "*Number five On/Off.*"

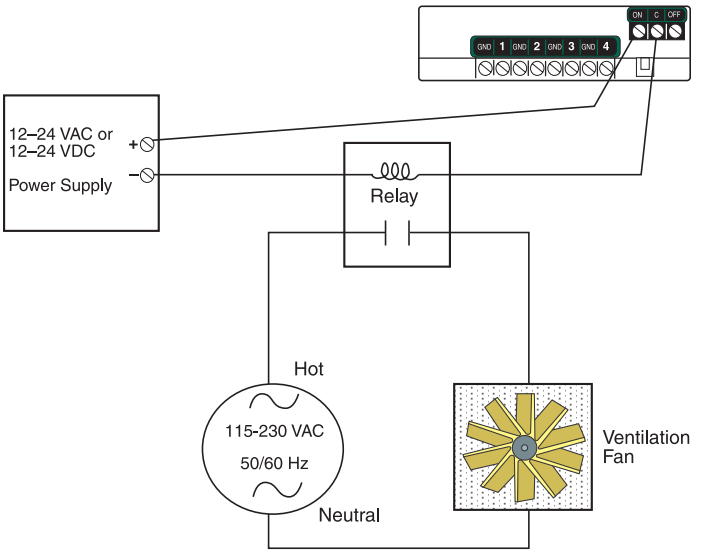


Figure 4: Controlling a Ventilation Fan

8.3.3 Controlling Lights or other devices

Using X10 technology, you can remotely activate any electrical device or appliance in your home through your 1104. X10 technology is a suite of control modules that plug into your existing electrical outlets and transmit coded signals to lamps, lights, and appliances to turn them on or off *(See Figure 5)*.

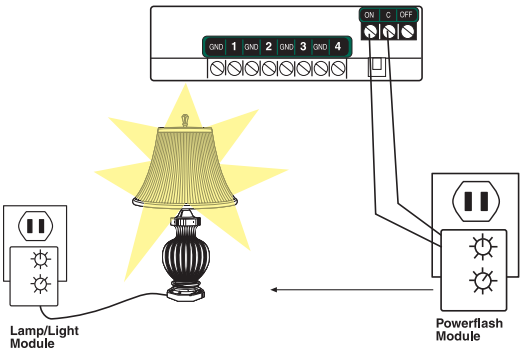


Figure 5: X10 Lighting Control Setup

The Model 1104 supports these devices through use of the popular X10 Powerflash relay interface. To learn more about this

technology, consult X10 products on the web at www.x10.com or visit your local electronics shop such as Radio Shack.

Such applications may include turning on a lamp or exterior lights remotely from your cellular telephone when arriving at your cottage or cabin late at night. Or you can use the X10 Powerflash Module (set to momentary contact) in conjunction with the X10 Universal Module to remotely control your electric garage door opener over the telephone—an ideal way of letting in your cottage or cabin service personnel without being on-site. You may also use the X10 technology to send the ON/OFF signal to a furnace or heater if your thermostat is not easy to wire directly.

Finally, in addition to remotely controlling devices, X10 technology lets you extend the reach of certain Sensaphone sensors such as door contacts, motion sensors, or water sensors. This is of great benefit where it is impossible to wire directly from your sensors to your Sensaphone. Consult a qualified electrician or your heating professional for assistance with locating your remote sensors or contact your Sensaphone dealer.

8.3.4 Relay Output Specifications

Rated Load:	2 A at 30 VAC 2 A at 30 VDC
Max. Operating Voltage:	30 VAC 30 VDC
Max. Operating Current:	2 A
Max. Switching Capacity:	60 VA 60 W

8.4 Model 1114 Line Seizure Edition

The Sensaphone Model 1114 operates identically to the Model 1104 except for the "line seizure" feature. The following is an explanation of the setup procedures unique to the Model 1114.

8.4.1 How Line Seizure Works

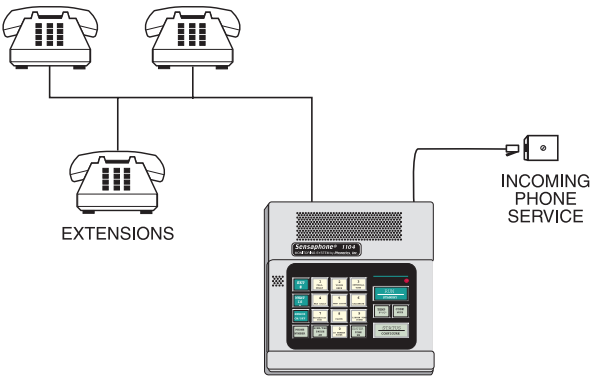
Line seizure gives the Sensaphone the ability to "seize" the telephone line when it needs to dial out. For example, if an emergency occurs that puts the Sensaphone into alert mode, the Sensaphone will be able to dial out even if a telephone has been left off the hook.

8.4.2 Hookup to the Phone Line

Programming and installation of the Sensaphone Model 1114 is identical the Model 1104 except for the telephone line hookup.

On the unit there are two RJ11C phone jacks:

- The six-foot telephone cord with the male RJ11C jack on the end is to be connected to the incoming line of your phone service, ahead of all other phones or telephone extensions.
- The female RJ11C telephone jack on the back of the unit is to be connected to all extensions.



Appendix A: Weekly Testing Procedure

We recommend that you test your Sensaphone weekly to be sure it is functioning properly. This will ensure that when a problem arises the Sensaphone will be ready to alert the appropriate personnel.

There are several tests that can be performed:

1) Call the unit and listen to the Status Report. This will test the unit's ability to answer the phone and speak a message. It will also verify that all of the inputs are reading properly, the alarm conditions are OK, the electricity is on, the microphone is functioning, and the batteries are OK.

2) Create an alarm on each input by tripping all connected sensors.

   Temperature sensors: Heat or cool the sensor.

   Motion sensors: Have someone walk in front of the sensor.

   Door/window sensors: open the door/window.

   Water sensors: Apply a small amount of water beneath the sensor or use a wet towel and touch it to the sensor probes.

   Humidity sensors: Raise the humidity around the sensor by holding a cup of very hot water beneath the sensor.

   Allow the unit to contact all programmed telephone numbers. This will make sure that the Sensaphone is programmed properly. It will also prepare personnel to respond appropriately when they receive a call from the Sensaphone.

3) Test the batteries by unplugging the AC adapter and making sure that the Sensaphone continues to function. Press WHAT IS, then STATUS on the keypad, and listen to the status report. Make sure the report states that "*the electricity is off*" and "*battery condition OK*." Keep the AC adapter unplugged so that a Power Failure alarm occurs. Allow the unit to dial all programmed telephone numbers while running on battery backup. Plug in the AC adapter after the unit has finished dialing all of the telephone numbers.

4) If you are using your Sensaphone to listen for a smoke alarm, then be sure to test the smoke alarm to make sure that the Sensaphone picks up the audible signal and triggers a high-sound-level alarm. Allow the unit to dial all programmed telephone numbers.

5) Keep a log of your tests, noting the date and whether the 1104 passed in each category tested. An example of such a log is shown below. *(See "Test Log" at the end of this manual.)*

1104 Test Log

Date	Inputs		Dialout		Call-in		Tested by
7/1/04	Pass ☒	Fail ☐	Pass ☒	Fail ☐	Pass ☒	Fail ☐	Bob H
7/15/04	Pass ☒	Fail ☐	Pass ☒	Fail ☐	Pass ☒	Fail ☐	Alex G.
7/22/04	Pass ☒	Fail ☐	Pass ☒	Fail ☐	Pass ☒	Fail ☐	Bob H.
	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	
	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	

If you require assistance, call Sensaphone Technical Support at 610-558-2700.

Appendix B: Troubleshooting

In the event that a problem is encountered, this section will assist you in determining the cause, so you can return the unit to its usual monitoring routine with minimal interruption.

Most problems with the Model 1104 are easy to identify and quickly corrected, and are found under the following general headings:

- Error Messages
- Communications/dial-out functions
- Temperature monitoring
- Sound level monitoring
- Other monitoring functions

If you have tried the solutions outlined in this section and are not satisfied with the results, call Sensaphone Technical Support at 610-558-2700, or follow the guidelines for shipping the Model 1104 to PHONETICS, INC. for repair (see Appendix F).

Error Messages

Problem	Cause	Solution
1. The unit says “Error 1.”	An invalid value has been entered or too much time has passed without entering a value.	Only enter values within the allowed programming range, and make programming changes in a timely fashion.
2. The unit says “Error 2.”	Programming changes were attempted without unlocking the keypad.	Unlock the keypad, then make programming changes.

Communications / Dial-out:

Problem	Cause	Solution
1. The Model 1104 fails to dial out.	a) The telephone number may be incorrectly programmed.	Recheck programming steps. Refer to Chapter 4, Section 4.2.1.
	b) Tone or pulse (the current dialing method) is not compatible with the telephone line on which the Model 1104 is installed.	Switch from the current setting: from tone to pulse, or from pulse to tone. Refer to Chapter 4, Section 4.3.
	c) Recognition Time is too long. An alert condition does not remain in effect long enough to become a valid alarm.	Reprogram Recognition Time. Set the Recognition Time to the minimum duration required to create a valid alarm. If possible, test the new setting by deliberately creating an alert condition. Refer to Chapter 5, Section 5.3.
	d) Max Calls is set to zero.	Reprogram Max Calls. It is a good idea to set your Max Calls to at least equal the number of dial-out telephone numbers programmed. Refer to Chapter 4, Section 4.12.1.

Communications / Dial-out:

Problem	Cause	Solution
	e) The Model 1104 is connected to an incompatible telephone line.	The Model 1104 must be connected to a standard (2-wire analog) telephone line, ***not a digital extension*** to a phone system. If the unit will not dial out and the factors previously listed have been ruled out, try connecting the unit to a standard residential telephone line.
2. The Model 1104 will not answer the telephone when called for a Status Report or alarm acknowledgment.	a) Rings Until Answer is incorrectly programmed.	Recheck programming of Rings Until Answer. Refer to Chapter 4, Section 4.5.1.
	b) The Model 1104 is connected to an incompatible telephone line.	Some telephone systems will not allow the telephone to ring beyond 4 rings. If your Model 1104's Rings Until Answer is set at more than 4 rings, you may not be able to access the unit. Try setting the Rings Until Answer to less than 4 rings. If this does not correct the problem, it may indicate telephone line incompatibility. In this case, try connecting the Model 1104 to a standard, residential telephone line.

3. The Model 1104 will not answer the telephone for Callback Acknowledgement.	You did not allow the telephone to ring 10 times. Note: If the TAD (telephone answering device) is disabled, the telephone rings ten times before the Model 1104 answers. If the TAD is enabled, the telephone rings once before the Model 1104 answers the call.	When calling the Model 1104, and the TAD is disabled, allow the telephone to ring 10 times. Refer to Chapter 6, Section 6.1.3, and Chapter 4, Section 4.6.3.
4. The Model 1104 recites the alarm message or Status Report over the telephone, but is silent at the installation site.	The local voice mute feature is in effect.	Deactivate local voice mute. Refer to the programming steps in Chapter 4, Section 4.9.
5. The Model 1104 dials out correctly but fails to audibly recite its alarm message when you answer the call.	Voice Reps is set to zero.	Reprogram Voice Reps to 1 or greater. Refer to Chapter 4, Section 4.10.
6. The Model 1104 and telephone answering device (sharing the same line) answer incoming calls simultaneously.	The Model 1104's number of Rings Until Answer is set to equal the number of rings set for the telephone answering device.	Change the number of Rings Until Answer for the Model 1104. Refer to Chapter 4, Section 4.5.

Temperature Monitoring:

Problem	Cause	Solution
1. Can't program temperature limits; or the unit won't read the temperature sensor.	The input isn't configured to read a temperature sensor.	Press SET and CONFIGURE to program the input. (See Section 5.1.1 for more information on configuring inputs.)
2. The temperature reading is -20° F or -30° C.	The temperature sensor has been disconnected or has broken wires.	Examine the wires to temperature sensor and connect or replace wiring.
3. Temperature reads 150° F or 65° C.	Temperature sensor wires are touching or have shorted.	Verify and correct wiring.
4. Temperature reading is inaccurate.	a) Temperature sensing may be affected by a source of ambient heat (ie., direct sunlight, or heat duct proximity).	Try moving the unit to a different location.
	b) Temperature may require calibration.	After moving or placing the unit away from ambient heat sources, the temperature may be calibrated to offset inaccurate normal reading by several degrees. Refer to Chapter 5, Section 5.6.
	c) The unit is using the wrong temperature scale (Fahrenheit vs. Celsius).	Verify temperature scale. Refer to Chapter 5, Section 5.5.

5. False high temperature alarms from freezer.	Most freezers have a defrost cycle during which the temperature will rise considerably, thus causing an alarm to occur.	Program an input recognition time longer than the defrost cycle.
6. The Sensaphone calls with a high/low temperature alarm but recites a temperature that's within the programmed limits.	The Sensaphone recites the "current" temperature when it calls you, not the temperature at the time the alarm occurred. It is likely that the temperature has changed since the time the alarm was detected and has since returned to normal operating conditions.	Shorten the Call Delay or lengthen the Input Recognition Time.

Sound Level Monitoring:

Problem	Cause	Solution
1. False high sound alarms occur frequently.	The programmed sound sensitivity results in over-sensitivity to non-alarm sound as well as alarm sound.	Reprogram the sound sensitivity. Refer to Chapter 5, Section 5.10.
	Sound Recognition Time is too short.	Lengthen the sound Recognition Time. Refer to Chapter 5, Section 5.10.
2. High sound does not cause an alarm.	The unit is not close enough to the high sound source, or the programmed sound setting results in a lack of sensitivity to high sound.	Move the unit closer or reprogram the sound sensitivity. Refer to Chapter 5, Section 5.10.

Other Monitoring:

Problem	Cause	Solution
1. Alarm status of an alert input is incorrect.	Incorrect input normality.	Reconfigure the input. Refer to Chapter 5, Section 5.1.
2. False power out alarms	Programmed Recognition Time is too short.	AC power is often subject to brief interruptions. To avoid frequent, false alarms, increase the power Recognition Time. Refer to Chapter 5, Section 5.9.
3. The Model 1104 does not recognize power failure.	a) Batteries are either incorrectly installed or drained.	To verify proper battery function, unplug the unit and verify continued operation using batteries only. If unit ceases to function, first try reinstalling the batteries. If this is not successful, replace the batteries. Refer to Chapter 2, Section 2.4 for complete instructions.
	b) Recognition time setting is too long.	Reprogram Recognition Time. Set the Recognition Time to the minimum required before a valid alarm occurs. If possible, test the condition by deliberately creating an alert condition. Refer to Chapter 5, Section 5.9.

4.	The Model 1104 does not recognize any alarm.	a) Inputs for alarm are disabled.	Enable the inputs for alarm. Refer to Chapter 5, Section 5.2.
		b) Programmed Recognition Time is too long.	Reprogram Recognition Time. Set the Recognition Time to the minimum required for a monitored condition to become a valid alarm. If possible, test the condition by deliberately creating an alert condition. Refer to Chapter 5, Section 5.3.
5.	The batteries drain prematurely.	The unit's AC transformer is unplugged or for some other reason, full AC power is not available to the unit.	The batteries will take over powering the unit when the AC transformer is unplugged from the 120 VAC outlet. When storing the unit, be sure to remove the batteries. Refer to Chapter 2, Section 2.4. *Be sure to use alkaline batteries—do not use rechargeable nicad batteries.*

If the solutions offered above do not appear to correct the problem, apply the following steps, in the order shown.

- Remove the batteries.
- Unplug the unit.
- Wait one minute for the Model 1104 to completely power down.
- Plug in the unit's AC adaptor into a standard 120 VAC outlet.
- Replace the batteries.

Refer to Chapter 2, Installation, for additional information on batteries and installation procedures.

Appendix C: 1104 QUICK REFERENCE

Parameter	Description	Key Sequence*	Range	Default
Call Delay	Time delay until first call is made	[SET] or [WHAT IS] + [CALL DELAY]	Min: 00:00 Max 60:00 (min:sec)	00:30 (min:sec)
Voice Reps	Number of times alarm message is repeated over the phone	[SET] or [WHAT IS] + [VOICE REPS]	Min: 0 reps Max: 10 reps	3 reps
Intercall Time	Time delay between phone calls	[SET] or [WHAT IS] + [INTERCALL TIME]	Min: 00:10 Max: 60:00 (min:sec)	01:00 (min:sec)
Max Calls	Number of calls until unit self-acknowledges	[SET] or [WHAT IS] + [MAX CALLS]	Min: 0 calls Max: 255 calls	100 calls
Temp Limits	High and low temperature alarm limits	[SET] or [WHAT IS] + [TEMP LIMITS] + [input #]	Min: -20°F/-30°C Max: 150°F/65°C	Low: 10°F High: 100°F
Calibrate	Temperature Correction factor	[SET] or [WHAT IS] + [CALIBRATE] + [input #]	Min: -10° Max: 10°	0°
Recognition Time: inputs 1–4	Length of time a fault condition must exist to trip an alarm	[SET] or [WHAT IS] + [RECOGNITION TiME] + [input#]	Min: 00:00 Max: 272:00 (min:sec)	00:03 (min:sec)
Recognition Time: Power Failure	Length of time the power must be off to trip an alarm	[SET] or [WHAT IS] +[RECOGNITION TIME]+[POWER]	Min: 00:00 Max: 272:00 (min:sec)	05:00 (min:sec)
Recognition Time: High Sound Level	Length of time the sound must be high to trip an alarm	[SET] or [WHAT IS] +[RECOGNITION TIME] + [SOUND]	Min: 00:00 Max: 272:00 (min:sec)	00:08 (min:sec)
Clock	Real time clock	[SET] or [WHAT IS] + [CLOCK] + [time] + [AM] or [PM]	Min: Max:	12:00 AM
High Sound Level Alarm Sensitivity	Microphone sensitivity for high sound level alarm	[SET] or [WHAT IS] + [CALIBRATE] + [SOUND]	Min: 1 unit Max: 255 units	32 units
Listen Time	Length of listen-in time during call-in status report	[SET] or [WHAT IS] + [LISTEN TIME]	Min: 0 sec Max: 255 sec	00:15 (min:sec)
Rings Until Answer	Number of rings until unit answers an incoming call	[SET] or [WHAT IS] + [RING]	Min: 1 ring Max: 15 rings	4 rings

* press [ENTER] after all Key Sequences starting with [SET]

Parameter	Description	Key Sequence	Response	Default
Speaker Mute	Turns off the speaker during alarm conditions	[SENSOR ON/OFF] + [MUTE]	On or Off	off
Input Enable/Disable	Turns input alarm detection on or off	[SENSOR ON/OFF] + [input#]	On or Off	Enabled
Power Alarm Enable/Disable	Turns power alarm detection on or off	[SENSOR ON/OFF] + [POWER]	On or Off	Enabled
Sound Alarm Enable/Disable	Turns high sound level alarm detection on or off	[SENSOR ON/OFF] + [SOUND]	On or Off	Enabled
Temperature Scale	Selects between Fahrenheit and Celsius	[SENSOR ON/OFF] + [F/C]	On or Off	Fahrenheit (on)
Security Code	Prohibits programming changes	[SET] or [WHAT IS] + [CODE] + [4 digit code]		none
Callback Acknowledgment	Turns Callback Acknowledgment on or off	[SENSOR ON/OFF] + [PHONE]	On or Off	off

SPECIAL KEY FUNCTIONS:

RING/TAD/PAUSE/AM
1) Used to enter a minus sign for negative temperature limits or temperature calibrations.
2) Used to program a 4 second pause into dialout phone numbers.

CODE/MUTE Key
Used to program a "wait for answer" into dialout phone numbers.

SET/# Key
Used to program a "#" into dialout phone numbers.

WHAT IS/* Key
Used to program an "*" into dialout phone numbers.

PROGRAMMING THE 1104 FOR USE WITH A PAGER
Press [SET/#] + [PHONE NUMBER] key + the phone number of the pager + [RING/TAD/**PAUSE**/AM]***** + the phone number of the 1104 (+ optional [SET/#] if required by your pager service) + [ENTER].

***NOTE**: You may have to press the [PAUSE] key multiple times to coordinate with the delay in your pager service's answering function. We recommend you try pressing [PAUSE] twice.

REMOTE TOUCH-TONE COMMANDS

Enable/Disable Alert Inputs: [*] + [input #]
Enable/Disable High Sound Level: [*] + [9]
Enable/Disable AC Power: [*] + [0]

Activate Listen-in: [#] + [1]
Activate Status Report: [#] + [2]
Disconnect: [#] + [#]

Appendix D: Accessories

The sensors listed below are available from Phonetics, Inc., and represent the most commonly used input devices. Other dry contact sensors, designed for more specialized applications, may also be used. Commercial or industrial electrical supply houses can provide devices to monitor virtually any condition. For further information, contact Sensaphone Customer Service at 610-558-2700.

PART #	SENSOR / SWITCH
FGD-0006	Magnetic Reed Switch
FGD-0007	Passive Infra-Red Detector
FGD-0010	50' two-conductor #22AWG shielded Accessory Cable
FGD-0013	Spot Water Detector
FGD-0022	Temp° Alert
FGD-0023	ISOTEL Surge Protector
FGD-0027	Humidistat
FGD-0049	Smoke Detector with Built-in Relay
FGD-0054	Power-Out Alert™
FGD-0056	Zone Water Detector w/Water Rope
FGD-0063	10' Water Rope for FGD-0056
FGD-0100	Remote Temperature Sensor
FGD-0101	Weatherproof Temperature Probe
FGD-0200	Phonecell SX3e Cellular Phone

Appendix E: Specifications

Alert Inputs

Number of Inputs: 4 (thermistor installed on input #1 for local temperature monitoring)

Input Connector: terminal block

Input Types: N.O./N.C. contact, 2.8K thermistor (-20 to 150° F or -30 to 65° C)

Input Characteristics: 5.6K to 5V (Short circuit current: 1mA max.)

A/D Converter Resolution: 10 bits ±2 LSB

Input Protection: 5.5VDC Metal Oxide Varistor with fast acting diode clamps.

Microphone

Internal Electret Condenser: For listening in to on-site sounds and detecting high sound levels.

Phone Interface

6' Cord w/RJ11 Plug: For connection to a two-wire analog telephone line.

Extension RJ11 Jack: For connecting other devices on the same telephone line.

Line Seizure RJ11 Jack (Model 1114 Only): Devices connected to this jack are disconnected in the event that the 1114 must dial out for an alarm.

Phone Line Protection: Metal Oxide Varistor & self-resetting fuse

LED Indicator

System LED: On steady when the unit is in RUN mode. LED blinks once every few seconds while in STANDBY mode.

Relay Output (1104-CS/BS/RC only)

Rated for 2A 30VAC/2A 30VDC maximum.

Power Supply

Power Supply: 120VAC/8VAC 60Hz 12W wall plug-in transformer w/6' cord.

Power Consumption: 5 Watts

Power Protection: Metal Oxide Varistor

Battery Backup: Six size-D alkaline batteries (not included), providing up to 24 hours of back-up time.

Environmental

Operating Temperature: 32–122° F (0–50° C)

Operating Humidity: 0–90% RH non-condensing

Storage Temperature: 32–140 deg F

Physical

Dimensions: 2.1"h x 7.8"w x 8.8"d

Weight: 2 lbs.

Enclosure: Indoor-rated plastic housing suitable for wall or desktop installation.

Certifications

NRTL Listed—File #E112098. Complies with UL60950-1/ CSA60950-1.

FCC Part 68 certified.

FCC Part 15 class B certified.

Industry Canada CS03 certified.

Appendix F: Returning the Unit for Repair

In the event that the Model 1104 does not function properly, we suggest that you do the following:

1) Record your observations regarding the Model 1104's malfunction.

2) Call the Technical Service Department at 610-558-2700 prior to sending the unit to Sensaphone for repair.

If the unit must be sent to Sensaphone for Servicing, please do the following:

1) Unplug the AC power supply from the wall outlet, remove the batteries, and disconnect all sensors from the alert inputs.

2) Carefully pack the unit to avoid damage in transit. Use the original container (if available) or a sturdy shipping box.

3) **You must include the following information to avoid shipping delays:**

   a) Your name, address and telephone number.

   b) A note explaining the problem.

4) Ship your package to the address below:

SERVICE DEPARTMENT
Phonetics, Inc.
901 Tryens Road
Aston, PA 19014

5) Ship prepaid and insured via UPS or US Mail to ensure a traceable shipment with recourse for damage or replacement.

Test Log

Date	Inputs	Dialout	Call-In	Battery		Tested By
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Date	Inputs		Dialout		Call-In		Battery				Tested By
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APPENDIX B

Inspection Logs

Sub-Slab Depressurization System
Operations and Maintenance Manual
Beals Linen Site
7 Chestnut Street, Auburn, Maine
MEDEP REM ID: 02284

Beal's Linen Site

7 Chestnut Street, Auburn, ME

MEDEP Remediation ID: 02284

Date:

Personnel:

Weather:

SSDS Monitoring

Exterior Observations:

Interior Observations:

Valve Positioning:

#4

#6

#8

#12

Panel Reading (Hours):

Equipment Used:

PID:

Pressure Guage:

Other:

Electric Meter Reading:

	Dia (inch)	Area	PID Reading (ppb)	Initial Pressure (" wc)	Post-Drain Pressure (" wc) *If Necessary	Velocity (fpm) *Every Other Event	Air Flow (CFM) *To be Calculated Based on Velocity	Notes
Inlet Line 4 (SP-4)	3	0.05						
Inlet Line 6 (SP-6)	3	0.05						
Inlet Line 8 (SP-8)	3	0.05						
Inlet Line 12 (SP-12)	3	0.05						
Pressure Guage #1 (Pre-Filter)	1.5	0.01	NA			NA		
Pressure Guage #2 (Post-Filter)	1.5	0.01	NA			NA		
Exhaust Line (SP-E)	4	0.09						
SSDS Apt. 1 Exhaust Line (SP-E Apt.1)	4	0.09						

Approximate Volume of condensate removed:

Disposal Method:

Other Notes/Observations:

Signature of Inspctor:

Beals Linen Site

7 Chestnut Street, Auburn, ME

MEDEP Remediation ID: 02284

Date: _____

Personnel: _____

Weather: _____

Sub-Slab Vacuum Monitoring

Instrument Used: _____

Vacuum Monitoring Point	Location	Vacuum Reading (in. H_20)
VP-1	Stairwell	
VP-2	Laundry Room	
VP-3	Apartment 3	
VP-4	Apartment 1	

Notes: _____

_____

Soil Vapor Monitoring (As Requested)

Soil Vapor Point	Location	O_2 (% Vol.)	CO_2 (ppm)	PID Reading (ppb)
Ambient Air	Ambient Air			
PID102	Chestnut St.			
PID103	Chestnut St.			
PID119	Webster St.			
PID121	Bearce St.			

Notes: _____

_____

APPENDIX C

Air Sampling Standard Operating Procedure

Sub-Slab Depressurization System
Operations and Maintenance Manual
Beals Linen Site
7 Chestnut Street, Auburn, Maine
MEDEP REM ID: 02284

COVERSHEET
STANDARD OPERATING PROCEDURE

Operation Title: **PROTOCOL FOR COLLECTING SUB SLAB SOIL GAS SAMPLES**

Originator: **Brian Beneski**
Quality Assurance Coordinator
Division of Remediation
Bureau of Remediation and Waste Management

Standard Operating Procedure: **DR#027**
REVISION: **00**
DATE: **March 12, 2009**
Written/Revised by: **Brian Beneski**
Reviewed by: **Troy Smith**

Five Year Review No Changes Needed:

Print Name: _____ Signature: _____ Date: _____

Print Name: _____ Signature: _____ Date: _____

Print Name: _____ Signature: _____ Date: _____

Print Name: _____ Signature: _____ Date: _____

Print Name: _____ Signature: _____ Date: _____

1.0 PURPOSE

The purpose of this document is to describe the Maine Department of Environmental Protection (DEP) Bureau of Remediation and Waste Management, Division of Remediation's (MEDEP/DR) procedure for collecting soil vapor samples from the interstitial spaces beneath the concrete floors of buildings.

2.0 APPLICABILITY

MEDEP/DR is responsible for the investigation and remediation of uncontrolled hazardous substance sites throughout Maine. In the course of the investigation and subsequent remediation, samples must be collected to determine the geographical extent, chemical characteristics, and relative levels of contaminants at each site and surrounding area. For this reason soil gas samples are often collected near sites where volatile chemicals are contaminants of concern. Collection of soil gas samples from beneath the concrete floor of buildings can determine the potential for impact to the indoor air of a building from volatile chemicals, without the issue of cross contamination from chemicals that may exist within the building itself. This standard operating procedure (SOP) is designed to be a guideline for the collection of building sub soil gas samples.

3.0 RESPONSIBILITIES

All Uncontrolled Sites Program Staff must follow this procedure when collecting sub slab soil gas samples. All managers and supervisors within MEDEP/DR are responsible for ensuring that their staff are familiar with and adhere to this procedure.

4.0 PREPARATION

4.1 SAMPLING PLAN

A well developed Site conceptual model is imperative for effective soil gas sampling. Prior to conducting any sampling event, a sampling plan should be developed (see SOP DR#014 - Development of a Sampling and Analysis Plan). Special considerations should be made to determine the presence of preferential pathways for contamination into the building, and appropriate locations and methodology to assure proper sampling locations are selected. Included in the sampling plan should be specifics regarding the anticipated substances of concern, data quality objectives, the laboratory conducting analysis, sample containers and tubing for collection, and Quality Assurance/Quality Control.

It should be noted that sub slab sampling will involve the drilling of a hole in the basement floor of the building. The owner of the property of the sampling must made fully aware and approve of the sampling event, and any follow up monitoring planned. Additionally, the owner/ operator of the building should identify any sub slab utilities, foundation/column footings, vapor barriers, radon sub slab depressurization systems, and any other foundation structures that might impact the results or collection of sub slab gas samples.

If collection of soil gas will become part of a routine monitoring program, it is recommended that permanent monitoring points, such as Geoprobe systems soil gas implant system.

4.2 SCHEDULING

It should be noted that sampling during heavy precipitation and saturated soil conditions may negatively effect collection of soil gas samples. A provision to have alternate days for conducting field work if scheduled days are raining, or immediately proceeding heavy rains, should be made.

5.0 EQUIPMENT

5.1 EQUIPMENT LIST

The Equipment for collection of soil gas samples following this this SOP may include:

- Hammer rotary drill
- Extension cord(s)
- Masonry drill bit, 3/8 inch diameter x 10 inches long
- Filter sand (for backfill)
- Appropriate tubing (see Section 5.2.3)
- Geoprobe Soil Gas Implant system (Optional if placing a permanent monitoring point),
- Vacuum pump, such as peristaltic;
- Bentonite clay or modeling clay;
- Quick mix concrete (optional, for permanent monitoring point)
- Containers (Summa Canister or Tedlar Bags, see Section 5.2.1 and 5.2.2)

5.2 Specific Container and Tubing Considerations for Soil Vapor Sampling

Due to the nature of sub slab soil gas sampling, additional planning must be undertaken in order to assure the appropriate sample collection/analysis methods and appropriate containers for a sampling event. Two types of sample containers are described in this SOP, Summa Canisters and Tedlar Bags. When deciding which container to use, staff should consider the data quality objectives for the sample and the availability of a laboratory capable of analyzing the sample.

5.2.1 Summa Canisters

A Summa canister is a clean metal container sealed with a vacuum; this vacuum is then used to draw in the gas sample. Summa canisters must be ordered from a laboratory in advance of the sampling event. Samples from Summa canisters are analyzed by certified labs only, and by methods which have been approved by EPA and have detection limits that generally meet the ambient air guidelines.

Summa canister samples can collect two types of samples; grab, and time elapsed. Grab samples are collected utilizing the vacuum of the canister for a sample with a collection time of less than 30 minutes. Time elapsed are samples collected utilizing the vacuum of the canister over an extended period of time, up to and beyond 24 hours. Both sample types require a regulator between the tubing and canister to control the length of time the sample is collected.

The regulator will be provided and calibrated by the laboratory conducting the analysis of the sample. The type and length of time of sample should be indicated as part of the sample plan.

Clean Summa canisters must be obtained from the laboratory providing the analysis for each sampling event. Unused canisters will be sent back to the laboratory. The laboratory will need to be informed as to the sample collection method used and the duration of collection time prior to shipping the Summa canisters and regulators for the sampling event.

5.2.2 Tedlar Bag

A tedlar bag is a bag manufactured from Tedlar (Polyvinyl fluoride) with a two way valve. Tedlar bag samples require less time for planning because they can be ordered in advance and kept on hand until they are needed. However, the bags must be stored in a clean location. Laboratories capable of analyzing these samples are limited and the holding time for tedlar bag samples is 48 hours. Tedlar bag sampless can be analyzed in the field with the appropriate mobile laboratory equipment and can provide real time data analyses. Due to detection limits for this analytical method (generally 10 times the indoor air standard for most compounds), tedlar bag collection is most often used for screening purposes. There are no USEPA approved methods for tedlar bag samples. Samplers utilizing tedlar bags must communicate with the laboratory conducting the analysis prior to sampling to assure data quality objectives for the project are met.

5.2.3 Tubing Selection

Certain volatile chemicals (especially those found in petroleum products) may interact with certain types of tubing used for collecting samples. Tubing used for vapor sampling is usually a flexible, PVC based tubing. These interactions will affect the quality of sample results, and may require a contaminant specific tubing, such as a Teflon lined tubing. Therefore, contaminants of concern for the site should be determined before collecting samples (refer to the Sites conceptual site model). If tubing interaction is a concern, the laboratory and /or the DEP Chemist in the DEP's Division of Technical Services should be consulted prior to sample collection to assure appropriate tubing is used. Type of tubing used should be noted in the field notes of the samplers.

6.0 SAMPLE COLLECTION

If the sampling point is for one time use, utilizing tubing inserted into the hole drilled in the slab will be sufficient. However, if the sampling is to be part of a long term monitoring program, a more robust sampler, such as Geoprobe Systems permanent soil gas implant, is recommended.

1) Drill hole into concrete slab floor. Using the hammer rotary drill and 3/8 inch drill bit, drill a hole through the cement floor slab of the building. If dust prevention is necessary, cover the location with a towel/ cloth and drill through a pre cut hole in the cloth.

2) Place tubing or implant into hole. After drilling the hole through the concrete slab, evaluate and note the subslab conditions. The conditions and data quality objectives will determine the appropriate intake depth(s) for the subslab sample(s). Conditions to be noted include the presence of bedrock, groundwater, pipes, underdrain, void spaces, soil conditions (native, backfill), and general soil type (silt, clay, sand, gravel) Sample tubing can be placed directly into

the subslab environment or tubing can be attached to an anchor (implant) to hold the tube in place beneath the cement slab.

Care should be taken to reduce cross contaminating subslab soil vapor and indoor air vapors. This may be done by backfilling the intake with filter sand below the slab and sealing the sample point with modeling clay or hydrated bentonite clay to the top of the cement slab. If using bentonite, wait 15 to 30 minutes prior to sampling for bentonite to congeal.

2a) Special considerations regarding implants:

Geoprobe Systems and other manufacturers of direct push drilling equipment manufacture soil gas implant systems designed for use with their boring equipment. These implants can also be deployed by hand in sub slab monitoring. The samplers should refer to the manufacturer's instructions for specific assembly and deployment instructions.

The entire implant should be place below the concrete slab, with tubing attached to the barbed end of the implant.

3) Connect tubing to a vacuum or peristaltic pump and purge tubing. Use a peristaltic pump to evacuate at least one sample tube volume prior sample collection. The volume of ¼" OD x 3/16" ID tubing is approximately 5.5 mL per ft. A minimum of 1 tube volume of gas should be removed prior to sampling.

4) Collect sample in Tedlar Bag or Summa Canister. If using a tedlar bag for sample collection, connect the exhaust end of the tube from the vacuum or peristaltic pump and directly fill the tedlar bag. Tedlar bags should be filled at a rate of approximately 5 minutes per liter, or 15 minutes for a three liter bag. If using Summa canisters for sample collection, remove pump from tubing, and attach canister/ regulator to end of tubing, and allow the canister to fill using the vacuum of the canister. To avoid connection problems at time of sampling, connection fittings should be checked for fit prior to sampling. .

5) Sealing permanent sample points If sample points are going to be used as monitoring points over a long period of time then it may be desirable to secure the sample point with concrete instead of modeling clay. Bentonite clay or modeling clay should be used at the bottom of the slab to seal the sample point. Portland cement should be used above the seal to the top of the slab.

6) Protect implant sample collection tubing. If the implant is designed for long term monitoring, placement and/or construction of some type of protective device is recommended. Be sure to provide some means of marking/locating the implant for future monitoring.

7.0 QUALITY CONTROL

Due to cross contamination issues inherent with soil gas sample collection, more rigorous quality control sampling may be required then the sampling of other media. Data quality objectives should be stated in the sampling plan. Quality Assurance/Quality Control (QA/QC) samples may be collected if needed to meet your data quality objectives. The following typical types of QA/QC samples should be collected as part of the QA/QC program for soil gas sample

collection. For an additional discussion of QA/QC, please refer to the MEDEP/DR Quality Assurance Plan, Section 5 and Section 10.

7.1 EQUIPMENT BLANKS

Equipment blanks should be collected at a rate of 5%, one equipment blank every twenty samples collected. The equipment blank will consist of purging a complete drive rod and closed point system with zero air.

7.2 DUPLICATE SAMPLES

It is recommended that duplicate samples be collected at a rate of 5% to assess sample location variability.

7.3 BACKGROUND/AMBIENT AIR SAMPLES

Depending on data quality objectives, one to two ambient air samples per day may be collected at the sampling locations to assess ambient air conditions.

7.4 TRIP BLANK

A trip blank should be collected particularly when utilizing tedlar bags as sample containers. The trip blank will consist of a tedlar bag filled at the Site area from a canister of zero air or an inert gas such as nitrogen.

7.5 TRACER GAS DISPERSION

Ambient air may intrude into the soil formation, and not provide a true sample of the gas below the slab. In situations where this is suspect, a tracer gas such as sulfur hexafluoride can be dispersed around the penetration point to determine if ambient air contamination of the sample may be present. If analysis indicates sulfur hexafluoride is present in the sample, re-sampling of the location may be warranted.

8.0 SYSTEM DECONTAMINATION

In an effort to provide the most representative soil vapor samples possible, all tooling and materials in contact with the site soils will be cleaned with a detergent wash and potable water rinse prior to re-use, as outlined in MEDEP/DR SOP# 017, Decontamination Procedures. Additional cleaning of the tooling with steam cleaning may be warranted depending on the site contamination.

New, flexible tubing (i.e. dedicated) will be used at each different sample location, regardless as to the type of tubing used.

9.0 DOCUMENTATION/CHAIN OF CUSTODY

All sampling activities must be documented as outlined in MEDEP/DR SOP DR#013 - Documentation of Field Notes and Development of a Sampling Event Trip Report. Sample

custody must be followed as outlined in MEDEP/DR SOP#012 – Chain of Custody Protocol. Due to the nature of soil gas sampling, attention should be made to the following:

- Weather conditions particularly precipitation within past 3 days;
- Depth of sample collection;
- Subslab conditions;
- Modifications to the procedure;
- Possible sources of off site contamination (gas stations, dry cleaners, automotive body shops, etc.) in the vicinity of the investigation field work;
- Possible sources of cross contamination (fueling vehicles/equipment, etc);
- Length of time of sample collection.

As with all sampling events, any deviations from the sampling plan or SOPs must be documented in field staffs field notes.

10.0 REFERENCES

1. Geoprobe Soil Vapor Sampling, Standard Operating Procedure, Technical Bulletin No. 93-660, 9/21/93.
2. USEPA, Environmental Response Team, Soil Gas Sampling, SOP #2042, 6/1/96.
3. Geoprobe Systems, Direct Push Installation of Devices for Active Soil Gas Sampling and Monitoring. Technical Bulletin NO. MK3098. Prepared May, 2006.