STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION

OCT. 21 2010

Mr. John Bierschenk
President
TerraTherm, Inc./SRSNE Site Group
10 Stevens Road
Fitchburg, MA 01420

Dear Mr. Bierschenk:

This letter is to inform you that the Bureau of Air Management ("Bureau") has evaluated your New Source Review Permit equivalency application submitted on July 28, 2010. Terra Therm, Inc. on behalf of the Solvents Recovery Service of New England (SRSNE) Site Group submitted this application pursuant to the Consent Decree for the Remedial Design/Remedial Action at the SRSNE, Inc. Superfund Site (Site) entered on March 26, 2009 by the United States District Court for the District of Connecticut.

The Bureau understands that the Site will be remediated by extracting vapors from the soil subsurface and treating it with In Situ Thermal Desorption to remove contaminants. The Bureau also recognizes that the remedial operation does not need any state permits pursuant to CERCLA Section 121(e)(1); but the operation must still comply with any air pollution regulatory standards made necessary by the applicable or relevant and appropriate requirements established in the Record of Decision.

The Bureau has reviewed the equivalency application and has concluded that the remediation operation meets all Applicable or Relevant and Appropriate Requirements.

If you have any questions, please contact Ms. Lakiesha Christopher, the permit engineer who evaluated your application, by calling (860) 424-4152.

Sincerely,

Richard A. Pirolli
Assistant Director, Engineering
Engineering & Enforcement Division
Bureau of Air Management

GSR:lsc

Cc: Ryan Santos, CTDEP
Robin Swift, TerraTherm, Inc.,
Bruce Thompson, de maximis, inc.,
✓Michael Holzman, M.I. Holzman & Associates, LLC
Karen Lumino, EPA

Certified Mail

M.I. HOLZMAN
& ASSOCIATES, LLC

Environmental Engineering ■ Impact Assessment ■ Compliance Services

TerraTherm®

Solvents Recovery Service of New England, Inc. (SRSNE) Superfund Site

New Source Review Permit Equivalency Application for Stationary Source of Air Pollution

In-Situ Thermal Desorption (ISTD) Remediation System

Prepared For:

TerraTherm, Inc.
10 Stevens Rd.
Fitchburg, MA 01420

Prepared By:

M.I. Holzman & Associates, LLC

July 2010

57 Mountain View Drive
West Hartford, CT 06117-3028

Phone: 860-523-8345
Fax: 860-523-8394
Mholzman2@comcast.net

Permit Application for Stationary Sources of Air Pollution

(CGS Section 22a-174, RCSA Sections 22a-174-1, 2a and 3a)

Complete this form in accordance with the permit application instructions (DEP-AIR-INST-200). Print legibly or type.

Part I: Contact Information

1. **Name of the applicant(s) as indicated on the *Permit Application Transmittal Form* (DEP-APP-001).**

   Applicant: **TerraTherm, Inc., on behalf of the SRSNE Site Group**

   Applicant is ☒ Owner ☒ Operator (check all that apply) of this equipment.

   ☐ Check if there are co-applicants. If so, attach additional sheet(s) with the required information as above.

2. **Primary contact for departmental correspondence and inquiries.**

   Contact Person: **Robin Swift** Title: **Project Manager**

   Company/Individual Name: **TerraTherm, Inc.**

   Mailing Address: **10 Stevens Rd.**

   City/Town: **Fitchburg** State: **MA** Zip Code: **01420**

   Business Phone: **978-343-0300** ext. **229** Fax: **978-343-2727**

   Email: **rswift@terratherm.com**

3. **Equipment owner or operator, if different than the applicant.**

   Contact Person: Title:

   Company/Individual Name:

   Mailing Address:

   City/Town: State: Zip Code:

   Business Phone: ext. Fax:

   Email:

4. **Preparer of this application.**

   Contact Person: **Michael Holzman** Title: **President**

   Company/Individual Name: **M.I. Holzman & Associates, LLC**

   Mailing Address: **57 Mountain View Drive**

   City/Town: **West Hartford** State: **CT** Zip Code: **06117**

   Business Phone: **860-523-8345** ext. Fax: **860-523-8394**

   Email: **mholzman2@comcast.net**

Part II: Premises Information

1. FACILITY NAME AND LOCATION

Name of facility: **SRSNE Superfund Site**

Street Address or Description of Location: **Lazy Lane, just off Route 10 (Queen St.), adjacent to Quinnipiac River**

City/Town: **Southington** State: **CT** Zip Code: **06489**

2. INDI AN LANDS: Is or will the premises be located on federally recognized Indian lands? ☐ Yes ☒ No

3. C OASTAL AREA: Is or will the premises be located in a municipality within the coastal area? (check town list in the instructions) ☐ Yes ☒ No

If yes, you must submit a *Coastal Consistency Review Form* (DEP-APP-004) with your application as Attachment L.

4. ENDANGERED OR THREATENED SPECIES: Is the project site located within an area identified as a habitat for endangered, threatened or special concern species as identified on the "State and Federal Listed Species and Natural Communities Map"? ☒ Yes ☐ No Date of Map: **December 2009**

If yes, complete and submit a *Connecticut Natural Diversity Data Base* (CT NDDB) *Review Request Form* (DEP-APP-007) to the address specified on the form. **Please note NDDB review generally takes 4 to 6 weeks and may require additional documentation from the applicant. DEP strongly recommends that applicants complete this process before submitting the subject application.**

When submitting this application form, include copies of any correspondence to and from the NDDB, including copies of the completed *CT NDDB Review Request Form*, as Attachment M. SEE Note 1.

For more information visit the DEP website at www.ct.gov/dep/endangeredspecies (Review/Data Requests) or call the NDDB at 860-424-3011.

5. CONSERVATION OR PRESERVATION RESTRICTION: Is the premises subject to a conservation or preservation restriction? ☐ Yes ☒ No

If Yes, proof of written notice of this application to the holder of such restriction or a letter from the holder of such restriction verifying that this application is in compliance with the terms of the restriction, must be submitted as Attachment N.

6. ENVIRONMENTAL JUSTICE COMMUNITY: Does the site include an applicable facility which is located within an Environmental Justice Community, as defined in the Environmental Justice Public Participation Guidelines (Guidelines) www.ct.gov/dep/environmentaljustice? ☒ Yes ☐ No

If yes and this application is for a new or expanded permit, you must prepare an Environmental Justice Public Participation Plan (DEP-EJ-PLAN-001) in accordance with the Guidelines and submit such plan to:

Environmental Justice Program
Office of the Commissioner
Department of Environmental Protection
79 Elm Street
Hartford, CT 06106-5127

prior to submitting this application. Once you have received written approval for your Environmental Justice Public Participation Plan from the DEP, submit this completed application with a copy of the Plan approval as Attachment O.

7. Indicate the air quality status of the area in which the premises is or will be located. (Check all that apply. See instructions for the air quality attainment status of Connecticut municipalities).

Ozone: ☐ Severe Non-Attainment ☒ Serious Non-Attainment

$PM_{2.5}$: ☐ Non-Attainment

8. Indicate the pollutant(s) for which the premises exceeds the major stationary source threshold.

☐ PM ☐ SO_2 ☐ NOx ☐ CO ☐ VOC ☐ Pb ☐ HAPs

9. SIC Codes:
Primary **4959** Secondary Other Other

1. Note - the RI and ROD both document "No known federal or state endangered, threatened or special concern species have been identified at the Site" - see ROD, page 47 of 115 (September 2005)

Part III: Application and Source Type

More than one permit may be applied for using just one application if the sources are located at the same premises. *Each* unit or process line requires a separate permit. Duplicate this page as necessary.

Unit No.	Source Type	App. Type (N, R, M)	If Renewal or Modification/Revision, Indicate Existing Permit/Registration No.	DEP Use Only	
				Application No.	Permit No.
U1	Site remediatio	N			

Part IV: Supporting Documents

Check **all applicable** attachments that have been submitted with this Permit Application Form. When submitting any supporting documents, label the documents as indicated in this Part (e.g., Attachment A, etc.) and include the applicant's name as indicated on the *Permit Application Transmittal Form*.

- ☒ Attachment A: *Executive Summary* (DEP-AIR-APP-222)
- ☒ Attachment B: *Applicant Background Information* (DEP-APP-008)
- ☒ Attachment C: An 8 ½" X 11" copy of the Site Plan
- ☒ Attachment D: An 8 ½" X 11" copy of the relevant portion of a USGS Quadrangle Map indicating the exact location of the facility or site.
- ☒ Attachment E: Supplemental Application Forms

  For each activity to be permitted, attach a detailed process flow diagram indicating, at a minimum, all materials and quantities entering and leaving, all units, air pollution control equipment and stacks, as applicable.

  - ☐ *Manufacturing or Processing Operations* (DEP-AIR-APP-201)
  - ☐ *Fuel Burning Equipment* (DEP-AIR-APP-202
  - ☐ *Incinerators* (DEP-AIR-APP-203): Attach documentation of waste heat contents and waste analysis.
  - ☐ *Volatile Liquid Storage* (DEP-AIR-APP-204): Attach the MSDS for each product stored.
  - ☐ *Surface Coating or Printing Operations* (DEP-AIR-APP-205): Attach the MSDS for each coating, ink, thinner, catalyst, cleanup solvent, or other compound, and documentation to support transfer efficiency of spray applicators, if applicable.
  - ☐ *Metal Cleaning Degreasers* (DEP-AIR-APP-207): Attach the MSDS for each solvent used.
  - ☐ *Concrete, Asphalt Concrete, Mineral Processing and other Similar Equipment* (DEP-AIR-APP-208)
  - ☒ *Site Remediation Equipment* (DEP-AIR-APP-209): Attach documentation, such as pilot test data, which characterizes the site's degree of contamination.
  - ☒ *Air Pollution Control Equipment* (DEP-AIR-APP-210)
  - ☒ *Stack Parameters* (DEP-AIR-APP-211)
  - ☒ *Unit Emissions* (DEP-AIR-APP-212): Attach all calculations by which emissions were determined.
- ☐ Attachment F: *Major Modification Determination Form* (DEP-AIR-APP-213)
- ☒ Attachment G: *BACT/LAER Determination Form* (DEP-AIR-APP-214)
- ☐ Attachment H: Operation and Maintenance Plan
- ☐ Attachment I: Ambient Air Quality Analysis
- ☒ Attachment J: *Applicant Compliance Information* (DEP-APP-002)

Part IV: Supporting Documents (continued)

☐	Attachment K:	For renewals or modification/revisions attach a marked up copy of the original NSR permit noting proposed changes.
☐	Attachment L:	*Coastal Consistency Review Form* (DEP-APP-004), if applicable.
☒	Attachment M:	*CT NDDB Review Request Form* (DEP-APP-007) and additional documentation, if applicable.
☐	Attachment N:	Conservation or Preservation Restriction Information, if applicable
☒	Attachment O:	Copy of the Written Environmental Justice Public Participation Plan Approval Letter, if applicable. (Also, a final report documenting the implementation of the Environmental Justice Public Participation Plan is to be prepared and submitted before the Department issues a Notice of Tentative Determination.)

Part V: Applicant Certification

The authorized representative **and** the individual(s) responsible for actually preparing the application must sign this part. An application will be considered incomplete unless all required signatures are provided.

"I have personally examined and am familiar with the information submitted in this document and all attachments thereto, and I certify that based on reasonable investigation, including my inquiry of those individuals responsible for obtaining the information, the submitted information is true, accurate and complete to the best of my knowledge and belief. I understand that any false statement made in the submitted information may be punishable as a criminal offense under section 22a-175 of the Connecticut General Statutes, under section 53a-157b of the Connecticut General Statutes, and in accordance with any applicable statute.

I certify that this application is on complete and accurate forms as prescribed by the commissioner without alteration of the text.

I certify that I will comply with all notice requirements as listed in section 22a-6g of the General Statutes."

[signature]	7/23/10
Signature of Applicant	Date
John Bierschenk	**President, TerraTherm, Inc.**
Name of Applicant (print or type)	Title (if applicable)
[signature]	7/23/10
Signature of Preparer (if different than above)	Date
Michael I. Holzman	**Pres., M.I. Holzman & Assoc.**
Name of Preparer (print or type)	Title (if applicable)

Note: Submit the Permit Application Transmittal Form, Application Form, an initial fee of $940.00 for *each* permit that you are applying for, and all Supporting Documents to:

CENTRAL PERMIT PROCESSING UNIT
DEPARTMENT OF ENVIRONMENTAL PROTECTION
79 ELM STREET
HARTFORD, CT 06106-5127

Remember to publish notice of the permit application immediately after submitting your completed application to DEP. Also send a copy of the notice to the chief elected official of the municipality in which the regulated activity is proposed.

ATTACHMENT A

EXECUTIVE SUMMARY
(DEP-AIR-APP-222)

Attachment A: Executive Summary

Applicant Name as indicated on the *Permit Application Transmittal Form* (DEP-APP-001):
TerraTherm, Inc. on behalf of SRSNE Site Group

Location of Facility or Activity: **Lazy Lane, just off Route 10 (Queen St.), adjacent to Quinnipiac River, Southington, CT**

Contact Person: **Bruce Thompson** Phone: **860-298-0541**

For Renewals, Modifications, and Revisions provide the following:

Existing Permit or Registration #: Expiration Date: / /

Provide a Table of Contents of the application which includes the *Permit Application Transmittal Form* (DEP-APP-001), the Permit Application Form (DEP-AIR-APP-100 or 200), and a list of all supplemental application forms, plans, drawings, reports, studies, or other supporting documentation which are attached as part of the application, along with the corresponding attachment label and the number of pages (e.g., Executive Summary - Attachment A - 4 pgs.).

(OVER)

Attachment A: Executive Summary (continued)

Provide a brief project description which includes: a description of the proposed regulated activities; a synopsis of the environmental and engineering analyses; summaries of data analysis; a conclusion of any environmental impacts and the proposed timeline for construction. For renewals, modifications, and revisions, provide a list of changes in circumstances or information on which the previous permit was based.

See attached

☒ If additional sheets are necessary, please label and attach them to this sheet and enter a check mark.

EXECUTIVE SUMMARY

TerraTherm, Inc. on behalf of the Solvents Recovery Service of New England (SRSNE) Site Group is submitting this air permit equivalency application to construct and operate a Thermal Conduction Heating (TCH) system, also called In Situ Thermal Desorption (ISTD), to remediate a Non-Aqueous Phase Liquid (DNAPL) source zone at the Solvents Recovery Service of New England Superfund Site in Southington, Connecticut. TerraTherm, Inc. has been contracted by *de maximis, inc.*, the project coordinator, to design, install and operate the remediation system. The work will be performed pursuant to a Remedial Design/Remedial Action (RD/RA) Consent Decree (CD) and Statement of Work (SOW) that has been negotiated with the United States Environmental Protection Agency (EPA) Region I and the Connecticut Department of Environmental Protection (CTDEP) by the Performing Parties. As previously discussed in a pre-application meeting with representatives of the CTDEP on April 29, 2009, CERCLA exempts remedial actions conducted pursuant to a consent decree from any federal, state, or local permits or approvals. However, CTDEP is provided the opportunity to review and comment on Applicable or Relevant and Appropriate Requirements (ARARs) established in the Record of Decision (ROD) on this matter.[1] This air permit equivalency application is designed to demonstrate that the proposed remediation process will comply with all air pollution regulatory requirements as if it was subject to typical air permit approval and the applicant understands that CTDEP may issue a document resembling a typical air permit and including all applicable requirements.

The target Thermal Treatment Zone (TTZ) for the ISTD remediation process is approximately 74,195 square feet with an average treatment depth of 17 ft (the approximate thickness of the overburden beneath the TTZ) and encompassing a total volume of approximately 47,298 cubic yards. The design of the thermal wellfield includes the following components:

- Heater wells to supply heat by thermal conduction from the ground surface to a depth of 15 ft bgs, 18 ft bgs, or 24 ft bgs, dependent on their location.
- Vapor extraction wells (VEWs) to extract vapors from the vadose zone. VEWs will be installed approximately 3 ft from each heater well.
- Horizontal vapor extraction wells to extract vapors in the shallowest eastern most part to extract vapors from the vadose zone.
- Combined pressure and water level monitoring points will be installed throughout the wellfield to monitor and document pneumatic and hydraulic control..
- Temperature sensors will be installed throughout the wellfield to monitor heating.
- A non-permeable vapor cap to cover the TTZ, limit precipitation infiltration, assist in the capture of the contaminant vapors and help to minimize heat losses.

[1] EPA Superfund Record of Decision: Solvents Recovery Service of New England, EPA ID: CTD009717604, EPA/ROD/R01-05/008, 09/30/2005.

A process flow diagram (PFD) is provided in Attachment E (Dwg. No. P101). Vapors will be extracted from the subsurface under vacuum and pass through a moisture separator to remove entrained liquid and condensate prior to vapor treatment by dual thermal oxidizers and a wet scrubber.

The thermal oxidizers will operate in parallel, such that two can be used to handle peak loadings and one will operate under normal loading conditions. The oxidizers combust the contaminants of concern (COCs) carried in the vapor stream. The temperature of the combustion chamber is automatically maintained in a temperature range of approximately 1227-1327˚C (1,500-1600˚F). Natural gas is used to provide supplemental fuel for combustion if the COC loading alone is not sufficient to maintain the combustion chamber in the desired temperature range. Operation of the oxidizer is controlled by a programmable logic controller (PLC). Permissive and shutdown signals from the oxidizer's on-board flow, pressure and temperature sensors, along with inputs from the scrubber, are interfaced with the oxidizer PLC to maintain or safely shut down operation of the oxidizer.

The oxidizers are followed by a quench and wet scrubber. The quench is supplied with potable city water. In the event of a loss of city water supply pressure, a flow switch sends a signal to the oxidizer PLC to shut down the oxidizer so that the scrubber section does not overheat. The scrubber section includes a recirculation loop in which a caustic solution is added based on pH of the liquid in the scrubber sump. Salt is formed by the neutralization reaction of the caustic solution with hydrochloric acid (HCl) generated in the combustion process. Conductivity of the liquid in the sump is monitored to allow automatic adjustments to prevent buildup of excessive solids in the sump and circulating loop. The scrubber circulating loop is fitted with a discharge control valve that will automatically discharge waste water from the scrubber sump when the sump fills up. The valve closes when the liquid level returns to the low level set-point.

Liquid condensate that accumulates in the wellfield piping manifold and moisture separator will be transferred to a phase separator designed to separate Light Non-Aqueous Phase Liquid (LNAPL) and DNAPL from water, if present. LNAPL and DNAPL, if present, will be collected in drums and the effluent water will be conveyed to an air stripper for treatment followed by a liquid phase carbon absorber for final polish prior to discharge to the Publically Owned Treatment Works (POTW). Vapors from the air stripper will be vented to the moisture separator, thermal oxidizers and scrubber.

Thermal design modeling indicates that the optimal approach to heat and treat the Site is to divide the Site into two segments or phases with each phase lasting 135 days and with the second phase starting 60 days after the first. (i.e., the overall operational period will be about 195 days). This approach significantly reduces the peak mass loading rate (fuel and Contaminants of Concern (COC) loads) and provides a means to heat the site in a controlled fashion and to regulate the mass loading rate to the off gas treatment system. During the operating period, approximately 13.8 million kWh of electrical power will be delivered to the heater wells.

Construction of the ISTD system is currently scheduled to commence in Spring of 2011 with thermal operation scheduled to begin in Fall 2011.

Monitoring

Although CERCLA remedial actions are exempted by law from the requirement to obtain Federal, State, and/or local permits, as described above, samples will be collected to verify performance of the process treatment equipment and to document compliance with substantive provisions of Federal, State, and/or local permitting regulations that are Applicable or Relevant and Appropriate Requirements (ARARs). Monitoring will include measurement of subsurface wellfield temperatures, measurements of temperature, pressure, flow rates and liquid levels throughout the process treatment system, as well as power delivery from the ISTD system.

In addition, grab samples will be collected and analyzed with a handheld PID to assess the volatile organic compound (VOC) removal rate during operations. Samples will be taken at the following locations on a daily basis:

- At the combined influent to the treatment system and inlet to the oxidizer; and
- At the discharge location (effluent stack).

Vapor samples for screening will be collected in Tedlar™ bags using a dedicated sample pump. Since moisture is known to interfere with the PIDs, a humidity filter will be used with the PID. The screening data will be included in the daily data collection sheet.

VOCs will also be monitored in the ambient air around the perimeter of the site using PIDs for the duration of the ISTD remediation. The ambient monitoring program will be conducted in accordance with the Thermal Treatment Monitoring Plan (Attachment B to the Remedial Design work Plan). Time weighted average data will be evaluated against 600 parts per billion (ppb), the CTDEP HLV for trichloroethene (TCE), the most prevalent compound on site. Project personnel will be notified immediately of an exceedance of this value.

Air Discharges/Emissions

Air discharges are expected to be limited to the single effluent stack from the thermal oxidizer/scrubber package. As discussed above, effluent vapors from the air stripper will be directed to the thermal oxidizer(s) for treatment. The thermal oxidizers are expected to maintain a minimum of 99% destruction and removal efficiency (DRE) for VOCs, including chlorinated VOCs (CVOCs). Acid gases exiting the oxidizer, from combustion of CVOCs, will be treated and neutralized in a caustic scrubber, which is expected to maintain a minimum 99% DRE for neutralization of the hydrogen chloride (HCl) vapors.

Emissions calculations are presented in Attachment E. Peak hourly VOC and HAP emissions are conservatively estimated based on analytical test data for the site and the design capacity of the ISTD system. Annual emissions are based on a total 1 million pound contaminant loading to be treated in one year. Other criteria pollutant emissions from natural gas combustion in the oxidizers have been estimated using AP-42 emission factors (5^{th} Edition, Section 1.4) and the rated capacity of the burners. The estimated maximum uncontrolled potential and controlled actual emissions from the proposed source are summarized, respectively in Tables 1 and 2:

Table 1: Maximum Uncontrolled Potential Emissions

Pollutant	ISTD lb/hr	2 Oxidizers lb/hr	Total lb/hr	Total TPY
PM-10/PM2.5 (total)		0.038	0.038	0.17
SO_X		0.003	0.003	0.01
NO_X		0.5	0.5	2.19
CO		0.42	0.42	1.84
Total VOC	355.42	0.028	355.44	500.12
HCl	134.22		134.22	188.82
Total Federal HAPs				688.9

Table 2: Maximum Controlled Actual (Proposed Allowable) Emissions

Pollutant	ISTD lb/hr	2 Oxidizers lb/hr	Total lb/hr	Total TPY
PM-10/PM2.5 (total)		0.038	0.038	0.17
SO_X		0.003	0.003	0.01
NO_X		0.50	0.5	2.19
CO		0.42	0.42	1.84
Total VOC	3.55	0.028	3.58	5.12
HCl	1.34			1.89
Total Federal HAPs				6.93

Based on these emissions estimates, it is expected that emissions of total VOCs and total federal HAPs will each be limited to less than 10 TPY. In addition, estimated emissions of other criteria pollutant will be well below 5 TPY. As such, the proposed source will not be a Major Stationary Source with respect to any criteria air pollutants or HAPs.

In addition, as documented in Attachment E, maximum controlled emissions of identified state-regulated HAPs will comply with Maximum Allowable Stack Concentrations (MASCs), in accordance with RCSA § 22a-174-29. As documented in Attachment G, the proposed vapor treatment system, consisting of condensation, dual thermal oxidizers and a wet scrubber, is consistent with Best Available Control Technology (BACT) criteria.

As documented in Table 3, the proposed ISTD remediation system with thermal oxidizers and a wet scrubber is demonstrated to be in compliance with applicable regulatory requirements.

Table 3: Summary of Regulatory Applicability Analysis and Compliance Demonstrations

Potentially Applicable Regulations	Applicable? (Yes/No)	Comments / Applicable Requirements / Compliance Demonstration
CTDEP – RCSA		
§ 22a-174-3a Permits to construct and permits to operate stationary sources	Yes	• NSR permit application triggered – due to construction of new emission unit with greater than 15 tons/year potential emissions (§ 22a-174-3a(a)(1)(D)). • With proposed controls, premise emissions will be not be Major for any pollutants (PSD, Nonattainment NSR, and MACT requirements do not apply). • Hazardous air pollutants are in compliance with Maximum Allowable Stack Concentrations (MASC) (see calculations and demonstration in Attachment E)
§ 22a-174-18 Particulate Control	Yes	• PM emissions from natural gas combustion in the thermal oxidizers will be in compliance with the regulatory standards in § 22a-174-18(d)(2) – 0.08 grains/scf @ 12% CO_2, based on emission factors.
§ 22a-174-19 Control of Sulfur Compound Emissions	Yes	• The maximum fuel sulfur content from natural gas will be in compliance with the regulatory limit.
§ 22a-174-29 Hazardous air pollutants	Yes	• Estimated worst case emissions of HAPs comply with MASCs. (See calculations in Attachment E)
EPA – 40 CFR 60, 61, 63, 72-75		
40 CFR Part 60 (NSPS)	No	• No applicable NSPS
40 CFR Part 61 (NESHAP)	No	• No applicable NESHAP
40 CFR Part 63 (NESHAP for source categories)	No	• The premise will not be a Major Stationary Source of HAPs. Specifically, 40 CFR 63, Subpart GGGGG (Site Remediation NESHAPs) is not applicable because the facility will not be a major source of HAP and the site remediation will be performed under the authority of CERCLA as a remedial action.
40 CFR Part 72 – 75 (Acid Rain Provisions)	No	• Not applicable.

Potentially Applicable Regulations	Applicable? (Yes/No)	Comments / Applicable Requirements / Compliance Demonstration
40 CFR 264, Subparts AA and BB (RCRA air emissions standards applicable to process vents and equipment leaks at treatment, storage and disposal facilities)	No	• Not believed to be applicable as the CERCLA Corrective Action will not "treat, store, or dispose of hazardous wastes" and CERCLA remedial actions are exempted from any federal, state or local permits. However, subparts AA and BB are identified as potential Applicable or Relevant and Appropriate Requirements (ARARs). The operation will comply with equivalent design and operational standards. Emissions from the air stripper will be directly vented to the thermal oxidizers.

ATTACHMENT B

APPLICANT BACKGROUND INFORMATION
(DEP-APP-008)

Applicant Background Information

Please enter a check mark by the entity which best describes the applicant and complete the requested information. **You must choose one of the following.**

☒ **Corporation**

1. Parent Corporation

Name: **TerraTherm, Inc.**

Mailing Address: **10 Stevens Road**

City/Town: **Fitchburg** State: **MA** Zip Code: **01420**-

Business Phone: **978-343-0300** ext. **229** Fax: **978-343-2727**

Contact Person: **Robin Swift** Title: **Project Manager**

2. Subsidiary Corporation:

Name:

Mailing Address:

City/Town: State: Zip Code: -

Business Phone: - - ext. Fax: - -

Contact Person: Title:

3. Directors:

Name: **Jeffrey Powell**

Mailing Address: **1 Walnut Street**

City/Town: **Acton** State: **MA** Zip Code: **01720**-

Business Phone: **800-628-7528** ext. Fax: - -

Name: **Greg Betterton, Bison Capital**

Mailing Address: **9981 Ridgewood Ave., Suite 105**

City/Town: **Venice** State: **FL** Zip Code: **34292**-

Business Phone: **941-488-4422** ext. Fax: - -

☐ Please enter a check mark, if additional sheets are necessary. If so, label and attach additional sheet(s) to this sheet with the required information as supplied above.

4. Officers:

Name: **Ralph S. Baker**

Mailing Address: **840 West Ashby State Road**

City/Town: **Fitchburg** State: **MA** Zip Code: **01420**-

Business Phone: **978-343-0300** ext. **11** Fax: **978-343-2727**

☒ Please enter a check mark, if additional sheets are necessary. If so, label and attach additional sheet(s) to this sheet with the required information as supplied above.

Applicant Background Information

Please enter a check mark by the entity which best describes the applicant and complete the requested information. **You must choose one of the following.**

☒ **Corporation**

1. Parent Corporation

Name: **TerraTherm, Inc.**

Mailing Address: **10 Stevens Road**

City/Town: **Fitchburg** State: **MA** Zip Code: **01420**-

Business Phone: **978-343-0300** ext. **229** Fax: **978-343-2727**

Contact Person: **Robin Swift** Title: **Project Manager**

2. Subsidiary Corporation:

Name:

Mailing Address:

City/Town: State: Zip Code: -

Business Phone: - - ext. Fax: - -

Contact Person: Title:

3. Directors:

Name: **Robert Crowley, MTDC**

Mailing Address: **148 State St.**

City/Town: **Boston** State: **MA** Zip Code: **02109**-

Business Phone: **617-226-2833** ext. Fax: - -

Name:

Mailing Address:

City/Town: State: Zip Code: -

Business Phone: - - ext. Fax: - -

☐ Please enter a check mark, if additional sheets are necessary. If so, label and attach additional sheet(s) to this sheet with the required information as supplied above.

4. Officers:

Name: **John Bierschenk**

Mailing Address: **358 Federal Hill Road**

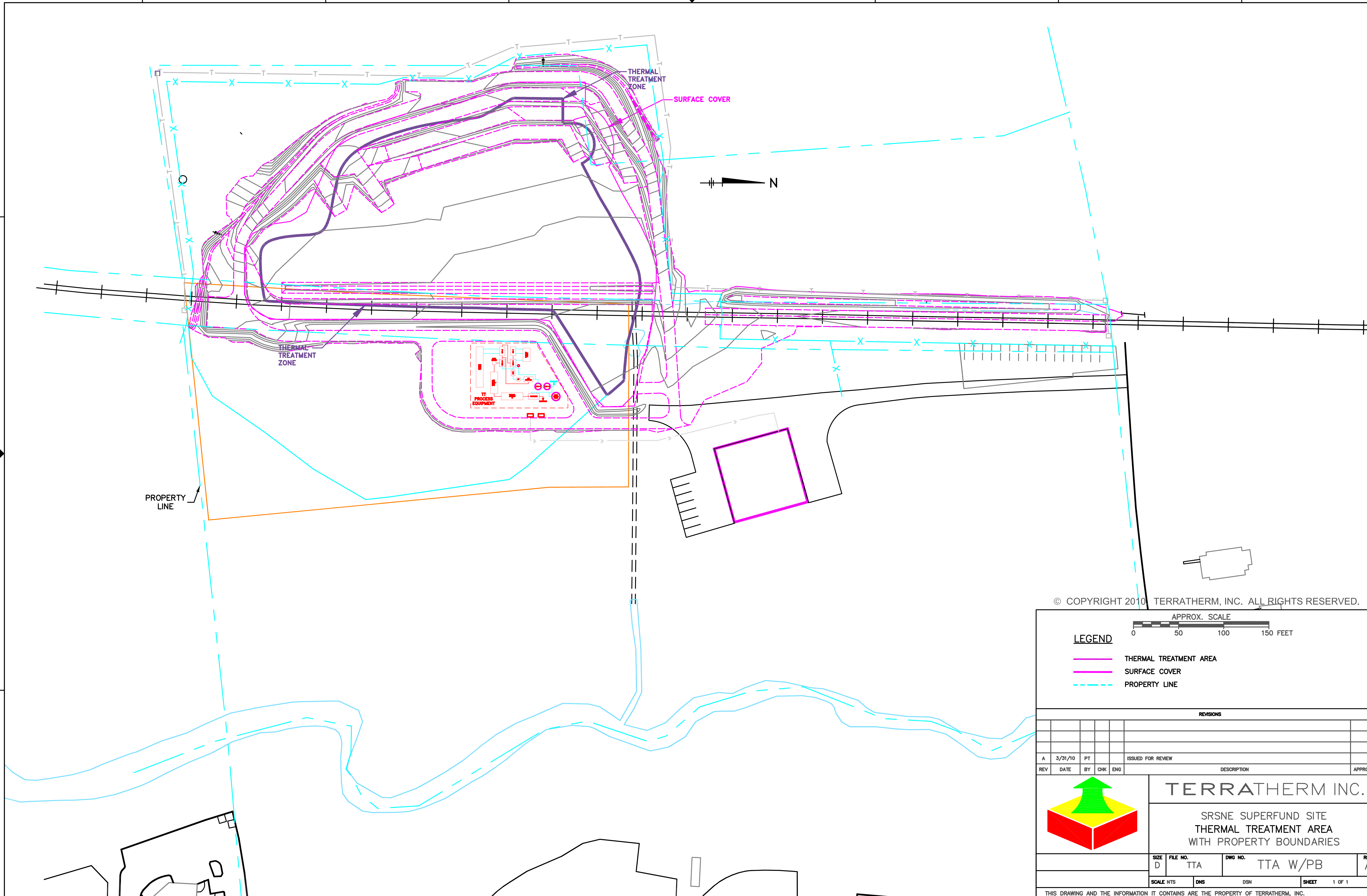
City/Town: **Milford** State: **NH** Zip Code: **03055**-

Business Phone: **978-343-0300** ext. Fax: - -

☐ Please enter a check mark, if additional sheets are necessary. If so, label and attach additional sheet(s) to this sheet with the required information as supplied above.

ATTACHMENT C

SITE PLAN



APPROX. SCALE

0 50 100 150 FEET

LEGEND

- THERMAL TREATMENT AREA
- SURFACE COVER
- PROPERTY LINE

REVISIONS

REV	DATE	BY	CHK	ENG	DESCRIPTION	APPROVED
A	3/31/10	PT			ISSUED FOR REVIEW	

TERRATHERM INC.

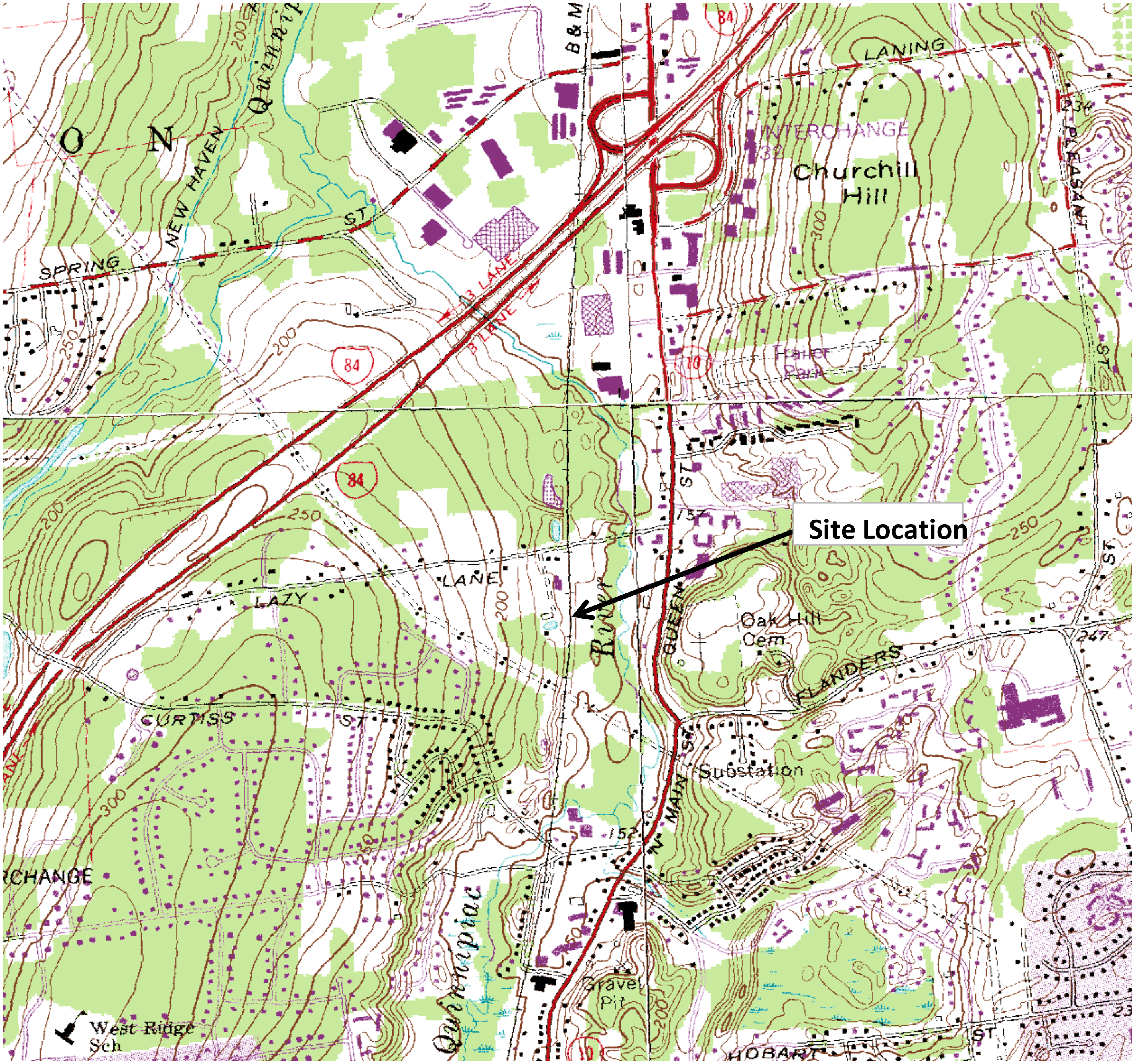
SRSNE SUPERFUND SITE
THERMAL TREATMENT AREA
WITH PROPERTY BOUNDARIES

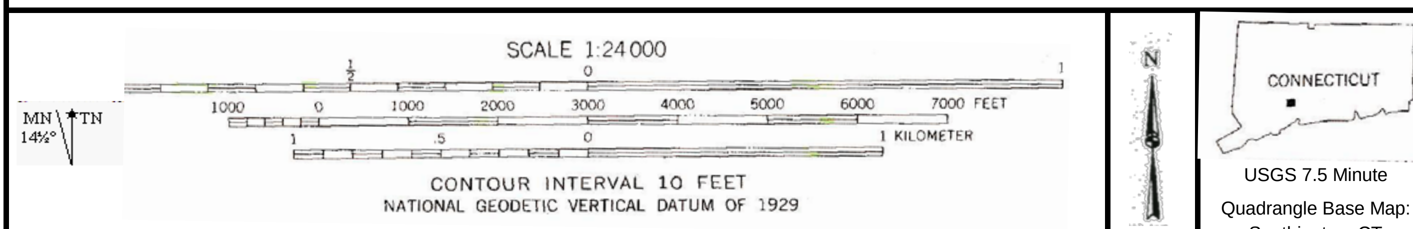
SIZE	FILE NO.	DWG NO.	REV
D	TTA	TTA W/PB	A

SCALE NTS | DNS | DSN | SHEET 1 OF 1

ATTACHMENT D

USGS SITE LOCATION MAP





USGS 7.5 Minute Quadrangle Base Map: Southington, CT

M.I. HOLZMAN & ASSOCIATES, LLC

Environmental Permitting, Compliance and Engineering Solutions

COMPILED BY:	MIH	DATE:	4/14/2010
REVIEWED BY:	MIH	DRAWN BY:	MIH
PROJ. NO:	091-002	FILENAME:	USGS.XLS

Attachment D

USGS SITE LOCATION MAP

SRSNE Superfund Site
Southington, CT

ATTACHMENT E

SUPPLEMENTAL APPLICATION FORMS

Site Remediation Equipment (DEP-AIR-APP-209)

Air Pollution Control Equipment (DEP-AIR-APP-210)

Stack Parameters (DEP-AIR-APP-211)

Unit Emissions (DEP-AIR-APP-212)

Calculations and Specifications

Process Flow Diagram

Air Pollution Control Equipment Specifications

Excerpt from Draft Conceptual Design Work Plan
(Available upon request as separately-bound document)

Supplemental Application Form
Site Remediation Equipment

Applicant Name: **TerraTherm, Inc. on behalf of SRSNE Site Group**
(As indicated on the *Permit Application Transmittal Form)*

DEP USE ONLY
App. No.: ____________
EPE No.: ____________

Please complete a separate form for each unit of an installation.
(You may reproduce this form as necessary.)

Unit No.: **U1**

Is this unit subject to Title 40 CFR Part 60, NSPS? ☐ Yes ☒ No

If yes, indicate the subpart(s):

Is this unit subject to Title 40 CFR Part 63, MACT? ☐ Yes ☒ No

If yes, indicate the subpart(s):

Section I: General

1a. Manufacturer: **TerraTherm, Inc.**

1b. Model No.: **custom** 1c. Serial No.: **N/A**

2. Construction Date: **08/01/2010**

3. Type of Remediation Process: **in-situ thermal desorption (ISTD)**

4. Type of Equipment: ☒ Stationary ☐ Portable

   If portable, indicate initial location:

5. Type of Contaminants and Concentrations: **See Attachment E, Calculations and Specifications for complete listing of contaminants and concentrations.**

6. Operating Schedule: **24** hours/day **8,760** hours/year

7. Percent of Annual Throughput: ☒ Not Applicable

   Jan - Mar: % April - June: % July - Sept: % Oct - Dec: %

Section II: Low Temperature Thermal Desorbers Only

Part A: Primary Treatment Unit (PTU)

1.	Maximum Soil Throughput: **N/A** tons/hour		
2.	Drum Speed Range:		RPM
3.	Soil Residence Time Range:		minutes
4.	Operating Temperature Range:		^{o}F
5.	Expected Soil Entrainment Rate:		lbs/hour
6a.	Maximum Total Petroleum Hydrocarbon Rate:		ppmw
6b.	Anticipated Total Petroleum Hydrocarbon Rate:		ppmw
	Specify Throughput:		tons/hour

Section II: Low Temperature Thermal Desorbers Only *(continued)*

Part A: Primary Treatment Unit (PTU) (continued)

7. Soil Moisture Content Range: % by weight
8. Storage Piles:
   a. Contaminated: ☐ Enclosed ☐ Covered ☐ None ☐ Other (specify):
   b. Treated: ☐ Enclosed ☐ Covered ☐ None ☐ Other (specify):
9. Soil Blending: ☐ Yes ☐ No

Part B: Primary Treatment Unit Auxiliary Burner System

1. Number of Burners: **N/A**
2. Burner Manufacturer(s) and Model No(s):
3. Maximum Heat Input: Btu/hour

Fuel Type(s) (4a)	% Ash (4b)	% Sulfur (4c)	% Nitrogen (4d)	Heating Value (4e)	Annual Usage (4f)

Section III: Air Strippers Only

1. Number of Wells: **N/A**
2. Maximum Flow Rate: gpm
3. Stripping Rate: lbs/hour

Section IV: Soil Vapor Extraction Only

1. Number of Wells: **550**
2. Maximum Fan Capacity: **3012** acfm
3. Stripping Rate: **355** lbs/hour

Supplemental Application Form
Air Pollution Control Equipment

DEP USE ONLY
App. No.: ______
EPE No.: ______

Applicant Name: TerraTherm, I**nc. on behalf of SRSNE Site Group**
(As indicated on *Permit Application Transmittal Form)*

Section I. Summary Sheet (Make additional copies, if necessary)

Unit Number (1)	Unit Description (2)	Control Equipment No. (3)	Control Equipment Type (4)	Overall Control Efficiency % (5)	Pollutants Controlled (6)	*Basis (7)	Stack No. (8)
U1	**ISTD remediation**	**C1a**	**oxidizer**	**99%**	**VOC, HAPs**	**vendor design**	**S1**
		C1b	**oxidizer**	**99%**	**VOC, HAPs**	**vendor design**	**S1**
		C1c	**scrubber**	**99%**	**HCl, acid gas**	**vendor design**	**S1**

** Attach supporting documentation with this form, e.g., stack test data, manufacturer's guarantee, etc.*

Section II: Specific Control Equipment

(Complete the appropriate subsection for each *distinct* piece of control equipment you utilize. You may reproduce the pages of the form as necessary.)

Adsorption Device

1a. Designated Reference Number of Adsorption Unit: **N/A**

1b. Designated Reference Number of Unit which uses Adsorber:

2. Manufacturer:

3. Model Name & Number:

4. Construction Date: / /

5. Adsorbent:

☐ Activated Charcoal Type:

☐ Other (specify):

6. Number of Beds:

7. Dimensions of Bed

Bed No.1

Thickness in direction of gas flow(inches): Cross-section area (sq. inches):

Bed No.2

Thickness in direction of gas flow(inches): Cross-section area (sq. inches):

Bed No.3

Thickness in direction of gas flow(inches): Cross-section area (sq. inches):

8. Inlet Gas Temperature: ^oF or ^oC

9. Design Pressure Drop Across Unit: inches H_2O

10. Type of Regeneration

☐ Replacement ☐ Steam ☐ Other (specify):

11. Method of Regeneration

☐ Alternate use of beds ☐ Source shut down ☐ Other (specify):

Describe procedures used to ensure that emissions from regeneration process are treated or minimized:

12. Maximum Operation Time Before Regeneration:

13. Is adsorber equipped with a break-through detector? ☐ Yes ☐ No

14. a) Control Efficiency(s) of Adsorber (%):

b) Collection Efficiency(s) of Adsorber (%):

15. Pollutant(s) Controlled:

Afterburner (Incinerator for Air Pollution Control)

1a. Designated Reference Number of Afterburner: **C1a + C1b (identical units)**

1b. Designated Reference Number of Unit which uses Afterburner: **U1**

2. Manufacturer: **Epcon, or equivalent**

3. Model Name & Serial Number: **1,100 scfm thermal oxidizers**

4. Construction Date: **03/01/2011**

5. Type of Afterburner: ☒ Thermal ☐ Catalytic ☐ Other (specify):

6. Combustion Chamber Dimensions

   Length (inches): **102** Cross-section area (sq. inches): **2016**

7. Inlet Gas Temperature: **158** ^{o}F *or* ^{o}C

8. Operating Temperature of Chamber: **1400** ^{o}F *or* ^{o}C

9. Type of Auxiliary Fuel: **nat. gas** Higher Heating Value: **1,000 Btu/CF**

10. a)% Sulfur: **.0006** b)% Ash: **negl.** c)% Nitrogen: **negl.**

11. Maximum Auxiliary Fuel Usage (specify units): a) Hourly: **2.5 MMBtu**

    b) Annually: **21,900 MMB**

12. Number of Burners Per Afterburner: **1**

    Burner No. 1 @: **2.5MM** BTU per hour

    Burner No. 2 @: BTU per hour

    Burner No. 3 @: BTU per hour

13. Catalyst Used: ☐ Yes ☒ No

    Type of Catalyst:

14. Catalyst Sampling Interval:

15. Heat Exchanger Used: ☐ Yes ☒ No

    Type of Heat Exchanger:

    Heat Recovery:

16. Gas Flow Rate (scfm): **1,135 ea. (typ.)**

17. Combustion Chamber Design Residence Time (seconds): **1.0+**

18. Moisture Content of Exhaust Gas (%): **14.6% wt.**

19. a) Control Efficiency of Afterburner (%): **99%**

    b) Collection Efficiency of Afterburner (%): **100%**

20. Pollutant(s) Controlled: **VOC, HAPs**

Condenser

1a. Designated Reference Number of Condenser Unit: **N/A**
1b. Designated Reference Number of Unit which uses Condenser:
2. Manufacturer:
3. Model Name & Number:
4. Construction Date: / /
5. Heat Exchange Area (sq. ft.):
6. Coolant Flow Rate: ☐ Water: gpm ☐ Air: scfm (at 68^o F)
   ☐ Other (specify) : Type: Flow Rate:
7. Gas Flow Rate: scfm (at 68^o F)
8. Coolant Temperature (^{o}F): In: Out:
9. Gas Temperature (^{o}F): In: Out:
10. a) Control Efficiency(s) of Condenser:
    b) Collection Efficiency(s) of Condenser (%):
11. Pollutant(s) Controlled:

Electrostatic Precipitator

1a. Designated Reference Number of Electrostatic Precipitator: **N/A**
1b. Designated Reference Number of Unit which uses Electrostatic Precipitator:
2. Manufacturer:
3. Model Name & Serial Number:
4. Construction Date: / /
5. Collecting Electrode Area (sq ft):
6. Gas Flow Rate (scfm):
7. Voltage Across the Precipitator Plates (kv):
8. Resistivity of Pollutants (ohms):
9. Number of Fields in the Precipitator:
10. Grain Loading (grains/scf @ 68^o F): a) Inlet: b) Outlet:
11. a) Control Efficiency(s) of Electrostatic Precipitator (%):
    b) Collection Efficiency(s) of Electrostatic Precipitator (%):
12. Pollutant(s) Controlled:

Filter

1a. Designated Reference Number of Filter: **N/A**
1b. Designated Reference Number of Unit which uses Filter:
2. Manufacturer:
3. Model Name & Serial Number:
4. Construction Date: / /
5. Filtering Material:
6. Air to Cloth Ratio (sq ft):
7. Cleaning Method: ☐ Shaker ☐ Reverse Air ☐ Pulse Air
☐ Pulse Jet ☐ Other (specify):
8. Gas Cooling Method: ☐ Ductwork Length (ft): Diameter (inches):
☐ Heat Exchanger ☐ Bleed-in Air ☐ Water Spray ☐ Other (specify):
9. Gas Flow Rate (from source): scfm (at 68☐ F)
10. Cooling Gas Flow Rate
Bleed-in Air: scfm (at 68☐ F) Water Spray: gpm
11. Inlet Gas Condition Temperature (☐F): Dew Point (☐F):
12. Grain Loading (grains/scf @ 68^o F): a) Inlet: b) Outlet:
13. Design Pressure Drop Across Unit (inches H_2O):
14. a) Control Efficiency of Filter (%):
b) Collection Efficiency of Filter (%):
15. Pollutant(s) Controlled:

Cyclone

1a. Designated Reference Number of Cyclone: **N/A**
1b. Designated Reference Number of Unit which uses Cyclone:
2. Manufacturer:
3. Model Name & Serial Number:
4. Construction Date: / /
5. Type of Cyclone: ☐ Single ☐ Multiple
6. Number of Cyclones in Multiple Cyclone:
7. Gas Flow Rate: scfm (at 68^o F)
8. Grain Loading (grains/SCF @ 68^o F): a) Inlet: b) Outlet:
9. Design Pressure Drop Across Unit (inches H_2O):
10. a) Control Efficiency of Cyclone (%):
b) Collection Efficiency of Cyclone (%):
11. Pollutant(s) Controlled:

Scrubber

1a. Designated Reference Number of Scrubber: **C1c**

1b. Designated Reference Number of Unit which uses Scrubber: **U1**

2. Manufacturer: **Epcon, or equivalent**

3. Model Name & Serial Number: **vertical quench + vertical packed tower**

4. Construction Date: **03/01/2011**

5. Type of Scrubber: ☐ Venturi ☐ Wet Fan

☒ Packed: Packing Material:

Size: **4 ft. diam** Packed Height (inches): **120**

☐ Spray: Number of Nozzles:

Nozzle No. 1 Pressure (psig):

Nozzle No. 2 Pressure (psig):

Nozzle No. 3 Pressure (psig):

Nozzle No. 4 Pressure (psig):

☐ Other (specify): ***(Attach description and sketch with dimensions)***

6. Design Pressure Drop Across the Scrubber (inches H_2O): **3**

7. Type of Flow: ☐ Concurrent ☒ Countercurrent ☐ Crossflow

8. Scrubber Geometry

Length in direction of Gas Flow (ft): **24** Cross Sectional Area (sq ft): **12.6**

9. Chemical Composition of Scrubbing Liquid: **NaOH**

10. a. Scrubbing Liquid Flow Rate (gpm): **75**

b. Fresh Liquid Make-Up Rate (gpm): **28**

11. Scrubber Liquid: ☐ One Pass ☒ Recirculated

12. Gas Flow Rate: **4,450** scfm (at 68☐ F)

13. Inlet Gas Temperature (^{o}F): **178**

14. a) Control Efficiency(s) of Scrubber (%):**99**

b) Collection Efficiency(s) of Scrubber (%):**100**

15. Pollutant(s) Controlled: **HCl, acid gases**

Mist Eliminator

1a. Designated Reference Number of Mist Eliminator:
1b. Designated Reference Number of Unit which uses Mist Eliminator:
2. Manufacturer:
3. Model Name & Number:
4. Construction Date: / /
5. Face Velocity (feet per second):
☐ Vertical Flow ☐ Horizontal Flow ☐ Diagonal
6. Design Pressure Drop Across Mist Eliminator (inches H_2O):
7. a) Control Efficiency of Mist Eliminator at:
1 mm Hg: 5 mm Hg: 10 mm Hg:
b) Collection Efficiency of Mist Eliminator (%):
8. Pollutant(s) Controlled:

Other Type of Control Equipment for Degreasing Equipment

1a. Designated Reference Number of Equipment:
1b. Designated Reference Number of Unit which uses Equipment:
2. Manufacturer:
3. Model Name & Serial Number:
4. Construction Date: / /
5. Method of Controls
☐ Refrigerator Chiller ☐ Water Spray ☐ Other (specify):
6. a) Control Efficiency of Other Type of Control Equipment (%):
b) Collection Efficiency of Other Type of Control Equipment (%):
7. Pollutant(s) Controlled:

Other Type of Control Equipment

1a. Designated reference number of other type of control equipment:
1b. Designated reference number of unit which uses other type of control equipment:
2. Manufacturer:
3. Model Name & Serial Number:
4. Construction Date: / /
5. Generic name of other equipment:
6. a) Control efficiency of other type of control equipment (%):
b) Collection efficiency of other type of control equipment (%):
7. Pollutant(s) Controlled:

Supplemental Application Form
Stack Parameters

DEP USE ONLY
App. No.: ______________________
EPE No.: ______________________

Applicant Name: Terra, Therm, I**nc. on behalf of SRSNE Site Group**
(As indicated on *Permit Application Transmittal Form)*

Section I. Stack Parameters (Make additional copies, if necessary)

Stack No. (1)	Unit No.(s) (2)	Control Equipment No.(s) (3)	Height ft. (4)	Diameter ft. (5)	Temp °F (6)	Flow ACFM (7)	Exit Dir. H or V (8)	Rain Hat Y or N (9)	Stack Lining (10)	Distance to Property Line ft. (11)
S1	U1	C1a, b, c	20	1.67	179	5,338	V	N	FRP	185

Supplemental Application Form
Unit Emissions

DEP USE ONLY	
App. No.:	
EPE No.:	

Applicant Name: **TerraTherm, Inc. on behalf of SRSNE Site Group**
(As indicated on the *Permit Application Transmittal Form)*

Section I: General Information

Please complete a separate form for each unit. You may reproduce this form as necessary.

1. Unit Number:
2. Stack Number:
3. Control Equipment Number(s):

Section II: Stack Emission Information for Listed Pollutants (Exclude Fugitive Emission Information)

See attached Tables E-1 through E-7 for calculations and summaries of criteria pollutant and HAP emissions from proposed ISTD remediation and vapor control system.

Pollutant		(1) Stack Emission Rate (@ *Rated Capacity)*			
		Pounds Per Hour (lb/hr) (a)	Tons Per Year (TPY) (b)	Other (Units) (c)	Basis (d)
Carbon Monoxide (CO)	Uncontrolled potential				
	proposed actual				
Volatile Organic Compounds (VOC)	uncontrolled potential				
	proposed actual				
Exempted Volatile Organic Compounds	uncontrolled potential				
	proposed actual				
Hydrocarbons	uncontrolled potential				
	proposed actual				
Nitrogen Oxides (NOx)	uncontrolled potential				
	proposed actual				
Sulfur Oxides (SOx)	uncontrolled potential				
	proposed actual				
Particulate Matter (TSP)	uncontrolled potential				
	proposed actual				
Particulate Matter <- 10 Micrometers (PM_{10})	uncontrolled potential				
	proposed actual				
Lead	uncontrolled potential				

(Pb)	proposed actual				

Section III: Stack Emission Information for Hazardous Air Pollutants

(Exclude Fugitive Emission Information)

Hazardous Air Pollutants *(List Separately)* (1)		Stack Emission Rate (@ *Rated Capacity)* (2)				
		Pounds Per Hour (lb/hr) (a)	Tons per year (TPY) (b)	Concentration Micrograms Per Cubic Meter ($\Phi g/m^3$) (c)	Other (Units) (d)	Basis (e)
	uncontrolled potential					
	proposed actual					
	maximum allowable					
	uncontrolled potential					
	proposed actual					
	maximum allowable					
	uncontrolled potential					
	proposed actual					
	maximum allowable					
	uncontrolled potential					
	proposed actual					
	maximum allowable					
	uncontrolled potential					
	proposed actual					
	maximum allowable					

See attached Tables E-1 through E-7 for calculations and summaries of criteria pollutant and HAP emissions from proposed ISTD remediation and vapor control system.

Section IV: Fugitive Emission Information for Listed Pollutants

Pollutant		Emission Rate (@ *Rated Capacity)* (1) Pounds Per Hour (lb/hr) (a)	Tons Per Year (TPY) (b)	Other (Units) (c)	Basis (d)
Carbon Monoxide (CO)	uncontrolled potential				
	proposed actual				
Volatile Organic Compounds (VOC)	uncontrolled potential				
	proposed actual				
Exempted Volatile Organic Compounds	uncontrolled potential				
	proposed actual				
Hydrocarbons	uncontrolled potential				
	proposed actual				
Nitrogen Oxides (NOx)	uncontrolled potential				
	proposed actual				
Sulfur Oxides (SO_X)	uncontrolled potential				
	proposed actual				
Particulate Matter (TSP)	uncontrolled potential				
	proposed actual				
Particulate Matter <- 10 Micrometers (PM_{10})	uncontrolled potential				
	proposed actual				
Lead (Pb)	uncontrolled potential				
	proposed actual				

See attached Tables E-1 through E-7 for calculations and summaries of criteria pollutant and HAP emissions from proposed ISTD remediation and vapor control system.

1e. Assumptions:

Section V: Fugitive Emission Information for Hazardous Air Pollutants

Hazardous Air Pollutants *(List Separately)* (1)		Emission Rate (@ *Rated Capacity)* (2)				
		Pounds Per Hour (lb/hr) (a)	Tons per year (TPY) (b)	Concentration Micrograms Per Cubic Meter (Φg/m^3) (c)	Other (Units) (d)	Basis (e)
	uncontrolled potential					
	proposed actual					
	maximum allowable					
	uncontrolled potential					
	proposed actual					
	maximum allowable					
	uncontrolled potential					
	proposed actual					
	maximum allowable					
	uncontrolled potential					
	proposed actual					
	maximum allowable					
	uncontrolled potential					
	proposed actual					
	maximum allowable					

See attached Tables E-1 through E-7 for calculations and summaries of criteria pollutant and HAP emissions from proposed ISTD remediation and vapor control system.

Table E-1
SRS of New England, Inc. (SRSNE) Superfund Site
Emission Calculations - VOC Emitting Equipment
In-Situ Thermal Desorption (ISTD) w/ Thermal Oxidation and Wet Scrubbing

1) Facility Name: SRS of New England, Inc. (SRSNE) Superfund Site
2) Emission Unit Number: U1
3) SCC#: 50410314 Site Remediation In Situ Venting/Venting of Soils Active Aeration, Vacuum: Control Devi
4) Permit/Order/Registration #: N/A
5a) Control Equipment Description: Thermal Oxidation + acid gas wet scrubber
5b) Control Equipment Code: 21, 50
5c) Control Efficiency - PM-10: 0%
5d) Control Efficiency - VOC and HCl: 99%
6) Method used to Determine Potential Emissions: Groundwater characterization data and material balance calculations, with assumptions on operating time.
7) Operation Type: In situ thermal desorption (ISTD) site remediation
8) Calculations:
Basis of Design (TerraTherm):

Max. annual VOC loading to be treated:	1,000,000	lb/yr
Peak hourly loading to be treated:	355	lb/hr
Peak daily loading to be treated:	8530	lb/day

			Uncontrolled Emissions Estimates			
Component	Mass %	Cl Mass Fraction	Mass loading @ 1 MM lb. Total (lb/Hr)	Mass loading @ 1 MM lb. Total (TPY)	HCl @ 1 MM lb. Total (lb/hr)	HCl @ 1 MM lb. Total (TPY)
1,1,1 Trichloroethane[1]	0.56	0.798	2.0	2.81	1.64	2.30
1,2,3-trimethylbenzene	0.44		1.6	2.22		
1,2,4 trimethylbenzene	17.31		61.5	86.55		
1,2-dimethyl-4-ethylbenzene	0.22		0.8	1.11		
1,2-methylethylbenzene	0.42		1.5	2.11		
1,2-methyl-i-propylbenzene	0.22		0.8	1.11		
1,3,5 trimethylbenzene	0.49		1.7	2.46		
1,3-methylethylbenzene	0.80		2.8	4.00		
1,3-methyl-n-propylbenzene	0.21		0.7	1.05		
1,4 methylethylbenzene	0.37		1.3	1.85		
1t,2-dimethylcyclopentane	5.40		19.2	27.01		
1t,3-dimethylcyclohexane	4.14		14.7	20.72		
2,3-dimethyloctane	0.29		1.0	1.43		
3,3-dimethyloctane	0.20		0.7	1.01		
3-ethylheptane	0.41		1.4	2.03		
cis-1,2 Dichloroethene	1.22	0.732	4.3	6.08	3.25	4.58
Ethylbenzene	3.74		13.3	18.71		
hexene-1	0.40		1.4	1.99		
m,p xylene	7.72		27.4	38.60		
methylcyclohexane	0.55		2.0	2.77		
n-decane	0.91		3.2	4.54		
n-heptane	0.36		1.3	1.79		
n-hexane	0.24		0.9	1.20		
n-nonane	0.57		2.0	2.85		
n-octane	0.40		1.4	2.01		
n-propylbenzene	0.37		1.3	1.87		
o-xylene	2.32		8.2	11.58		
Styrene	0.35		1.2	1.75		
Tetrachloroethene[1]	19.18	0.856	68.2	95.91	60.00	84.41
Toluene	6.78		24.1	33.92		
Trichloroethene	23.39	0.811	83.1	116.96	69.33	97.53
Total	100.0		355.4	500.0	134.22	188.82

	1 MM lb. Case		2 MM lb. Case	
	Uncontrolled Potential Emissions	Controlled Actual Emissions	Uncontrolled Potential Emissions	Controlled Actual Emissions
Maximum total VOC emission rate (lb/hr)	355.4	3.55	710.8	7.1
Average total VOC emission rate (lb/day)	8530	85.3	17060	170.6
Average total VOC emission rate (TPY)	500	5.0	1000	10.0
Maximum total HCl emission rate (lb/hr)	134.2	1.34	188.8	1.9
Average total HCl emission rate (lb/day)	3221.2	32.2	4532	45.3
Average total HCl emission rate (TPY)	189	1.9	378	3.8

Note:
Emissions are conservatively estimated based on the total mass of VOC estimated to be present in the ground and a total operating time of one year. Based on extensive monitoring, pilot testing data and experience on other remediation projects, TerraTherm estimates that entire VOC loading can be treated in less than 195 operating days for the 1MM lb. case. The maximum recovery rate was 36 pounds per hour. The mass removal rates during thermal remediation will vary with time and are estimated to peak within 60 to 90 days from initiating heating. The estimated peak hourly and daily mass loadings estimated to occur during that time interval are uesd for MASC compliance purposes. The annual loading and VOC emission rates are based on the total estimated mass of VOC to be remediated.

1. Not included in EPA definition of VOC. However, compound was included in total VOCs to provide conservative estimate.

Table E-2
SRS of New England, Inc. (SRSNE) Superfund Site
Demonstration of Compliance With CTDEP Hazardous Air Pollutant Regulations (RCSA 22a-174-29)
In-Situ Thermal Desorption (ISTD) w/ Thermal Oxidation and Wet Scrubbing

		Alternate Units:
6.1	= Stack Height (m)	20 = Stack Height (ft)
56.4	= Property Line (m)	185 = Property Line (ft)
56.4	= Xmax (m)	
2.52	= V_O, flow (acm/s)	5,338 = Flow (acfm)
199.76	= unitless MASC	
500,000	= total mass (lbs.) - Case 1	
1,000,000	= total mass (lbs.) - Case 2	
2,000,000	= total mass (lbs.) - Case 3	DRE(%) = 99.0

Pollutant	Case 1 Max. APC Inlet Loading @ 0.5 MM lb. Total Mass (lb/hr)	Case 2 Max. APC Inlet Loading @ 1 MM lb. Total Mass (lb/hr)	Case 3 Max. APC Inlet Loading @ 2 MM lb. Total Mass (lb/hr)	Case 1 Max. Controlled Emissions @99% DRE (lb/hr)	Case 2 Max. Controlled Emissions @99% DRE (lb/hr)	Case 3 Max. Controlled Emissions @99% DRE (lb/hr)	HLV (μg/m^3)[3]	MASC (μg/m^3)[3]	Case 1 ASC (μg/m^3)[3]	Case 2 ASC (μg/m^3)[3]	Case 3 ASC (μg/m^3)[3]	Max. ASC	Case 1 ASC < MASC?	Case 2 ASC < MASC?	Case 3 ASC < MASC?	ASC < MASC?
1,1,1 Trichloroethane1	1.00	2.00	3.99	0.010	0.020	0.040	38000	7.6E+06	5.0E+02	1.0E+03	2.0E+03	2.0E+03	Yes	Yes	Yes	Yes
1,2,3-trimethylbenzene	0.79	1.57	3.15	0.008	0.016	0.031	2500	5.0E+05	3.9E+02	7.9E+02	1.6E+03	1.6E+03	Yes	Yes	Yes	Yes
1,2,4 trimethylbenzene	30.76	61.52	123.05	0.308	0.615	1.230	2500	5.0E+05	1.5E+04	3.1E+04	6.2E+04	6.2E+04	Yes	Yes	Yes	Yes
1,2-dimethyl-4-ethylbenzene	0.39	0.79	1.58	0.004	0.008	0.016	--	--	2.0E+02	3.9E+02	7.9E+02	7.9E+02	--	--	--	--
1,2-methylethylbenzene	0.75	1.50	2.99	0.007	0.015	0.030	--	--	3.7E+02	7.5E+02	1.5E+03	1.5E+03	--	--	--	--
1,2-methyl-i-propylbenzene	0.39	0.79	1.58	0.004	0.008	0.016	--	--	2.0E+02	4.0E+02	7.9E+02	7.9E+02	--	--	--	--
1,3,5 trimethylbenzene	0.87	1.75	3.49	0.009	0.017	0.035	2500	5.0E+05	4.4E+02	8.7E+02	1.7E+03	1.7E+03	Yes	Yes	Yes	Yes
1,3-methylethylbenzene	1.42	2.85	5.69	0.014	0.028	0.057	--	--	7.1E+02	1.4E+03	2.8E+03	2.8E+03	--	--	--	--
1,3-methyl-n-propylbenzene	0.37	0.74	1.49	0.004	0.007	0.015	--	--	1.9E+02	3.7E+02	7.4E+02	7.4E+02	--	--	--	--
1,4 methylethylbenzene	0.66	1.31	2.63	0.007	0.013	0.026	--	--	3.3E+02	6.6E+02	1.3E+03	1.3E+03	--	--	--	--
1t,2-dimethylcyclopentane	9.60	19.20	38.39	0.096	0.192	0.384	--	--	4.8E+03	9.6E+03	1.9E+04	1.9E+04	--	--	--	--
1t,3-dimethylcyclohexane	7.36	14.73	29.46	0.074	0.147	0.295	32000	6.4E+06	3.7E+03	7.4E+03	1.5E+04	1.5E+04	Yes	Yes	Yes	Yes
2,3-dimethyloctane	0.51	1.02	2.04	0.005	0.010	0.020	--	--	2.5E+02	5.1E+02	1.0E+03	1.0E+03	--	--	--	--
3,3-dimethyloctane	0.36	0.72	1.44	0.004	0.007	0.014	--	--	1.8E+02	3.6E+02	7.2E+02	7.2E+02	--	--	--	--
3-ethylheptane	0.72	1.44	2.89	0.007	0.014	0.029	--	--	3.6E+02	7.2E+02	1.4E+03	1.4E+03	--	--	--	--
cis-1,2 Dichloroethene	2.16	4.32	8.65	0.022	0.043	0.086	15800	3.2E+06	1.1E+03	2.2E+03	4.3E+03	4.3E+03	Yes	Yes	Yes	Yes
Ethylbenzene	6.65	13.30	26.60	0.067	0.133	0.266	8700	1.7E+06	3.3E+03	6.7E+03	1.3E+04	1.3E+04	Yes	Yes	Yes	Yes
hexene-1	0.71	1.42	2.83	0.007	0.014	0.028	--	--	3.5E+02	7.1E+02	1.4E+03	1.4E+03	--	--	--	--
m,p xylene	13.72	27.44	54.87	0.137	0.274	0.549	8680	1.7E+06	6.9E+03	1.4E+04	2.7E+04	2.7E+04	Yes	Yes	Yes	Yes
methylcyclohexane	0.98	1.97	3.94	0.010	0.020	0.039	32000	6.4E+06	4.9E+02	9.8E+02	2.0E+03	2.0E+03	Yes	Yes	Yes	Yes
n-decane	1.62	3.23	6.46	0.016	0.032	0.065	--	--	8.1E+02	1.6E+03	3.2E+03	3.2E+03	--	--	--	--
n-heptane	0.64	1.28	2.55	0.006	0.013	0.026	7000	1.4E+06	3.2E+02	6.4E+02	1.3E+03	1.3E+03	Yes	Yes	Yes	Yes
n-hexane	0.43	0.85	1.71	0.004	0.009	0.017	3600	7.2E+05	2.1E+02	4.3E+02	8.5E+02	8.5E+02	Yes	Yes	Yes	Yes
n-nonane	1.01	2.02	4.05	0.010	0.020	0.040	21000	4.2E+06	5.1E+02	1.0E+03	2.0E+03	2.0E+03	Yes	Yes	Yes	Yes
n-octane	0.71	1.43	2.85	0.007	0.014	0.029	7000	1.4E+06	3.6E+02	7.1E+02	1.4E+03	1.4E+03	Yes	Yes	Yes	Yes
n-propylbenzene	0.67	1.33	2.66	0.007	0.013	0.027	--	--	3.3E+02	6.7E+02	1.3E+03	1.3E+03	--	--	--	--
o-xylene	4.12	8.23	16.46	0.041	0.082	0.165	8680	1.7E+06	2.1E+03	4.1E+03	8.2E+03	8.2E+03	Yes	Yes	Yes	Yes
Styrene	0.62	1.25	2.49	0.006	0.012	0.025	4300	8.6E+05	3.1E+02	6.2E+02	1.2E+03	1.2E+03	Yes	Yes	Yes	Yes
Tetrachloroethene1	34.09	68.17	136.35	0.341	0.682	1.363	1700	3.4E+05	1.7E+04	3.4E+04	6.8E+04	6.8E+04	Yes	Yes	Yes	Yes
Toluene	12.06	24.11	48.22	0.121	0.241	0.482	7500	1.5E+06	6.0E+03	1.2E+04	2.4E+04	2.4E+04	Yes	Yes	Yes	Yes
Trichloroethene	41.57	83.14	166.28	0.416	0.831	1.663	1350	2.7E+05	2.1E+04	4.2E+04	8.3E+04	8.3E+04	Yes	Yes	Yes	Yes
TOTAL VOCs	177.71	355.42	710.83	1.78	3.55	7.11			8.89E+04	1.78E+05	3.55E+05	3.55E+05				

Notes:

1. HLV = Hazard Limiting Value, per RCSA 22a-174-29, 8-hr average concentration
   MASC = Maximum Allowable Stack Concentration, calculated per RCSA 22a-174-29, 8-hr. average concentration
   ASC = Actual Stack Concentration

2. ASC values calculated from estimated mass loadings (see Table E-1), which are believed to be representative, but can vary with location of extraction well and time during remediation phase.

Table E-3
SRS of New England, Inc. (SRSNE) Superfund Site
Criteria Pollutant Emissions from Natural Gas Combution in Two Thermal Oxidizers
In-Situ Thermal Desorption (ISTD) w/ Thermal Oxidation and Wet Scrubbing

1) Facility Name:	SRS of New England, Inc. (SRSNE) Superfund Site	
2) Emission Unit Number:	U1	C1a and C1b (2 identical oxidizers in parallel)
3) SCC#:		
4) Construction Date:	2010	
5) Permit/Order/Registration #:	N/A	
6a) Control Equipment Description:	Thermal Oxidizer	
6b) Control Equipment Code:	021	
7a) Monitoring Equipment Description:	Daily initial, then weekly FID analysis of Summa canisters.	
7b) Pollutants Monitored:	VOCs analyzed using EPA method TO-15	
8) Maximum Rated Capacity of Emissions Unit:	2.50E+06	Btu/hr, each oxidizer
9) Combustion Method:	External	
10) Primary Fuel Type: Natural Gas % Sulfur: 0.0006	% Ash: N/A	
11) Maximum Fuel Consumption:	2,500	cf/hr (ea. Unit)
12) Method Used to Determine Potential Emissions:	Maximum Rated Capacity times emission factor x 8760 hours per year AP-42 fifth edition, Section 1.4	

13) Primary Fuel Calculations Summary (**each oxidizer**):

13a)	13b)	13c)	13d)	13e)
Pollutant	Uncontrolled Emission Factor (lb/mmcf)	Uncontrolled Emission Rate (lbs/hr)	Pollution Control Efficiency (%)	Potential Emissions (tons/yr)
PM-10/PM2.5 (total)	7.6	0.019	N/A	0.083
SO_X	0.6	0.002	N/A	0.007
NO_X	100	0.250	N/A	1.095
VOC	5.5	0.014	N/A	0.060
CO	84	0.210	N/A	0.920
Lead	0.0005	1.25E-06	N/A	5.48E-06

14) Emission Unit Emission Summary:

14a)	14b)	14c)	14d)
Pollutant	Potential Emissions Each Oxidizer (lb/hr)	Potential Emissions Two Oxidizers (lb/hr)	Potential Emissions Two Oxidizers (tons/yr)
PM-10/PM2.5 (total)	0.019	0.038	0.166
SO_X	0.0015	0.003	0.013
NO_X	0.25	0.500	2.190
VOC	0.01375	0.028	0.120
CO	0.21	0.420	1.840
Lead	0.00000125	2.50E-06	1.10E-05

Table E-4
SRS of New England, Inc. (SRSNE) Superfund Site
Hazardou Air Pollutant Emissions from Natural Gas Combution in Two Thermal Oxidizers
In-Situ Thermal Desorption (ISTD) w/ Thermal Oxidation and Wet Scrubbing

1) Facility Name: SRS of New England, Inc. (SRSNE) Superfund Site
2) Emission Unit Number: U1 C1a and C1b (2 identical oxidizers in parallel)
3) SCC#:
4) Permit/Order/Registration #:
5a) Control Equipment Description: Thermal Oxidizer
5b) Control Equipment Code: 021
6) Maximum Fuel Consumption: 2,500 cf/hr ea. Unit
7) Method Used to Determine Potential Emissions: AP-42 5th edition (section 1.4) emission factors times maximum fuel consumption times 8760 hours per year

7) Calculations Summary:

7a)	7b)	7c)	7d)	7e)	7f)	7g)
VOC/GASEOUS HAP Name	CAS No.	Uncontrolled Emission Factor (lb/mmcf)	Uncontrolled Emission Rate (ea. Unit) (lbs/hr)	Uncontrolled Emission Rate (2 units) (lbs/hr)	Pollution Control Efficiency (%)	Potential Emissions (2 units) (tons/yr)
POM/PAH[1]	50-32-8	8.82E-05	2.21E-07	4.41E-07	N/A	1.93E-06
Benzene	71-43-2	2.10E-03	5.25E-06	1.05E-05	N/A	4.60E-05
Butane[2]	106-97-8	2.10E+00	5.25E-03	1.05E-02	N/A	4.60E-02
Dichlorobenzene	25321-22-6	1.20E-03	3.00E-06	6.00E-06	N/A	2.63E-05
Formaldehyde	50-00-0	7.50E-02	1.88E-04	3.75E-04	N/A	1.64E-03
Hexane	110-54-3	1.80E+00	4.50E-03	9.00E-03	N/A	3.94E-02
Naphthalene	91-20-3	6.40E-04	1.60E-06	3.20E-06	N/A	1.40E-05
Pentane[2]	109-66-0	2.60E+00	6.50E-03	1.30E-02	N/A	5.69E-02
Toluene	108-88-3	3.40E-03	8.50E-06	1.70E-05	N/A	7.45E-05
Arsenic	7440-38-2	2.00E-04	5.00E-07	1.00E-06	N/A	4.38E-06
Barium	7440-39-3	4.40E-03	1.10E-05	2.20E-05	N/A	9.64E-05
Beryllium	7440-41-7	1.20E-05	3.00E-08	6.00E-08	N/A	2.63E-07
Cadmium	7440-43-9	1.10E-03	2.75E-06	5.50E-06	N/A	2.41E-05
Chromium	7440-47-3	1.40E-03	3.50E-06	7.00E-06	N/A	3.07E-05
Cobalt	7440-48-4	8.40E-05	2.10E-07	4.20E-07	N/A	1.84E-06
Copper	7440-50-8	8.50E-04	2.13E-06	4.25E-06	N/A	1.86E-05
Lead	7439-92-1	5.00E-04	1.25E-06	2.50E-06	N/A	1.10E-05
Manganese	7439-96-5	3.80E-04	9.50E-07	1.90E-06	N/A	8.32E-06
Mercury	7439-97-6	2.60E-04	6.50E-07	1.30E-06	N/A	5.69E-06
Molybdenum	7439-98-7	1.10E-03	2.75E-06	5.50E-06	N/A	2.41E-05
Nickel	7440-02-0	2.10E-03	5.25E-06	1.05E-05	N/A	4.60E-05
Selenium	7782-49-2	2.40E-05	6.00E-08	1.20E-07	N/A	5.26E-07
Vanadium	7440-62-2	2.30E-03	5.75E-06	1.15E-05	N/A	5.04E-05
Zinc	7440-66-6	2.90E-02	7.25E-05	1.45E-04	N/A	6.35E-04

MASC Calculations to Determine Maximum Permittable (Potential) Emissions

Stack Flow Rate (total at common stack)	2.5 m^3/s	89 ft^3/s
Distance to property line	56.4 meters	185 feet
H, height of discharge point	6.10 meters	20 feet
Xmax	56.4 meters	185 feet

HAP Name	CAS No.	Maximum Emission Rate (2 Units) (lb/hr)	HLV ($\mu g/m^3$) 8 hour	MASC ($\mu g/m^3$) 8 hour	ASC ($\mu g/m^3$)	ASC % of MASC
POM/PAH	50-32-8	4.41E-07	0.1	19.98	2.21E-02	< 1%
Benzene	71-43-2	1.05E-05	150	29,964	5.25E-01	< 1%
Butane[2]	106-97-8	1.05E-02	38000	7,590,916	5.25E+02	< 1%
Dichlorobenzene	25321-22-6	6.00E-06	9000	1,797,849	3.00E-01	< 1%
Formaldehyde	50-00-0	3.75E-04	12	2,397	18.75	< 1%
Hexane	110-54-3	9.00E-03	3600	719,139	450	< 1%
Naphthalene	91-20-3	3.20E-06	1000	199,761	1.60E-01	< 1%
Pentane[2]	109-66-0	1.30E-02	7000	1,398,327	6.50E+02	< 1%
Toluene	108-88-3	1.70E-05	7500	1,498,207	8.50E-01	< 1%
Arsenic	7440-38-2	1.00E-06	0.05	10	5.00E-02	< 1%
Barium	7440-39-3	2.20E-05	10	1,998	1.10E+00	< 1%
Beryllium	7440-41-7	6.00E-08	0.01	2	3.00E-03	< 1%
Cadmium	7440-43-9	5.50E-06	0.4	80	2.75E-01	< 1%
Chromium	7440-47-3	7.00E-06	2.5	499	3.50E-01	< 1%
Cobalt	7440-48-4	4.20E-07	2	400	2.10E-02	< 1%
Copper	7440-50-8	4.25E-06	2	400	2.13E-01	< 1%
Lead	7439-92-1	2.50E-06	3	599	1.25E-01	< 1%
Manganese	7439-96-5	1.90E-06	20	3,995	9.50E-02	< 1%
Mercury	7439-97-6	1.30E-06	0.2	40	6.50E-02	< 1%
Molybdenum	7439-98-7	5.50E-06	100	19,976	2.75E-01	< 1%
Nickel	7440-02-0	1.05E-05	0.3	60	5.25E-01	< 1%
Selenium	7782-49-2	1.20E-07	4	799	6.00E-03	< 1%
Vanadium	7440-62-2	1.15E-05	1	200	5.75E-01	< 1%
Zinc	7440-66-6	1.45E-04	100	19,976	7.25E+00	< 1%

1. Sum of POM/PAH.
2. Not a federal HAP.

Table E-5
SRS of New England, Inc. (SRSNE) Superfund Site
Summary of Uncontrolled and Controlled Emissions - 1MM lb. Case
In-Situ Thermal Desorption (ISTD) w/ Thermal Oxidation and Wet Scrubbing

Uncontrolled Potential						
	ISTD		2 Oxidizers		Total	
Pollutant	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
PM-10/PM2.5 (total)			0.038	0.17	0.038	0.17
SO_X			0.003	0.013	0.003	0.013
NO_X			0.5	2.19	0.5	2.19
CO			0.42	1.84	0.42	1.84
Total VOC	355.42	500.0	0.028	0.120	355.44	500.12
1,1,1 Trichloroethane	2.00	2.81			2.00	2.81
1,2,3-trimethylbenzene	1.57	2.22			1.57	2.22
1,2,4 trimethylbenzene	61.52	86.55			61.52	86.55
1,2-dimethyl-4-ethylbenzene	0.79	1.11			0.79	1.11
1,2-methylethylbenzene	1.50	2.11			1.50	2.11
1,2-methyl-i-propylbenzene	0.79	1.11			0.79	1.11
1,3,5 trimethylbenzene	1.75	2.46			1.75	2.46
1,3-methylethylbenzene	2.85	4.00			2.85	4.00
1,3-methyl-n-propylbenzene	0.74	1.05			0.74	1.05
1,4 methylethylbenzene	1.31	1.85			1.31	1.85
1t,2-dimethylcyclopentane	19.20	27.01			19.20	27.01
1t,3-dimethylcyclohexane	14.73	20.72			14.73	20.72
2,3-dimethyloctane	1.02	1.43			1.02	1.43
3,3-dimethyloctane	0.72	1.01			0.72	1.01
3-ethylheptane	1.44	2.03			1.44	2.03
cis-1,2 Dichloroethene	4.32	6.08			4.32	6.08
Ethylbenzene	13.30	18.71			13.30	18.71
hexene-1	1.42	1.99			1.42	1.99
m,p xylene	27.44	38.60			27.44	38.60
methylcyclohexane	1.97	2.77			1.97	2.77
n-decane	3.23	4.54			3.23	4.54
n-heptane	1.28	1.79			1.28	1.79
n-hexane	0.85	1.20	9.00E-03	3.94E-02	0.86	1.24
n-nonane	2.02	2.85			2.02	2.85
n-octane	1.43	2.01			1.43	2.01
n-propylbenzene	1.33	1.87			1.33	1.87
o-xylene	8.23	11.58			8.23	11.58
Styrene	1.25	1.75			1.25	1.75
Tetrachloroethene	68.17	95.91			68.17	95.91
Toluene	24.11	33.92	1.70E-05	7.45E-05	24.11	33.92
Trichloroethene	83.14	116.96			83.14	116.96
POM/PAH			4.41E-07	1.93E-06	4.41E-07	1.93E-06
Benzene			1.05E-05	4.60E-05	1.05E-05	4.60E-05
Butane[1]			1.05E-02	4.60E-02	1.05E-02	4.60E-02
Dichlorobenzene			6.00E-06	2.63E-05	6.00E-06	2.63E-05
Formaldehyde			3.75E-04	1.64E-03	3.75E-04	1.64E-03
Naphthalene			3.20E-06	1.40E-05	3.20E-06	1.40E-05
Pentane[1]			1.30E-02	5.69E-02	1.30E-02	5.69E-02
Arsenic			1.00E-06	4.38E-06	1.00E-06	4.38E-06
Barium[1]			2.20E-05	9.64E-05	2.20E-05	9.64E-05
Beryllium			6.00E-08	2.63E-07	6.00E-08	2.63E-07
Cadmium			5.50E-06	2.41E-05	5.50E-06	2.41E-05
Chromium			7.00E-06	3.07E-05	7.00E-06	3.07E-05
Cobalt			4.20E-07	1.84E-06	4.20E-07	1.84E-06
Copper[1]			4.25E-06	1.86E-05	4.25E-06	1.86E-05
Lead			2.50E-06	1.10E-05	2.50E-06	1.10E-05
Manganese			1.90E-06	8.32E-06	1.90E-06	8.32E-06
Mercury			1.30E-06	5.69E-06	1.30E-06	5.69E-06
Molybdenum[1]			5.50E-06	2.41E-05	5.50E-06	2.41E-05
Nickel			1.05E-05	4.60E-05	1.05E-05	4.60E-05
Selenium			1.20E-07	5.26E-07	1.20E-07	5.26E-07
Vanadium[1]			1.15E-05	5.04E-05	1.15E-05	5.04E-05
Zinc[1]			1.45E-04	6.35E-04	1.45E-04	6.35E-04
HCl	134.22	188.82				188.82
Total Federal HAPs						688.9

Controlled Actual

Pollutant	ISTD		2 Oxidizers		Total	
	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
PM-10/PM2.5 (total)			0.038	0.17	0.038	0.17
SO_X			0.003	0.013	0.003	0.013
NO_X			0.50	2.19	0.5	2.19
CO			0.42	1.84	0.42	1.84
Total VOC	3.55	5.0	0.028	0.12	3.58	5.12
1,1,1 Trichloroethane	0.02	0.03			0.02	0.03
1,2,3-trimethylbenzene	0.02	0.02			0.02	0.02
1,2,4 trimethylbenzene	0.62	0.87			0.62	0.87
1,2-dimethyl-4-ethylbenzene	0.01	0.01			0.01	0.01
1,2-methylethylbenzene	0.01	0.02			0.01	0.02
1,2-methyl-i-propylbenzene	0.01	0.01			0.01	0.01
1,3,5 trimethylbenzene	0.02	0.02			0.02	0.02
1,3-methylethylbenzene	0.03	0.04			0.03	0.04
1,3-methyl-n-propylbenzene	0.01	0.01			0.01	0.01
1,4 methylethylbenzene	0.01	0.02			0.01	0.02
1t,2-dimethylcyclopentane	0.19	0.27			0.19	0.27
1t,3-dimethylcyclohexane	0.15	0.21			0.15	0.21
2,3-dimethyloctane	0.01	0.01			0.01	0.01
3,3-dimethyloctane	0.01	0.01			0.01	0.01
3-ethylheptane	0.01	0.02			0.01	0.02
cis-1,2 Dichloroethene	0.04	0.06			0.04	0.06
Ethylbenzene	0.13	0.19			0.13	0.19
hexene-1	0.01	0.02			0.01	0.02
m,p xylene	0.27	0.39			0.27	0.39
methylcyclohexane	0.02	0.03			0.02	0.03
n-decane	0.03	0.05			0.03	0.05
n-heptane	0.01	0.02			0.01	0.02
n-hexane	0.01	0.01	9.00E-03	3.94E-02	0.02	0.05
n-nonane	0.02	0.03			0.02	0.03
n-octane	0.01	0.02			0.01	0.02
n-propylbenzene	0.01	0.02			0.01	0.02
o-xylene	0.08	0.12			0.08	0.12
Styrene	0.01	0.02			0.01	0.02
Tetrachloroethene	0.68	0.96			0.68	0.96
Toluene	0.24	0.34	1.70E-05	7.45E-05	0.24	0.34
Trichloroethene	0.83	1.17			0.83	1.17
POM/PAH			4.41E-07	1.93E-06	4.41E-07	1.93E-06
Benzene			1.05E-05	4.60E-05	1.05E-05	4.60E-05
Butane[1]			1.05E-02	4.60E-02	1.05E-02	4.60E-02
Dichlorobenzene			6.00E-06	2.63E-05	6.00E-06	2.63E-05
Formaldehyde			3.75E-04	1.64E-03	3.75E-04	1.64E-03
Naphthalene			3.20E-06	1.40E-05	3.20E-06	1.40E-05
Pentane[1]			1.30E-02	5.69E-02	1.30E-02	5.69E-02
Arsenic			1.00E-06	4.38E-06	1.00E-06	4.38E-06
Barium[1]			2.20E-05	9.64E-05	2.20E-05	9.64E-05
Beryllium			6.00E-08	2.63E-07	6.00E-08	2.63E-07
Cadmium			5.50E-06	2.41E-05	5.50E-06	2.41E-05
Chromium			7.00E-06	3.07E-05	7.00E-06	3.07E-05
Cobalt			4.20E-07	1.84E-06	4.20E-07	1.84E-06
Copper[1]			4.25E-06	1.86E-05	4.25E-06	1.86E-05
Lead			2.50E-06	1.10E-05	2.50E-06	1.10E-05
Manganese			1.90E-06	8.32E-06	1.90E-06	8.32E-06
Mercury			1.30E-06	5.69E-06	1.30E-06	5.69E-06
Molybdenum[1]			5.50E-06	2.41E-05	5.50E-06	2.41E-05
Nickel			1.05E-05	4.60E-05	1.05E-05	4.60E-05
Selenium			1.20E-07	5.26E-07	1.20E-07	5.26E-07
Vanadium[1]			1.15E-05	5.04E-05	1.15E-05	5.04E-05
Zinc[1]			1.45E-04	6.35E-04	1.45E-04	6.35E-04
HCl	1.34	1.89				1.89
Total Federal HAPs						6.9

1. Not a federal HAP.

Table E-6
SRS of New England, Inc. (SRSNE) Superfund Site
Summary of Uncontrolled and Controlled Emissions - 2MM lb. Case
In-Situ Thermal Desorption (ISTD) w/ Thermal Oxidation and Wet Scrubbing

Uncontrolled Potential						
	ISTD		2 Oxidizers		Total	
Pollutant	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
PM-10/PM2.5 (total)			0.038	0.17	0.038	0.17
SO_X			0.003	0.013	0.003	0.013
NO_X			0.5	2.19	0.5	2.19
CO			0.42	1.84	0.42	1.84
Total VOC	710.8	1000.0	0.028	0.120	710.86	1000.12
1,1,1 Trichloroethane	4.0	5.6			3.99	5.61
1,2,3-trimethylbenzene	3.1	4.4			3.15	4.43
1,2,4 trimethylbenzene	123.0	173.1			123.05	173.10
1,2-dimethyl-4-ethylbenzene	1.6	2.2			1.58	2.22
1,2-methylethylbenzene	3.0	4.2			2.99	4.21
1,2-methyl-i-propylbenzene	1.6	2.2			1.58	2.22
1,3,5 trimethylbenzene	3.5	4.9			3.49	4.91
1,3-methylethylbenzene	5.7	8.0			5.69	8.01
1,3-methyl-n-propylbenzene	1.5	2.1			1.49	2.09
1,4 methylethylbenzene	2.6	3.7			2.63	3.70
1t,2-dimethylcyclopentane	38.4	54.0			38.39	54.01
1t,3-dimethylcyclohexane	29.5	41.4			29.46	41.44
2,3-dimethyloctane	2.0	2.9			2.04	2.87
3,3-dimethyloctane	1.4	2.0			1.44	2.03
3-ethylheptane	2.9	4.1			2.89	4.06
cis-1,2 Dichloroethene	8.6	12.2			8.65	12.16
Ethylbenzene	26.6	37.4			26.60	37.43
hexene-1	2.8	4.0			2.83	3.98
m,p xylene	54.9	77.2			54.87	77.19
methylcyclohexane	3.9	5.5			3.94	5.54
n-decane	6.5	9.1			6.46	9.09
n-heptane	2.6	3.6			2.55	3.59
n-hexane	1.7	2.4	9.00E-03	3.94E-02	1.72	2.44
n-nonane	4.0	5.7			4.05	5.70
n-octane	2.9	4.0			2.85	4.02
n-propylbenzene	2.7	3.7			2.66	3.74
o-xylene	16.5	23.2			16.46	23.16
Styrene	2.5	3.5			2.49	3.51
Tetrachloroethene	136.3	191.8			136.35	191.81
Toluene	48.2	67.8	1.70E-05	7.45E-05	48.22	67.84
Trichloroethene	166.3	233.9			166.28	233.92
POM/PAH			4.41E-07	1.93E-06	4.41E-07	1.93E-06
Benzene			1.05E-05	4.60E-05	1.05E-05	4.60E-05
Butane[1]			1.05E-02	4.60E-02	1.05E-02	4.60E-02
Dichlorobenzene			6.00E-06	2.63E-05	6.00E-06	2.63E-05
Formaldehyde			3.75E-04	1.64E-03	3.75E-04	1.64E-03
Naphthalene			3.20E-06	1.40E-05	3.20E-06	1.40E-05
Pentane[1]			1.30E-02	5.69E-02	1.30E-02	5.69E-02
Arsenic			1.00E-06	4.38E-06	1.00E-06	4.38E-06
Barium[1]			2.20E-05	9.64E-05	2.20E-05	9.64E-05
Beryllium			6.00E-08	2.63E-07	6.00E-08	2.63E-07
Cadmium			5.50E-06	2.41E-05	5.50E-06	2.41E-05
Chromium			7.00E-06	3.07E-05	7.00E-06	3.07E-05
Cobalt			4.20E-07	1.84E-06	4.20E-07	1.84E-06
Copper[1]			4.25E-06	1.86E-05	4.25E-06	1.86E-05
Lead			2.50E-06	1.10E-05	2.50E-06	1.10E-05
Manganese			1.90E-06	8.32E-06	1.90E-06	8.32E-06
Mercury			1.30E-06	5.69E-06	1.30E-06	5.69E-06
Molybdenum[1]			5.50E-06	2.41E-05	5.50E-06	2.41E-05
Nickel			1.05E-05	4.60E-05	1.05E-05	4.60E-05
Selenium			1.20E-07	5.26E-07	1.20E-07	5.26E-07
Vanadium[1]			1.15E-05	5.04E-05	1.15E-05	5.04E-05
Zinc[1]			1.45E-04	6.35E-04	1.45E-04	6.35E-04
HCl	268.4	377.6				3.78E+02
Total Federal HAPs						1377.7

Controlled Actual

Pollutant	ISTD lb/hr	ISTD TPY	2 Oxidizers lb/hr	2 Oxidizers TPY	Total lb/hr	Total TPY
PM-10/PM2.5 (total)			0.038	0.17	0.038	0.17
SO_X			0.003	0.013	0.003	0.013
NO_X			0.50	2.19	0.5	2.19
CO			0.42	1.84	0.42	1.84
Total VOC	7.11	10.0	0.028	0.12	7.14	10.12
1,1,1 Trichloroethane	0.04	0.06			0.04	0.06
1,2,3-trimethylbenzene	0.03	0.04			0.03	0.04
1,2,4 trimethylbenzene	1.23	1.73			1.23	1.73
1,2-dimethyl-4-ethylbenzene	0.02	0.02			0.02	0.02
1,2-methylethylbenzene	0.03	0.04			0.03	0.04
1,2-methyl-i-propylbenzene	0.02	0.02			0.02	0.02
1,3,5 trimethylbenzene	0.03	0.05			0.03	0.05
1,3-methylethylbenzene	0.06	0.08			0.06	0.08
1,3-methyl-n-propylbenzene	0.01	0.02			0.01	0.02
1,4 methylethylbenzene	0.03	0.04			0.03	0.04
1t,2-dimethylcyclopentane	0.38	0.54			0.38	0.54
1t,3-dimethylcyclohexane	0.29	0.41			0.29	0.41
2,3-dimethyloctane	0.02	0.03			0.02	0.03
3,3-dimethyloctane	0.01	0.02			0.01	0.02
3-ethylheptane	0.03	0.04			0.03	0.04
cis-1,2 Dichloroethene	0.09	0.12			0.09	0.12
Ethylbenzene	0.27	0.37			0.27	0.37
hexene-1	0.03	0.04			0.03	0.04
m,p xylene	0.55	0.77			0.55	0.77
methylcyclohexane	0.04	0.06			0.04	0.06
n-decane	0.06	0.09			0.06	0.09
n-heptane	0.03	0.04			0.03	0.04
n-hexane	0.02	0.02	9.00E-03	3.94E-02	0.03	0.06
n-nonane	0.04	0.06			0.04	0.06
n-octane	0.03	0.04			0.03	0.04
n-propylbenzene	0.03	0.04			0.03	0.04
o-xylene	0.16	0.23			0.16	0.23
Styrene	0.02	0.04			0.02	0.04
Tetrachloroethene	1.36	1.92			1.36	1.92
Toluene	0.48	0.68	1.70E-05	7.45E-05	0.48	0.68
Trichloroethene	1.66	2.34			1.66	2.34
POM/PAH			4.41E-07	1.93E-06	4.41E-07	1.93E-06
Benzene			1.05E-05	4.60E-05	1.05E-05	4.60E-05
Butane[1]			1.05E-02	4.60E-02	1.05E-02	4.60E-02
Dichlorobenzene			6.00E-06	2.63E-05	6.00E-06	2.63E-05
Formaldehyde			3.75E-04	1.64E-03	3.75E-04	1.64E-03
Naphthalene			3.20E-06	1.40E-05	3.20E-06	1.40E-05
Pentane[1]			1.30E-02	5.69E-02	1.30E-02	5.69E-02
Arsenic			1.00E-06	4.38E-06	1.00E-06	4.38E-06
Barium[1]			2.20E-05	9.64E-05	2.20E-05	9.64E-05
Beryllium			6.00E-08	2.63E-07	6.00E-08	2.63E-07
Cadmium			5.50E-06	2.41E-05	5.50E-06	2.41E-05
Chromium			7.00E-06	3.07E-05	7.00E-06	3.07E-05
Cobalt			4.20E-07	1.84E-06	4.20E-07	1.84E-06
Copper[1]			4.25E-06	1.86E-05	4.25E-06	1.86E-05
Lead			2.50E-06	1.10E-05	2.50E-06	1.10E-05
Manganese			1.90E-06	8.32E-06	1.90E-06	8.32E-06
Mercury			1.30E-06	5.69E-06	1.30E-06	5.69E-06
Molybdenum[1]			5.50E-06	2.41E-05	5.50E-06	2.41E-05
Nickel			1.05E-05	4.60E-05	1.05E-05	4.60E-05
Selenium			1.20E-07	5.26E-07	1.20E-07	5.26E-07
Vanadium[1]			1.15E-05	5.04E-05	1.15E-05	5.04E-05
Zinc[1]			1.45E-04	6.35E-04	1.45E-04	6.35E-04
HCl	2.68	3.78				3.78E+00
Total Federal HAPs						13.8

1. Not a federal HAP.

Table E-7
SRS of New England, Inc. (SRSNE) Superfund Site
Summary of MASC Compliance Demonstration - Common Exhaust Stack
In-Situ Thermal Desorption (ISTD) w/ Thermal Oxidation and Wet Scrubbing

Alternate Units:

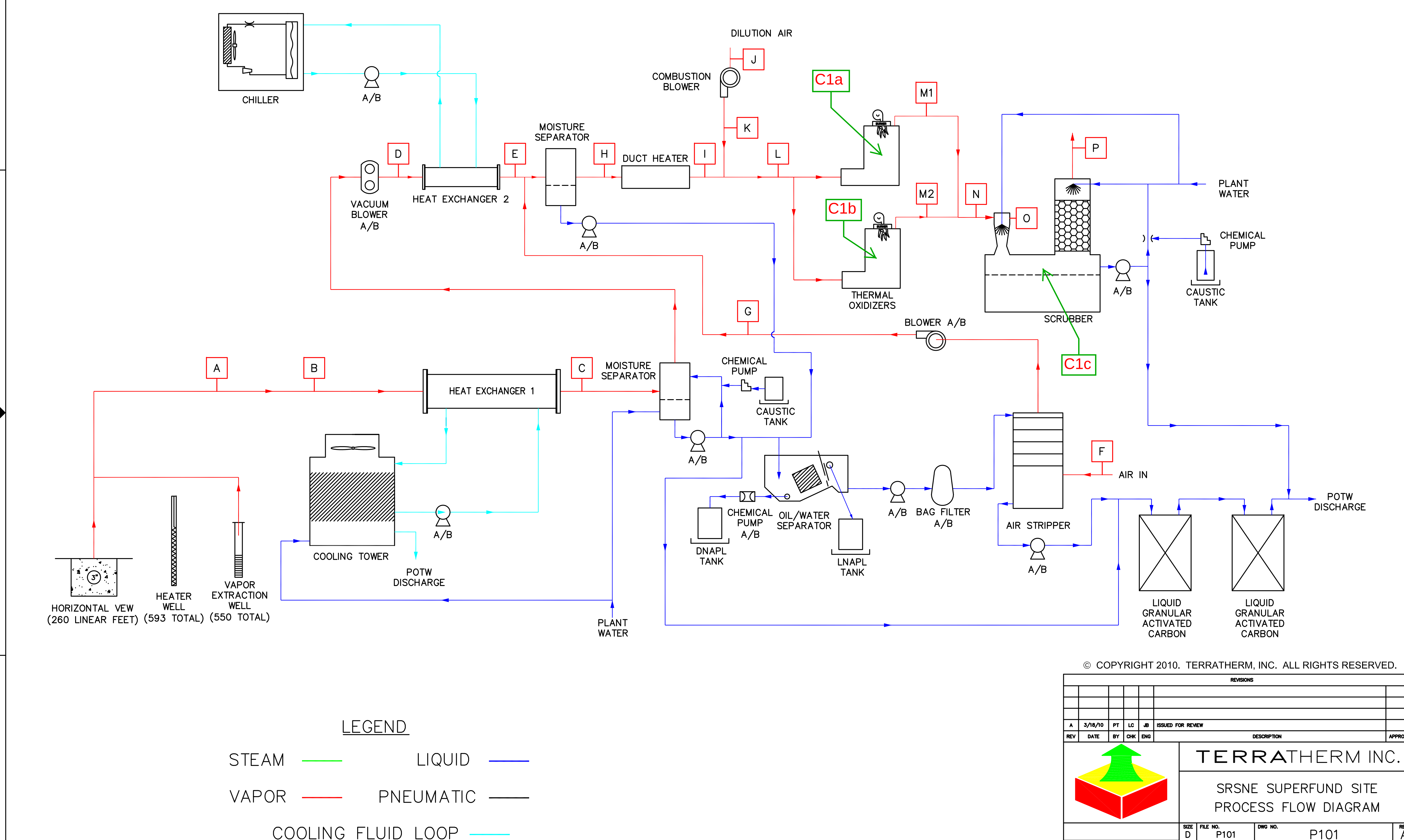
6.1 = Stack Height (m) | 20 = Stack Height (ft)
56.4 = Property Line (m) | 185 = Property Line (ft)
56.4 = Xmax (m)
2.52 = V_O, flow (acm/s) | 5,338 = Flow (acfm)

199.76 = unitless MASC

500,000 = total mass (lbs.) - Case 1
1,000,000 = total mass (lbs.) - Case 2
2,000,000 = total mass (lbs.) - Case 3

DRE(%) = 99.0

Pollutant	Case 1 Max. APC Inlet Loading @ 0.5 MM lb. Total Mass (lb/hr)	Case 2 Max. APC Inlet Loading @ 1 MM lb. Total Mass (lb/hr)	Case 3 Max. APC Inlet Loading @ 2 MM lb. Total Mass (lb/hr)	Case 1 Max. Controlled Emissions @99% DRE (lb/hr)	Case 2 Max. Controlled Emissions @99% DRE (lb/hr)	Case 3 Max. Controlled Emissions @99% DRE (lb/hr)	Oxiders (lb/hr)	HLV (µg/m^3)[3]	MASC (µg/m^3)[3]	Total Stack Emissions Case 1 (lb/hr)	Total Stack Emissions Case 2 (lb/hr)	Total Stack Emissions Case 3 (lb/hr)	Case 1 ASC (µg/m^3)[3]	Case 2 ASC (µg/m^3)[3]	Case 3 ASC (µg/m^3)[3]	Max. ASC	Case 1 ASC < MASC?	Case 2 ASC < MASC?	Case 3 ASC < MASC?	ASC < MASC?
1,1,1 Trichloroethane1	1.00	2.00	3.99	0.010	0.020	0.040		38000	7.6E+06	0.01	0.02	0.04	5.0E+02	1.0E+03	2.0E+03	2.0E+03	Yes	Yes	Yes	Yes
1,2,3-trimethylbenzene	0.79	1.57	3.15	0.008	0.016	0.031		2500	5.0E+05	0.01	0.02	0.03	3.9E+02	7.9E+02	1.6E+03	1.6E+03	Yes	Yes	Yes	Yes
1,2,4 trimethylbenzene	30.76	61.52	123.05	0.308	0.615	1.230		2500	5.0E+05	0.31	0.62	1.23	1.5E+04	3.1E+04	6.2E+04	6.2E+04	Yes	Yes	Yes	Yes
1,2-dimethyl-4-ethylbenzene	0.39	0.79	1.58	0.004	0.008	0.016		--	--	0.00	0.01	0.02	2.0E+02	3.9E+02	7.9E+02	7.9E+02	--	--	--	--
1,2-methylethylbenzene	0.75	1.50	2.99	0.007	0.015	0.030		--	--	0.01	0.01	0.03	3.7E+02	7.5E+02	1.5E+03	1.5E+03	--	--	--	--
1,2-methyl-i-propylbenzene	0.39	0.79	1.58	0.004	0.008	0.016		--	--	0.00	0.01	0.02	2.0E+02	4.0E+02	7.9E+02	7.9E+02	--	--	--	--
1,3,5 trimethylbenzene	0.87	1.75	3.49	0.009	0.017	0.035		2500	5.0E+05	0.01	0.02	0.03	4.4E+02	8.7E+02	1.7E+03	1.7E+03	Yes	Yes	Yes	Yes
1,3-methylethylbenzene	1.42	2.85	5.69	0.014	0.028	0.057		--	--	0.01	0.03	0.06	7.1E+02	1.4E+03	2.8E+03	2.8E+03	--	--	--	--
1,3-methyl-n-propylbenzene	0.37	0.74	1.49	0.004	0.007	0.015		--	--	0.00	0.01	0.01	1.9E+02	3.7E+02	7.4E+02	7.4E+02	--	--	--	--
1,4 methylethylbenzene	0.66	1.31	2.63	0.007	0.013	0.026		--	--	0.01	0.01	0.03	3.3E+02	6.6E+02	1.3E+03	1.3E+03	--	--	--	--
1t,2-dimethylcyclopentane	9.60	19.20	38.39	0.096	0.192	0.384		--	--	0.10	0.19	0.38	4.8E+03	9.6E+03	1.9E+04	1.9E+04	--	--	--	--
1t,3-dimethylcyclohexane	7.36	14.73	29.46	0.074	0.147	0.295		32000	6.4E+06	0.07	0.15	0.29	3.7E+03	7.4E+03	1.5E+04	1.5E+04	Yes	Yes	Yes	Yes
2,3-dimethyloctane	0.51	1.02	2.04	0.005	0.010	0.020		--	--	0.01	0.01	0.02	2.5E+02	5.1E+02	1.0E+03	1.0E+03	--	--	--	--
3,3-dimethyloctane	0.36	0.72	1.44	0.004	0.007	0.014		--	--	0.00	0.01	0.01	1.8E+02	3.6E+02	7.2E+02	7.2E+02	--	--	--	--
3-ethylheptane	0.72	1.44	2.89	0.007	0.014	0.029		--	--	0.01	0.01	0.03	3.6E+02	7.2E+02	1.4E+03	1.4E+03	--	--	--	--
cis-1,2 Dichloroethene	2.16	4.32	8.65	0.022	0.043	0.086		15800	3.2E+06	0.02	0.04	0.09	1.1E+03	2.2E+03	4.3E+03	4.3E+03	Yes	Yes	Yes	Yes
Ethylbenzene	6.65	13.30	26.60	0.067	0.133	0.266		8700	1.7E+06	0.07	0.13	0.27	3.3E+03	6.7E+03	1.3E+04	1.3E+04	Yes	Yes	Yes	Yes
hexene-1	0.71	1.42	2.83	0.007	0.014	0.028		--	--	0.01	0.01	0.03	3.5E+02	7.1E+02	1.4E+03	1.4E+03	--	--	--	--
m,p xylene	13.72	27.44	54.87	0.137	0.274	0.549		8680	1.7E+06	0.14	0.27	0.55	6.9E+03	1.4E+04	2.7E+04	2.7E+04	Yes	Yes	Yes	Yes
methylcyclohexane	0.98	1.97	3.94	0.010	0.020	0.039		32000	6.4E+06	0.01	0.02	0.04	4.9E+02	9.8E+02	2.0E+03	2.0E+03	Yes	Yes	Yes	Yes
n-decane	1.62	3.23	6.46	0.016	0.032	0.065		--	--	0.02	0.03	0.06	8.1E+02	1.6E+03	3.2E+03	3.2E+03	--	--	--	--
n-heptane	0.64	1.28	2.55	0.006	0.013	0.026		7000	1.4E+06	0.01	0.01	0.03	3.2E+02	6.4E+02	1.3E+03	1.3E+03	Yes	Yes	Yes	Yes
n-hexane	0.43	0.85	1.71	0.004	0.009	0.017	9.00E-03	3600	7.2E+05	0.01	0.02	0.03	6.6E+02	8.8E+02	1.3E+03	1.3E+03	Yes	Yes	Yes	Yes
n-nonane	1.01	2.02	4.05	0.010	0.020	0.040		21000	4.2E+06	0.01	0.02	0.04	5.1E+02	1.0E+03	2.0E+03	2.0E+03	Yes	Yes	Yes	Yes
n-octane	0.71	1.43	2.85	0.007	0.014	0.029		7000	1.4E+06	0.01	0.01	0.03	3.6E+02	7.1E+02	1.4E+03	1.4E+03	Yes	Yes	Yes	Yes
n-propylbenzene	0.67	1.33	2.66	0.007	0.013	0.027		--	--	0.01	0.01	0.03	3.3E+02	6.7E+02	1.3E+03	1.3E+03	--	--	--	--
o-xylene	4.12	8.23	16.46	0.041	0.082	0.165		8680	1.7E+06	0.04	0.08	0.16	2.1E+03	4.1E+03	8.2E+03	8.2E+03	Yes	Yes	Yes	Yes
Styrene	0.62	1.25	2.49	0.006	0.012	0.025		4300	8.6E+05	0.01	0.01	0.02	3.1E+02	6.2E+02	1.2E+03	1.2E+03	Yes	Yes	Yes	Yes
Tetrachloroethene1	34.09	68.17	136.35	0.341	0.682	1.363		1700	3.4E+05	0.34	0.68	1.36	1.7E+04	3.4E+04	6.8E+04	6.8E+04	Yes	Yes	Yes	Yes
Toluene	12.06	24.11	48.22	0.121	0.241	0.482	1.70E-05	7500	1.5E+06	0.12	0.24	0.48	6.0E+03	1.2E+04	2.4E+04	2.4E+04	Yes	Yes	Yes	Yes
Trichloroethene	41.57	83.14	166.28	0.416	0.831	1.663		1350	2.70E+05	0.42	0.83	1.66	2.1E+04	4.2E+04	8.3E+04	8.3E+04	Yes	Yes	Yes	Yes
POM/PAH							4.41E-07	0.1	2.00E+01	4.41E-07	4.41E-07	4.41E-07	2.21E-02	2.21E-02	2.21E-02	2.21E-02	Yes	Yes	Yes	Yes
Benzene							1.05E-05	150	3.00E+04	1.05E-05	1.05E-05	1.05E-05	5.25E-01	5.25E-01	5.25E-01	5.25E-01	Yes	Yes	Yes	Yes
Butane1							1.05E-02	38000	7.59E+06	1.05E-02	1.05E-02	1.05E-02	5.25E+02	5.25E+02	5.25E+02	5.25E+02	Yes	Yes	Yes	Yes
Dichlorobenzene							6.00E-06	9000	1.80E+06	6.00E-06	6.00E-06	6.00E-06	3.00E-01	3.00E-01	3.00E-01	3.00E-01	Yes	Yes	Yes	Yes
Formaldehyde							3.75E-04	12	2.40E+03	3.75E-04	3.75E-04	3.75E-04	1.88E+01	1.88E+01	1.88E+01	1.88E+01	Yes	Yes	Yes	Yes
Naphthalene							3.20E-06	1000	2.00E+05	3.20E-06	3.20E-06	3.20E-06	1.60E-01	1.60E-01	1.60E-01	1.60E-01	Yes	Yes	Yes	Yes
Pentane1							1.30E-02	7000	1.40E+06	1.30E-02	1.30E-02	1.30E-02	6.50E+02	6.50E+02	6.50E+02	6.50E+02	Yes	Yes	Yes	Yes
Arsenic							1.00E-06	0.05	9.99E+00	1.00E-06	1.00E-06	1.00E-06	5.00E-02	5.00E-02	5.00E-02	5.00E-02	Yes	Yes	Yes	Yes
Barium1							2.20E-05	10	2.00E+03	2.20E-05	2.20E-05	2.20E-05	1.10E+00	1.10E+00	1.10E+00	1.10E+00	Yes	Yes	Yes	Yes
Beryllium							6.00E-08	0.01	2.00E+00	6.00E-08	6.00E-08	6.00E-08	3.00E-03	3.00E-03	3.00E-03	3.00E-03	Yes	Yes	Yes	Yes
Cadmium							5.50E-06	0.4	7.99E+01	5.50E-06	5.50E-06	5.50E-06	2.75E-01	2.75E-01	2.75E-01	2.75E-01	Yes	Yes	Yes	Yes
Chromium							7.00E-06	2.5	4.99E+02	7.00E-06	7.00E-06	7.00E-06	3.50E-01	3.50E-01	3.50E-01	3.50E-01	Yes	Yes	Yes	Yes
Cobalt							4.20E-07	2	4.00E+02	4.20E-07	4.20E-07	4.20E-07	2.10E-02	2.10E-02	2.10E-02	2.10E-02	Yes	Yes	Yes	Yes
Copper1							4.25E-06	2	4.00E+02	4.25E-06	4.25E-06	4.25E-06	2.13E-01	2.13E-01	2.13E-01	2.13E-01	Yes	Yes	Yes	Yes
Lead							2.50E-06	3	5.99E+02	2.50E-06	2.50E-06	2.50E-06	1.25E-01	1.25E-01	1.25E-01	1.25E-01	Yes	Yes	Yes	Yes
Manganese							1.90E-06	20	4.00E+03	1.90E-06	1.90E-06	1.90E-06	9.50E-02	9.50E-02	9.50E-02	9.50E-02	Yes	Yes	Yes	Yes
Mercury							1.30E-06	0.2	4.00E+01	1.30E-06	1.30E-06	1.30E-06	6.50E-02	6.50E-02	6.50E-02	6.50E-02	Yes	Yes	Yes	Yes
Molybdenum1							5.50E-06	100	2.00E+04	5.50E-06	5.50E-06	5.50E-06	2.75E-01	2.75E-01	2.75E-01	2.75E-01	Yes	Yes	Yes	Yes
Nickel							1.05E-05	0.3	5.99E+01	1.05E-05	1.05E-05	1.05E-05	5.25E-01	5.25E-01	5.25E-01	5.25E-01	Yes	Yes	Yes	Yes
Selenium							1.20E-07	4	7.99E+02	1.20E-07	1.20E-07	1.20E-07	6.00E-03	6.00E-03	6.00E-03	6.00E-03	Yes	Yes	Yes	Yes
Vanadium1							1.15E-05	1	2.00E+02	1.15E-05	1.15E-05	1.15E-05	5.75E-01	5.75E-01	5.75E-01	5.75E-01	Yes	Yes	Yes	Yes
Zinc1							1.45E-04	100	2.00E+04	1.45E-04	1.45E-04	1.45E-04	7.25E+00	7.25E+00	7.25E+00	7.25E+00	Yes	Yes	Yes	Yes



REV	DATE	BY	CHK	ENG	DESCRIPTION	APPROVED
A	3/18/10	PT	LC	JB	ISSUED FOR REVIEW	

TERRATHERM INC.

SRSNE SUPERFUND SITE
PROCESS FLOW DIAGRAM

SIZE D | FILE NO. P101 | DWG NO. P101 | REV A

SCALE NTS | DNS | SHEET 1 OF 2

STREAM ID#		dry bulb deg F	abs. press atm	rel. press. "wc	Dew Point F	Sat Temp F	Rel. Humidity %	Humidity #/# Dry	Enthalpy Btu/# Dry Air	Dry Mass Flow #/min	Wet Mass flow #/min	Wet Density #/Ft^3	Total Flow SCFM	Flow ACFM	Enthalpy Btu/Hr	Δ Enthalpy Btu/Hr
	AIR STREAM FROM WELL FIELD							0.92290		97.5						
	WATER STREAM FROM WELL FIELD										89.98					
	BACKGROUND SOIL	55	1	0	54.9	211.7										
A	WELLS	190	0.96	-16	184.6	210.0	76	0.92290	1143.86	97.5	187.48	0.04739	3680.5	4715.9	6691558	
B	HX-1 INLET	190	0.95	-20	184.6	209.6	74	0.92290	1143.86	97.5	187.48	0.04713	3680.5	4764.5	6691558	
C	HX-1 OUTLET, BLOWER INLET	175	0.94	-24	174.4	209.2	100	0.58448	728.77	97.5	154.49	0.04795	2807.6	3587.6	4263285	-2428273
D	BLOWER OUTLET, HX -2 INLET	205	1.05	20	178.9			0.57854	746.34	97.5	153.91	0.06247	2508.8	3012.1	4366089	102804
E	HX-2 OUTLET	130	1.04	15	129.7	213.3	100	0.10589	150.86	97.5	107.82	0.06577	1609.3	1734.5	882503	-3483587
F	AIR STRIPPER VAPOR INFLUENT	80	1	0	63.6	211.7	57	0.01252	32.72	29	29.36	0.07281	397.2	406.2	56929.9	
G	AIR STRIPPER VAPOR EFFLUENT	130	1.04	15	133.6	213.3	100	0.10589	150.86	29	32.07	0.06577	478.7	515.9	262488	205558
H	DUCT HEATER INLET	130	1.04	15	129.8	213.3	100	0.10589	150.86	126.5	139.90	0.06577	2087.9	2250.4	1144991	
I	DUCT HEATER OUTLET	165	1.04	15	129.8	213.3	32	0.10581	162.87	126.5	139.88	0.06294	2059.1	2350.9	1236147	91157
J	COMBUSTION/DILUTION AIR	80	1	0	63.6	211.7	57	0.01252	32.72	15	15.19	0.07281	205.4	210.1	29447	
K	DILUTION AIR BLOWER OUTLET	95	1.04	15	65.1	213.3	36	0.01272	36.73	15	15.19	0.07344	205.5	208.3	33057	3610
L	OXIDIZER 1 INLET	157.58	1.04	15	126.5	213.3	37	0.09594	148.88	70.75	77.54	0.06374	1135.3	1280.8	631981	-816
M1	OXIDIZER 1 OUTLET	1500	1.03	12	139.7			0.14594	724.85	70.75	81.08	0.01934	1252.3	4516.0	3076981	2445000
L	OXIDIZER 2 INLET	157.58	1.04	15	126.5	213.3	37	0.09594	148.88	70.75	77.54	0.06374	1135.3	1280.8	631981	-816
M2	OXIDIZER 2 OUTLET	1500	1.03	12	139.7			0.14594	724.85	70.75	81.08	0.01934	1252.3	4516.0	3076981	2445000
N	COMBINED STREAM, SCRUBBER INLET	1500	1.03	12	139.7			0.14594	724.85	141.5	162.15	0.01934	2504.7	9032.1	6153962	
O	POST VENTURI QUENCH	178.2	1.02	7	177.5	212.5	100	0.57810	723.89	141.5	223.30	0.05162	4450.1	5288.2	6145797	-8165
P	VAPOR DISCHARGE	179	1.00	1	176.9	211.8	94	0.57842	724.91	141.5	223.35	0.05115	4421.6	5338.1	6154526	8729

REVISIONS						
A	3/18/10	PT	LC	JB	ISSUED FOR REVIEW	
REV	DATE	BY	CHK	ENG	DESCRIPTION	APPROVED

TERRATHERM INC.

SRSNE SUPERFUND SITE
PROCESS FLOW DIAGRAM

SIZE	FILE NO.	DWG NO.	REV
D	P101	P101	A

SCALE NTS | DNS | SHEET 2 OF 2

1.0 GENERAL

This proposal is for standard Two (2) 1,100 SCFM **Thermal Oxidizers and One (1) Quench and Scrubber** package designed to treat the process gas stream described as under.

Assumption:
Total Process Gas Flow: 1,100 SCFM each Afterburner
VOC Loading: 375 Lbs/hr each Afterburner
Temp: 150°F

INLET Avg. TEMP.	150°F
OPERATING TEMP	1400 -1500°F
HEATING VALUE	3891 Btu/LB
LEL	8.0%
%LEL PROCESS	18.36%
COMPONENT	**LB/HR**
TCE	Approx. 187.5 Lbs/hr
PCE	Approx. 187.5 Lbs/hr
Moisture	0.174 Lbs Water/ Lbs Dry Air
Air	Balance (Approx. 827 SCFM)

2.0 SCOPE OF SUPPLY

2.1 Two (2) 1,100 SCFM **Afterburners** and One (1) **Quench and Scrubber** will be provided with the following:

2.1.1 Two (2) Burner Systems (One for each Afterburner)

2.1.2 One (1) Exhaust Air Fan (Induced Draft Fan)

2.1.3 Two (2) Combustion Air Fans (One for each Afterburner)

2.1.4 Choke and ring to insure proper mixing and create high turbulence to achieve higher rate of destruction efficiency

2.1.5 Two (2) Fuel Gas Train (pre-piped and pre-wired) (One for each Afterburner)

2.1.6 Two (2) Pilot Train (pre-piped and pre-wired) (One for each Afterburner)

2.1.7 One (1) Quench and Scrubber

2.1.8 One (1) UL Listed NEMA - 4 Control Panel with Chart Recorder for Oxidizer and the Quench and Scrubber.

3.0 COMBUSTION / RETENTION CHAMBER (One for each Afterburner)

3.1 Residence Time: 1.0+ seconds

3.2 Operating Temperature: 1400-1500°F (or sufficient to achieve the desired destruction efficiency)

3.3 Turbulence shall be sufficient to achieve the desired temperature profile.

3.4 Materials of construction

3.4.1 Inner shell: 12 Ga. thick AL6XN

3.4.2 Outer Shell (Jacketing): 20 Ga. 316/316L Stainless Steel

3.4.3 Structural reinforcements as required to withstand the systems static pressure, load, and wind forces.

3.4.4 Insulation: ceramic fiber block insulation, 2,200 °F rated

3.4.5 Insulation thickness shall be sufficient to maintain the shell design, with a target temperature <140°F.

3.5 Personnel access to the inside is provided via a man-way door for inspection purposes.

4.0 BURNER(S) (One for each Afterburner)

4.1 Two (2) Burners (One for each Afterburner)

4.2 One (1) 2.5 MMBTUH Maxon "Oven Pak" (Or Equal) burner with 20:1 turndown will operate on natural gas.

4.3 Sizing shall be for a maximum burner output of 2.5 MMBTUH total. During the process gas treatment mode the burner will utilize its thermal turndown to adjust to varying conditions as determined by the temperature controller.

4.4 A regulator will reduce the incoming natural gas pressure from 10.0 psig to the required operating pressure at the burner.

5.0 COMBUSTION AIR FAN(S) (for each Afterburner)

5.1 Qty.: 2 (One for each Afterburner)

5.2 Capacity: 580 SCFM

5.3 Type: Integral Type

5.4 Motor: 3/4 HP, TEFC, 480V/3PH/60HZ

6.0 ONE (1) EXHAUST AIR FAN (INDUCED DRAFT FRP FAN)

6.1 Capacity: 6,000 ACFM

6.2 Static Pressure: 16" W.C.

6.3 Material: FRP

6.4 Motor: 40 HP, TEFC, 480V/3PH/60HZ

7.0 VARIABLE FREQUENCY DRIVE (SEPARATELY PRICED) (for Exhaust Air Fan)

The variable frequency drive shall be housed in the control panel, or free-standing by the panel. The VFD shall adjust the fan capacity as per the temperature inside the oxidizer. The variable frequency drive shall increase the RPM of the fan as the temperature increases.

The drive is a microprocessor based adjustable frequency drive, designed to provide exceptional reliability when controlling three phase induction motors. The drive produces a 3-phase, adjustable frequency output that controls and adjusts motor speed. Drive output voltage blower speed requirements can be adjusted to match motor. The input signal can be fed to the drive, either directly from the process or through a PLC. In either option, the variable frequency drive is required to control air volume.

13.0 ONE (1) VERTICAL QUENCH AND VERTICAL PACKED TOWER

13.1 INLET EXHAUST:

13.1.1 Gas Volume: 2,748 SCFM

13.1.2 Gas Temperature: 1600°F

13.1.3 Cl_2 Loading: approximately 624 lb/hr

13.2 PERFORMANCE CRITERIA (AT SCRUBBER OUTLET):

13.2.1 Outlet Exhaust Gas Volume (saturated): 5,469 ACFM

13.2.2 Gas Temperature: 177 °F

13.2.3 Pressure Drop: 3" W.C.

13.2.4 Cl_2 content: 6.24 lb/hr (99% Removal)

13.3 OPERATING DATA (WATER FLOWS):

13.3.1 Recycle Liquid Rate: 75 GPM

13.3.2 Evaporation Rate: 9 GPM

13.3.3 Bleed Rate @ 10% dis. Solid concentration: 19 GPM

13.3.4 Make-up Rate: 28 GPM @ 60psig (min.)

13.3.5 Alkali Requirement, (NaOH) estimated: 685 lb/hr

13.3.6 @ 25% concentration: 4.3 GPM

13.4 QUENCH DUCT:

13.4.1 Material of Construction : C-276 (or equal)

13.4.2 Thickness : 3/16"

13.4.3 Diameter: 28 inch

13.4.4 Length: 10.5 ft

13.5 VERTICAL PACKED TOWER:

13.5.1 Material of Construction: FRP (or Equal)

13.5.2 Vessel Thickness: 1/4”

13.5.3 Diameter: 4.0 ft

13.5.4 Height: 24.0 ft

13.5.5 Packing Bed Height: 10 ft

13.5.6 Packing Type: Random Dump

13.5.7 Packing Material: Glass-linked Polypropylene

13.6 MIST ELIMINATOR:

13.6.1 Type: HE mesh pad

13.6.2 Material of Construction: polypropylene (or Equal)

13.7 EQUIPMENT DATA:

13.7.1 System Weight (Empty): 4,000 lbs

13.7.2 Weight, Operating: 5,600 lbs

13.8 RECIRCULATION PUMP(S):

13.8.1 Quantity: 1

13.8.2 Capacity: 75 gpm

13.8.3 Discharge Pressure: 80 ft head

13.8.4 Drive Type: Direct

13.8.5 Casing Material: FRP

13.8.6 Impeller Material: FRP

13.8.7 Seal: Single Mechanical

13.8.8 Motor: 5 HP

13.8.9 Voltage: 480V/3P/60HZ

13.8.10 Speed: 3000 RPM

13.8.11 Enclosure: TEFC

13.9 INSTRUMENTATION AND CONTROLS:

13.9.1 One (1) Differential Pressure Transmitter

13.9.2 One (1) Flow Indicator/Transmitter

13.9.3 One (1) Conductivity Indicator/Transmitter

13.9.4 One (1) Level Indicator/Transmitter

13.9.5 One (1) pH Indicator/Transmitter with diaphragm pump

13.9.6 One (1) Temperature Indicator/Transmitter

13.9.7 One (1) Junction Box, NEMA - 4.

13.10 RECIRCULATING LIQUID PIPING:

13.10.1 Scope: Pump discharge to Scrubber inlet to pump inlet

13.10.2 Material: CPVC

14.0 UTILITIES

14.1 Electric Power: 480VAC/3Ph/60HZ

14.2 Air: 100 Psi

14.3 Natural Gas: 10 Psi

Epcon® Industrial Systems, LP 17777 I-45 S, Conroe, TX – 77385. | Ph.: 936-273-3300 | Fax: 936-273-4600
www.epconlp.com

ATTACHMENT G

BACT/LAER DETERMINATION FORM
(DEP-AIR-APP-214)

EPA RBLC Search Results – Groundwater and Soil Remediation (Nellis Air Force Base)

Example South Coast AQMD Permit forTerraTherm Remediation Project in Santa Fe Springs, CA

Vapor Treatment Needs Evaluation Work Plan for SRSNE Site Group, TerraTherm Inc., April 2009

TerraTherm Memo dated December 4, 2009: SRSNE Superfund Site Treatment Process Options

Attachment G: BACT/LAER Determination Form

(Complete for each pollutant for which BACT/LAER must be incorporated. Duplicate this section as necessary.)

Applicant Name: **TerraTherm, Inc. on behalf of SRSNE Site Group**
(As indicated on the *Permit Application Transmittal Form)*

App. No.: ____________________

Unit Number: **U1**

Unit Description: **In-situ thermal desorption site remediation**

Pollutant: **VOC/HAPs**

Section I: Identify LAER

To ensure a sufficiently broad and comprehensive search of control alternatives, sources other than the RBLC database should be investigated and documented. These sources include: EPA/State air quality permits, control equipment vendors, trade associations, international agencies or companies, technical papers or journals. Attach documentation of investigation to this form. The source of information, e.g., RBLC, South Coast AQMD, state permit, vendor, etc. and sufficient information for verification of the achievable limit, e.g. contact information to include: name, affiliation, address, phone, email of contact; any relevant permit; RBLC ID; etc. should be included for each system.

When using the RLBC database: The RACT/BACT/LAER Clearinghouse (RBLC) database on EPA's Technology Transfer Network (TTN), Clean Air Technology Center (CATC) website may be accessed at: (http://cfpub.epa.gov/rblc/cfm/basicsearch.cfm). Select the "Find Lowest Emissions Rate" search option. Choose the process type and pollutant from the dynamic menu, then "run report now". The results will be sorted by the emission limit from lowest to highest. You may print this list and attach to this form.

A. List all available control systems with a practical potential for application to this type of unit.

1. **Carbon adsorption - non regenerative**
2. **Carbon adsorption - steam regenerative**
3. **Condensation, solvent recovery**
4. **Thermal oxidiation**
5. **Combination of condensation + carbon adsorption or condensation + thermal oxidation**

B. List control systems included above that are rejected as technically infeasible for this unit. Include an explanation for each rejection. [1]

1. **Carbon adsorption (regenerative or non-regenerative) - Not practical as primary control technology based on mass loading and presence of some high vapor pressure compounds that do not adsorb well to activated carbon.**
2. **Condensation - Not practical as primary control technology due to low vapor pressures of some compounds that are resistant to condensing. However, condensation is retained for pre-treatment and/or peak-leveling purposes.**
3.

1. See attached Vapor Treatment Needs Evaluation (April 2009)and memo dated December 4, 2009 for additional information.

Section I: Identify LAER (continued)

C. Determine overall control effectiveness of remaining control systems:

	System 1	System 2	System 3	System 4	System 5
Description of Control System	**thermal oxid**ation	co**ndens+oxidation**			
1. Inl et Concentration	**1.78E7 ug/m3**	**1.78E7 ug/m3**			
2. Outlet Concentration	**1.78E5 ug/m3**	**1.78E5 ug/m3**			
3. Coll ection Efficiency	**100%**	**100%**			
4. Remov al Efficiency	**99%**	**99%**			
5. Ov erall Control Efficiency	**99%**	**99%**			
6. Emission Estimates	**3.55 lb/hr**	**3.55 lb/hr**			
7. So urce of Emission Estimates	**mfg. spec., mass bal.**	m**fg. spec., mass bal.**			

D. Identification of LAER:

Condensation for pre-treatment and peak leveling + thermal oxidation at an estimated 99 percent overall VOC/organic HAP control efficiency is identified as LAER for this application, resulting in 5 TPY controlled total VOC/HAP emissions (for the 1MM lb case). In addition, hydrogen chloride (HCl) formed from oxidation of chlorinated compounds will be controlled by 99% using a high-efficiency packed tower wet scrubber. As documented in the attached EPA RBLC search result and an example South Coast AQMD air permit for a similar TerraTherm remediation site, the combination of proposed condensation and oxidation controls are consistent with the most stringent level of control for this source category. The other attached documents (Vapor Treatment Needs Evaluation Work Plan, dated April 2009 and TerraTherm memo, dated December 4, 2009, provide further documentation of the control identification process and justification of the proposed control combination.

Section II: Top-Down BACT Analysis

A. Rank the control systems in *decreasing order* of overall control effectiveness. The system identified as LAER in Section I should rank number 1.

1. **combination of condensation and thermal oxidation**
2.
3.
4.
5.

B. Complete the cost analysis for each control system: Not applicable. Identified LAER is selected.

	System 1	System 2	System 3	System 4	System 5
1. Type of System					
2. Installed Capital Cost (ICC)					
3. Annual Labor Cost					
4. Annual Maintenance Cost					
5. Annual Energy Cost					
6. Replacement Parts and Materials Cost					
7. Waste Treatment and Disposal Cost					
8. Miscellaneous Annual Costs					
9. **Total Direct Annual Cost** (add Items 3 to 8)					
10. Annual Overhead Cost					
11 Administrative, Tax and Insurance Costs					
12. Capital Recovery Cost					

(Continued on next page)

Section II: Top-Down BACT Analysis (continued)

	System 1	System 2	System 3	System 4	System 5
13. Ta x Credits					
14. **Total Indirect Annual Cost** (add Items 10 to 12 and subtract item 13)					
15. Total Annual Cost for the Control System (add Items 9 and 14)					
16. Total Pollutant Collected					
17. Unit Control Cost (it em 15 ÷ 16) (dollars per ton)					

C. Pr oposed BACT:
combination of condensation for pre-treatment and peak leveling with two identical thermal oxidizers in parallel.

D. Reason or Justification for Proposed BACT:
The most stringent of the identified control options (LAER) is selected as BACT. The attached documents (Vapor Treatment Needs Evaluation Work Plan, dated April 2009 and TerraTherm memo, dated December 4, 2009, provide further documentation of the control identification process and justification of the proposed control combination as BACT.

Pollutant Information

Click on the Process Information button to see more information about the process associated with this pollutant.
Or click on the Process List button to return to the list of processes.

Help
DRAFT

RBLC ID: NV-0047
Corporate/Company: 99 CIVIL ENGINEER SQUADRON OF USAF
Facility Name: NELLIS AIR FORCE BASE
Process: GROUND WATER AND SOIL REMEDIATION

Pollutant: Volatile Organic Compounds (VOC) **CAS Number:** VOC

Pollutant Group(s): **Substance Registry System:** Volatile Organic Compounds (VOC)

Pollution Prevention/**A**dd-on Control Equipment/**B**oth/**N**o Controls Feasible: A
P2/Add-on Description: INCINERATION

Test Method: Unspecified EPA/OAR Methods All Other Methods

Percent Efficiency: 99.000
Compliance Verified: Yes
EMISSION LIMITS:
Case-by-Case Basis: Other Case-by-Case
Other Applicable Requirements: SIP , OPERATING PERMIT
Other Factors Influence Decision: No
Emission Limit 1: 0.1800 LB/H
Emission Limit 2: 0.7700 T/YR
Standard Emission Limit: 0
COST DATA:
Cost Verified? No
Dollar Year Used in Cost Estimates:
Cost Effectiveness: 0 $/ton
Incremental Cost Effectiveness: 0 $/ton
Pollutant Notes:

Process Information - Details

For information about the pollutants related to this process, click on the specific pollutant in the list below.

Help

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RBLC ID: NV-0047
Corporate/Company: 99 CIVIL ENGINEER SQUADRON OF USAF
Facility Name: NELLIS AIR FORCE BASE
Process: GROUND WATER AND SOIL REMEDIATION

Primary Fuel: N/A
Throughput:
Process Code: 22.100

Pollutant Information - List of Pollutants

Help

Pollutant	Primary Emission Limit	Basis	Verified
Carbon Monoxide	0.0100 LB/H	Other Case-by-Case	YES
Nitrogen Oxides (NOx)	0.0600 LB/H	Other Case-by-Case	YES
Volatile Organic Compounds (VOC)	0.1800 LB/H	Other Case-by-Case	YES

Process Notes: THE PROCESS IS DESIGNED TO CLEAN THE GROUND WATER AND SOIL, WHICH ARE CONTAMINATED WITH TOTAL PETROLEUM HYDROCARBONS (TPH). EMISSION UNIT F001, A THERMAL/CATALYTIC OXIDIZER (FIRECAT 250, 0.4 MMBTU/HR, BURNING PROPANE), IS SELECTED TO SHOW THE BACT DETERMINATIONS.

AQMD

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
21865 East Copley Drive, Diamond Bar, CA 91765

PERMIT TO CONSTRUCT

2/1/03 faxed to SCE

Granted as of 01/22/2003

ID 124520

LEGAL OWNER
OR OPERATOR: TERRATHERM, INC.
356 B. BROAD STREET
FITCHBURG, MA 01420

Equipment Location: 501 S. MARENGO AVENUE, ALHAMBRA, CA 91803

Equipment Description:

IN-SITU SOIL THERMAL DESORPTION AND TREATMENT SYSTEM CONSISTING OF:

1) THERMAL WELLS, ELECTRICALLY HEATED, TERRATHERM.

2) HEATER/VACUUM WELLS AND DUCTS, TERRATHERM.

3) THREE CYCLONES, IN PARALLEL, EACH WITH 1,000 SCFM DESIGN CAPACITY.

4) THERMAL OXIDIZER, AIREX CORPORATION, MODEL NO. RETOX 3000, WITH A NATURAL GAS FIRED BURNER, 867,000 BTU/HR, AN AUTOMATIC TEMPERATURE CONTROL SYSTEM, WITH A COMBUSTION BLOWER.

5) HEAT EXCHANGER, DES CHAMPS LABORATORIES INC., MODEL NO. SERIES 81MUI-702230.

6) THREE CARBON ADSORBERS (ONE ON STANDBY), TETRASOLV, MODEL NO. VF-5000, EACH 6'-0" L. X 8'- 0" W. X 6'- 8" H., IN SERIES, EACH WITH 5,000 POUNDS (EXCEPT STAND-BY WITH 3000 LBS) OF GRANULAR ACTIVATED CARBON.

7) EXHAUST SYSTEM CONSISTING OF 2 VACUUM BLOWERS, 60 H.P. EACH, AND A STACK, 0'- 10" DIA. X 10' TO 20' HIGH.

Conditions:

1. OPERATION OF THIS EQUIPMENT SHALL BE IN COMPLIANCE WITH ALL DATA AND SPECIFICATIONS SUBMITTED WITH THE APPLICATION, INCLUDING REVISED DOCUMENTS, REPORTS AND OTHER CORRESPONDANCES SUBMITTAL UNDER WHICH THIS PERMIT WAS ISSUED, UNLESS OTHERWISE NOTED BELOW.

2. THIS EQUIPMENT SHALL BE PROPERLY MAINTAINED AND KEPT IN GOOD OPERATING CONDITION AT ALL TIMES.

3. UPON COMPLETION, ANY VAPOR EXTRACTION WELLS AND DUCTS SHALL BE CAPPPED TO PREVENT VAPORS FROM VENTING TO THE ATMOSPHERE. VAPORS SHALL NOT BE EXTRACTED FROM THE SOIL UNLESS THEY ARE MAINTAINED UNDER NEGATIVE PRESSURE AND TREATED BY THE VAPOR CONTROL SYSTEM.

ORIGINAL

4. AN IDENTIFICATION TAG OR NAMEPLATE SHALL BE DISPLAYED ON THE EQUIPMENT TO SHOW THE MANUFACTURER, MODEL NUMBER AND SERIAL NUMBER. THE TAG(S) OR PLATE(S) SHALL BE ISSUED BY THE MANUFACTURER AND SHALL BE ADHERED TO THE EQUIPMENT IN A PERMANENT AND CONSPICUOUS POSITION.

5. THE MOST CURRENT CONTACT PERSON'S NAME, COMPANY AND PHONE NUMBER SHALL BE DISPLAYED IN A PERMANENT AND CONSPICUOUS LOCATION.

6. A TEMPERATURE MEASURING AND RECORDING DEVICE WITH AN ACCURACY TO WITHIN PLUS OR MINUS 5 DEGREES FAHRENHEIT SHALL BE INSTALLED AND MAINTAINED AT THE THERMAL WELL HEADER.

7. EXCEPT DURING THE WARM-UP PERIOD, THE TEMPERATURE OF THE SOIL VAPOR AS MEASURED PURSUANT TO CONDITION NO. 6 SHALL NOT BE LESS THAN 212 DEGREES FAHRENHEIT. AN OPERATIONAL LOG SHALL BE KEPT AND THE DATE AND TIME OF INITIAL STARTUP AND END OF WARMUP TIME SHALL BE RECORDED.

8. A FLOW INDICATOR SHALL BE INSTALLED AND MAINTAINED AT THE MAIN INLET STREAM (DOWNSTREAM OF THE CYCLONE SEPARATORS) TO THE VAPOR CONTROL SYSTEM TO INDICATE THE TOTAL AIR FLOW RATE IN CUBIC FEET PER MINUTE (CFM). IN CASE A PRESSURE SENSOR DEVICE IS USED IN PLACE OF THE FLOW INDICATOR, A CONVERSION CHART SHALL BE MADE AVAILABLE TO INDICATE THE CORRESPONDING FLOW RATE, IN CFM, TO THE PRESSURE READING.

9. THE TOTAL INLET FLOW RATE SHALL NOT EXCEED 3000 SCFM.

10. VOLATILE ORGANIC COMPOUND (VOC) CONCENTRATION SHALL BE MEASURED AT THE INLET TO THE THERMAL OXIDIZER, AND AT THE INLET AND OUTLET OF EACH CARBON ADSORBER DAILY DURING THE FIRST 10 DAYS OF OPERATION, THEN AT LEAST ONCE EVERY OTHER OPERATING DAY THEREAFTER. THE OPERATOR SHALL USE A FLAME IONIZATION DETECTOR OR AN AQMD APPROVED ORGANIC VAPOR ANALYZER (OVA) CALIBRATED IN PARTS PER MILLION BY VOLUME (PPMV) OF HEXANE (IF ANOTHER CALIBRATING AGENT IS USED, IT SHALL BE CORRELATED TO AND EXPRESSED AS HEXANE).

11. GRAB SAMPLES SHALL BE COLLECTED AT THE INLET AND OUTLET OF EACH CARBON ADSORBER AT LEAST ONCE DURING THE FIRST WEEK OF OPERATION, THEN AT LEAST ONCE PER MONTH THEREAFTER. THE SAMPLES SHALL BE ANALYZED FOR VOC CONCENTRATION IN PPMv AS HEXANE IN ACCORDANCE WITH AQMD APPROVED METHODS.

12. THE VOC CONCENTRATION AT THE INLET TO THE THERMAL OXIDIZER DETERMINED PURSUANT TO CONDITION 10 SHALL NOT EXCEED 18,612 PPMV MEASURED AS HEXANE.

13. WHENEVER THE VOC CONCENTRATION AT THE OUTLET OF THE PRIMARY CARBON ADSORBER IS 100 PPMV OR GREATER AS MEASURED PURSUANT TO CONDITIONS 10 AND 11, THE PRIMARY CARBON ADSORBER SHALL BE BYPASSED AND REPLENISHED WITH FRESH ACTIVATED CARBON AND RETURNED TO SERVICE AS THE SECONDARY CARBON ADSORBER. THE REPLENISHING OF THE PRIMARY CARBON ADSORBER SHALL BE EXECUTED IN A MANNER

SUCH THAT TWO CARBON ADSORBERS IN SERIES ARE PROVIDED FOR THE TREATMENT OF WELL FIELD VAPORS AT ALL TIMES.

14. THE ACTIVATED CARBON USED IN THE ADSORBERS SHALL HAVE A CARBON TETRACHLORIDE ACTIVITY NUMBER OF NOT LESS THAN 60% AS MEASURED BY ASTM METHOD D3467-99.

15. A TEMPERATURE MEASURING AND RECORDING DEVICE WITH AN ACCURACY TO WITHIN PLUS OR MINUS 5 DEGREES FAHRENHEIT SHALL BE INSTALLED AND MAINTAINED AT THE FOLLOWING LOCATIONS:

    A. THE COMBUSTION CHAMBER OF THE THERMAL OXIDIZER.
    B. THE INLET TO THE PRIMARY CARBON ADSORBER.

16. WHENEVER THE THERMAL OXIDIZER IS IN OPERATION, THE TEMPERATURE AT THE COMBUSTION CHAMBER AS MEASURED PURSUANT TO CONDITION 15 SHALL NOT BE LESS THAN 1500 DEGREES FAHRENHEIT.

17. EQUIPMENT SHUTDOWN INTERLOCKS OR OPERATING MANUAL CONTINGENCIES SHALL BE PROVIDED FOR LOW OXIDATION TEMPERATURES AS STATED IN CONDITIONS 7 AND 16.

18 SOURCE PERFORMANCE TESTING SHALL BE CONDUCTED IN ACCORDANCE WITH AQMD GUIDELINES, TO DETERMINE THE EMISSIONS OF POLY-AROMATIC HYDROCARBONS (PAH), POLYCHLORINATED DIBENZO-P-DIOXINS (PCDD), POLYCHLORINATED DIBENZOFURANS (PCDF), POLYCHLORINATED BIPHENYLS (PCB), CHLOROPHENOLS, VOLATILE ORGANIC COMPOUNDS (VOC), OXIDES OF NITROGEN (NOx), CARBON MONOXIDE (CO), AND TOTAL PARTICULATE MATTER (PM10). THE RESULTS IN WRITING SHALL INCLUDE AT A MINIMUM AIR FLOW RATES, TEMPERATURES, OXYGEN CONTENT, MOISTURE CONTENT, AND FUEL USAGE. EMISSION RATES SHALL BE PRESENTED IN UNITS OF POUNDS PER HOUR, AND CONCENTRATIONS IN PPMv. TESTING SHALL BE PERFORMED AT THE ADSORBER OUTLET AND THERMAL OXIDIZER INLET (FOR DETERMINING VOC DESTRUCTION EFFICIENCY).

    A PROTOCOL SHALL BE SUBMITTED AND APPROVED IN WRITING BY THE AQMD PRIOR TO PERFORMING THE SOURCE TEST.

    THE SOURCE PERFORMANCE TESTING SHALL BE COMPLETED DURING THE FIRST 30 DAYS OF OPERATION. A COMPLETE REPORT SHALL BE SUBMITTED TO THE AQMD NO LATER THAN 45 DAYS AFTER TESTING HAS BEEN COMPLETED.

19 RECORDS SHALL BE KEPT AND MAINTAINED TO PROVE COMPLIANCE WITH ALL CONDITIONS ON THIS PERMIT. THE RECORDS SHALL BE KEPT ON FILE FOR AT LEAST TWO YEARS AND SHALL BE MADE AVAILABLE TO AQMD PERSONNEL UPON REQUEST.

THIS PERMIT TO CONSTRUCT R-373262 SUPERSEDES PERMIT TO CONSTRUCT 373262 ISSUED 11/16/2001.

PERMIT TO CONSTRUCT

Approval or denial of this application for permit to operate the above equipment will be made after an inspection to determine if the equipment has been constructed in accordance with the approved plans and specifications and if the equipment can be operated in compliance with all Rules of the South Coast Air Quality Management District.

Please notify GAURANG RAWAL at (909) 396-2543 when construction of equipment is complete.

This Permit to Construct is based on the plans, specifications, and data submitted as it pertains to the release of air contaminants and control measures to reduce air contaminants. No approval or opinion concerning safety and other factors in design, construction or operation of the equipment is expressed or implied.

This Permit to Construct shall serve as a temporary Permit to Operate provided the Executive Officer is given prior notice of such intent to operate.

This Permit to Construct will become invalid if the Permit to Operate is denied or if the application is cancelled. THIS PERMIT TO CONSTRUCT SHALL EXPIRE ONE YEAR FROM THE DATE OF ISSUANCE unless an extension is granted by the Executive Officer.

By Dorris M. Bailey
DORRIS M. BAILEY
Principal Office Assistant

DMB/gr01

ORIGINAL

South Coast
Air Quality Management District
AQMD
21865 Copley Drive, Diamond Bar, CA 91765-4178
(909) 396-2000 · www.aqmd.gov

DATE: 02-01-06

EQUIPMENT LOCATED AT: 501 S MARENGO AVE
ALHAMBRA, CA 91803

LEGAL OWNER OR OPERATOR
CO. ID: 124520
TERRA THERM, LLC
356 B BROAD ST
FITCHBURG, MA 01420

PERMIT/APPLICATION RENEWALS

PERMIT/ APPL NBR	EQUIPMENT DESCRIPTION	NEXT RENEWAL DATE
BILLING YEAR :	2005	
373262	SOIL TREAT VAPOR EXTRACT OTHER VOC UNDER	02-16-07

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SRSNE Site Group

Remedial Design Work Plan Attachment D

Vapor Treatment Needs Evaluation Work Plan

Solvents Recovery Service of New England, Inc.
(SRSNE) Superfund Site
Southington, Connecticut

April 2009

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Disclaimer: *This document is a DRAFT document prepared by the Settling Defendants under a government Consent Decree. This document has not undergone formal review by the EPA and CT DEP. The opinions, findings, and conclusions, expressed are those of the author and not those of the U.S. Environmental Protection Agency or the CT Department of Environmental Protection.*

Remedial Design Work Plan
Attachment D

Vapor Treatment Needs Evaluation Work Plan

Solvents Recovery Service of New England, Inc. (SRSNE) Superfund Site
Southington, Connecticut

Prepared for:
SRSNE Site Group

Prepared by:
TerraTherm, Inc.
10 Stevens Road
Fitchburg
MA 01420
Phone: (978) 343-0300
Fax: (978) 343-2727

Our Ref.:
9-101

Date:
April 2009

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Executive Summary

The Vapor Treatment Needs Evaluation Work Plan was prepared to address Section V.C.1.d of the Statement of Work (SOW), which states that an evaluation of vapor treatment needs and options may be conducted to evaluate vapor treatment design options, including bench scale testing if necessary. At this time, it is believed that bench-scale testing will not be required as the vapor treatment components contemplated for the Site are all commercially available and in widespread use for similar applications.

The focus of this Work Plan is the integration of these commercially available components into a system that achieves the following objectives:

- Successfully treat the range of Site constituents of concern (COCs) and maintain compliance with the specified discharge limits;
- Maintain operational performance in response to changing COC composition, mass loading, and extraction rates, without impeding the progress of the heating operation; and,
- Incorporate sufficient flexibility to allow for scale-up/scale-down of operations in response to changing COC mass loading and extraction rates to optimize energy efficiency of the selected vapor treatment system.

Vapor Treatment System Performance Testing and Permit Compliance

Since the remediation is being performed as part of a Superfund remediation action, a Connecticut Department of Environmental Protection (CTDEP) air permit is not required. However, in accordance with CTDEP, the proposed vapor phase control system will be designed to meet or exceed Best Available Control Technology (BACT) criteria, which will demonstrate compliance with applicable requirements, including but not limited to the following:

- Emissions calculations, including Hazardous Air Pollutant (HAP) Maximum Allowable Stack Concentrations (MASC) compliance analysis;
- BACT Analysis using EPA/NESCAUM "top-down" procedures; and,
- Program for compliance demonstration.

In addition, potential emissions after control are expected to be less than major source thresholds. Therefore, Prevention of Significant Deterioration (PSD) and non-attainment New Source Review (NSR) requirements will not apply and the facility should not be considered a major source of HAPs.

Design Basis

Several input parameters will be evaluated as Applicable or Relevant or Appropriate Requirements (ARAR) and incorporated into the vapor treatment system final design. A comprehensive list of these parameters can be found in the document as Tables D-1 through D-3.

Some conceptual design and evaluation work on the vapor treatment system for the Site was performed during preparation of the Technical Proposal. The conceptual screening analysis evaluates each alternative's ability to achieve the project requirements of adequate treatment, scalability, capability to handle the anticipated VOC loading conditions, and expected reliability. The following technologies have been evaluated and their ability to achieve the project requirements is discussed below:

- **Vapor Phase Carbon, Sacrificial and On-Site Steam Regeneration:** Both vapor phase carbon technologies use activated carbon granules. Volatile organic compounds (VOCs) are sorbed on to the carbon pore space surface. Neither of these technologies is practical for use as the primary treatment means for approximately 1 million pounds of non-aqueous phase liquid (NAPL).

- **Solvent Recovery by Condensing:** Solvent recovery by condensing lowers the temperature of the vapors to reduce the vapor pressures of each of the VOCs. The individual VOCs begin to condense as their partial pressures diminish with cooler temperatures. A number of the selected Site COCs have vapor pressures above that of water, which results in needing colder temperatures before chilling/condensing will occur. Additionally, several COCs are high-vapor pressure compounds, which are resistant to condensing.

  Solvent recovery with reduced temperatures can be enhanced at elevated pressures. This occurs because the partial pressures of the VOCs increase with increasing pressure, which, in turn, reduces the relative concentration of each individual constituent. However, condensing the VOCs will generate a large liquid waste stream that would require off-site disposal.

This potential waste disposal issue, coupled with the fact that some of the primary Site COCs are not easily removed by condensing, make this option less attractive as a primary treatment alternative.

- **Thermal Oxidation:** Thermal oxidization exposes the vapors to temperatures well above the autoignition temperature of the VOCs. A surplus of oxygen is required for complete combustion and provisions are required to dissipate the large amount of thermal energy released during combustion of the VOCs. The combustion of Chlorinated VOCs (CVOCs) will produce hydrogen chloride gas and as such, the oxidizer exhaust vapors will require further treatment by scrubbing with a caustic soda solution to neutralize the acid gas vapors, prior to discharge to the atmosphere. The product of this neutralization is salt.

  Given the highly concentrated and variable nature of the Site COCs, it is anticipated thermal oxidation will be the most robust and capable primary vapor treatment technology for this Site.

- **Combined Condensing & Thermal Oxidation:** In this option, condensing through cooling or compression and cooling is used as a pre-conditioning step prior to thermal oxidation. The benefits of such a combined system utilizing different vapor treatment technologies will enhance the operational flexibility to handle a potentially changing vapor composition over time. Further, a combined system may also improve robustness and reliability, in that if one system or component must be temporarily shut down for maintenance, the other system is available to continue treating the extracted vapors.

Vapor Treatment Alternatives for Further Consideration

At this time, thermal oxidation has emerged as the preferred vapor treatment alternative, either alone or in combination with other technologies that may include front-end condensing for resource recovery or peak load management, or vapor phase carbon for final effluent polishing. Initial consultations with several oxidizer vendors indicate that the anticipated peak mass load may require the use of substantially oversized oxidizers, with a significant amount of dilution air introduced, which would result in a significant increase in both capital and operating costs. Further evaluations with this technology will be performed. The final system design will be based on the results of this evaluation.

1. Purpose and Scope

This document has been prepared on behalf of the SRSNE Site Group, an unincorporated association of Settling Defendants to a Consent Decree (CD) and Statement of Work (SOW) for the Remedial Design/Remedial Action (RD/RA) at the Solvents Recovery Service of New England, Inc. (SRSNE) Superfund Site in Southington, Connecticut (Site). The CD was lodged on October 30, 2008 with the United States District Court for the District of Connecticut in connection with Civil Actions No. 3:08cv1509 (SRU) and No. 3:08cv1504 (WWE). The CD was entered by the Court on March 26, 2009.

Section V.C.1 of the SOW suggests that certain pre-design studies may be undertaken prior to the design and implementation of the remedy for the Site. Specifically, Section V.C.1.d of the SOW states that an evaluation of vapor treatment needs and options may be conducted to evaluate vapor treatment design options, including bench scale testing if necessary. At this time, it is believed that bench-scale testing will not be required as the vapor treatment components contemplated for the SRSNE Site are all commercially available and in widespread use for similar applications.

The challenge for this site and the focus of the "Vapor Treatment Needs and Options Evaluation" described in this Work Plan is the integration of these commercially available components into a system that achieves the following objectives:

- Successfully treat the range of Site constituents of concern (COCs) and maintain compliance with the specified discharge limits;
- Maintain operational performance in response to changing COC composition, mass loading, and extraction rates, without impeding the progress of the heating operation; and
- Incorporate sufficient flexibility to allow for scale-up/scale-down of operations in response to changing COC mass loading and extraction rates to optimize energy efficiency of the selected vapor treatment system.

With those objectives in mind, the "Vapor Treatment Needs and Options Evaluation" will evaluate commercially available and proven vapor treatment technologies suitable for treating both the range and anticipated mass load of the SRSNE Site COCs.

Some preliminary evaluations and conceptualizations have been developed in the course of preparing the technical proposal for this project and in developing this Work Plan. The Vapor Treatment Needs and Options Evaluation will start from the preliminary concept basis described in this Work Plan. Specific vapor treatment scenarios will be developed and evaluated for use during thermal remediation at the SRSNE site. Conclusions from the Vapor Treatment Evaluation will serve as the Preliminary Design criteria for the vapor treatment system that will be specified in the Preliminary Design submittal. It is anticipated that the results of the Vapor Treatment Evaluation will be summarized in memo form and presented to the Agencies in an interactive meeting, early in the Preliminary Design development process. Because of the flexibility required, it is possible that a combination of several vapor treatment technologies will be used to treat the extracted vapors.

2. Vapor Treatment System Performance Testing and Permit Compliance

Air pollution control requirements for ISTD are the "Applicable or relevant or appropriate requirements" (ARARs) presented in Table 4-32 of the Feasibility Study (BBL and United States Environmental Protection Agency [USEPA] 2005), and incorporated as Appendix D of the Record of Decision (ROD; USEPA 2005). These ARARs will be reviewed to evaluate and select potential emission limits and compliance monitoring requirements for the recommended vapor treatment alternative. Within this section of the Vapor Treatment Needs and Options Evaluation, the following items will be considered.

- Identification of Applicable Regulations (ARARs)
- Anticipated Permit Equivalency Requirements
- Expected Performance Goals
- Monitoring and Testing Methods
- Daily Monitoring
- Periodic Analytical Sampling
- Methods
- Frequency

Based on the estimated potential vapor-phase flows and pollutant concentrations from the thermal conduction heating (TCH) process, a permit to construct and operate a stationary source of air pollution would normally be required from the Connecticut Department of Environmental Protection (CTDEP) prior to construction. The potential need for an air permit in this case is based on the assumption that stationary sources subject to an air permit to construct and operate must demonstrate compliance with applicable emission limitations, standards and other requirements. Potential requirements applicable to In Situ Thermal Desorption (ISTD) processes include demonstration that Best Available Control Technology (BACT) or Lowest Achievable Emission Rates (LAER) will be employed, that emissions of hazardous air pollutants (HAPs) comply with applicable Maximum Allowable Stack Concentrations (MASCs), and that other monitoring, recordkeeping and operating procedures will be followed.

The proposed vapor phase control system will be designed to meet or exceed BACT criteria. In addition, potential emissions after control are expected to be less than major source thresholds. Therefore, Prevention of Significant Deterioration (PSD) and non-attainment New Source Review (NSR) requirements will not apply and the facility should not be considered a major source of HAPs.

However, because the project is being performed as part of a Superfund remedial action, it is exempt from having to obtain state and local permits such as a CTDEP air permit. Nevertheless, information and analyses will be provided that satisfy the intent of the CTDEP air permitting program and demonstrate compliance with applicable requirements, including but not limited to the following:

- Emissions calculations, including Hazardous Air Pollutant MASC compliance analysis;
- BACT Analysis using EPA/NESCAUM "top-down" procedures; and
- Program for compliance demonstration.

The anticipated permit equivalency requirements and emission monitoring requirements will be integrated into the design submittals, as well as the Operation, Maintenance and Monitoring Plan that will be developed for the site prior to the start of system operation. Treatment equipment specifications provided to vendors will include these anticipated performance requirements, and the system Design will integrate the necessary provisions for the anticipated monitoring requirements.

3. Design Basis

Once the ARAR emission criteria have been identified, the next step in completing the Vapor Treatment Needs and Options Evaluation is to establish the basis of design for the vapor treatment system. This will serve to establish input parameters upon which the Evaluation and the subsequent design of the vapor treatment system will be based, and will ultimately drive the layout and selection of the vapor treatment train. Important components of the basis of design include:

- Total anticipated COC mass load expected to be extracted – presently estimated at 500,000 to 2,000,000 pounds;
- Composition – see Table D-1;
- Heating value [British Thermal Unit/pound (BTU/lb)] of the anticipated mixture = to be established through laboratory analysis of Site dense non-aqueous phase liquid (DNAPL) samples;
- Duration of heating and extraction – 120 to 180 days;
- Expected "average" and "peak" loading conditions – see Tables D-2 and D-3;
- Expected extraction temperatures and pressures;
- Vapor treatment system performance requirements (permit equivalency ARAR discharge limits);
- System redundancy requirements; and
- Other related factors or limitations, including;
- Utility supply requirements and limitations;
- Potable water usage, if any;
- Waste handling/disposal;
- Sewer/storm drain discharge limits;
- Noise limitations;
- Material of construction requirements/limitations for the treatment equipment; and
- Commercial availability.

The basis of design established in the Vapor Treatment System Needs Evaluation and will carry through to the Preliminary Design submittal, where the Process Flow Diagram (PFD), and preliminary Material and Energy Balance will be further developed.

Table D-1. Composition of Chemicals in Thermal Treatment Zone

	VOC Composition, on Average, as % of Total
	Average Composition
Vinyl Chloride	1.4%
1,1-Dichloroethylene	0.1%
Methylene Chloride	0.2%
1,1-Dichloroethane	0.6%
cis-1,2-Dichloroethylene	8.7%
Chloroform	0.0%
2-Butanone	0.3%
1,1,1-Trichloroethane	6.8%
Benzene	0.0%
1,2-Dichloroethane	0.0%
Trichloroethylene	43.4%
4-Methyl-2-pentanone (MIBK)	0.4%
2-Hexanone	0.0%
Toluene	15.0%
1,1,2-Trichloroethane	0.0%
Tetrachloroethylene	13.2%
Ethylbenzene	2.9%
P/M Xylenes	5.1%
O Xylene	2.0%
Styrene	0.2%
TOTAL VOCs	100.4%

Table D-2. Preliminary estimates of mass removal rates during thermal remediation for various mass estimates

		120 days at 100 C					
	heating					cooling	
Timeline	Day 1 -30	Days 31 - 60	Days 61 - 90	Days 91 - 120	Days 121 - 150	Days 151 - 180	total
Percent of Total Mass Removed per 30 day period	2.5%	25.0%	30.0%	25.0%	15.0%	2.5%	100%
Mass Scenario (total pounds VOCs, @ 100% removed)	VOC Mass (pounds) per day						
500,000	417	4,167	5,000	4,167	2,500	417	
1,000,000	833	8,333	10,000	8,333	5,000	833	
2,000,000	1,667	16,667	20,000	16,667	10,000	1,667	

Table D-3. Compound specific estimates of mass removal rates during thermal remediation for various mass estimates

	VOC Composition, on Average, as % of Total	Pounds per Day, per VOC, Total Mass Scenarios		
	Average Composition	500,000	1,000,000	2,000,000
Vinyl Chloride	1.4%	69	139	278
1,1-Dichloroethylene	0.1%	6	13	25
Methylene Chloride	0.2%	8	16	31
1,1-Dichloroethane	0.6%	31	62	125
cis-1,2-Dichloroethylene	8.7%	435	870	1,740
Chloroform	0.0%	0	0	0
2-Butanone	0.3%	13	26	53
1,1,1-Trichloroethane	6.8%	338	677	1,354
Benzene	0.0%	1	2	5
1,2-Dichloroethane	0.0%	0	0	0
Trichloroethylene	43.4%	2,171	4,341	8,682
4-Methyl-2-pentanone (MIBK)	0.4%	21	41	83
2-Hexanone	0.0%	0	0	0
Toluene	15.0%	748	1,497	2,993
1,1,2-Trichloroethane	0.0%	0	0	0
Tetrachloroethylene	13.2%	660	1,321	2,642
Ethylbenzene	2.9%	145	290	580
P/M Xylenes	5.1%	256	513	1,026
O Xylene	2.0%	102	204	408
Styrene	0.2%	11	23	45
TOTAL VOCs	100.4%	5,018	10,035	20,070

4. Conceptual Vapor Treatment Alternative Screening Evaluation

As mentioned earlier in this Work Plan, some conceptual design and evaluation work on the vapor treatment system for the SRSNE thermal remediation project was performed during preparation of the Technical Proposal. This section summarizes the vapor treatment technologies that have been considered and the results of the initial concept level technology screening that has been completed to date.

The evaluation of treatment technologies for the SRSNE thermal remediation project is a complex process given the expected large amount of volatile organic compound (VOC) mass to be treated in a relatively short time period, the number of different VOCs making up the total mass to be treated, and the number of variables associated with each of the potential treatment technologies. The ISTD heating process volatilizes nearly all of the VOC mass, so that it is removed from the subsurface almost exclusively in the vapor phase.

An initial screening of commercially available vapor treatment alternatives is presented in the following sections to evaluate the various potential alternatives' capabilities to meet the project's anticipated requirements.

The conceptual screening analysis presented in the paragraphs below evaluates each alternative's ability to achieve the project requirements of adequate treatment, scalability, capability to handle the anticipated VOC loading conditions, and expected reliability. The Vapor Treatment Needs and Options Evaluation will examine the remaining alternatives emerging from this initial screening in more detail, including such additional factors as capital and operating costs as well as utility demands to select the vapor treatment system that will be included in the Preliminary and Final Design submittals.

4.1 Conceptual Vapor Treatment Alternatives

Several vapor treatment alternatives have been considered in a concept-level screening review for the SRSNE Site, as part of this Work Plan. The preliminary alternatives include the following:

- Vapor Phase Carbon, Sacrificial

- Vapor phase carbon, On-site Steam Regeneration
- Solvent Recovery (Condensing)
- Thermal Oxidation
- Combined Condensing & Carbon
- Combined Condensing & Thermal Oxidation
- Following is a brief summary of each preliminary vapor treatment alternative.

4.1.1 Vapor Phase Carbon, Sacrificial

Activated carbon adsorption entails sorption of the extracted VOCs onto the carbon particles pore-space surfaces using a combination of physical and chemical adsorption processes. Each activated carbon granule or pellet consists of micro-porous particles with very large internal surface area. It has been reported that a pound of highly activated carbon has an equivalent surface area approaching 140 acres.

Under the sacrificial carbon alternative, spent activated carbon would be manifested and transported off site for recycling or disposal. Exclusively using activated carbon adsorption for treatment of 1 million or more pounds of VOCs is not practical. Even at an optimistic adsorption capacity of 20%, this project would require in excess of 5 million pounds of activated carbon. Also important is the fact that several of the target VOCs, including methylene chloride and vinyl chloride do not sorb well to activated carbon and thus would not be adequately removed by this treatment technology. However, this alternative will be retained, as it may be useful in combination with another alternative, or as a final polishing step.

4.1.2 Vapor Phase Carbon, On-site Steam Regeneration

Vapor phase carbon with on-site steam regeneration utilizes the same VOC removal mechanism as does sacrificial activated carbon; however, rather than shipping the carbon off-site for disposal, the spent carbon is regenerated utilizing an on-site steam source. This technology is subject to the same limitations as sacrificial carbon, in that several of the site constituents are not removed by activated carbon. Implementation of this type of system would entail the use of activated carbon media beds constructed as pressure vessels and an on-site steam boiler. On a pre-determined schedule, or as indicated by vessel effluent VOC concentrations, individual beds are isolated from the extracted vapor stream and heated and pressurized with steam over a period of several hours to desorb the VOCs from the carbon particles. Air is then swept through the heated bed to remove the VOCs and cool and dry the media.

The desorbed VOCs and steam are then typically condensed and separated with the VOCs containerized for disposal. This process requires several hours to heat, desorb and cool the beds; therefore, multiple media beds of adequate size will be required to implement this approach. Regeneration control may be either manual or automated; however, given the large VOC mass at this site, regeneration will be frequent and it is expected that the regeneration controls would be automated. After repetitive steam regeneration cycles, the VOC adsorption capacity of the carbon diminishes and the spent carbon requires replacement. Manufacturer advice and observation of carbon performance determines when it is appropriate to replace the spent carbon.

Again, given this technique's limitations with regard to certain VOCs present at this site, this alternative would have to be combined with a secondary VOC treatment technique or be utilized as a final polishing step.

4.1.3 Solvent Recovery (Condensing)

Cooling/condensing solvent recovery systems lower the temperature of the vapors to reduce the vapor pressures of each of the VOCs. The individual VOCs begin to condense as their partial pressures diminish with cooler temperatures. A common analogy to such a system is the removal of water vapor as condensation in a home or office air conditioning system. VOCs recovered as liquid using the cooling/condensing technology will need to be shipped to a licensed facility for destruction or possible recycling.

Figure 1 presents a graph of the vapor pressure versus temperature for 13 site COCs and water. As can be observed from the graph, a number of the selected site COCs have vapor pressure above that of water, whiles others such as perchlorethylene (PCE), methyl isobutyl ketone (MIBK), ethylbenzene, xylene and styrene have vapor pressures at or below that of water. The range of vapor pressures varies by a factor of 5,000 between vinyl chloride and xylenes. The higher the vapor pressure, the colder it must to be to begin solvent recovery by chilling/condensing for that VOC.

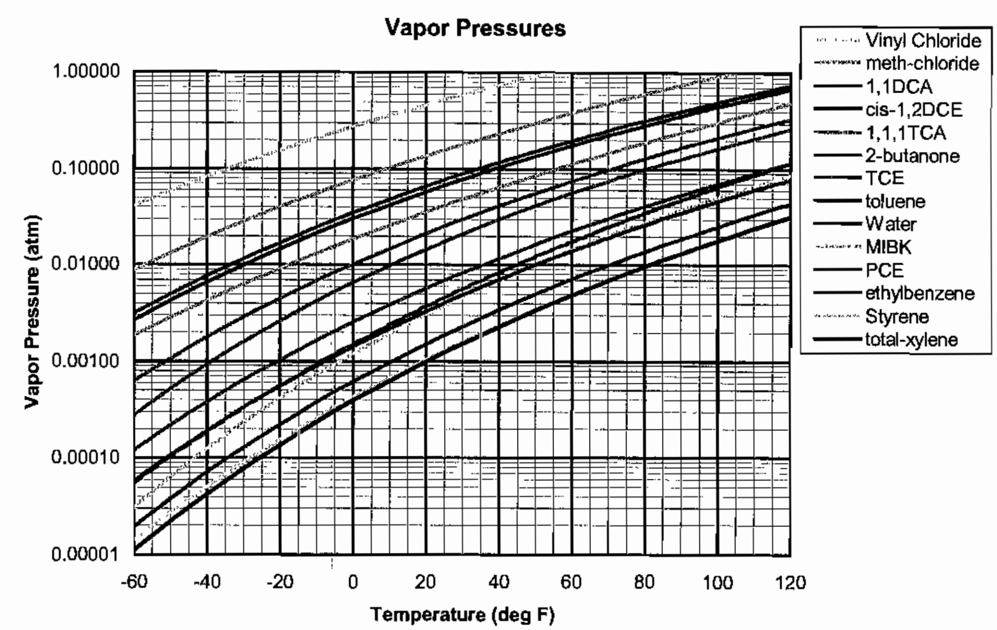

Figure D-1. Graph of the Vapor Pressure Versus Temperature for 13 Site COCs and Water

Of the 13 COC compounds and water represented in the graph above, both cis-1,2 dichloroethene (DCE) and 1,1,1-trichloroethane (TCA) represent particular concern for removal by condensing. Based on a preliminary review of the site COC data, it is believed that together, these two compounds could represent over 10% of the VOC mass at the Site. 1,1,1-TCA is a compound that readily hydrolyzes at temperatures above 50°C, and the rate of hydrolysis increases by approximately one order of magnitude with each 20 degree F increase in temperature. Thus, 1,1,1-TCA may not represent as significant of a vapor phase load on the treatment system, once the subsurface temperature begins to increase. However, the resistance of cis-1,2-DCE and, to a lesser degree 1,1,1-TCA (prior to the onset of significant hydrolysis), to condensation is a significant consideration in the evaluation of this vapor treatment alternative. Other high-vapor pressure compounds, including vinyl chloride and methylene chloride, which are also present at the site, albeit at lesser concentrations, are resistant to condensing and further, do not sorb well to activated carbon and thus must be given special consideration.

Importantly, the relatively high vapor pressure of these compounds means that they will have to be cooled well below zero (0˚F), likely to the range of -40˚F, to initiate significant condensation. This impacts the type of cooling equipment that will be required to achieve this level of cooling, representing both significant capital and operating costs. Insufficient cooling of these compounds will represent a significant mass of VOCs that will remain in the vapor phase and require further treatment to ensure compliance with emission limits.

Solvent recovery with reduced temperatures can be enhanced at elevated pressures. This occurs because the partial pressures of the VOCs increase with increasing pressure, which, in turn, reduces the relative concentration of each individual constituent. For example, compressing the vapors to 3 atmospheres absolute [~45 pounds per square inch, gauge (psig)] will reduce the condensation concentration by a factor of 3. Likewise, compressing the vapors to 10 atmospheres absolute (~150 psig) will reduce the condensation concentration by a factor of 10. Thus, by adding a compressing step in conjunction with the cooling process, a proportionately larger volume of contaminant can be condensed at a given temperature.

Condensing the COCs will generate a liquid waste stream. It is possible that there may be a recycling avenue for some or all of the recovered liquids; however, most likely the recovered liquid NAPL will have to be manifested off-site for disposal. Thus, the estimated mass of 500,000 to 2,000,000 pounds of NAPL could generate on the order of 50,000 to 200,000 gallons of liquid waste requiring off-site disposal.

This potential waste disposal issue, coupled with the fact that some of the primary site COCs are not easily removed by condensing, make this option less attractive as a primary treatment alternative. However, the condensing option will be retained for potential consideration in the Vapor Treatment Needs and Options Evaluation as a pre-treatment or peak-leveling alternative.

4.1.4 Thermal Oxidation

Thermal oxidization systems expose the vapors to temperatures well above the autoignition temperature of the VOCs. A surplus of oxygen is required for complete combustion and provisions are required to dissipate the large amount of thermal energy released during combustion of the VOCs. The combustion of chlorinated VOCs (CVOCs) will produce hydrogen chloride gas and as such, the oxidizer exhaust vapors will require further treatment by scrubbing with a caustic soda (i.e., sodium hydroxide [NaOH]) solution to neutralize the acid gas vapors, prior to discharge to atmosphere. The product of this neutralization is water with moderate levels of sodium chloride (salt).

As the site is heated, VOCs will be desorbed from the soil and volatilized along with the VOCs in DNAPL present in the subsurface. The VOC mixture will be extracted, along with steam and soil vapor (air), and delivered to the aboveground vapor treatment system. The lower boiling point VOCs will be extracted first, followed by the higher boiling compounds. However, under the ISTD process heat conducts radially out from the heater wells, such that a range of temperatures exist in the subsurface during the early stages of the heating process, and therefore, a range of VOC compounds will be volatized and extracted during the heat-up process.

The limit of VOC mass loading for a thermal oxidizer is the heat release resulting from combustion of those VOCs – an important consideration for a site such as SRSNE, with a substantial VOC mass to be extracted over a relatively short time. Therefore, it will also be important for the Vapor Treatment Needs and Options Evaluation to estimate the heating value for oxidation of the modeled composition. The heat released during combustion of the site VOCs is a critical design parameter for the selection and design of a thermal oxidizer system.

A number of different thermal oxidizer designs are available including once-through thermal oxidizers, catalytic oxidizers, regenerative thermal oxidizers, recuperative thermal oxidizers, etc. Given the high VOC mass loading expected at this site, on the order of 1MM to 2MM pounds of VOCs, and the relatively short duration of thermal treatment, expected to be on the order of 120-150 days, thermal oxidizer systems considered for this site must be capable of treating average VOC recovery rates estimated to be on the order of 300 to 600 pounds of VOCs per hour. Higher peak loads are expected.

Through review of new and existing analytical data and site DNAPL samples, a "representative average" or "typical" site-wide VOC mixture composition will be developed as part of the Vapor Treatment Needs and Options Evaluation. This model composition will also be used to develop a representative equation for the combustion that will occur in a thermal oxidizer.

Destruction of the hydrocarbon portion of the VOCs in the thermal oxidizer liberates the chlorine molecules from the CVOCs. Chlorine makes up an estimated 60% by mass of the Site COC mass. This leads to two important considerations. First, the liberated chlorine becomes hydrogen chloride gas which must be scrubbed and neutralized prior to release to atmosphere. Second, the liberated chlorine and hydrogen chloride gas can form extremely corrosive hydrochloric acid, thus materials of construction of the thermal oxidizer, wet scrubber and the interconnecting piping are important to the reliability of the system. The potential for corrosion and the selection of appropriate materials of construction will be addressed in the *System Design Evaluation Work Plan* (Attachment E to the RDWP).

Given the highly concentrated and variable nature of the Site COCs, it is anticipated thermal oxidation will be the most robust and capable primary vapor treatment technology for this Site. Thermal oxidation is presently the preferred vapor treatment approach for this Site. The Vapor Treatment Needs and Options Evaluation will proceed on this basis, examining mass loading capabilities of the various oxidizer designs, as well as the costs and benefits of various pre-treatment and parallel vapor treatment train scenarios to select the most flexible, roust and reliable configuration upon which the Preliminary Design will be based.

4.1.5 Combined Condensing and Carbon

This alternative simply consists of a combination of the condensing and vapor phase carbon treatment alternatives discussed earlier. In this combined approach, VOCs would be condensed through a cooling or compression and cooling. Vapor phase carbon, either sacrificial or on-site steam-regenerated, would then be used to treat the vapor effluent from the condensing system.

In this scenario, the majority of the VOCs would be condensed and recovered as NAPL, with residual VOCs collecting in the activated carbon beds. Waste streams requiring off-site disposal include recovered VOC NAPL and spent carbon. Importantly, as discussed previously, there are a number of high-vapor pressure compounds, including cis-1,2-DCE, vinyl chloride and methylene chloride that are resistant to condensing and do not sorb well to activated carbon. Given the significant limitations of this alternative, this combination has been eliminated from further consideration.

4.1.6 Combined Condensing and Thermal Oxidation

In this option, condensing through cooling or compression and cooling is used as a pre-conditioning step prior to thermal oxidation. This alternative may warrant further consideration to improve both the robustness and reliability of a thermal oxidation system. A condensing system installed upstream of the thermal oxidizer(s) system can be used to manage peak VOC loading to maintain the vapor mass load within the thermodynamic limits of the thermal oxidizer, thereby eliminating the potential need to throttle back the in-situ heating process to stay below the operating limits of the thermal oxidizer. In this configuration, the condensing system will only be brought on-line, if needed, during peak VOC loading periods. Such operation would provide a margin of safety against exceeding the oxidizer capacity while minimizing the volume of condensed NAPL requiring off-site disposal and improving the robustness and reliability of the overall vapor treatment train.

The Vapor Treatment Needs and Options Evaluation will consider both the benefits and the capital and operating costs of such a combined system, as compared with extended heating or an additional oxidizer train in parallel. The benefits of such a combined system utilizing different vapor treatment technologies will enhance the operational flexibility to handle a potentially changing vapor composition over time. Further, a combined system may also improve robustness and reliability, in that if one system or component must be temporarily shut down for maintenance, the other system is available to continue treating the extracted vapors. This option will be retained for consideration in the Vapor Treatment Needs and Options Evaluation. The costs and benefits of the combined condensing/oxidizer system, including the estimated off-site NAPL disposal costs, will be compared against the cost of adding an additional oxidizer/scrubber system to manage peak loading.

5. Vapor Treatment Alternatives for Further Consideration

From the concept level evaluations conducted to date and summarized in the preceding sections of this Work Plan, thermal oxidation has emerged as the preferred vapor treatment alternative, either alone or in combination with other technologies that may include front-end condensing for resource recovery or peak load management, or vapor phase carbon for final effluent polishing.

The initial concept for treatment of the extracted VOC vapors from this site consists of two thermal oxidizer/scrubber treatment trains piped in parallel. During the initial and late stages of the heating process when extracted VOC mass load is lower, only one of the oxidizer/scrubber trains will operate, thus minimizing system operating costs. As VOC concentrations and mass loads increase, the second oxidizer/scrubber train will be brought on line to divide the VOC mass load between the two devices. This approach provides increased flexibility and reliability of the overall system. In this treatment process very little liquid VOC would be manifested off-site. Instead, the VOCs will be destroyed on site through combustion within the thermal oxidizers.

Oxidizer and scrubber designs, thermal treatment capacity, destruction and removal efficiency, materials of construction and energy utilization will be reviewed with manufacturers to determine an appropriate device(s) for the anticipated conditions as part of the Vapor Treatment Needs and Options Evaluation.

Initial consultations with several oxidizer vendors indicate that the anticipated peak mass load may require the use of substantially oversized oxidizers, with a significant amount of dilution air introduced. This could significantly increase both the capital and operating costs for the thermal oxidizer treatment trains. Therefore, the Vapor Treatment Needs and Options Evaluation will consider the alternative of including a condensing system upstream of the thermal oxidizer(s) that will operate only during peak VOC loading periods, to reduce the VOC mass entering the oxidizer(s).

The Vapor Treatment Needs and Options evaluation will examine these alternatives with special consideration given to the potential limitations identified in the preceding paragraphs. The following factors will be considered during the evaluation of these alternative(s):

- Proposed Process Flow Diagram
- Treatment Performance Capabilities
- COC-Specific Limitations
- Mass Loading Capacity (lb VOC/hr; Btu/hr)
- Capability to Handle Mass Load Fluctuations, Peak Loading
- Vendor Availability and Delivery Lead Time
- Permit Equivalency Compliance
- Vapor Emission Limits
- Required Destruction/Removal Efficiency (DRE)
- Anticipated Monitoring Requirements
- Cost Considerations
- Unit Capacity, Redundancy
- Fuel Consumption
- Materials of Construction
- Waste Streams
- Operating Modes

The outcome of the Vapor Treatment Needs and Options Evaluation will be the selection of the vapor treatment system that will carry forward into the Preliminary Design documents. it is important to establish the design approach for the vapor treatment system as early as possible to allow for critical component procurement planning, as some of the components may require custom designs and/or special materials of construction that could significantly impact the item's capital cost or extend standard vendor lead times.

Results of the Vapor Treatment Needs and Options Evaluation will be summarized in memo form and presented to the Agencies upon completion. The intent of presenting this information in advance of the Preliminary Design submittal is to inform the Agencies of the planned vapor treatment approach and to obtain some general feedback on the proposed design concept and Agency concerns, before the Preliminary Design package is submitted.

Memo

TerraTherm, Inc.
10 Stevens Rd.
Fitchburg, MA 01420
Phone: (978) 343-0300
Fax: (978) 343-2727

To: John Hunt, Bruce Thompson, *de maximis, inc.*

From: Larry Conant, John LaChance, TerraTherm, Inc.

Date: December 4, 2009

Re: SRSNE Superfund Site Treatment Process Options

This memorandum presents a review of vapor treatment system options for the planned thermal remediation of the Observed NAPL in the Overburden Groundwater Unit (ONOGU) area at the Solvents Recovery Systems of New England Superfund Site (SRSNE) in light of new data and analyses, and provides our revised recommended approach for vapor treatment. We begin with an evaluation of the design basis and the approach put forth in our proposal that was the basis for our Best and Final Offer (BAFO) and the contract award. Next, we present recently acquired information that was used to revise the design basis; then, we summarize our review by presenting three treatment scenarios and treatment approaches that frame the issues and options for designing a treatment system for the site. Finally, we present our revised recommended approach for the SRSNE site.

Attached to this memorandum is a table of system components for each option, with estimated equipment, operation, waste disposal, fuel, and energy costs. Please note that fuel and energy costs were estimated using today's market rate and may change at the time of project startup.

<u>Original Design Basis Used for Proposal/Bid</u>

The design basis for the vapor treatment system presented in our proposal and assumed for the contract award is as follows:

- NAPL characteristics: fuel load of 8,000 BTU/lb with 80% chlorides
- Design for 1,000,000 lbs present within treatment volume (however, actual mass unknown and thought to likely be in the range of 500,000 to 2,000,000 lbs)
- Minimize duration of operational phase in order to reduce potential for EPA requested add-on days of operation

Original Treatment System Design as Awarded

The original treatment system design, as presented in our BAFO and shown below (Figure 1), used two Regenerative Thermal Oxidizers (RTO) to destroy constituents of concern (COCs) in the vapors extracted from the wellfield. For this system, vapors from the wellfield would be processed through a heat exchanger to condense out the moisture/steam from the wellfield prior to the RTOs. This reduces the flow rate and size requirements and operating costs of the RTOs. Additional process steps included an oil/water separator to recover organic material that also condensed out and two scrubbers to neutralize any acids created in the oxidizers (e.g., HCL). The operational period over which the mass present in the treatment volume (assumed to be 1,000,000 lbs) would be removed and sent to the treatment system was 135 days. As indicated above, this design was based on laboratory data which indicated that the contaminant mass (i.e., NAPL) had a fuel load of 8,000 BTU/lb and was comprised of 80% chlorides.

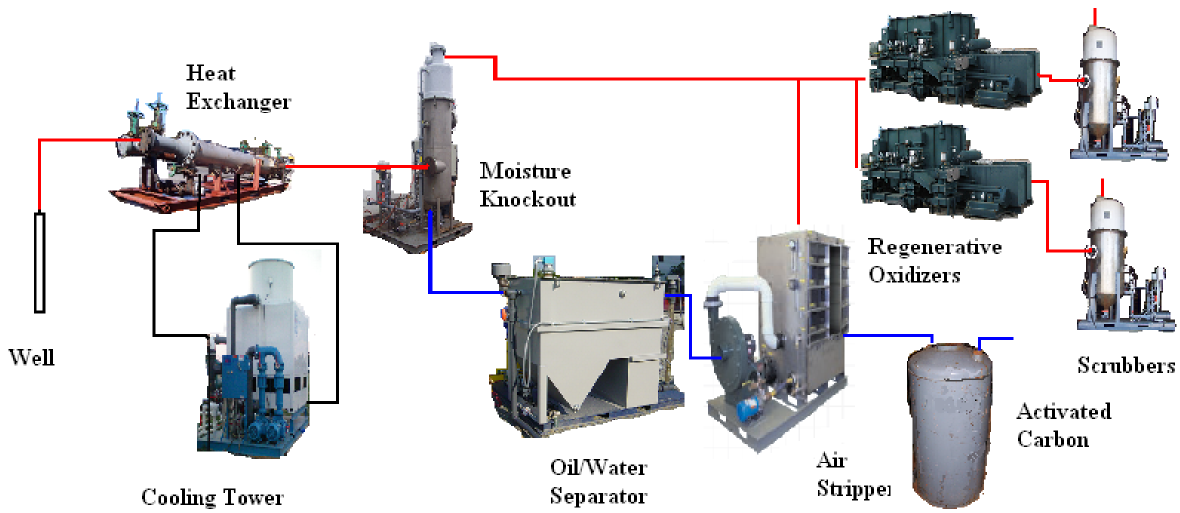

Figure 1. Treatment System Presented in Proposal

Revised Treatment System Considerations

Recent laboratory data from the NAPL sample collected from the SRSNE site for the materials compatibility testing indicated a higher BTU value and a lower chlorine content than the data used for the original design. These new values are 13,000 BTU/lb and 30% chlorine. A vapor stream rich with NAPL with these characteristics would not be handled efficiently in the original design. The primary concern is thermal overload of the RTOs due to the high BTU or fuel value of the vapor stream. The regenerative concept of the RTO relies on recycling energy from the exhaust into the inlet to pre-heat the incoming vapors. This recycling concept reduces the supplemental fuel load, and also cools the exiting gas. This is the most efficient approach for a vapor stream with a moderate to low BTU fuel load. However, a vapor stream with a high BTU fuel value will create temperatures within the RTOs above the operating limits of the units and very hot exhaust. This can be addressed by adding dilution air to the inlet vapor stream, but this would require significant increases in the size and/or number of RTOs and the size and capacities of all of the down stream piping and equipment (e.g., blowers and scrubbers). Given the potential for relatively high BTU loads and the uncertainty in the actual mass present in the treatment volume and thus the peak loading rate, this approach was determined to not be satisfactory.

In addition, based on the chemical composition of the NAPL, it was determined that several low-boiling point azeotropes would be formed and that the NAPL would boil in the presence of water at a temperature around 75ºC (this has been confirmed in the laboratory during the initial condensate production phase of the materials compatibility testing). What this means is that a significant portion of the mass present in the treatment volume (e.g., 80-90%) will be produced over a period of 4-6 weeks as the average temperature approaches 75ºC, well before the target temperature of 100ºC is reached. Furthermore, due to thermal coasting (i.e., the treatment volume will continue to heat-up even if the heater wells are shut down due to heat dissipation), it will not be possible to effectively control the arrival or duration of the peak loadings. If the mass present in the treatment volume is closer to 2M lbs than 1M lbs, then the peak loadings could easily be more than the treatment system can handle.

For example, if the entire treatment volume was heated all at once, and the total mass of COCs present was closer to 2M lbs than 1M lbs, and 80% of this mass was produced over a 4 week period corresponding to achieving temperatures around 75ºC, the average loading to the treatment system would be ~2,400 lbs/hr or 31M BTU/hr. Peak loading rates could be 2-3 times higher.

Installation and operation of a system large enough to handle these potential maximum peak loadings would be very expensive and may not be necessary if the actual mass present in the treatment zone is significantly lower than what is assumed. Therefore, as described below, we evaluated: 1) different equipment designs that could handle higher mass/fuel loadings and 2) different operational strategies to control and reduce the potential peak loadings to ranges that would be economically more feasible to design for. For instance, the treatment systems proposed for the three design scenarios evaluated below all use Thermal Accelerators (TA) instead of the original RTO's. A TA does not have as much thermal recycling capability as the RTO, and therefore is designed for a higher BTU vapor load. In addition, we evaluated extending the operation phased from 135 to 195 days and dividing the treatment area up into quarters and phasing the start of heating of each quarter by 2-3 weeks. This has the distinct advantage of providing a means to regulate the loading rates and attenuating and spreading out the peak loadings.

Each scenario and treatment approach will be explained in detail below, including which of the three is our recommended approach.

Scenario 1

Summary of Assumptions and Objectives:

- Design and size treatment system for 1,000,000 lbs of mass, but be prepared to treat unknown mass (up to 2,000,000 lbs) in most economical way.

Summary of Approach:

- Replace RTOs with TAs.

- Extend treatment period from 135 to 195 days to allow phased startup and treatment and control/regulation of peak loadings to treatment system. This provides flexibility and will allow treatment of more than 1,000,000 lbs without sizing and building an overly large and expensive treatment system.

- System will be designed and run primarily to minimize condensation and removal of NAPL from vapor stream (condense out water only). However, the system can be easily adjusted to facilitate the removal of NAPL from the vapor stream by simply lowering the cooling temperature of the heat exchanger in front of the knock out pot. This would only be done if the mass loadings were too high and could not be controlled by phasing the operation of the heaters. The condensed NAPL would have to be sent off for disposal at a regulated disposal facility.

The treatment system for Scenario 1 consists of replacing the original RTO's with two TAs and removing one scrubber while still using a single incoming heat exchanger/moisture knockout and an oil/water separator similar to the original design (see Figure 2). In addition to replacing the original RTO's with TAs, this option extends the processing time from 135 days to 195 days which would allow for a phased startup of the heaters and treatment of additional mass over 1,000,000 pounds. This extension of time also allows for a gradual ramp-up of the wellfield temperature and therefore a control of the removal rate from the wellfield.

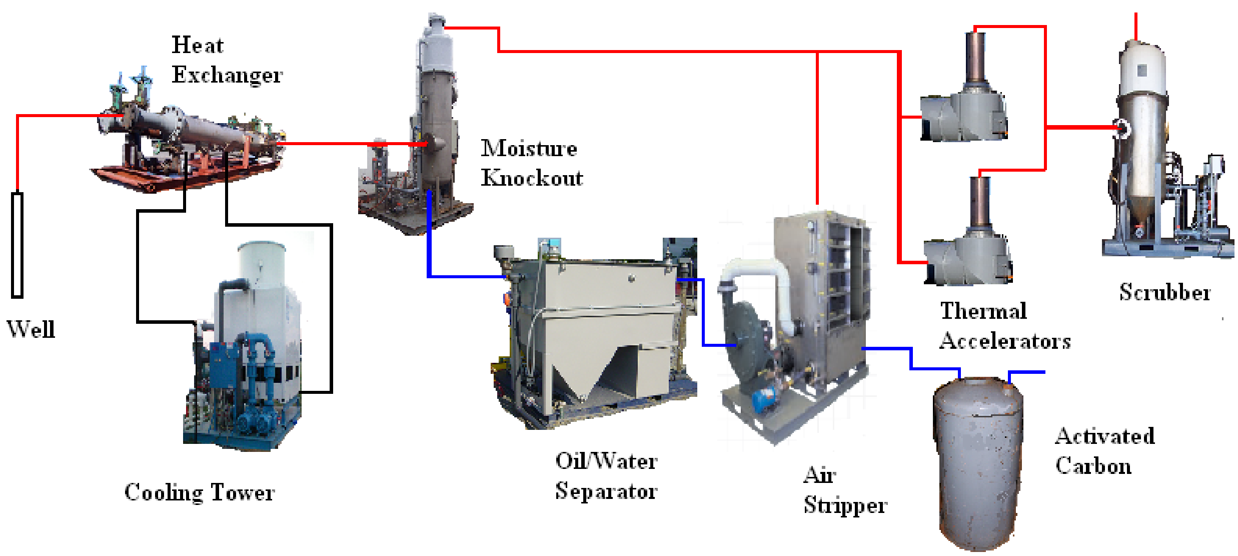

Figure 2. Treatment System for Scenario 1

Scenario 2

Summary of Objectives:

- Design and size system for 2,000,000 lbs of mass in 135 days.

Summary of Approach:

- Replace RTOs with TAs.
- Treatment period from remains at 135 (no phased startup).
- System will be designed and run primarily to minimize condensation and removal of NAPL from vapor stream (condense out water only). However, the system can be easily adjusted to facilitate the removal of NAPL from the vapor stream by simply lowering the cooling temperature of the heat exchanger in front of the knock out pot. This would only be done if the mass loadings were too high and could not be controlled by phasing the operation of the heaters. The condensed NAPL would have to be sent off for disposal at a regulated disposal facility.

The treatment system for Scenario 2 consists of replacing the original RTO's with four TAs (see Figure 3). Everything else would remain the same as the original design. The increase in oxidizer capacity will handle up to 2,000,000 pounds in the same operational period as the original proposal (i.e., 135 days).

The major disadvantage of this option is the higher capital cost for the extra TAs and scrubber and the significantly higher operations costs, including natural gas for the TAs.

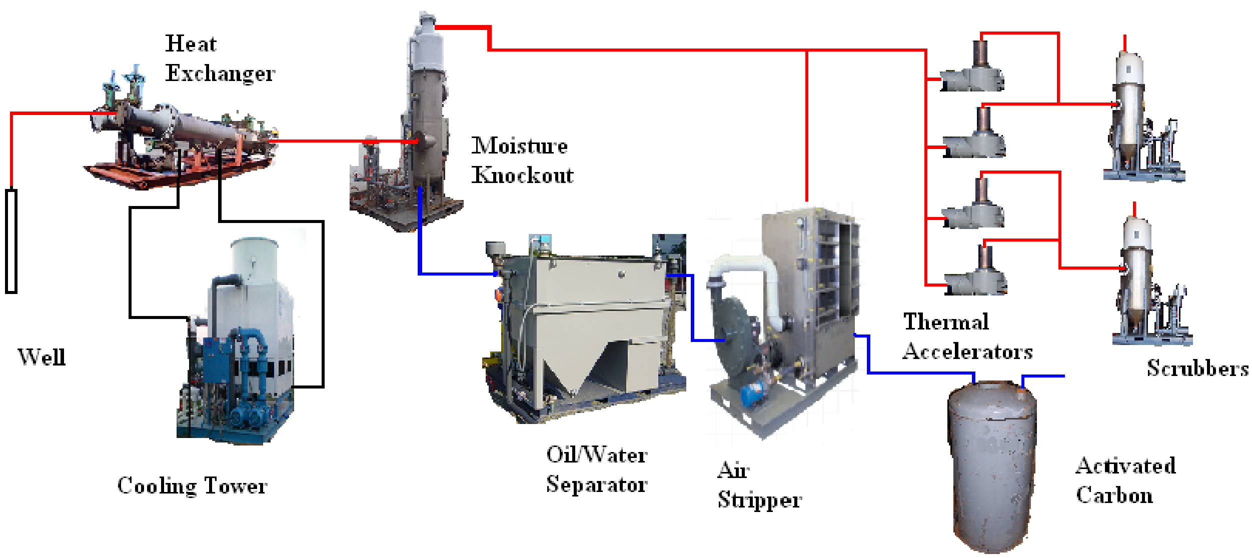

Figure 3. Treatment System for Scenario 2

Scenario 3

Summary of Objectives:

- Design and size system for 2,000,000 lbs in 135 days.

Summary of Approach:

- Replace RTOs with TAs;
- Treatment period remains at 135 (no phased startup).
- An additional heat exchanger and knockout will be added to allow two-stage condensing of water and petroleum hydrocarbon NAPL. The system will be designed and run to maximize removal of petroleum hydrocarbon NAPL while keeping chlorinated volatile organic compounds (CVOCs) in vapor phase for destruction in the TAs.
- NAPL condensate will require disposal at an approved regulated facility.

The treatment system for Scenario 3 consists of replacing the original RTO's with two heat exchangers and two TAs with a single scrubber (see Figure 4). The assumed operational time period is the same as the original at 135 days, but the mass to be removed is assumed to be 2,000,000 pounds. The mass and fuel load would be attenuated by the two-stage condensing of water and petroleum hydrocarbons. The first heat exchanger and knock out would remove water moisture from the vapor stream. The second heat exchanger and knock out would be configured and operated to primarily remove the petroleum hydrocarbons while leaving the CVOCs in vapor stream for treatment by the TAs. By removing the petroleum hydrocarbons the fuel load can be reduced to levels that two TAs can handle. Leaving the CVOCs in the vapor stream ensures that the petroleum hydrocarbon NAPL can be disposed of as non-hazardous and therefore reduces the cost of disposal.

This option has a higher capital cost than the treatment approach for Scenario 1 due to the added heat exchanger and cooling tower and generates a NAPL waste stream that has to be sent for off-site disposal.

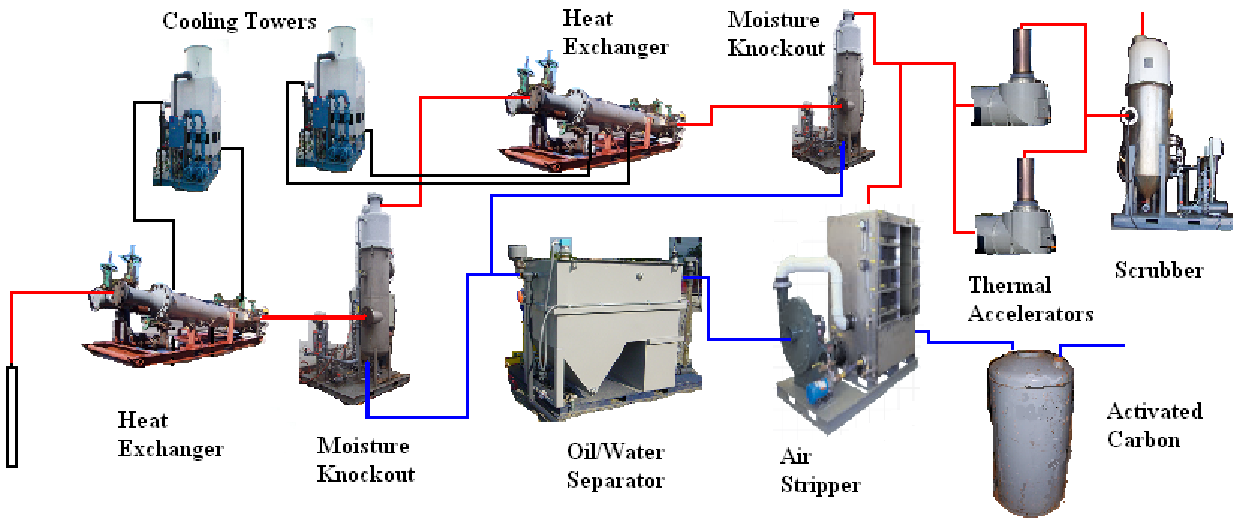

Figure 4. Treatment System for Scenario 3

<u>Conclusion and Recommendation</u>

The original process design was based on the NAPL having an 8,000 BTU/lb fuel loading rate and consisting of 80% chlorine. The most recent laboratory data indicates a 13,000 BTU/lb vapor fuel loading rate with only 30% chlorine. The change in chlorine isn't a concern, but the higher BTU value cannot be processed in the original design without severely limiting the process rate. Therefore, three revised scenarios/treatment options have been proposed.

All of the treatment approaches replace the RTOs with TAs which are designed to handle the higher BTU fuel.

The treatment approach for Scenario 1 increases the operating time but has the lowest capital cost and greatest flexibility to handle the unknown amount of mass present in the treatment volume.

The treatment approach for Scenario 2 doubles the number of oxidizers and scrubbers increasing the capital cost over the system for Scenario 1, but brings the process time back to the original 135 days without creating a condensate stream requiring offsite disposal.

The treatment approach for Scenario 3 doubles the heat exchange capacity increasing the capital cost over the system for Scenario 1, but still uses two oxidizers. The process time is the original 135 days; however, there is an additional NAPL waste stream produced that requires off-site disposal.

Our recommended approach for the SRSNE site is to use the treatment approach outlined for Scenario 1 for the following reasons:

- Its total cost is similar to the original proposal,
- It allows for flexibility and control of the removal rate of contaminants, specifically if the estimated mass exceeds 1,000,000 pounds, and
- The NAPL waste stream requiring off-site disposal is estimated to be minimal.

SRSNE Superfund Site
Matrix of Major System Components and Estimated Costs

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Fitchburg, MA 01420

Scenario/ Option	Feed	Assumed Total Treatment Quantity Pounds	Operating Days	Major Equipment	Quantity	Size/Description	Estimated Equipment Cost	Estimated Operation Cost	Estimated Waste Disposal Cost	Power kWh	Fuel Therms	Total Costs
Proposed												
Original												
Approach	8,000 Btu/#	1,000,000	135	Heat Exchanger/Condenser	1	259 ft2						
	80% Cl			Cooling Tower	1	200 Tons						
				Duplex Blower Skid	1	2,500 ACFM						
				Moisture Sep Skid	1	1,700 SCFM						
				Thermal Oxidizer	2	2,000 SCFM						
				Scrubber	2	2,000 SCFM						
				Oil Water Seperator	1	10 gpm						
				Air Stripper Skid	1	11 gpm						
				Venturi Quench	2	Hastelloy 2,000 SCFM						
				Caustic Feed & Tank	2							
Total							$1,100,000	$500,000	$0	$57,000	$5,000	**$1,662,000**
1	13,000 Btu/#	1,000,000	195	Heat Exchanger	1	259 ft2						
		capable of efficiently	Phased									
		treating between	startup of									
		500,000 to 2,000,000	heaters									
	30% Cl	lbs		Cooling Tower	1	100 Tons						
				Venturi Quench	1	Hastelloy 2,000 SCFM						
				Duplex Blower Skid	1	2,500 ACFM						
				Thermal Accelerators	2	4 million Btu/hr						
				Oil-Water Sep	1	10 gpm						
				Air Stripper	1	11 gpm						
				Caustic Package	1							
				Scrubber	1	1600 scfm						
Total							$890,000	$750,000	$0	$83,000	$25,000	**$1,748,000**
2	13,000 Btu/#	2,000,000	135	Heat Exchanger	1	259 ft2						
	30% Cl			Cooling Tower	1	100 Tons						
				Venturi Quench	2	Hastelloy 2,000 SCFM						
				Duplex Blower Skid	1	2,500 ACFM						
				Thermal Accelerators	4	4 million Btu/hr						
				Oil-Water Sep	1	10 gpm						
				Air Stripper	1	11 gpm						
				Caustic Package	2							
				Scrubber	2	1600 scfm						
Total							$1,500,000	$500,000	$0	$57,000	$34,000	**$2,091,000**
3	13,000 Btu/#	2,000,000	135	Heat Exchanger	2	259 ft2						
	30% Cl			Cooling Tower & Chiller	2	100 Tons						
				Venturi Quench	1	Hastelloy 2,000 SCFM						
				Duplex Blower Skid	1	2,500 ACFM						
				Compressors	2							
				Thermal accelerators	2	4 million Btu/hr						
				Oil-Water Sep	1	10 gpm						
				Air Stripper	1	11 gpm						
				Caustic Package	1							
				Scrubber	1	1600 scfm						
Total							$1,100,000	$500,000	$225,000	$57,000	$17,000	**$1,899,000**

Note: Actual costs to be finalized upon completion of the treatment design.

ATTACHMENT J

APPLICANT COMPLIANCE INFORMATION
(DEP-APP-002)

Applicant Compliance Information

DEP ONLY
App. No. ____________________________
Co./Ind. No. __________________________

Applicant Name: **TerraTherm, Inc.**
(as indicated on the *Permit Application Transmittal Form*)

If you answer *yes* to any of the questions below, you must complete the Table of Enforcement Actions on the reverse side of this sheet as directed in the instructions for your permit application.

A. During the five years immediately preceding submission of this application, has the applicant been convicted in any jurisdiction of a criminal violation of any environmental law?

☐ Yes ☒ No

B. During the five years immediately preceding submission of this application, has a civil penalty been imposed upon the applicant in any state, including Connecticut, or federal judicial proceeding for any violation of an environmental law?

☐ Yes ☒ No

C. During the five years immediately preceding submission of this application, has a civil penalty exceeding five thousand dollars been imposed on the applicant in any state, including Connecticut, or federal administrative proceeding for any violation of an environmental law?

☐ Yes ☒ No

D. During the five years immediately preceding submission of this application, has any state, including Connecticut, or federal court issued any order or entered any judgement to the applicant concerning a violation of any environmental law?

☐ Yes ☒ No

E. During the five years immediately preceding submission of this application, has any state, including Connecticut, or federal administrative agency issued any order to the applicant concerning a violation of any environmental law?

☐ Yes ☒ No

Table of Enforcement Actions

(1) Type of Action	(2a) Date Commenced	(2b) Date Terminated	(3) Jurisdiction	(4) Case/Docket/ Order No.	(5) Description of Violation
N/A					

☐ Check the box if additional sheets are attached. Copies of this form may be duplicated for additional space.

ATTACHMENT M

CT NDDB REVIEW REQUEST FORM
(DEP-APP-007)

Connecticut Natural Diversity Data Base Review Request Form

Please complete this form *only* if you have conducted a review which determined that your activity is located in an area of concern.

Name: **Michael I. Holzman**

Affiliation: **M.I. Holzman & Associates, LLC**

Mailing Address: **57 Mountain View Drive**

City/Town: **West Hartford** State: **CT** Zip Code: **06117**

Business Phone: **860-523-8345** ext. Fax: **860-523-8394**

Contact Person: **Michael I. Holzman** Title: **President**

Project or Site Name: **Solvent Recovery Service of New England, Inc. Superfund Site**

Project Location

Town: **Southington** USGS Quad: **Southington**

Brief Description of Proposed Activities:

Proposed activities involve remediation of an existing Superfund hazardous waste site in accordance with the Remedial Design/Remedial Action (RD/RA) Consent Decree (CD) and Statement of Work (SOW) negotiated with the US EPA Region I and the CTDEP. Remediation activities include installation and operation of Thermal Conduction Heating (TCH), also called In Situ Thermal Desorption (ISTD), to remediate a Non-Aqueous Phase Liquid (DNAPL) source zone at the Solvents Recovery Service of New England in Southington, Connecticut. Vapors will be extracted from the subsurface under vacuum and pass through a moisture separator to remove entrained liquid and condensate prior to vapor treatment by dual thermal oxidizers (TO) and a wet scrubber.

Have you conducted a "State and Federal Listed Species and Natural Communities Map" review?

☒ Yes ☐ No Date of Map: **December 2009**

Has a field survey been previously conducted to determine the presence of any endangered, threatened or special concern species? ☒ Yes ☐ No

If yes, provide the following information and submit a copy of the field survey with this form.

Biologists Name:

Address:

Based on ecological investigations by EPA during the Remedial Investigation, they concluded that no endangered, threatened, or special concern species were present on Site (see Record Of Decision, page 47 of 115, September 2005). Also see attached Final Wetlands Evaluation Study (Halliburton NUS, 1993) and Habitat Characterization Report (ARCADIS, 2010).

If the project will require a permit, list type of permit, agency and date or proposed date of application:

Although Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) on-site response actions are exempted by law from the requirement to obtain Federal, State, and/or local permits, a permit equivalency review will be conducted by CTDEP to document compliance with substantive provisions of Federal, State, and/or local permitting regulations that are Applicable or Relevant and Appropriate Requirements (ARARs).

The Connecticut Natural Diversity Data Base (CT NDDB) information will be used for:

☒ permit application

☐ environmental assessment (give reasons for assessment):

☒ other (specify):

Although Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) on-site response actions are exempted by law from the requirement to obtain Federal, State, and/or local permits, a permit equivalency review will be conducted by CTDEP to document compliance with substantive provisions of Federal, State, and/or local permitting regulations that are Applicable or Relevant and Appropriate Requirements (ARARs).

"I certify that the information supplied on this form is complete and accurate, and that any material supplied by the CT NDDB will not be published without prior permission."

Signature

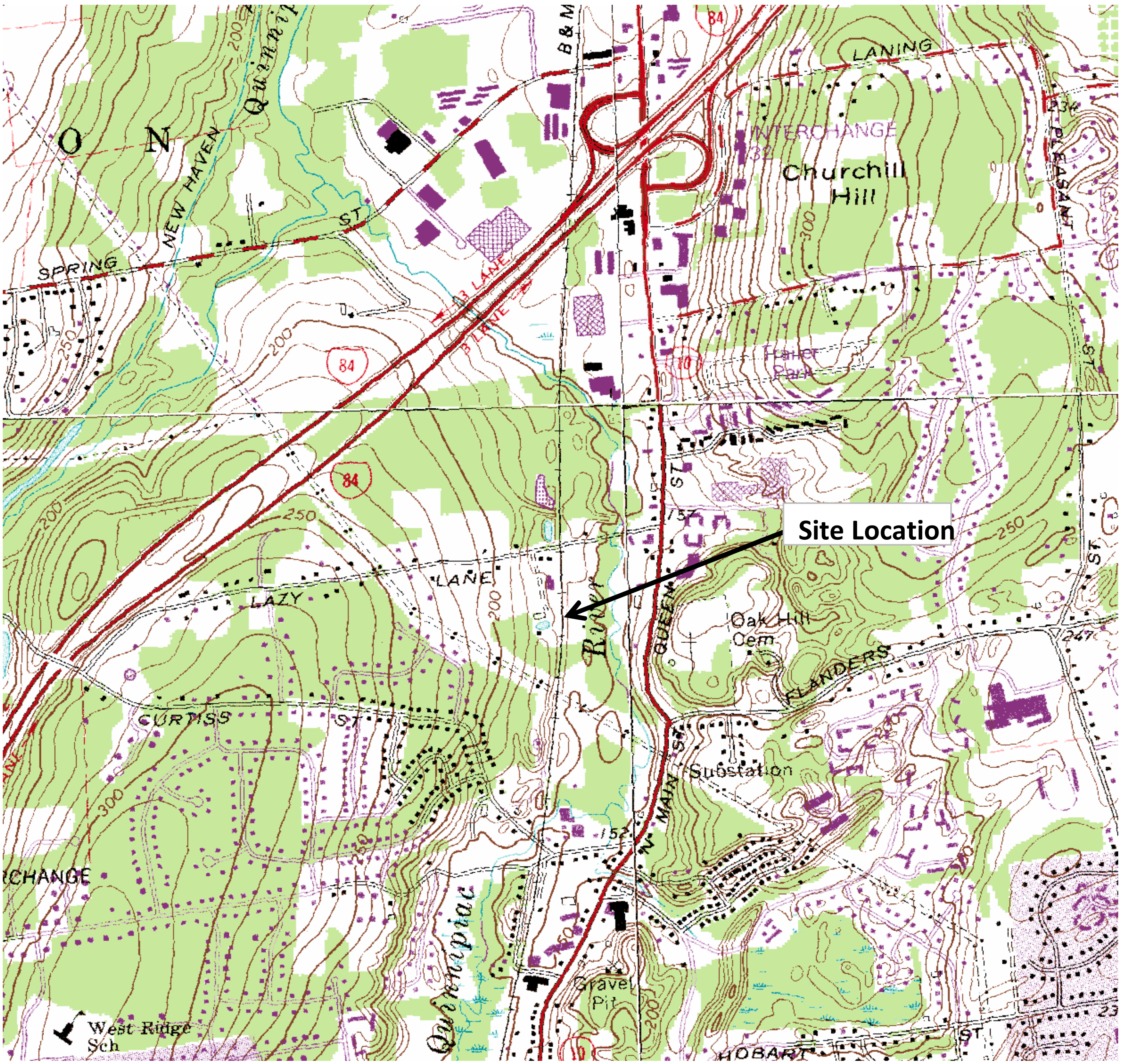
Date

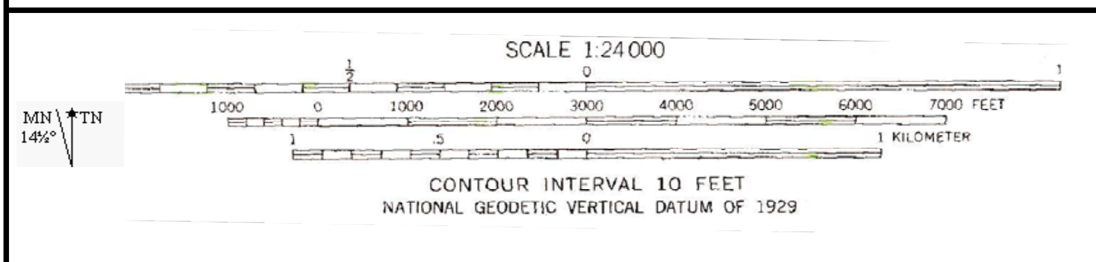
All requests must include a USGS topographic map with the project boundary clearly delineated.

Return completed form to:

WILDLIFE DIVISION
BUREAU OF NATURAL RESOURCES
DEPARTMENT OF ENVIRONMENTAL PROTECTION
79 ELM ST, 6TH FLOOR
HARTFORD, CT 06106-5127

* You must submit a copy of this completed form with your registration or permit application.





USGS 7.5 Minute

Quadrangle Base Map: Southington, CT

M.I. HOLZMAN & ASSOCIATES, LLC

Environmental Permitting, Compliance and Engineering Solutions

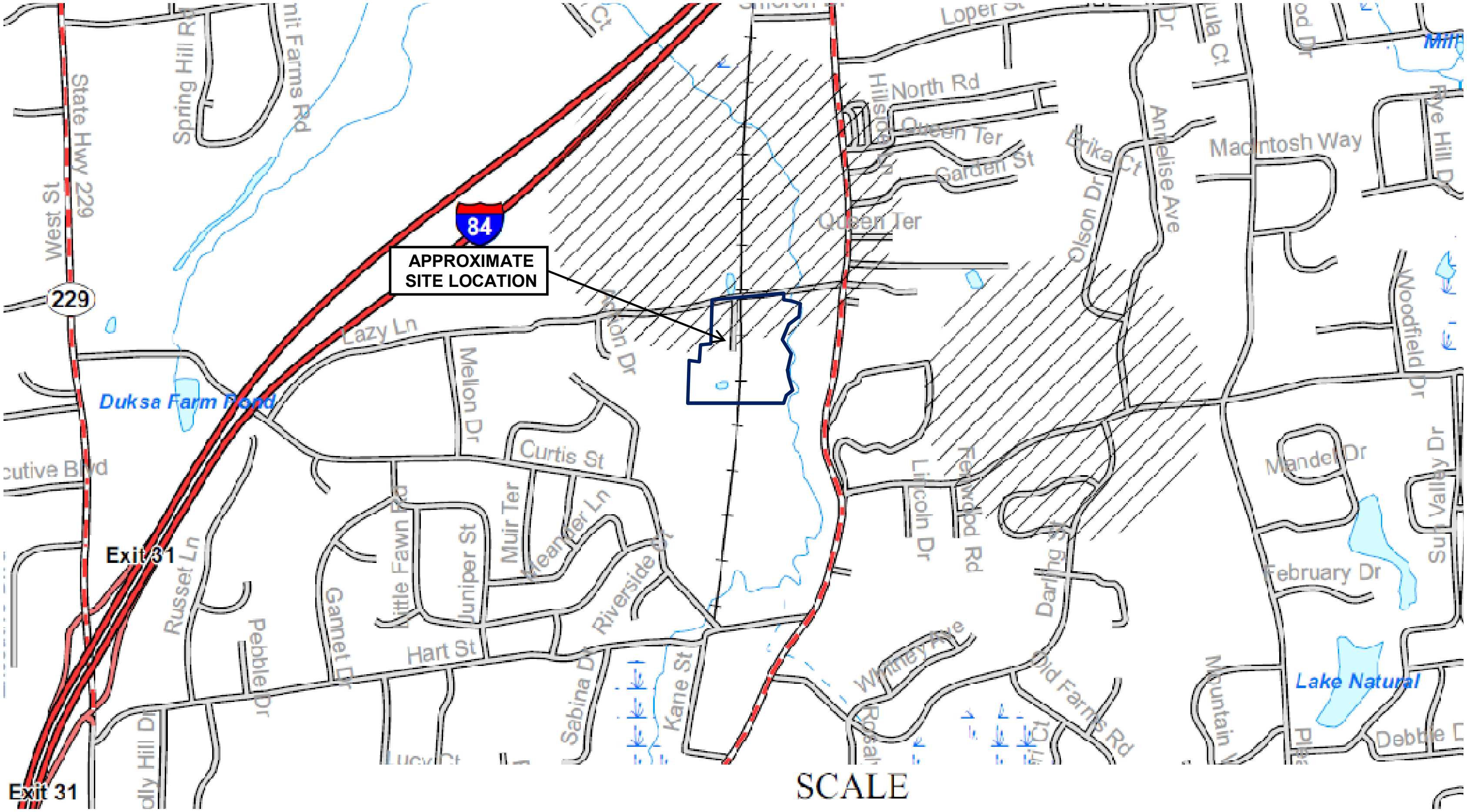
COMPILED BY:	MIH	DATE:	4/14/2010
REVIEWED BY:	MIH	DRAWN BY:	MIH
PROJ. NO:	091-002	FILENAME:	USGS.XLS

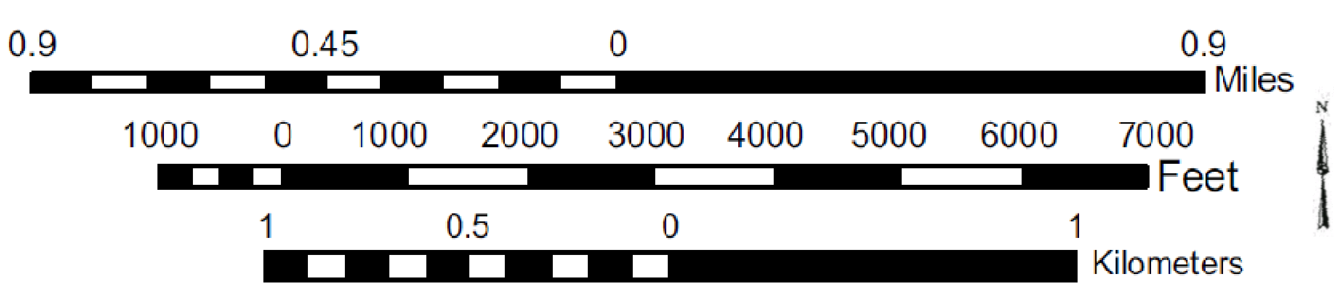
Figure 1

USGS SITE LOCATION MAP

SRSNE Superfund Site

Southington, CT





Note: This is an excerpt from the CTDEP's Natural Diversity Database Digital Data map of the Town of Southington, dated December 2009. Site boundaries and scale shown are approximate.

M.I. HOLZMAN & ASSOCIATES, LLC

Environmental Engineering, Impact Assessment, Compliance Services

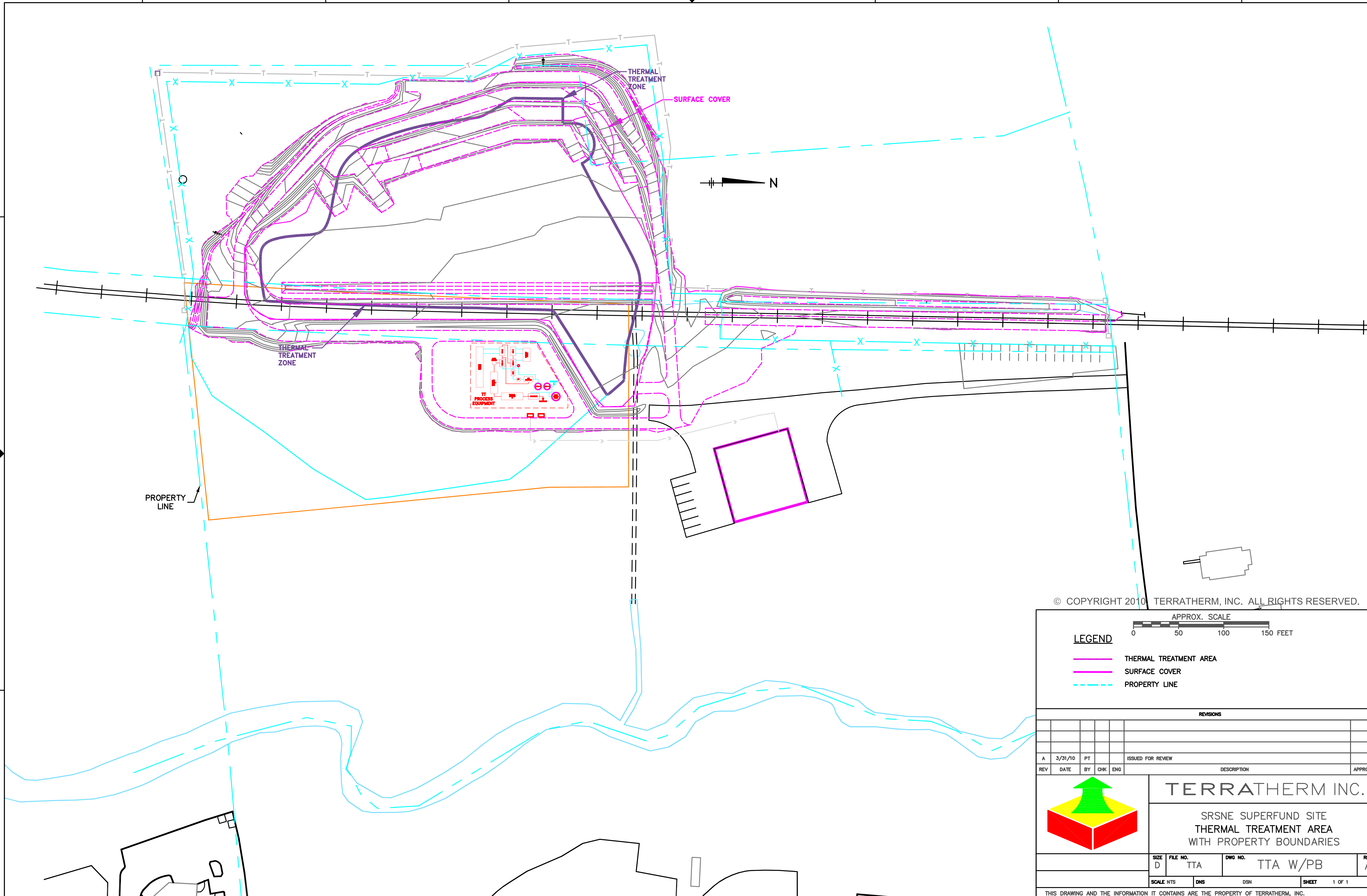
COMPILED BY:	MIH	DATE:	4/12/2010
REVIEWED BY:	MIH	DRAWN BY:	MIH
PROJ. NO:	091-002	FILENAME:	Figure2.xls

Figure 2

CTDEP NDDB MAP EXCERPT

SOLVENT RECOVERY SERVICES OF NEW ENGLAND SUPERFUND SITE

SOUTHINGTON, CT



LEGEND

- THERMAL TREATMENT AREA
- SURFACE COVER
- PROPERTY LINE

REVISIONS

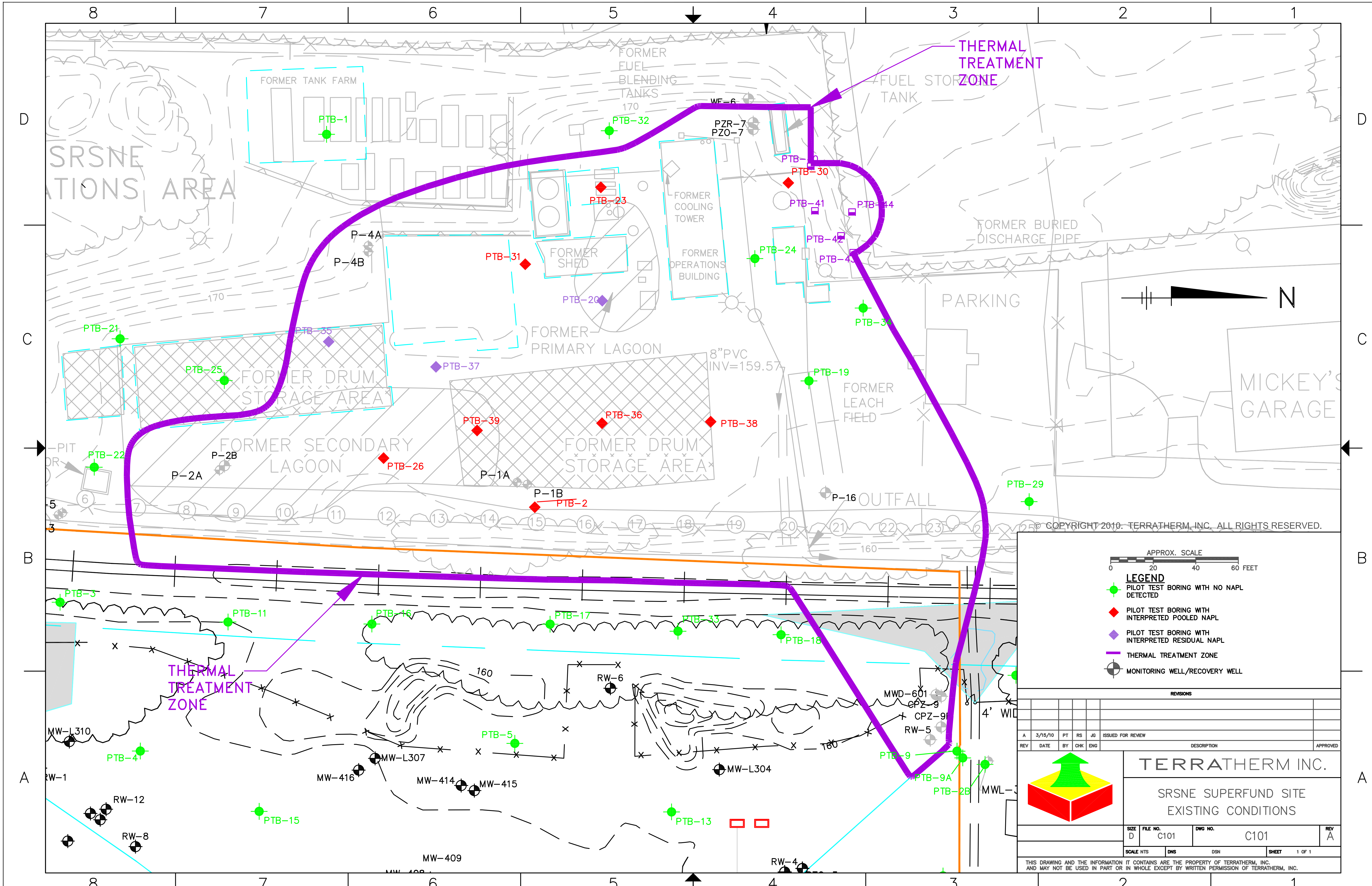
REV	DATE	BY	CHK	ENG	DESCRIPTION	APPROVED
A	3/31/10	PT			ISSUED FOR REVIEW	

TERRATHERM INC.

SRSNE SUPERFUND SITE
THERMAL TREATMENT AREA
WITH PROPERTY BOUNDARIES

SIZE	FILE NO.	DWG NO.	REV
D	TTA	TTA W/PB	A

SCALE NTS | DNS | DSN | SHEET 1 OF 1


THERMAL TREATMENT ZONE
FORMER TANK FARM
FORMER FUEL BLENDING TANKS
FUEL STORAGE TANK
SRSNE OPERATIONS AREA
FORMER COOLING TOWER
FORMER OPERATIONS BUILDING
FORMER SHED
FORMER PRIMARY LAGOON
FORMER DRUM STORAGE AREA
FORMER SECONDARY LAGOON
FORMER LEACH FIELD
FORMER BURIED DISCHARGE PIPE
PARKING
MICKEY'S GARAGE
OUTFALL
8"PVC INV=159.57
N
PTB-1
PTB-2
PTB-3
PTB-4
PTB-5
PTB-9
PTB-9A
PTB-2B
PTB-11
PTB-13
PTB-15
PTB-16
PTB-17
PTB-18
PTB-19
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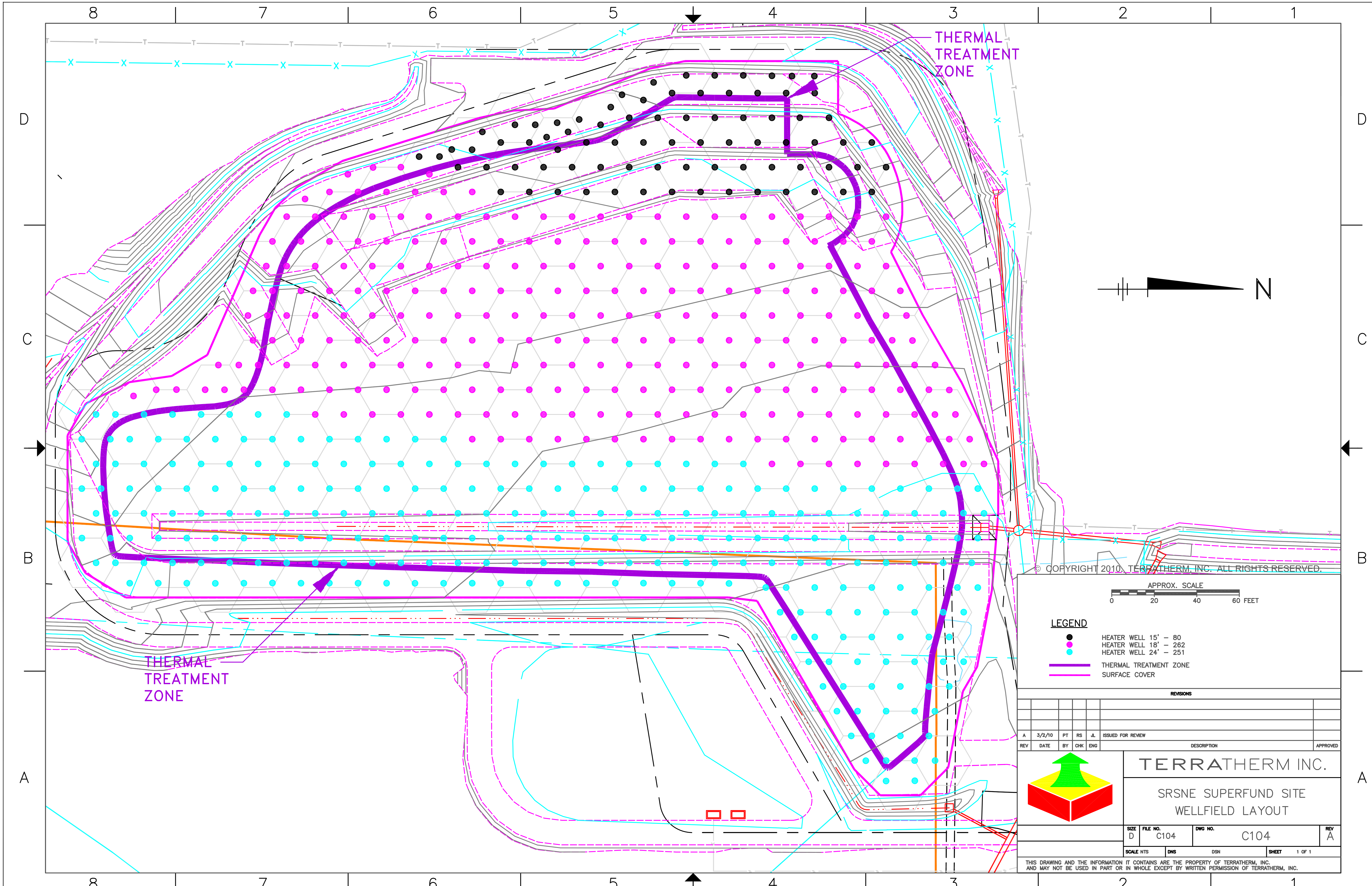
PTB-36
PTB-37
PTB-38
PTB-39
PTB-41
PTB-42
PTB-43
PTB-44
P-1A
P-1B
P-2A
P-2B
P-4A
P-4B
P-16
PZR-7
PZO-7
WE-6
RW-1
RW-4
RW-5
RW-6
RW-8
RW-12
MW-L304
MW-L307
MW-L310
MW-409
MW-414
MW-415
MW-416
MWD-601
CPZ-9
CPZ-9I
MWL-
4' WID
160
170
© COPYRIGHT 2010. TERRATHERM, INC. ALL RIGHTS RESERVED.
APPROX. SCALE
0 20 40 60 FEET
LEGEND
PILOT TEST BORING WITH NO NAPL DETECTED
PILOT TEST BORING WITH INTERPRETED POOLED NAPL
PILOT TEST BORING WITH INTERPRETED RESIDUAL NAPL
THERMAL TREATMENT ZONE
MONITORING WELL/RECOVERY WELL
REVISIONS
A 3/15/10 PT RS JG ISSUED FOR REVIEW
REV DATE BY CHK ENG DESCRIPTION APPROVED
TERRATHERM INC.
SRSNE SUPERFUND SITE
EXISTING CONDITIONS
SIZE D FILE NO. C101 DWG NO. C101 REV A
SCALE NTS DNS DSN SHEET 1 OF 1
THIS DRAWING AND THE INFORMATION IT CONTAINS ARE THE PROPERTY OF TERRATHERM, INC. AND MAY NOT BE USED IN WHOLE OR IN PART EXCEPT BY WRITTEN PERMISSION OF TERRATHERM, INC.



APPROX. SCALE

0 20 40 60 FEET

LEGEND

- HEATER WELL 15' – 80
- HEATER WELL 18' – 262
- HEATER WELL 24' – 251
- THERMAL TREATMENT ZONE
- SURFACE COVER

REVISIONS

REV	DATE	BY	CHK	ENG	DESCRIPTION	APPROVED
A	3/2/10	PT	RS	JL	ISSUED FOR REVIEW	

TERRATHERM INC.

SRSNE SUPERFUND SITE
WELLFIELD LAYOUT

SIZE D | FILE NO. C104 | DWG NO. C104 | REV A

SCALE NTS | DNS | DSN | SHEET 1 OF 1

W93376F

Note - full report included in submittal to DEP Wildlife Division.

FINAL
WETLANDS EVALUATION STUDY

TECHNICAL MEMORANDUM

SOLVENTS RECOVERY SERVICE OF NEW ENGLAND, INC. SITE SOUTHINGTON, CONNECTICUT

Halliburton NUS Environmental Corporation

EPA Work Assignment No. 01-1L08
EPA Contract No. 68-W8-0117
HNUS Project No. 0217

December 1993

HALLIBURTON NUS
Environmental Corporation

DRAFT

Note - full report included in submittal to DEP Wildlife Division.

SRSNE Site Group

Habitat Characterization Report

Solvents Recovery Service of New England, Inc.
(SRSNE) Superfund Site
Southington, Connecticut

April 2010

ATTACHMENT O

ENVIRONMENTAL JUSTICE PUBLIC PARTICIPATION PLAN EQUIVALENCY APPROVAL

Michael I. Holzman

From: Bruce Thompson [brucet@demaximis.com]
Sent: Monday, April 05, 2010 11:40 AM
To: Mike Holzman
Cc: John Hunt
Subject: SRSNE Site - EJ and CRSP
Attachments: CRSP.pdf

Mike - please see attached, and e-mail from EPA RPM below that states the DEP agrees the CRSP meets the EJ requirements.

What is the timing to complete the draft permit application?

John - when you get a minute, please hook up Mike with PP access.

- BRT

Bruce Thompson
de maximis, inc.
200 Day Hill Road
Suite 200
Windsor, CT 06095

860 298 0541 main
860 298 0561 fax
860 662 0526 cell

brucet@demaximis.com
www.demaximis.com

>>> <lumino.karen@epamail.epa.gov> 2/3/2010 10:42 AM >>>

EPA and CT DEP have reviewed the community relations support plan, which can be found in attachment E of the RD/RA POP. Here are our comments:

1. Implementation of the activities outlined in the CRSP will satisfy CT's requirements for an environmental justice public participation plan.

2. section 2.2 -- EPA will be conducting community interviews for the five-year review and updated community involvement plan in march/april. this section will needed to be modified should any new concerns be brought our attention.

3. section 2.2, bullet 2 -- it is our expectation that the Group will provide for round-the-clock security personnel during the more active portions of remedy implementation, particularly during ISTR.

4. section 3.3.1 -- please modify the first sentence so it now reads:

"The SRSNE Site Group will participate in and/or host (in the case of open houses held on site) the public meetings that USEPA...".

5. section 3.3.2 -- EPA may decide that additional fact sheets or updates, beyond those required by CERCLA, may be necessary to be responsive to the public. we would expect the Group to provide support for those as well. After the sentence that reads "No other community updates are required during this phase of work.", add the following: However, if EPA makes the determination that additional fact sheets or updates are needed to be responsive to the community, the SRSNE Group will provide support as outlined above.

let me know if you have any questions.
karen

STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION
79 Elm Street
Hartford, CT 06106-5127
www.ct.gov/dep

JAN 19 2011

TerraTherm, Inc.
Robin Swift
10 Stevens Rd
Fitchburg, MA 01420-4631

1/14/2011

Dear Permittee:

Enclosed is a certificate of registration for the general permit recently issued to you by our office.

This certificate will serve two purposes. First, this is a way for us to acknowledge to you that your registration has been processed. Second, it is a way for our inspection staff to know that you have the appropriate permit for your discharges.

The expiration date noted is the expiration date for all discharges registered for this permit. A mass mailing will be done nine months prior to the expiration of this permit to notify you of this date together with instructions on how to file for a permit renewal.

When corresponding with our office regarding your registration please use the "Site No." and the "Permit No." on the certificate. These numbers are unique to your discharge and its location.

If you have any questions regarding general permits for wastewater discharges please feel free to call 860-424-3018 and ask for the Engineer of the Day.

Enclosure

STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION
79 Elm Street
Hartford, CT 06106-5127
www.ct.gov/dep

Certificate of Registration

Issued To

TerraTherm, Inc.

For

Groundwater Remediation Wastewater To A Sanitary Sewer

General Permit

Amey Marrella
Commissioner

Facility Information:
SOLVENT'S RECOVERY SERVICES NEW ENGLAND
SUPERFUND SITE
90 LAZY LANE
SOUTHINGTON, CT 06489-

Permit No: GGR001781

Application No: 201006527
Issue Date: 1/7/2011
Expiration Date: 2/15/2018
Water Location No: 131 - 252

STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Central Permit Processing Unit
79 Elm Street
Hartford, CT 06106-5127

CPPU USE ONLY
App #: ______
Doc #: ______
Check #: ______
______

Permit Application Transmittal Form

Please complete this transmittal form in accordance with the instructions in order to ensure the proper handling of your application(s) and the associated fee(s). Print legibly or type.

Part I: Applicant Information:

- ***If an applicant is a corporation, limited liability company, limited partnership, limited liability partnership, or a statutory trust, it must be registered with the Secretary of State. If applicable, applicant's name shall be stated *exactly* as it is registered with the Secretary of State.***
- *If an applicant is an individual, provide the legal name (include suffix) in the following format: First Name; Middle Initial; Last Name; Suffix (Jr, Sr., II, III, etc.).*

Applicant: TerraTherm, Inc.
Mailing Address: 10 Stevens Road
City/Town: Fitchburg State: MA Zip Code: 01420
Business Phone: 978-343-0300 ext.: Fax: 978-343-2727
Contact Person: Robin Swift Phone: 978-343-0300 ext. 229
E-Mail: rswift@terratherm.com
Applicant (check one): ☐ individual ☒ *company ☐ federal gov't ☐ state agency ☐ municipality
*If a company, list company type (e.g., corporation, limited partnership, etc.): Corporation
☐ Check if any co-applicants. If so, attach additional sheet(s) with the required information as supplied above.

Please provide the following information to be used for *billing purposes only*, if different:
Company/Individual Name: de maximis, inc.
Mailing Address: 450 Montbrook Lane
City/Town: Knoxville State: TN Zip Code: 37919
Contact Person: Thomas Dorsey Phone: ext.

Part II: Project Information

Brief Description of Project: *(Example: Development of a 50 slip marina on Long Island Sound)*
Thermal remediation of the Solvents Recovery Services of New England.

Location (City/Town): Southington

Other Project Related Permits (*not* included with this form):

Permit Description	Issuing Authority	Submittal Date	Issuance Date	Denial Date	Permit #
Air Permit Equivalency	CT DEP	07/23/10	10/21/10		

Part III: Individual Permit Application and Fee Information

New, Mod. or Renew	Individual Permit Applications	Initial Fees	No. of Permits Applied For	Total Initial Fees	Original + Required Copies
	AIR EMISSIONS				
	New Source Review	$940.00			1 + 0
	Title V Operating Permits	none			1 + 0
	Title IV	none			1 + 0
	Clean Air Interstate Rule (CAIR)	none			1 + 0
	WATER DISCHARGES				
	To Groundwater	$1300.00			1 + 1
	To Sanitary Sewer (POTW)	$1300.00			1 + 1
	To Surface Water (NPDES)	$1300.00			1 + 2
	INLAND WATER RESOURCES-multiple permits 1 + 6 total copies				
	Dam Construction	none			1 + 2
	Flood Management Certification	none			1 + 1
	Inland 401 Water Quality Certification	none			1 + 5
	Inland Wetlands and Watercourses	none			
	Stream Channel Encroachment Lines	★			
	Water Diversion	★			1 + 5
	OFFICE OF LONG ISLAND SOUND PROGRAMS				
	Certificate of Permission	$375.00			1 + 3
	Coastal 401 Water Quality Certification	none			1 + 3
	Structures and Dredging/Tidal Wetlands	$660.00			1 + 3
	WASTE MANAGEMENT				
	Aerial Pesticide Application	★			1 + 2
	Aquatic Pesticide Application	$200.00			1 + 0
	CGS Section 22a-454 Waste Facilities	★			1 + 1
	Hazardous Waste Treatment, Storage and Disposal Facilities	★			1 + 1
	Marine Terminal License	$125.00			1 + 0
	Stewardship	$4000.00			1 + 1
	Solid Waste Facilities	★			1 + 1
	Waste Transportation	★			1 + 0
		Subtotal ➡	0	0	
	GENERAL PERMITS and AUTHORIZATIONS	Subtotals Page 3 ➡	1	$500	
	Enter subtotals from Part IV, pages 3 & 4 & 5 of this form	Subtotals Page 4 ➡	0	0	
		Subtotals Page 5 ➡	0	0	
		TOTAL ➡	1	$500	

☐ Indicate whether municipal discount or state waiver applies.
Less Applicable Discount ➡ 0

AMOUNT REMITTED ➡ $500

Check # ➡

Check or money order should be made payable to:
"Department of Environmental Protection"

★ See fee schedule on individual application.

Part IV: General Permit Registrations and Requests for Other Authorizations Application and Fee Information

✓	General Permits and Other Authorizations	Initial Fees	No. of Permits Applied For	Total Initial Fees	Original + Required Copies
	AIR EMISSIONS				
☐	Limit Potential to Emit from Major Stationary Sources of Air Pollution	$5000.00			1 + 0
☐	Ionizing Radiation Registration	$200.00			1 + 0
☐	Emergency/Temporary Authorization	★★			★★
☐	Other, (please specify):				
	WATER DISCHARGES				
☐	Domestic Sewage	$500.00			1 + 0
☐	Food Processing Wastewater	$500.00			1 + 0
☒	Groundwater Remediation Wastewater to a Sanitary Sewer	$500.00	1	$500	1 + 0
	Groundwater Remediation Wastewater to a Surface Water				
☐	Registration Only	$625.00			1 + 0
☐	Approval of Registration by DEP	$1250.00			
	Hydrostatic Pressure Testing Wastewater				
☐	Registration Only	$625.00			1 + 0
☐	Approval of Registration by DEP (natural gas pipelines)	$1250.00			
	Miscellaneous Discharges of Sewer Compatible Wastewater				
☐	Flow < 5,000 gpd and fire sprinkler system testwater	$500.00			1 + 1
☐	Flow > 5,000 gpd	$1000.00			
☐	Non-Contact Cooling and Heat Pump Water (Minor)	$625.00			1 + 1
☐	Photographic Processing Wastewater (Minor)	$100.00			1 + 0
☐	Printing & Publishing Wastewater (Minor) Flow < 40 gpd	$500.00 $100.00			1 + 0
☐	Stormwater Associated with Commercial Activities	$500.00			1 + 0
☐	Stormwater Associated with Industrial Activities	$500.00			1 + 0
	Stormwater & Dewatering Wastewaters-Construction Activities				
☐	5 – 10 acres	$625.00			1 + 0
☐	> 10 acres	$1250.00			
☐	Stormwater from Small Municipal Separate Storm Sewer Systems (MS4)	$250.00			1 + 0
☐	Swimming Pool Wastewater - Public Pools and Contractors	$500.00			1 + 0
☐	Tumbling or Cleaning of Parts Wastewater (Minor)	$1000.00			1 + 1
	Vehicle Maintenance Wastewater				
☐	Registration Only	$500.00			1 + 0
☐	Approval of Registration by DEP	$1000.00			
☐	Water Treatment Wastewater	$625.00			1 + 0
☐	Emergency/Temporary Authorization - Discharge to POTW	$1500.00			1 + 0
☐	Emergency/Temporary Authorization - Discharge to Surface Water	$1500.00			1 + 0
☐	Emergency/Temporary Authorization - Discharge to Groundwater	$1500.00			1 + 0
☐	Other, (please specify):				
	Note: Carry subtotals over to Part III, page 2 of this form.	Subtotal ➡	1	$500	

★★ **Contact the specific permit program for this information (Contact numbers are provided in the instructions).**

Part IV: General Permit Registrations and Requests for Other Authorizations (continued)

✓ General Permits and Other Authorizations	Initial Fees	No. of Permits Applied For	Total Initial Fee	Original + Required Copies
AQUIFER PROTECTION PROGRAM				
☐ Registration for Regulated Activities	$625.00			1 + 0
☐ Permit Application to Add a Regulated Activity	$1250.00			1 + 0
☐ Exemption Application from Registration	$1250.00			1 + 0
INLAND WATER RESOURCES				
☐ Dam Safety Repair and Alteration	$1000.00			1 + 2
☐ Diversion of Water for Consumptive Use: Reauthorization Categories	$1000.00			1 + 2
☐ Diversion of Water for Consumptive Use: Authorization Required	$2500.00			1 + 5
☐ Diversion of Water for Consumptive Use: Filing Only	$1500.00			1 + 4
☐ Habitat Conservation	$1000.00			1 + 2
☐ Lake, Pond and Basin Dredging	$1000.00			1 + 2
☐ Minor Grading	$1000.00			1 + 2
☐ Minor Structures	$1000.00			1 + 2
☐ Utilities and Drainage	$1000.00			1 + 2
☐ Emergency/Temporary Authorization	★★			★★
☐ Other, (please specify):				
OFFICE OF LONG ISLAND SOUND PROGRAMS				
☐ 4/40 Docks	$700.00			1 + 1
☐ Beach Grading	$100.00			1 + 1
☐ Coastal Remedial Activities Required by Order	$700.00			1 + 1
☐ Marina and Mooring Field Reconfiguration	$700.00			1 + 1
☐ Non-harbor Moorings	$100.00			1 + 1
☐ Osprey Platforms and Perch Poles	none			1 + 1
☐ Pump-out Facilities (no fee for Clean Vessel Act grant recipients)	$100.00			1 + 1
☐ Removal of Derelict Structures	$100.00			1 + 1
☐ Residential Flood Hazard Mitigation	$100.00			1 + 1
☐ Swim Floats	$100.00			1 + 1
☐ Emergency/Temporary Authorization	★★			★★
☐ Other, (please specify):				
Note: Carry subtotals over to Part III, page 2 of this form.	Subtotal	0		

★ See fee schedule on registration/application. ★★ Contact the specific permit program for this information.

Part IV: General Permit Registrations and Requests for Other Authorizations (continued)

✓	General Permits and Other Authorizations	Initial Fees	No. of Permits Applied For	Total Initial Fee	Original + Required Copies
	WASTE MANAGEMENT				
☐	Addition of Grass Clippings at Registered Leaf Composting Facilities	$500.00			1 + 0
☐	Asbestos Disposal Authorization	$300.00			1 + 0
	Certain Recycling Facilities				
☐	Drop-site Recycling Facility	$200.00			1 + 0
☐	Limited Processing Recycling Facility	$500.00			1 + 0
☐	Recyclables Transfer Facility	$500.00			1 + 0
☐	Single Item Recycling Facility	$500.00			1 + 0
	Contaminated Soil and/or Staging Management (Staging/Transfer)				
☐	Registration Only	$250.00			1 + 0
☐	Approval of Registration by DEP	$1500.00			1 + 0
☐	Connecticut Solid Waste Demonstration Project	$1000.00			1 + 0
☐	Disassembling Used Electronics	$400.00			1 + 0
☐	Leaf Composting Facility	none			1 + 1
☐	Municipal Transfer Station	$800.00			1 + 1
☐	One Day Collection of Certain Wastes and Household Hazardous Waste	$1000.00			1 + 0
☐	Special Waste Authorization	$660.00			1 + 0
☐	Storage and Distribution of Two (2) Inch Nominal Tire Chip Aggregate	$500.00			1 + 0
☐	Storage and Processing of Asphalt Roofing Shingle Waste and/or Storage and Distribution of Ground Asphalt Aggregate	★			1 + 0
☐	Storage and Processing of Scrap Tires for Beneficial Use	$1000.00			1 + 0
☐	Emergency/Temporary Authorization	★★			★★
☐	Other, (please specify):				
	REMEDIATION				
☐	In Situ Groundwater Remediation: Enhance Aerobic Biodegradation	★			1 + 2
	Note: Carry subtotals over to Part III, page 2 of this form. Subtotal ➡		0		

★See fee schedule on registration/application. ★★Contact the specific permit program for this information.

In conformance with the ADA, individuals with disabilities who need information in an alternative format to allow them to benefit and/or participate in the agency's programs and services, should call 860-424-3051 or 860-418-5937, or e-mail Marcia Z. Bonitto, ADA Coordinator at Marcia.Bonitto@ct.gov.

General Permit Registration Form for the Discharge of Groundwater Remediation Wastewater to a Sanitary Sewer

Please complete this form in accordance with the general permit (DEP-WD-GP-007) in order to ensure the proper handling of your registration. Print or type unless otherwise noted. You must submit the *Permit Application Transmittal Form* (DEP-APP-001) and the registration fee along with this form.

DEP USE ONLY
Application No. __________
Permit No. __________
Facility I.D. __________

Part I: Registration Type

This registration is for (check one):	
☒ A *new* general permit registration *and*	1. Existing permit or authorization number:
☐ A *transfer of ownership*	
☐ A *replacement* of an individual State or NPDES permit, or an authorization	2. Facility ID number (fka DEP/WPC number):
☐ A *renewal* of an existing registration	
☐ A *modification* of an existing registration	3. Expiration Date:

Part II: Fee Information

The registration fee of $500.00 for any person and $250.00 for any municipality, shall be submitted with a completed registration form. The registration will not be processed without the initial fee. The fee is non-refundable and shall be paid by check or money order to: Department of Environmental Protection.

Part II: Registrant Information

1. **Name of applicant/registrant(s)** as indicated on the *Permit Application Transmittal Form* (DEP-APP-001):

Applicant/Registrant/Operator: TerraTherm, Inc.

Mailing Address: 10 Stevens Road

City/Town: Fitchburg State: MA Zip Code: 01420

Business Phone: 978-343-0300 ext. Fax:

Contact Person: Robin Swift Title: Project Manager

Email address: rswift@terratherm.com

☐ Check here if there are co-registrants. If so, label and attach additional sheet(s) to this sheet and include the name, address, phone and contact of each co-registrant

Part II: Registrant Information (continued)

3. List primary contact for departmental correspondence and inquiries (if other than registrant).

Name: same as above

Mailing Address:

City/Town: State: Zip Code:

Business Phone: ext. Fax:

Contact Person: Title:

Email address:

2. List facility or site owner. de maximis inc. on behalf of the SRSNE PRP Group

Name: Bruce Thompson, Project Coordinator

Mailing Address: 200 Day Hill Road, Suite 200

City/Town: Windsor State: CT Zip Code: 06095

Business Phone: 860-298-0431 ext. Fax: 860-298-0431

Contact Person: Bruce Thompson Title: Project Coordinator

Email address: brucet@demaximis.com

3. List attorney or other representative, if applicable.

Firm Name: None

Mailing Address:

City/Town: State: Zip Code:

Business Phone: ext. Fax:

Contact Person: Title:

Email address:

4. List any other engineer(s) or consultant(s) employed or retained to assist in preparing the registration or in designing, constructing or operating the groundwater remediation wastewater activity.

Firm Name: Aquair Environmental Consultants, LLC

Mailing Address: 59 Rainbow Road

City/Town: East Granby State: CT Zip Code: 06026

Business Phone: 860-653-1709 ext. Fax: 860-653-1710

Contact Person: Bill Williams Title:

Email address: aecwaw@aol.com

Service Provided: Review and PE Certification

☐ Check here if additional sheets are necessary, and label and attach them to this sheet.

Part III: Site Information

1. FACILITY NAME AND LOCATION

Name of facility : Solvents Recovery Services New England Superfund Site

Street Address or Location Description: 90 Lazy Lane

City/Town: Southington State: CT Zip Code: 06489

2. COASTAL AREA: Is the activity which is the subject of this registration located within the coastal boundary as delineated on DEP approved coastal boundary maps? ☐ Yes ☒ No

If yes, and this registration is for a new authorization, you must submit a *Coastal Consistency Review Form* (DEP-APP-004) with your application as Attachment C.

Information on the coastal boundary is available at the local town hall or on the "Coastal Boundary Map" available at DEP Maps and Publications (860-424-3555).

3. ENDANGERED OR THREATENED SPECIES: Is the project site located within an area identified as a habitat for endangered, threatened or special concern species as identified on the "State and Federal Listed Species and Natural Communities Map"? ☒ Yes ☐ No Date of Map: December 2009

If yes, complete and submit a *Connecticut Natural Diversity Data Base* (CT NDDB) *Review Request Form* (DEP-APP-007) to the address specified on the form. **Please note NDDB review generally takes 4 to 6 weeks and may require additional documentation from the registrant. DEP strongly recommends that registrants complete this process before submitting the subject registration.**

When submitting this registration form, include copies of any correspondence to and from the NDDB, including copies of the completed *CT NDDB Review Request Form*, as "Attachment D."

For more information visit the DEP website at www.ct.gov/dep/endangeredspecies (Review/Data Requests) or call the NDDB at 860-424-3011.

4. **AQUIFER PROTECTION AREAS:** Is the site located within a town required to establish Aquifer Protection Areas, as defined in section 22a-354a through 354bb of the General Statutes (CGS)?

☒ Yes ☐ No

If yes, is the site within an area identified on a Level A or Level B map? ☐ Yes ☒ No

To view the applicable list of towns and maps visit the DEP website at www.ct.gov/dep/aquiferprotection
To speak with someone about the Aquifer Protection Areas, call 860-424-3020.

Part IV: Activity Information

1. Maximum Daily Flow of the withdrawal and discharge in gallons per day: 53,000

2. Number of hours per day of the withdrawal and discharge 24

3. Estimated duration of the withdrawal and discharge activity. Provide an estimated beginning and ending date.

   Beginning Date: ~August 2011 Ending Date: ~February 2012

Part IV: Activity Information

4. A detailed description of the type of contamination being remediated and the likely source of such contamination.

   Spent solvents including chlorinated solvents, ketones,alcohols and aromatic compounds from a former spent solvent recovery operation.

5. A detailed description of the activity generating the withdrawal and the discharge.

   Thermal conductive heating followed by vapor treatment through thermal oxidizers followed by scrubbers. Neutralization of the scrubber consists of a packed tower and recirculating sump. A caustic is added to the recirculation loop to maintain pH. The sump is discharged at a rate that maintains neutralization. Groundwater and liquid streams generated during vapor treatment are treated through an air stripper and granular activated carbon.

6. Groundwater classification of the site GAA - degraded

7. Name and location of POTW 12 Maxwell Noble Drive, Plantsville, CT

8. A detailed description of the type of treatment system installed to treat the discharge.

   Liquids generated in the vapor treatment process will be sent to an oil/water separator. The liquids will go through an air stripper and finally granular activated carbon prior to discharge. Neutralized scrubber blowdown is discharged directly to the sanitary sewer without additional treatment.

9. A brief description of the BMP's to be implemented by the permittee to minimize the adverse environmental affects of activities covered under this general permit.

   Systems will be in place to handle solids removal, should any be generated during operations of the treatment system. The site and thermal treatment area will follow good housekeeping protocols during construction and operation. Thermal treatment equipment will be inspected daily, at minimum. Chemical storage, such as caustic, will be stored in secondary containment. Erosion/sediment control will be done by TerraTherm, if needed.

Part V: Supporting Documents

Please check the box by the attachments being submitted as verification that *all* applicable attachments have been submitted with this registration form. When submitting any supporting documents, please label the documents as indicated in this part (e.g., Attachment A, etc.) and be sure to include the registrant's name as indicated on the *Permit Application Transmittal Form*.

☒	Attachment A:	Plan of the site showing at least the boundaries of the site, the exact location of all existing and proposed recovery, soil venting and drinking water wells on the site, the location of discharges covered under this general permit, the monitoring locations, the treatment systems and the location of wetlands and watercourses as defined by Sections 22a-28 and 22a-38 of the General Statutes.
☒	Attachment B:	An 8 1/2" by 11" copy of a United States Geological Survey (USGS) quadrangle map, with a scale of 1:24,000, showing the exact location of each discharge, specifying the longitude and latitude of the discharge to within the closest 15 seconds, the location of any drinking water wells within a quarter mile of the site. Please include the quadrangle name and number of the USGS map.
☐	Attachment C:	*Coastal Consistency Review Form* (DEP-APP-004), if applicable.
☒	Attachment D:	A copy of the *CT NDDB Review Request Form* (DEP-APP-007) and the NDDB response thereto, if applicable.
☒	Attachment E:	The attached Professional Certification Form, if applicable
☒	Attachment F:	*Screening Form* (DEP-WD-SCREEN-007)
☒	Attachment G:	*Approval for Connection/Transport to a POTW Form* (DEP-WD-APPROVAL-001)

Part VI: Registrant Certification

The registrant *and* the individual(s) responsible for actually preparing the registration must sign this part. A registration will be considered incomplete unless all required signatures are provided. If the registrant is the preparer, please mark N/A in the spaces provided for the preparer.

"I have personally examined and am familiar with the information submitted in this document and all attachments thereto, and I certify that a copy of this registration has been submitted to the applicable POTW Authority and written approval from the receiving POTW has been received. I certify based on reasonable investigation, including my inquiry of those individuals responsible for obtaining the information, the submitted information is true, accurate and complete to the best of my knowledge and belief. I certify that this general permit registration is on complete and accurate forms as prescribed by the commissioner without alteration of their text.

I certify that I have read the *General Permit for the Discharge of Groundwater Remediation Wastewater to the Sanitary Sewer* issued by the Commissioner of the Connecticut Department of Environmental Protection and that the discharge which is the subject of this registration is eligible for authorization under such permit; that if such discharge commenced prior to the issuance of such permit, all applicable requirements of such permit are being met; and that a functioning and effective system is in place to assure that all such requirements are met so long as the discharge which is the subject of this registration continues.

I understand that a false statement made in the submitted information may be punishable as a criminal offense, in accordance with section 22a-6 of the General Statutes, pursuant to section 53a-157b of the General Statutes, and in accordance with any other applicable statute."

Signature of Registrant	Date
John Bierschenk,TerraTherm, Inc.	President
Name of Registrant (print or type)	Title (if applicable)
Signature of Preparer (if different than above)	Date
Robin Swift	Project Manager
Name of Preparer (print or type)	Title (if applicable)

☐ Check here if additional signatures are required. If so, please reproduce this sheet and attach signed copies to this sheet.

Note: Please submit the Permit Application Transmittal Form, Registration Form, Fee, and all Supporting Documents to:

CENTRAL PERMIT PROCESSING UNIT
DEPARTMENT OF ENVIRONMENTAL PROTECTION
79 ELM STREET
HARTFORD, CT 06106-5127

For any discharge of groundwater remediation wastewater to a POTW, a copy of this completed registration shall also be sent to the POTW which receives or will receive the subject discharge.

Attachment E: Professional Certification

The following certification must be signed by a professional engineer (PE) licensed to practice in Connecticut, Licensed Environmental Professional (LEP), or Certified Hazardous Materials Manager (CHMM). For short-term discharges of one month or less, the following certification is not required.

"I certify that in my professional judgment, proper operation and maintenance of any systems installed to treat the discharge(s) which are the subject of this registration will ensure that all effluent limitations and other conditions in the *General Permit for the Discharge of Ground Water Remediation Wastewater to a Sanitary Sewer* are met, or if there is no treatment system for such discharge(s), that the discharge(s) will meet all effluent limitations and conditions of such general permit without treatment. This certification is based in part on my review of the information contained in the screening requirement form completed for this discharge and attached to this registration and if applicable a review of the historic land use of the site, and on any other water analyses associated with this discharge, and on engineering and/or hydrogeologic reports and/or plans and specifications describing (1) the proposed activities and (2) any proposed treatment facilities for the wastewaters to be discharged. I am aware that there are significant penalties for false statements in this certification, including the possibility of fine and imprisonment for knowingly making false statements."

Signature of Qualified Professional as described in paragraph at top of page.	Date
Name of Signatory (print or type)	License Number, if applicable
Professional Title and associated company, if applicable.	Affix professional stamp here, if applicable

General Permit for the Discharge of
Groundwater Remediation Wastewater to a Sanitary Sewer
Screening Form

DEP USE ONLY
Registration No. ______
General Permit No. ______
Facility I.D. ______

Site Name: Solvents Recovery Services of New England

Address: 90 Lazy Lane, Southington, CT

"I certify that I have personally examined and am familiar with the information submitted in this document, and I certify that based on reasonable investigation, including my inquiry of those individuals responsible for obtaining the information, the information is true, accurate and complete to the best of my knowledge and belief. I understand that a false statement made in this information may be punishable as a criminal offense, in accordance with section 22a-6 of the General Statutes, pursuant to section 53a-157 of the General Statutes, and in accordance with any other applicable statute."

Signature - Title Date

Monitoring results shall be recorded below and on the following pages. Refer to Sections 4 and 6 of this general permit for parameters required to be monitored. Parameters not required shall be marked "NA".

Date Sampled: DSN:

Parameter	Result	Limit
Daily Flow		
Chlorinated VOCs		1.0 mg/l
Total VOCs		5.0 mg/l
Oil & Grease - Hydrocarbon Fraction		100 mg/l
MTBE		1.0 mg/l
Total Lead		0.1 mg/l
Arsenic		0.1 mg/l
Barium		5.0 mg/l
Beryllium		2.0 mg/l
Boron		5.0 mg/l
Cadmium		0.1 mg/l
Chromium (total)		1.0 mg/l
Chromium (hexavalent)		0.1 mg/l
Cobalt		2.0 mg/l
Copper		1.0 mg/l
Magnesium		50 mg/l
Mercury		0.005 mg/l
Nickel		1.0 mg/l
Selenium		1.0 mg/l
Silver		0.1 mg/l
Thallium		1.0 mg/l
Tin		2.0 mg/l

Parameter	Result	Limit
Vanadium		1.0 mg/l
Zinc		1.0 mg/l
Total Cyanide		0.6 mg/l
Amenable Cyanide		0.1 mg/l
Phenols (EPA Method 625)		1.0 mg/l
Pthalate Esters (EPA Method 606)		2.0 mg/l
Polynuclear Aromatic Hydrocarbons (PAHs) (EPA Method)		0.5 mg/l
Base Neutral/Acid Extractables (BNAs) (EPA Method 625, Excluding PAHs & Phenols)		1.0 mg/l
Pesticides (EPA Method 608)		
Aldrin		1.5 ug/l
alpha-BHC		1.0 ug/l
beta-BHC		1.0 ug/l
delta-BHC		1.0 ug/l
gamma-BHC (Lindane)		2.0 ug/l
Chlordane (technical)		20 ug/l
4,4' - DDD, plus 4,4' - DDE, plus 4,4' - DDT Combined		0.2 ug/l
Dieldrin		10 ug/l
Endosulfan I		2.0 ug/l
Endosulfan II		2.0 ug/l
Endosulfan Sulfate		2.0 ug/l
Endrin		1.0 ug/l
Endrin aldehyde		1.0 ug/l
Heptachlor		0.6 ug/l
Heptachlor epoxide		0.4 ug/l
Methoxychlor		360 ug/l
Toxaphene		10 ug/l
Chlorinated Herbicides (EPA Method 615)		
2,4 D plus 2,4 DB		700 ug/l
2,4,5 T		10 ug/l
2,4,5 TP (Silvex)		10 ug/l
Dicamba		10 ug/l

PCBs (EPA Method 608)		***Sum of all detected PCBs shall not exceed 1.0 ug/l.***	
Parameter	**Result**	**Parameter**	**Result**
PCB - 1016		*Other PCBs if present:*	
PCB - 1221			
PCB - 1232			
PCB - 1242			
PCB - 1248			
PCB - 1254			
PCB - 1260		**Total PCBs:**	

Submit to: DMR SECTION (*Except for monitoring submitted as part of the General Permit registration process.*)
BUREAU OF MATERIALS MANAGEMENT AND COMPLIANCE ASSURANCE
DEPARTMENT OF ENVIRONMENTAL PROTECTION
79 ELM STREET, HARTFORD, CT 06106-5127

Approval for Connection/Transport to a POTW

Part 1: The registrant must complete and sign Part 1.
Part 2 The form must then be submitted to the Publicly Owned Treatment Works (POTW, or sewage treatment plant) receiving the discharge for approval. Part 2 must be completed and signed by a responsible official of the POTW.
Part 3 Where a local sewer commission acts independently of the POTW (i.e. facilities that receive sewage from more than one town), the registrant ***must also*** have the local sewer commission approve the discharge. In this case, Part 3 must be completed and signed by a responsible official of the local sewer commission.

Part 1: ***The facility listed in this Part is seeking Authority from the Department of Environmental Protection to discharge wastewater to the sanitary sewer, or for such discharge to be transported to the POTW.***

Facility Name: Solvents Recovery Services of New England

Site Address: 90 Lazy Lane

City/Town: Southington

Facility is requesting approval to (check one):

☒ Connect to the Sanitary Sewer ☐ Truck Transport to the POTW

Discharge volume will not exceed 53,000 gallons per day.

Type of Discharge: treated groundwater

Signature of Registrant Date

Part 2: ***To be completed by POTW (sewage treatment plant) receiving discharge whether by sewer line or truck transport:***

Name of Receiving POTW:

Address of POTW:

City/Town:

Approved by:

Signature Date:

Name (please print) Title

Part 3--*To be completed by Local Sewer Commission (if separate from POTW) when seeking approval for connection to the sanitary sewer:*

Local Sewer Commission:

Address:

City/Town:

Approved by:

Signature Date:

Name (please print) Title

Comments:

Office of Building Department

Town of Southington, Connecticut

Jim Butler
Building Official
(860)-276-6242
Fax (860)-276-6295

75 Main Street
Southington, CT 06489

TOWN OF SOUTHINGTON, CT

BUILDING PERMIT

Permit #: 34988

Issue Date: 2/28/2014

Type: Electrical Permit

Estimated Cost: $165,000.00

State Fee	$42.90
Electrical	$2,480.00
Total Fee:	**$2,522.90**

Property Location: 90 LAZY LN

Contractor	Stephen B. Claar
Owner	Lazy Lane Corp

Job Description:

Install 150A, 25000 KV service for transformers.

Jim Butler

Jim Butler, Building Official

BUILDING OFFICIAL'S CASH RECEIPT

Town of Southington, Connecticut

34988 **Date: 2/28/2014**

RECEIVED OF Stephen B. Claar

the sum of $2,522.90

Payment Type

90 LAZY LN

Job Address

Estimated Cost	$165,000.00
Electrical	$2,480.00
State Fee	$42.90

Jim Butler

Building Official