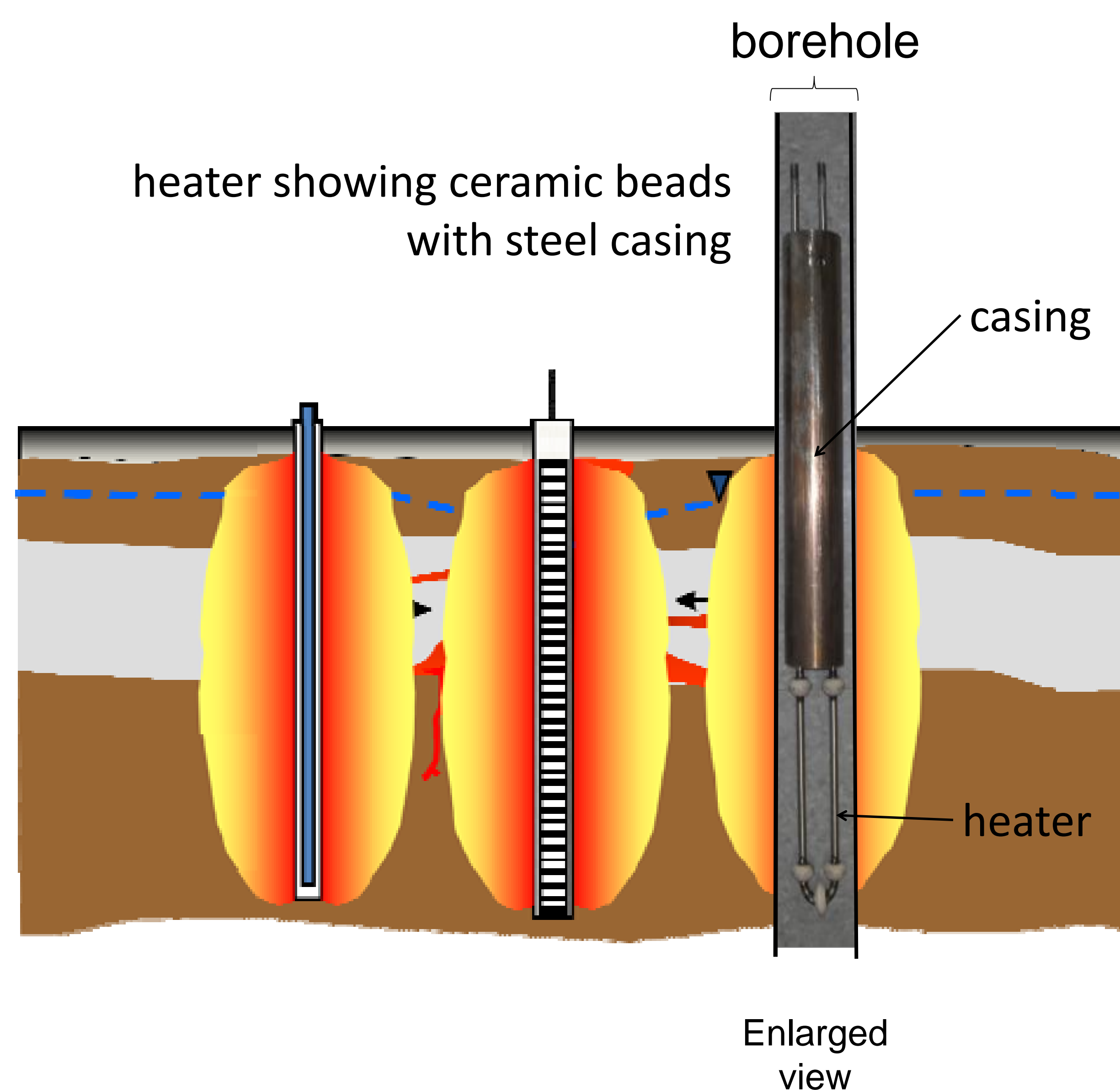


# Solvents Recovery Services of New England (SRSNE) Superfund Site

Robin Swift, John LaChance, Jim Galligan, Larry Conant, Willey Leung, Gorm Heron

## What Is In Situ Thermal Remediation?

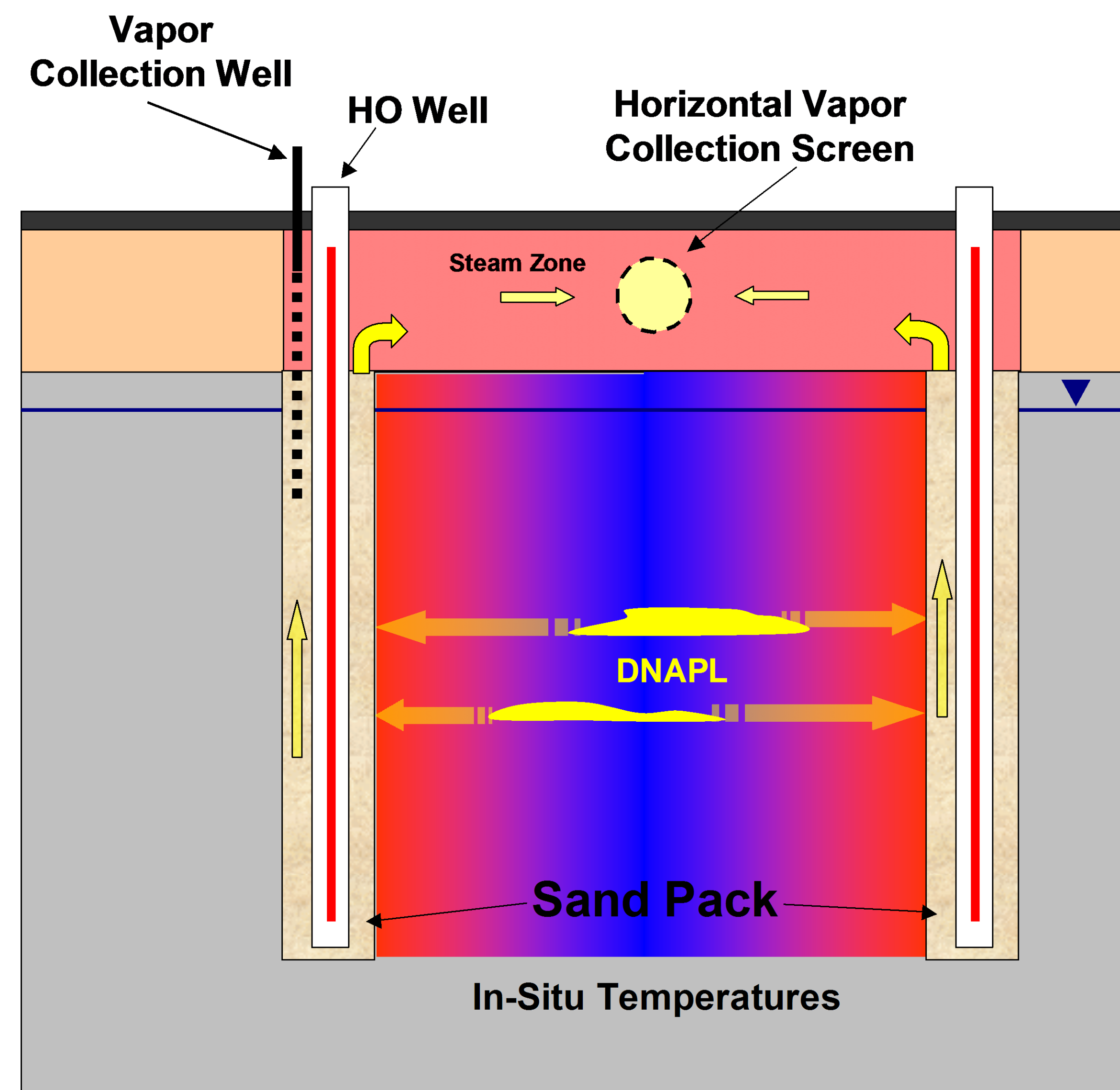
...it's a remediation technique where electric heaters are placed inside steel wells to generate heat, which then heats the soil by thermal conduction. A vacuum is applied to the heated soil to remove vaporized constituents for above ground treatment.



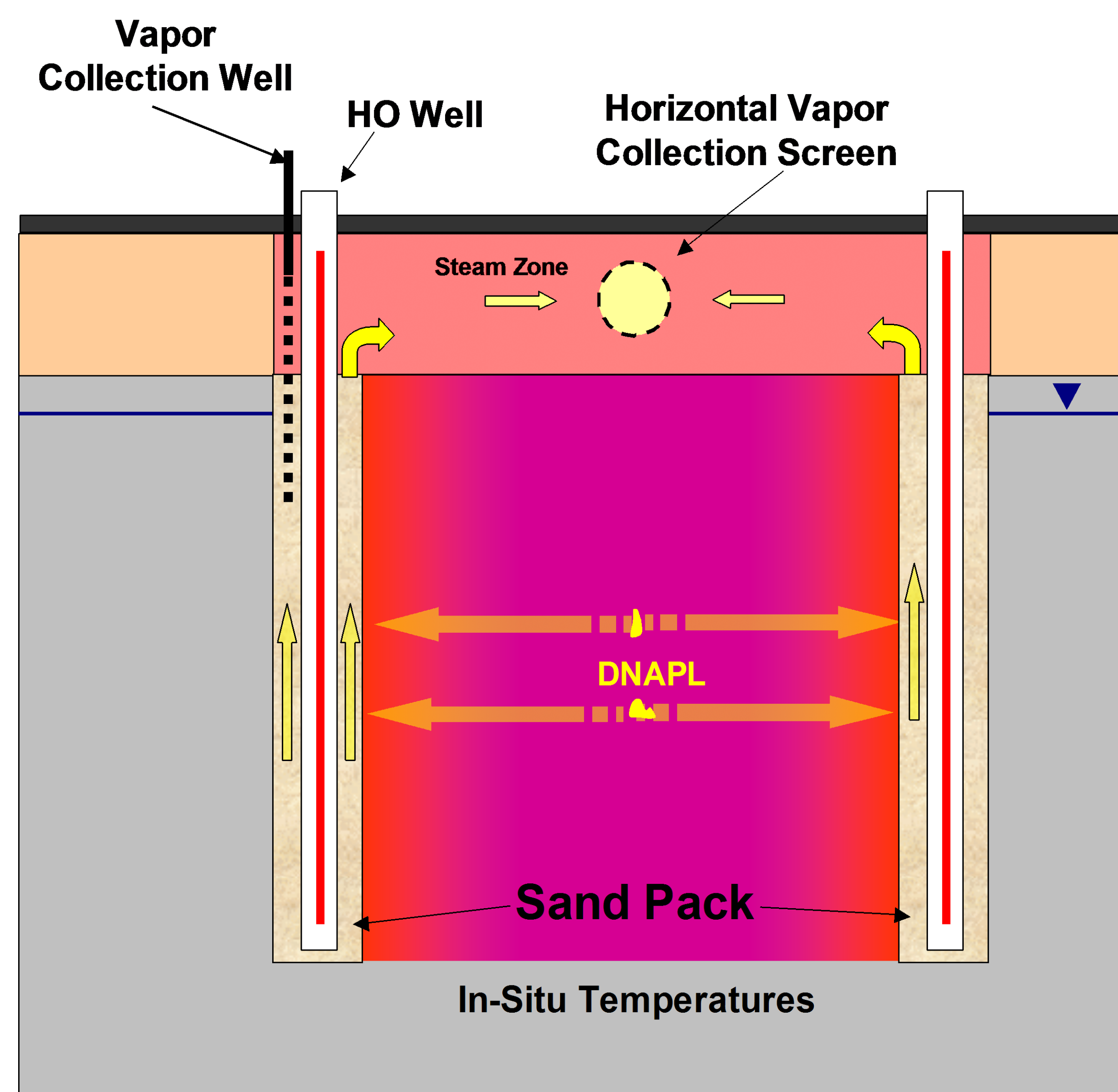
Vertical heaters are used to heat contaminated soil and water to 212 F (boiling) and create a temperature gradient.

The heat/energy moves away from the heaters through thermal conduction.

## How Does it Work?



A vacuum is applied to vapor extraction wells to collect vaporized constituents for aboveground treatment.



As soil temperatures rise, volatile contaminants in soil and water are vaporized.

DNAPL = dense non aqueous phase liquid



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## Other Similar TerraTherm Sites

Brownfield Site in  
Syracuse, NY.  
Former manufacturing  
site contaminated with  
chlorinated  
compounds. Now a  
Lowes home  
improvement center.



Industrial site in TN.  
Ongoing. Chlorinated  
solvents and Dense  
Non Aqueous Phase  
Liquid. Thermal  
treatment area is  
approx. 67,000 cubic  
yards.



2006

2007

2008

2009

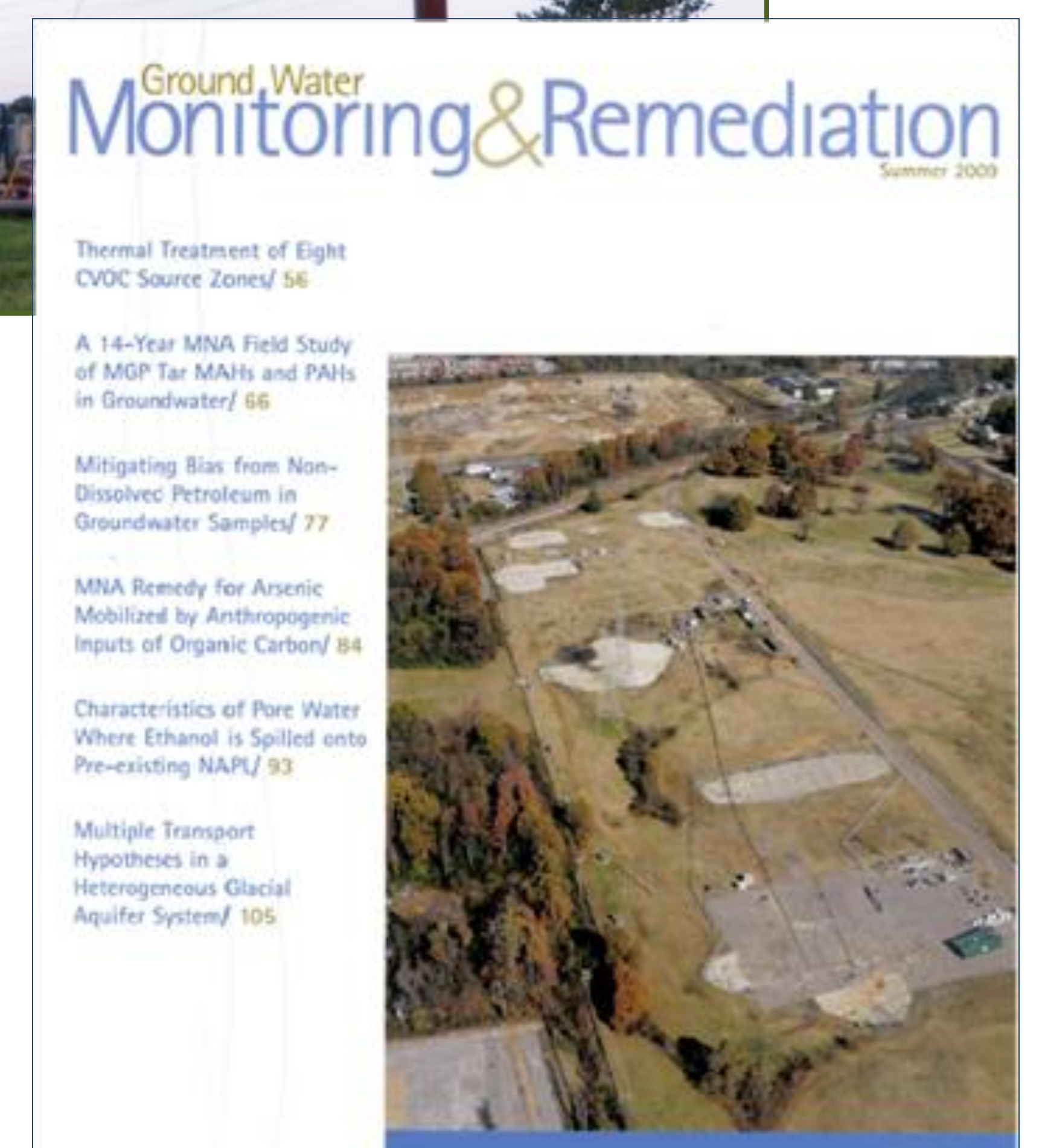
2010



Taunton, MA. Former drum  
disposal area contaminated with  
chlorobenzenes, benzene,  
toluene, ethylbenzene, xylenes,  
and chlorinated volatile organic  
compounds.



Former military storage facility in Memphis, TN contaminated  
with chlorinated volatile organic compounds. Successful  
removal of 12,500 lbs of mass (over 99.99% of volatile organic  
compounds) . Thermal treatment area was approx. 50,000  
cubic yards. Recipient of the 2009 Secretary of Defense  
Environmental Award.

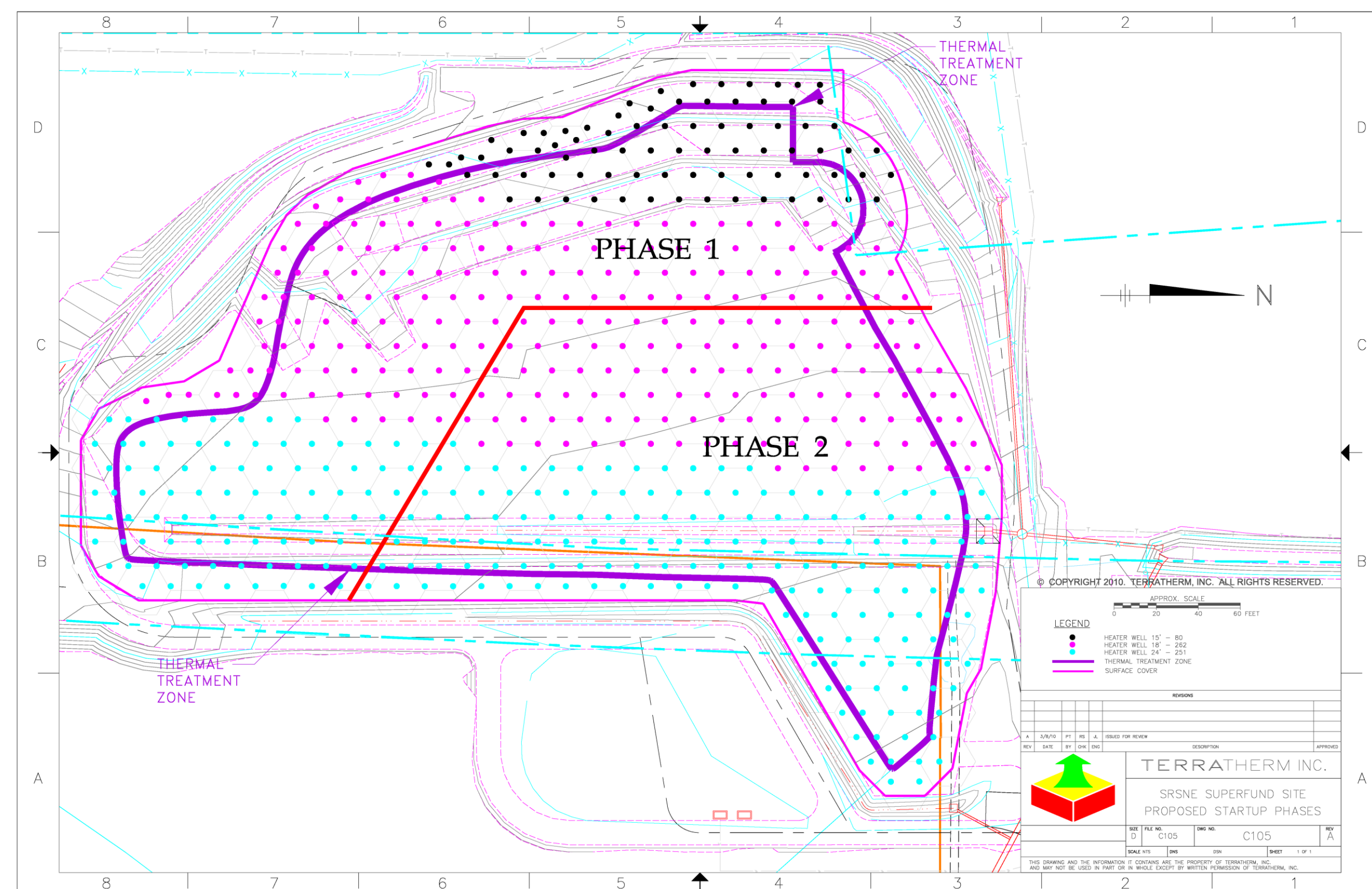




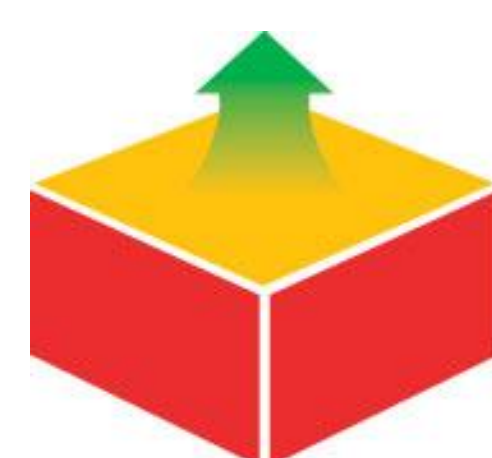
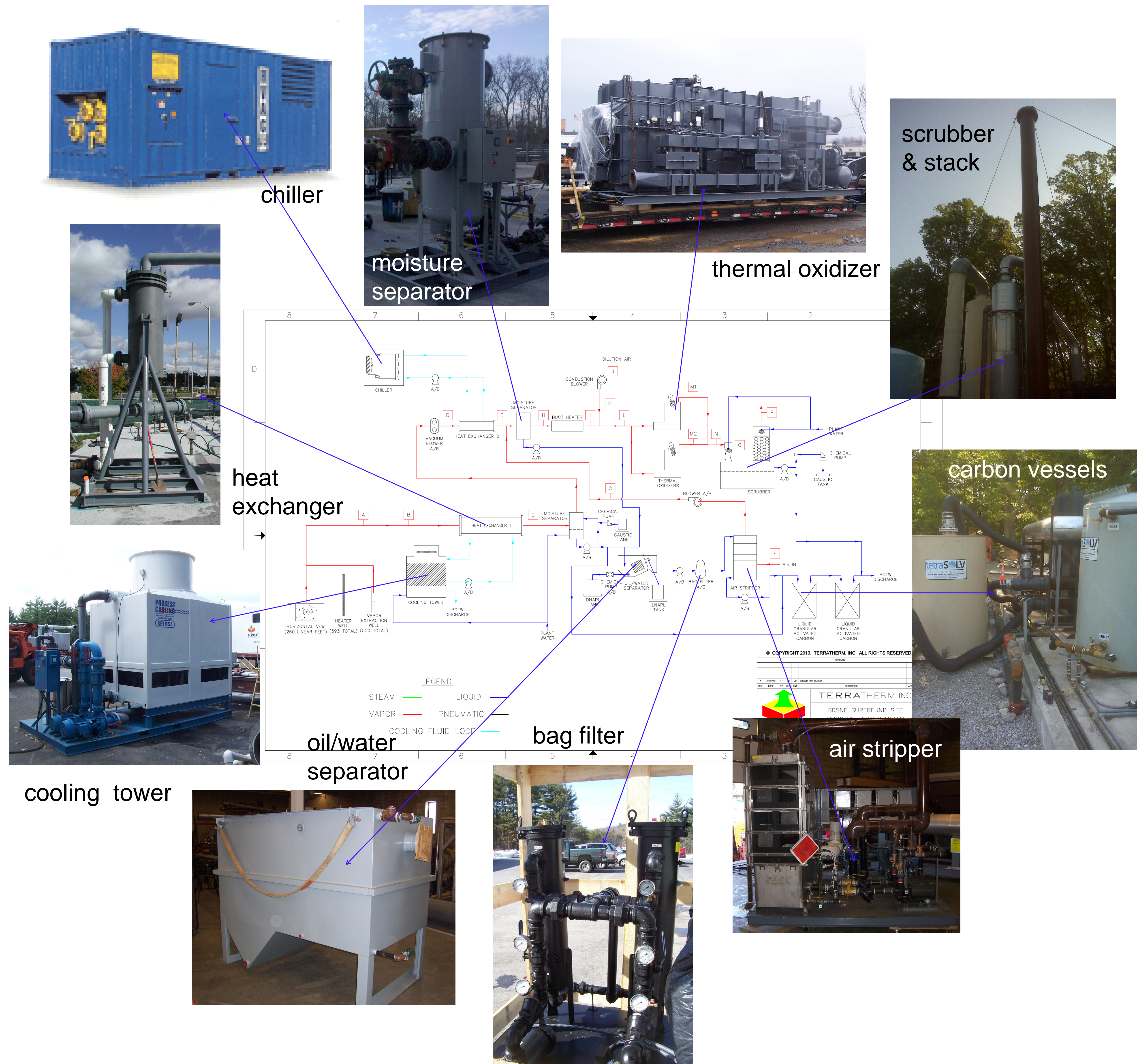
# Solvents Recovery Services of New England (SRSNE) Superfund Site

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## What is planned for SRSNE?



- The thermal treatment area is approximately 47,000 cubic yards
- Treatment depth is 15 ft bgs (west); 18 ft bgs (center); 24 ft bgs (east)
- Operate in two overlapping phases
- Each phase is not expected to exceed 135 days
- Total duration is estimated to be 195 days, but may operate longer at EPA's discretion, provided NAPL continues to be removed
- 593 heater wells; 550 vertical vapor extraction wells; 260 linear feet of horizontal vapor wells; 50 temperature monitor wells; and 25 combined pressure temperature monitor wells
- Target thermal temperature is 212 °F
- Approx. 13.8 million kWh of power
- Vapor flowrate: up to 5,400 scfm



**TERRATHERM**  
Think Thermal

*Equipment not specific to SRS*



# Solvents Recovery Services of New England (SRSNE) Superfund Site

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## Think Thermal...Think Safety

TerraTherm has maintained an active program promoting Health & Safety, with:

- No OSHA recordable incidents, and
- No lost-time accidents in over 355,000 hours worked since 2000.



*Typical personal protective equipment*



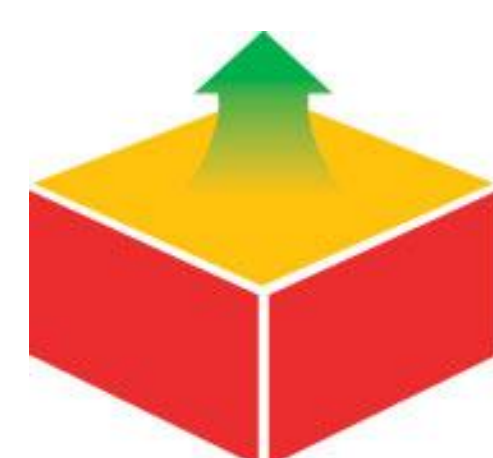
*Typical signage and security fence*

Our systems include the following safety features:

- Electrical equipment is bonded and grounded; touching equipment does not result in electrical shock.
- Heated pipes and surfaces are insulated and protected; touching them does not result in burns.
- Sites are fenced, with caution signs to alert passers-by not to enter. Operators are on-site daily and on-call at night and on weekend (within 30 minute commute); alarms will automatically notify the operator in the event of a condition that requires attention. Operators will mobilize to the site to correct it immediately.
- Redundant back-up systems are provided, including an emergency generator that turns on automatically in the event of a loss of grid power, so that the off-gas treatment equipment can continue to operate continuously.

The system at SRSNE will include the above, plus:

- Ambient air monitoring at the fence line for immediate notification of increased volatile organic compound concentrations. (TerraTherm has not had an exceedance of ambient air monitoring criteria at any of its sites.)
- Monitoring of the air emissions from the off-gas treatment system.
- Monitoring of the process parameters of the ISTR equipment.
- The off-gas treatment system will be subject to the CTDEP air permitting process which includes monitoring and reporting schedules. (TerraTherm has successfully complied with all air permitting requirements at all of its sites.)
- Display of daily monitoring data on a website accessible to regulators and the community.



# TERRATHERM

Think Thermal

## Why the visible vapor plume?

Think boiling tea kettle



The visible vapor plume is condensing water vapor (steam).

The steam is most visible on cool mornings or evenings or during the day in the winter.

