Constant Improvement Makes TRS Group More Sustainable

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Improve or fade away

At TRS Group (TRS) our culture is to seek improvement in everything we do. Each day we want to be a bit better than the previous day. Year to year we want to become more efficient, use less energy, and reduce the cost of our thermal remediation solutions. This push towards efficiency is lowering our treatment costs and making our solutions more sustainable.

Of course, money matters; sustainability does too

We believe as time goes on there will be a greater emphasis on sustainability, which will influence remedy selections. We will see more energy-intensive services and activities leading to resource depletion incur taxes or fees. By focusing on our current environmental impacts (i.e., climate, resources, toxicity) we are preparing ourselves not only for overall improvement, but also for long-term cost-effectiveness. Efforts to reduce environmental impacts will translate into ways to reduce costs.

Thermal remediation has a huge footprint, doesn't it?

We do use a lot of energy and hardware to heat the source zones and to treat the extracted fluids. The question is not whether in situ thermal remediation (ISTR) has a higher impact than doing nothing or doing a little (e.g., MNA, SVE, pump and treat), it is how thermal treatment compares with the alternatives of similar effectiveness (Ding et al 2019). In this regard, thermal stands on its own, with the only other comparable remedy being excavation. This is particularly true for fire-training areas with elevated concentrations of per- and polyfluoroalkyl substances (PFAS), a very recalcitrant set of contaminants.

ISTR is more sustainable than excavation

Thermal compares favorably to excavation because:

- Excavation is avoided, reducing impacts to active facilities.
- Transportation to a treatment facility is avoided.
- Thermal treatment in situ or on site occurs at lower temperature than off-site thermal destruction, uses less energy, and reduces potential exposure and release pathways.

As a result, in-situ treatment of volumes over 2 to 3,000 cubic yards is more sustainable and usually less expensive than excavation (Crownover and Oberle 2020).

Thermal is often more sustainable than SVE

Thermal treatment is intense but efficiently solves the problem in less than a year. Hiester et al. (2003) showed that thermal treatment has a lower environmental impact than SVE, if the latter is expected to operate more than five years to accomplish complete removal of the source, which rarely happens. As a result, thermal treatment is usually more sustainable than SVE over the lifetime of the project.

How we are reducing our environmental footprint

Lemming et al. (2013) analyzed the life-cycle environmental impact of in-situ thermal technologies and identified the major impacts. The activities identified as having the largest impacts include:

- Energy usage
- Use of cement in grout seals and vapor covers
- Use of metals in heaters, electrodes, wells and equipment
- Use of activated charcoal for vapor and water treatment

TRS has active programs to improve our efficiency in each category. Table 1 provides a snapshot of those activities and intended impacts.

Table 1. Focus area for sustainability improvement

	Impact of Use	TRS Focus
Energy usage	Energy depletion Carbon dioxide (CO_2) emissions Curtailment	Minimize treatment volume Treat quickly with less energy Adjustable power input to minimize costs Sample frequently to minimize time Use sustainable energy when possible Minimize gas usage for vapor treatment
Use of cement	Energy used to mine and produce cement Transport	Reduction of borehole size Minimal use of cement for vapor covers Utilize carbon-negative concrete when possible

	Impact of Use	TRS Focus
Use of metals	Toxicity and resource depletion for nickel (Ni) and chromium (Cr)	Minimize stainless steel usage Optimize heaters and electrodes to reduce Ni and Cr usage Reuse of metal elements
Use of activated charcoal	Energy to produce and activate Transport CO_2 emission when disposed or regenerated	On-site regeneration systems Alternate vapor treatment technologies Use of coconut-based granular activated carbon (GAC) Use locally sourced biochar

Additional options for improvement are summarized in Table 2.

Table 2. Future sustainability improvements

	Impact of Use	TRS Focus
Harvest stored energy during cool-down	Provide energy for air conditioning and heating for nearby residents or buildings constructed on site	Thermal conduction heating (TCH) and electrical resistance heating (ERH) heating elements compatible with heat removal – watertight casings
Reuse energy between phases at large sites	Use stored energy in treated volumes to preheat next volumes	Simple water-based energy shuttling from area to area
Solar enhancements of ISTR system	Reduce energy use and provide benefits during energy harvesting and reuse	Determine when solar plants are useful for ISTR and subsequent site use Use solar-driven heat pumps and cooling units
Energy recovered from condensing vapors	Instead of wasting heat in cooling towers or chillers, use the energy to drive heat pumps or to make electricity	Build heat exchange into processes

As a virtual company we have a head start

By having home offices throughout the country, which helps to reduce our travel, TRS uses less fuel and energy than others. Our ongoing optimization efforts are lowering our carbon footprint, reducing costs and saving our clients' money. The additional optimization we do on the sustainable use of energy and material resources will make a similar impact as markets change to focus on sustainability.

References

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