

Constant Improvement Makes TRS more Sustainable

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Improve or fade away

At 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 minimize the cost of our thermal solutions. This push towards efficiency is lowering our treatment costs and making our solutions more sustainable.

Right now it is all about money – that will change

We are convinced that the future economy will place much more emphasis on sustainability, and that metrics other than money will be used to select remedies. Taxes or fees will be increased on energy-intensive services and activities leading to resource depletion. By focusing on our current environmental impacts (climate, resources, toxicity) we are preparing ourselves not only for overall improvement, but for long-term cost-effectiveness. Efforts to reduce impacts on the climate now, will in the near future translate into ways to reduce cost.

Thermal 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 thermal has a higher impact than doing nothing or doing a little (MNA, SVE, pump and treat), it is whether thermal treatment compares well with the alternatives with similar effectiveness (Ding et al 2019). In this regard, thermal stands on its own, with the only other comparable remedy being excavation.

In-situ thermal is more sustainable than excavation?

Thermal compares favorably to excavation because:

- The excavation is avoided – this reduces impacts to active facilities
- Transportation to a treatment facility is avoided.
- Thermal treatment in-situ 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 a few thousand cubic yards will be more sustainable than excavation (Crownover and Oberle 2020).

Sometimes thermal is 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 5 years to accomplish complete removal of the source. This comparison is even less favorable for SVE in most sites, as it is well known that most SVE system will not remediate a heavily

contaminated source zone quickly – rather it is used to control emissions and reduce mass. As a result, realistic studies conclude that thermal treatment is more sustainable in the long term.

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. Several activities were identified as having the largest impacts:

- 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 all four categories. Table 1 provides a snapshot of our activities and their intended impact.

Table 1. Focus area for sustainability improvement at TRS.

	Impact of use	TRS focus
Energy usage	Energy depletion CO ₂ emissions Curtailement	Minimize treatment volume Treat quickly with less energy Adjustable power input to minimize energy bill 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
Use of metals	Toxicity and resource depletion for nickel and chromium	Minimize 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 GAC

As an ESOP company we have a head start

By having home offices and minimizing our travel, TRS uses less fuel and energy than average already. These optimization efforts are currently lowering our carbon footprint as well as the cost to our clients. The additional optimization we do on sustainable use of energy and material resources will soon make a similar impact as markets change to focus on sustainability.

References

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