Frontier Fertilizer Risk Management Summary Table

Uncertainty to be Managed	Category	Impact	Probability	Risk Response Plan (Avoid, Retain, Mitigate, Transfer)
Thermal treatment zone does not include all high concentration soil and groundwater.	Source treatment target volume			
Minimal soil data between 30-100' bgs.	Source treatment target volume			
Uncertainty associated with existing soil sampling results because of soil sampling technique.	Source treatment target volume			
Would a combined technology approach for treating deeper source contamination be more cost effective?	Source treatment target volume			
What heating regime, i.e. temperature and duration, will achieve objective most effectively? What is the cost time tradeoff between just targeting 100 vs targeting a lower temperature and relying on hydrolysis?	In-Situ thermal treatment mechanisms			
What criteria would be used to gauge in-situ transformation progress including heating and process shutdown?	In-Situ thermal treatment mechanisms			
What contingenciy(ies) are necessary in the event low temperature mechanisms fail to achieve RAOs, i.e. can capacity to add heat to cause phase change and treat resulting emissions be added if implementation of low temperature is not effective?	In-Situ thermal treatment mechanisms			
Treatment zone COC mass underestimated or over estimated.	Design consideration			
Premature thermal treatment shut down, i.e. rebound.	Design consideration			
Design or construction error, e.g. temperature goal not achieved with original design.	Design consideration			
Potential for uneven heating of the treatment area, e.g. ability to heat in higher yield zones (60-90 ft bgs).	Design consideration			
Treatment rate is faster or slower than predicted, e.g. [COC] heterogeneity.	Design consideration			
Heating impact on GW extraction system components and other public or private subsurface utilities.	Design consideration			
Availability/proximity of power drops.	Design consideration			
What are the expected influent gas concentration of COCs and what are the required emission goals? What are the options for off gas treatment	Design consideration			
Effectiveness of the off-gas treatment process selected.	Health and Safety			
System failure, e.g. component malfunction.	Health and Safety			
Impact if power disruption occurs.	Health and Safety			
COC treatment byproducts not fully characterized.	Health and Safety			
Air detection limits unable to achieve sensitivity for worker protection levels (DBCP).	Health and Safety			
Effects of close proximity to residences (nuisance).	Health and Safety			
What will be the primary by-products and end-products during heating and what are the acceptable ambient air concentration to protect workers and the public.	Health and Safety			
What by-products and end –products need to be characterized and monitored during treatment.	Health and Safety			
Vandalism or unauthorized system modification.	Health and Safety			
Funding not available to cover cost to achieve RAO.	Cost Risk			
Cost for procuring energy significantly increases.	Cost Risk			
Community perception of unacceptable threat for treatment process.	Community			
Community does not accept air treatment technology recommended.	Community			