

# Black Tank Remedy Framework Agreement

- Remediation Timeframe = 20 years
- Current calculated timeframes are ~14 years with bioventing and would be ~30 years for the Low RTF area
- Area requiring some form of "treatment" is where there is a gauged LNAPL thickness of > 1 foot
- WSDOT will develop plan to provide access to high RTF area by shifting alignment west which would expose at least 75% of the high RTF area even after full build-out of NSC.
- Remediation will begin with optimized bioventing/biosparging with Steam Enhanced Extraction (SEE) as the contingent remedy
- Remediation would proceed as follows:
  - Initial testing for bioventing ROI with an existing well
  - Confirming the ROI and other design parameters, we would initially install a bioventing/biosparging system (similar to that depicted on the figures we provided) – shared infrastructure that could accommodate steam where needed
  - After installation of system, we would operate for a period of time (~1-2 years) and then perform respirometry testing to determine degradation rates and need for optimization
    - Initial optimization activities could include additional bioventing or sparging wells, and adjusting air flow rates
    - If degradation rates were acceptable, no optimization activities would be added until such time that the remediation time frame was at substantive risk
    - If degradation rates and optimization of installation were not acceptable per above (i.e. in 5 or 10 years), we would begin installing additional shared infrastructure in the accessible high RTF area
    - This shared infrastructure would include additional well installations and spacing in the accessible high RTF area that could accommodate bioventing and/or sparging and the wells would be constructed of materials that could also be used in the future for Steam Enhanced Extraction (SEE) if needed.
    - Degradation rates would be evaluated in similar fashion to above and compared to the remediation time frame
  - Concurrently to above, we would advance contingent remedy design and other enhancements from conceptual to design level (This will include a steam propagation study in an area of low risk within 1 to 2 yrs concurrent with bioventing)
  - If the contingent remedy would need to be deployed in order to meet the remedial time frame, steam would be deployed in accessible areas (at least 70-75% of high RTF area or larger) for a period of time up to 3 years
    - This would include the installation of additional wells in the high RTF area for steam (that could also be transitioned to bioventing at a later date) as well as extraction wells
    - If highway installation needed to proceed in an area that had steam, wells along the margins of the highway would be converted to bioventing or sparging wells and wells within the footprint of the highway would be properly decommissioned.

## Other Components of deal between the 3 parties:

- Performance of bioventing/biosparging system will be monitored and performance metrics will be:
  - Degradation rates per above in line with achieving remedial timeframe
  - Monitoring viscosity increases over time
  - Monitoring potential to migrate into a well over time
- BNSF has general agreement with WS DOT on buying access to the site (cost capped) to mitigate risks associated with NSC encumbering property and obtains indemnification from BNSF for claims or liability from site contamination from any WS DOE action and is exclusive of property, engineering and other considerations
  - Portion of costs will be placed into escrow and will be returned to WS DOT if not needed to mitigate risks
- BNSF permanent easement transaction to be completed by October 2018
- BNSF provides WSDOT unencumbered construction access by January 2019
- DOE remediation schedule will not encumber or impact construction of NSC (WSDOT to review schedule) or require BNSF to remove and/or reinstall remediation infrastructure.
- If SEE system mobilizes contaminants with potential to migrate off site, SEE is discontinued; transition to optimized bioventing/biosparging system if SEE system is terminated due to contaminant migration
- A SEE design and evaluation team from WS DOE and BNSF/Husky will develop performance and other criteria for implementation of a pre-design study and/or pilot scale system as a proof of concept and design considerations for a full scale system
  - If pilot system operation determines system requires steam injection density of <60 feet, full scale system will be determined to be technically infeasible
  - If pilot system determines mass removal rate or effectiveness is less than bioventing/biosparging – full scale system will be deemed technically infeasible
  - Full scale SEE System should operate until asymptotic removal levels are achieved or until remediation timeframe is back on schedule (estimated to be no more than 3 years)

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