



Practical Remediation Closure Solutions for Remote Sites in Northern British Columbia

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Completing assessment and remediation work in remote northern British Columbia sites has a variety of constraints including accessibility, equipment availability, short assessment seasons, and landfill distances. Regulators and industry are actively looking for solutions to reduce landfill volumes, and use practical and sustainable methods to achieve site closure.

This presentation will focus on progressing an area encompassing 69 single oil and gas well sites in northern BC, towards regulatory closure. While the goal of Preliminary Site Investigations are to assess areas of concern and contaminants, additional goals were implemented including proactively delineating onsite and analyzing for parameters that would aid with guideline modification, thus reducing the need for numerous supplemental assessments. A total of 55 sites failed when compared to the BC Contaminated Sites Regulation Standards. If remedial excavation and landfilling were to occur at these sites, an estimated soil volume of 31,500 m³ would have made its way to landfill.

Sites were thoroughly reviewed and following strategies were implemented to reduce impact volumes:

1. Analyze site specific details to modify numerical soil standards or remove non-viable pathways;
2. Use controls and regional background levels to justify naturally elevated parameters;
3. Utilize additional sample analyses collected during the initial investigations to aid in guideline modification;
4. Review regional infiltration rates and install groundwater wells to update the groundwater protection model;
5. Recharacterize exceedance anomalies;
6. Complete in-situ or ex-situ treatment of residual organic contaminants;
7. Incorporate subsurface impacts into reclamation plans to determine risk and if removal is required;
8. Landfill contaminated soil that did not meet the standards, nor was able to be treated or justified; and
9. Engage in consultation and feedback from the regulator on various closure strategies.

A total of 34 sites remained that required remediation following re-analyzation, hydrogeological assessment, and guideline adjustment, reducing the estimated impact soil volume to 19,500 m³. Additional strategies were utilized onsite including excavation, bioremediation and

re-characterization. This further reduced the impacted soil volume and only approximately 11,500 m³ of soil went to the landfill. Overall, the reduction of soil to landfill was approximately 20,061 m³ or 64% from the original estimated volume.

Working with the regulator and implementing the strategies described above, over 90% of the sites were able to meet BC regulatory requirements and were reclaimed within 2 years. The remaining sites are still in progress.

Lucas Hewitt

Mr. Hewitt has over 14 years of environmental consulting experience in the oil and gas industry, specifically with Phase I, II, and III Environmental Site Assessments (ESAs), Site Specific Liability Assessments (SSLAs), Remediation and Reclamation projects. Mr. Hewitt has worked in regulatory jurisdictions across western Canada with focus in British Columbia and Alberta. In addition, Mr. Hewitt has worked on client driven Area Based Closure programs since 2013.

Nicole Prince

Ms. Prince is a Professional Engineer with over 13 years of experience within the environmental industry, specializing in contaminated site assessments and remediation. Ms. Prince has additional experience with Phase 1 and 2 ESAs, hazardous building material assessments, site specific liability assessments (SSLAs), designing and implementing in-situ and ex-situ remedial applications, , completing risk management plans and assessing potable water treatment systems. Nicole has worked for a variety of sectors in Western and North Canada, including power generating facilities, manufacturing facilities, agricultural areas, automotive repair shops, landfills, oil and gas sites, as well as various residential and commercial areas.