2012 Supplemental Investigation
Eureka High Arctic Weather Station, Nunavut

Executive Summary

SENES Consultants Ltd. (SENES), in association with Franz Environmental Inc. (FRANZ), was retained by Public Works and Government Services Canada (PWGSC) on behalf of Environment Canada (EC) to conduct a supplemental field investigation in support of a Remedial Action Plan (RAP), at the Eureka High Arctic Weather Station ("the site"). The goal of the supplemental investigation was to close the identified data gaps in order to prepare a comprehensive RAP.

The 2012 field program conducted by SENES/FRANZ specifically focused on i) delineating impacts in AEC D (Powerhouse) and the Delta, ii) assessing whether impacts existed in the area west of Station Creek, iii) assessing background metals concentrations for comparison to site levels, iv) identifying a suitable potential borrow source area for any construction associated with remedial activities, v) assessing geotechnical conditions of the slope west of the Powerhouse and vi) assessing the potential risks associated with vapour intrusion into indoor air through sub-slab and indoor air sampling. In order to address these objectives, SENES/FRANZ collected soil, surface water, sediment, infiltration water, indoor air and sub-slab vapour samples.

Results - Delineation of Impacts in AEC D and the Delta

Contamination around AEC D near Building #17 (Plumbing Shack) was not fully delineated in previous field programs, and was found to pose a potentially unacceptable risk to some receptors in a risk assessment previously performed at the site. The 2012 field program included the collection of soil, sediment, indoor air, and sub-slab vapour samples to address data gaps. Analysis of soil samples collected west of the Powerhouse, at the top and bottom of the slope near the drainage pond, provided full delineation of arsenic and PHC-related impacts in the area. Results were similar to previous investigations. Soil samples collected southeast of Building # 17 (Plumbing Shack), the Former Bunkhouse, and the Delta area exhibited concentrations of arsenic and PHC-related impacts above environmental quality guidelines. Delineation of the impacted area was achieved horizontally along the north and west boundaries. To achieve full delineation, additionally sampling east and south of the Carpentry/Plumbing Shop is required; however, based on existing data an estimate of the volume of impacted material can be developed. Elevated concentrations of petroleum hydrocarbon (PHC) related impacts in sediment relative to background conditions were observed in 2009 and 2010 in the area down slope of the Powerhouse. In combination with previous sample results, analytical data from samples collected in 2012 is sufficient to provide a reliable estimate of the volume of impacted sediment in the drainage pond.

Results - Area West of Station Creek

The area west of Station Creek was investigated to confirm that sources of contamination at the site (including the powerhouse and fuel handling area) had not caused impacts off-site.

Two of the four soil samples collected in the area exhibited concentrations of select PAHs above environmental quality guidelines. No exceedances of PHC or metals guidelines were observed. The applicable environmental quality guidelines in this area are very low for PAHs based on the potential that soil impacts may migrate to surface water and impact aquatic life. Given that a complete pathway for the transport of PAHs to surface water via groundwater is not anticipated at the site, SENES/FRANZ does not expect these relatively low exceedances to pose a threat to adjacent freshwater. No further action is recommended to address impacts in this area.

Results - Background Sampling

The previously completed Detailed Quantitative Risk Assessment (DQRA) results indicated that for soil, aluminum, boron and chromium exceeded ecological risk targets; for sediment aluminum, barium and iron exceeded ecological risk targets, and; for surface water, a variety of metals exceeded risk targets, but only in samples collected from an active layer water seep downgradient of the Powerhouse – these are not considered representative of surface water conditions at the site. The DQRA suggested all metals in soil, sediment and surface water are likely reflective of local conditions, as metal "impacts" were widespread but no anthropogenic source was apparent. The purpose of the background sampling program was to collect a sufficient number of samples to obtain a reliable representation of background conditions. By collecting additional samples, a more realistic average and maximum concentration of metals naturally occurring in soil, sediment, and surface water near the site could be calculated. The data collected as part of the background sampling program was required to update the site specific risk assessment and the calculation of site specific target levels.

The background soil sampling program indicated that naturally occurring arsenic concentrations are above environmental quality guidelines in the area around the site and that the metals that were identified in the DQRA to represent potentially unacceptable ecological risks (aluminum, boron and chromium) in soil exhibit the same average and range of concentrations in on-site versus background soils. Chemical analysis of background surface water samples indicated naturally elevated concentrations of aluminum, cadmium, copper, lead, iron, manganese, and zinc in surface water. The background sediment sampling program found arsenic and copper concentrations above environmental quality guidelines and indicated that the metals in on-site sediment that were identified in the DQRA to represent potentially unacceptable ecological risks (aluminum, barium and iron) exhibit a similar average and range of concentrations in on-site versus background soils. A more rigorous statistical comparison of background metals concentrations in soil, sediment and surface water with those observed within the Areas of

Concern is presented under separate cover in the Remedial Action Plan/Risk Management Plan.

Results – Potential Borrow Source Materials

In case excavation of impacted material is part of the RAP, the identification of a suitable potential borrow source was required. Two borrow sources (one identified in 2012 and one identified in a previous geotechnical report) were examined through sampling and chemical analysis in the 2012 field program. A sample for geotechnical analysis was also collected from the borrow source identified in 2012, near the "upper paradise" area. Chemical analyses of both borrow sources found only one compound (arsenic) in one sample above guidelines. This exceedance is likely related to background concentrations.

Results – Indoor Air and Subslab Vapour Sampling

Eight 24-hour air samples, including one duplicate sample, were collected from inside the operation and maintenance buildings at the Eureka HAWS. Five locations had concentrations of PHC F2 above the conservative reference thresholds: the Old Garage, Building #17, the Former Bunkhouse, the New Garage, and the Powerhouse. Some of these locations also exhibited benzene and xylenes above the reference thresholds. Of these, only Building #17 and the New Garage exhibited concentrations more than 2x the reference thresholds. Building #17 (Plumbing Shack) is primarily a storage building, and was observed to be occupied with tires and miscellaneous plumbing parts. The New Garage has a slab on grade concrete floor with a thermosyphon system within the slab; as a result, SENES/FRANZ was not able to install a sub-slab sample. Vehicle maintenance occurs in the New Garage. During sampling in summer 2012, SENES/FRANZ noted several containers of chemicals (coolant, antifreeze, motor oil, varsol, hydraulic oil) that would likely interfere with the sample. Two other samples, one 24-hour and one 20-minute, were collected from the crawlspace beneath the Powerhouse. Both exhibited concentrations of PHCs/BTEX below applicable reference thresholds strongly suggesting the indoor PHC concentrations are from stored products and maintenance activities. The results of the sub-slab vapour sampling from the Old Garage exhibited concentrations of PHC F1 and F2 above reference thresholds.

This executive summary should be read in conjunction with the main report and is subject to the same limitations described in Section 8.0.