

Common Roster Submission Deficiencies as Identified in Recent Quality Reviews

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Questions

- One of my sites I am to roster as a standards professional has chloroform in soil vapour beneath a City road, adjacent to our remedial excavation. I'm not sure why it was tested, but now that it's there and over ACC, I'm not sure how to proceed. There are no other contaminants in the sample. I suspect that the chloroform originates from a leaky City water main – I expect that proving this hypothesis is prohibitively expensive. Any advice?

Questions

- One of my sites has “intermittent” contamination by LEPH that crosses a corner of the property a couple of times a year when the groundwater flow direction changes slightly. The LEPH likely originates from an off-site adjacent property. However, I cannot “prove” that the contamination is from the adjacent property, as they refuse to allow me to drill on their property and prove the source. There is no other way to demonstrate this hypothesis. I recommended that an AIP be issued for this site, and it was issued. However, I don’t know how to recommend a CoC be issued. Any advice?

Questions

- One of my sites has high iron (over 100 mg/L) in groundwater that is discharging into a ditch that eventually makes its way into a larger stream (fish-bearing habitat). Undoubtedly, the iron as Fe^{2+} is toxic. All CSR regulated parameters are okay. Can I ignore the iron and issue a CoC?

MOE Comments

- single land uses - only the predominant land use should apply. Exceptions would include urban park standards along riparian zones or areas covered by roadways, in which case a metes and bounds description must be provided.

MOE Comment

- sediments are not always investigated when site is adjacent to a water course.
- not all APECs (especially offsite) are thoroughly investigated or explained.
- inadequate investigation of fill material
- inadequate explanation of monitoring well construction or placement.

MOE Comments

- entire extent of contamination must be addressed.
- parts of legal parcels should not be considered, except in very rare situations, or in the case of offsite migration.
- metes and bounds descriptions must state who provided the description including name of surveyor or engineering firm and date of drawing.
- AP commonly fails to track the 30 day to 60 day time requirement between preliminary and final determinations.

MOE Comments

- current templates must be used - downloadable from CSAP web site
- site plans need to have boundary of site clearly outlined in dark bold. We work in a black and white world and colour site plans do not show up well. The site plan should be uncluttered with APECs, boreholes, company logos.

Recommended Steps for Roster Review

Step 1

- Site owner representative (SOR) selects consultant team with appropriate qualifications and conducts work

Step 2

- For "peer" review, SOR or the Consultant selects an Approved Professional for "numerical standards" (SAP), and an Approved Professional for "risk assessment" (RAP) if required . For self-review, the Consultant team would serve as the SAP/RAP.

Step 3

- AP conducts a preliminary review, meets with the Consultant to discuss key points, and if practical visits the site. Multiple stages of interaction throughout the investigation and remediation process may facilitate the review process.

Step 4

- AP prepares written preliminary findings of issues for each stage of the review, which are responded to by the Consultant. It is important that each review stage is clearly documented.

Step 5

- AP may seek clarification from MOE for issues that relate to interpretation of regulation, guidance and policies. MOE has committed to providing answers and post these on the FAQ site.

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Step 6

- **FOR RISK ASSESSMENT:** Once the SAP is satisfied that all issues related to site investigation have been resolved, SAP meets with RAP to discuss potential implications of investigation findings on risk assessment. RAP performs the review following STEPS 3 through 7.

Step 7

- SAP/RAP finalize review findings, and include resolution of preliminary findings . The SAP/RAP prepare and submit draft instrument and cover letter using templates; and reviews and signs the summary of site conditions which is prepared by the Consultant. submit to CSAP.

Step 8

- CSAP processes the application (screening for missing parts) and forwards it to MOE unless it is selected for random performance assessments.

Step 9

- MOE accepts the recommendations by SAP/RAP without further review, and issues instrument.

Importance of Preparing Written Review Findings

- AP should prepare findings of review, including additional assessments or interpretations that the AP considers necessary to make the submissions satisfactory for a submission under the Protocol 6 submission process.

Lack of Scope, Clarity and Quality of Reports

- The initial PSI, DSI and Remediation work performed by Consultant did not meet the CSR requirements. Only through substantial additional work requested by AP, could AP make a recommendation for a COC.
- AP was diligent in his review and in preparing recommendations to resolve issues. Where professional opinion was involved, AP provided carefully prepared and well founded rationale, including hand drawn cross-sections and marked up figures, tables and text.
- An alternate approach would have been for the AP to request a re-submission with complete and updated information, for submissions that are inadequate.

Provide Clear Summary of APEC

QR Conclusion: The former and current ownership, site activities and legal descriptions of the site make the Stage I PSI difficult to follow. More effort is required to describe this and to provide better rationale for APEC and PCOC.

Adequate Rationale to Support Conclusions

QR Conclusion: All findings (previous data, significance of stratigraphy, well screen lengths and location, seasonal groundwater, fate and transport including indicators of biodegradation , etc.) must be included in interpretation to build “weight-of-evidence” arguments to support the conclusion. The fact that the samples met the standards was in this case not sufficient to conclude the site was not contaminated.

Missed APECs

- The AP concluded that an AiP (and subsequent COC) could be issued for contamination related to the xxxxx plant. However, all contamination (known or potential) within the site boundaries must be addressed in order to obtain an AiP or COC.

Action: Investigation of other site activities is required to address potential APECs

Missed APECs

- Activities on the property adjacent and west of the former service station, which is included in the COC, appears not to have investigated for the following APECs:
 - Use of fill to construct driveway (where metal contamination was later found and remediated).
 - Use of drums for dispensing of fuel oils and gasoline
 - Potential for a heating oil tank to have been present

Final QR Conclusion: Clarification by the AP indicated that it is unlikely that fuel drums had been present, and if present, that minor spills would have been contained by the pavement which was present across the entire site. AP confirmed that historic heating at the site was electrical.

QR considered the issue resolved, but that this information should have been provided in the original submission.

Missed APEC - Fill

- The Map indicated that the site lies in a topographical low area which connects to a creek. This topographical low area corresponds to upper part of a former creek channel which has been infilled
- Descriptions on borehole logs refer to the presence of fill and included observations of bottles and solvent/hydrocarbon odour; and concrete, asphalt and wood.

QR Conclusion: Further sampling required

Missed PCOC

- Iron and manganese in previously installed wells exceeded the DW standards, apparently because the risk was considered to be low as the standards are for protection against taste and odour.
- New wells were not assessed for iron and manganese.

QR Conclusion: Resampling should be conducted to confirm iron and manganese exceedances. If these exceedances are confirmed, the site would be considered to be contaminated, and a determination cannot be issued.

AP subsequently provided new information supporting the conclusion that DW standards did not apply.

Water Use Standards

- AW standards: AP states that AW standards do not apply. Their rationale is based on distance to nearest creek and estimated flow time. However:
 - Inspection of map indicated that the shortest distance to creek could be less than 1 km.
 - Previous investigation concluded that AW standard applied because surface water drainage ditches existed closer than 1 km, and these ditches discharged to the adjacent creek.
 - Preferential pathways may exist, such as utility trenches.
 - Groundwater flow estimate needed further explanation:
 - No field measurements of K
 - Stratigraphy sand deposits with silt, fine sand and gravel lenses
 - Used hydraulic gradient measured for site instead of between site and creek

AW Water Use Standard

- Previous consultant argued that AW standards did not apply to portions of the site isolated by concrete walls (sides), bedrock (base), and pavement (top).based in the argument that groundwater flow is not possible through these soils.
- AP agreed but did not state why. Wells on site were completed to bedrock but were dry.

Action Requested: Provide a hydrogeological assessment of groundwater flow time addressing both previous (paved), current (partial gravel surfaced), and future (covered?) conditions.

Drinking Water Standard

- One deep well was located potentially downgradient within 1.5 km was in use.
- The AP agreed with Consultant's conclusion that DW standards did not apply as homes were supplied by a municipal source of water and because they concluded the confining layer consisted of till/clay was 15 to 30 m thick and continuous.

QR Conclusion:

- *Better document and pre-approval by the Ministry is required for making arguments of adequate protection offered by the confining layer. If confirmed DW would NOT apply to the confined aquifer, but would apply to the unconfined aquifer and the confining layer.*
- *CSR 12 (5) states that zoning and future use of the site (including use of groundwater) must be considered when establishing the appropriate standards to apply. Information should be requested from the Municipality about future site use (over one lifetime).*

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Interim Procedure – Aquitard Assessment

- consultant's to submit a formal application requesting a determination of applicable water use for a shallow aquifer at a site;
- application subject to general hourly review fees;
- application to be supported on the basis of detailed hydrogeological investigations carried out by a qualified hydrogeologist and presented in a technical report that documents and verifies that requisite hydrogeological conditions (listed below) are satisfied.

Requisite Hydrogeological Conditions

- the semi-confining unit must be a continuous mapable unit identifiable on a regional scale (\gg square kilometre) and continuous across the site and between the site and nearest receptor of groundwater in the regional aquifer;
- the semi-confining unit must be mapped as mainly silt to clay in composition with a maximum K of 10^{-7} m/s and must be absent sand interbeds and unfractured;
- the unit must be mapped at 3 metres minimum in thickness across its regional extent;
- must be confirmed by detailed on-site hydrogeological investigations and off-site geological records, maps and reports;
- the calculated travel time to nearest receptor of groundwater in the regional aquifer considering advective flow along the entire flow path (vertical and horizontal) is greater than 100 years.

Interim Procedure – Aquitard Assessment

- the determination of groundwater use in the shallow aquifer was made independently of the determination of groundwater use in the deep aquifer due to the presence of a significant continuous confining unit separating the shallow and deep aquifers at the site and offsite;
- the groundwater use (and standards) that applied to the deep aquifer was applied to the full thickness of the overlying aquitard/aquiclude and likewise the soil standards protective of this use;
- Only the shallow aquifer was offered relief from the groundwater standard (and matrix soil standard) that applied to the regional aquifer.

Groundwater Plume Assessment

- In 1996, on-site groundwater contamination included NAPL at one location and high concentrations of BTEX, VPH and LEPH at several locations. A borehole located downgradient had slight a hydrocarbon odour at 4.5 m depth (just below the water table) and an OVR of 680 ppm (Gastector).
- In 2006, confirmatory sampling of on-site wells and wells located immediately down and side gradient had LEPH = 350 ug/l and HEPH = 2500 ug/l which met AW standards.
- AP concluded that no off-site contamination existed.

QR Conclusion: Further clarification of plume migration and probability for significant groundwater contamination to have migrated off-site must be provided.

Groundwater Investigation

Physical hydrogeology

- The wells were not surveyed; hence the flow direction cannot be determined with the required accuracy.

Groundwater quality

- Based on the number of APEC with potential groundwater issues, an insufficient number of wells were installed; and that the two downgradient wells may not have been optimally located. Furthermore, the rationale for using 15 ft long screens were not provided.

Groundwater Assessment

- The flow direction and estimated flow time to nearest surface water were not consistent with the observation that the site was located in a former in-filled creek channel which could act as a preferential pathway for groundwater flow.
- Groundwater elevations were not measured during the DSI as it was thought the AW standards did not apply.
- The concentration of PERC was near the AW standard of 970 ug/l in June. In October 2005 only 44 ug/l was measured. Upgradient well was dry (too shallow); however, odour and soil vapour were indicated in soil.

QR Conclusion: Further assessment of groundwater is required to determine whether AW applies, and whether PERC may be present at greater than AW upgradient of the current well.

Delineation of Soil Contamination

- AP provided rationale for why contamination associated with on-site activities was limited to on-site soil, and why similar contamination off-site (which appeared to fit contamination contours) was not related to the site.

QR requested further clarification and better rationale why the two apparently similar contamination were not related , such as a physical boundary (e.g. a fence or building).

QA/QC

- Investigation did not appear to include the required QA/QC data such as field duplicate RPD, field blanks for groundwater, elevated detection limits for some PCOC; and discussion of lab QA/QC results.
- It was unclear whether water samples for metals were field filtered.
- Chain of Custody forms, sampling logs and test pit logs were missing.

Conclusion - The following information was requested including discussion of QA/QC results, and a statement about the reliability of the data in light of the opinion of whether any substances may have exceeded the standards.

Revised Conclusion: The new information is NOT sufficient to support the conclusion that the data quality was adequate. However, given the low concentrations observed (mostly < DL), the lack of appropriate QA/QC is not likely to affect the conclusions of the report. Therefore, no further information is required.

QA/QC

- QA/QC and reliance on data from previous investigations, on which the current report relies, were not discussed. Also percentage of duplicates of the current work is limited, and the RPD for several substances exceeded the targets set.
- Consultant concluded that the data were reliable but did not discuss the implication of high RPDs.
- AP did not provide comments on significance on limited QA/QC information and indication of poor data quality.

RPD Outside Acceptable Range

- An soil RPD of 113% requires some response such as:
 - re-analyses by the lab if possible
 - Inspection of sample
 - Discussion of implication on interpretation of soil contamination
- In light of some samples being close to the standard of 150 ug/g (one had a concentration of 149 ug/g) , the significance of high RPD on soil delineation must be provided.

Soil pH versus Soil Standard

- No guidance is provided on how to apply the pH based standards. The soil pH for the remediation confirmation sampling appears to be at least one full pH unit higher than those obtained by the DSI. This has a significant potential implication, as the standard is pH dependent. For example:
 - 221 u/g at pH of 5.7 EXCEEDANCE
 - 255 ug/g at pH of 7.3 NOT EXCEEDANCE
- On this basis it would seem reasonable to apply the same standard to all results, and not based on pH measurements on individual samples (potential for type II error if using wrong pH).

Vapour Screening of Soil samples

- GasTec was used for screening of soil samples. Readings in percent LEL range required further interpretation and recommendations.

QR Conclusion: The clarification provided by the AP indicate that the vapours are not associated with contamination, but rather with methane. Potential presence of methane must be brought to the attention of the property owners, so that they can take necessary precaution.

Hazardous Waste

- A LEPH concentration of 44,000 mg/kg clearly indicates the potential for the HW standard to have been exceeded (for MOG). This may have led to non-compliance with HWR and TDG in terms of handling, transportation and disposal of contaminated soil.
- Consultant referred to Hazco handling the excavation and disposal., but information on quality of excavated soil and shipping and disposal of soil was not provided.

QR Conclusion: The AP obtained copies of manifests (attached to the letter), confirming that some of the soil was shipped as hazardous waste.

Groundwater Treatment and Re-injection

- Groundwater was remediated by pumping, treating and re-injecting water from a 12 inch diameter well. Re-injection of treated water to the ground is not allowed unless an authorization has been obtained from MOE.

QR Conclusion: The AP confirmed that authorization was not obtained. However, the AP argued that the it is unlikely that the small amount of water involved would not likely had any significant effect on groundwater flow. QR agreed – Documentation error.

Remediation of Off-site Contamination

- Consultant described remediation of the land adjacent to the site to remove metal contamination, and included this land on the COC. No other substances such as hydrocarbons were included in the investigation.
- Given that this adjacent land had activities that included use of petroleum, other APEC and PCOC should have been investigated

Confirmatory Samples

- No confirmatory base of excavation samples. Contaminates soil had been excavated to bedrock.

QR requested: Comment on likelihood that hydrocarbons and metals could have migrated into the underlying bedrock.

Backfill Testing

- Consultant used imported backfill; however, the source was not identified. Although results of testing of backfill quality were provided, no details were presented on sampling method or how representative these samples may be of the soil placed at the site. In addition, the samples were only analyzed for hydrocarbons (which can often be detected visually/olfactory), but not for metals (which is generally not visible).

Larson

