

SOME POINTS TO CONSIDER
DURING EVALUATION OF ANALYTICAL DATA (page 1 of 5)
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A. Needed to determine the usefulness of the data.

- Are the water-table monitoring wells located properly, such as in areas of highest soil contamination?
- What was the drilling method? [Mud rotary is necessary in some cases, but this method increases the chance of introducing contamination.]
- Are the monitoring wells (including compliance wells if any are present and were sampled) properly constructed (sand-packed and grouted if permanent monitoring wells)?
- Are the water-table monitoring wells screened properly?
- Was the water table above the top of the screen of any water-table monitoring well during the sampling event?
- Was the vertical extent monitoring well (if warranted by the results obtained at water-table monitoring wells) installed near and downgradient from the water-table well with the highest contaminant concentrations? Was it screened at an appropriate depth? [It is recommended that the top of the screen be located approximately ten (and no more than twenty) feet below the bottom of the screen in the adjacent water-table monitoring well, unless the lithology dictates a departure from this norm to be more appropriate.]
- Is the vertical extent monitoring well double-cased? [Single-cased wells are acceptable if the lithology is fairly homogeneous, although it is highly recommended to install double-cased wells if significant contamination was detected in the upper zone. Multiple-cased wells are required if they need to be screened below a confining or semi-confining layer.]
- Was there any evidence of well tampering? Was any well unlocked or improperly locked? Was there any evidence of recent soil staining?
- Were soil samples collected at the best locations, such as inside the areas where soil contamination had been identified through visual observations and/or headspace screening? Were the sampling depths listed? Were the samples obtained at appropriate depths, such as in the intervals where the highest soil contamination had been identified during soil screening?
- Were surface water samples collected at the best locations, such as at outfalls or close to the areas where contaminated groundwater may be discharging into surface water? Are the sampling depths listed?

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- Were sediment samples collected at the best locations, such as close to the areas where contaminated groundwater may be discharging into surface water?

B. Needed to evaluate the quality of the sampling and the handling of the samples.

- Does the company conducting the sampling have a Comprehensive Quality Assurance Plan approved by the Department's Quality Assurance Section? Are they approved for all the media and types of constituents to be analyzed?
- Does the information on well depths and depths to groundwater summarized in the field sampling logs agree with the information provided in tables summarizing well construction details and water-level data?
- Was any monitoring well redeveloped or overdeveloped? How many well volumes and/or total gallons were evacuated? Was there enough time between development and sampling? [For development, there is no waiting time if five well volumes or less are withdrawn; a minimum of 24 hours if more than five well volumes are removed. For overdevelopment, a minimum waiting time of 48 hours is required, a minimum of seven days is recommended.]
- Was the correct equipment used to purge the monitoring wells? What was the purging rate? How many well volumes (and total gallons) were evacuated? [Maximum five well volumes; minimum three well volumes if pH, temperature and conductivity stabilize within 5% difference.]
- If pH, conductivity and temperature were measured, were they within reasonable limits?
- Were any of the wells purged dry? How long did it take for the groundwater to recover to the original level? Was the well sampled after one dry purge?
- Was the proper equipment used to sample the monitoring wells (a peristaltic pump for metals, a stainless steel or Teflon® bailer for most other samples)? [Bailers are acceptable to sample for metals, but not recommended because they cause turbidity problems.]
- If metal samples were collected, was low flow purging and low flow sampling conducted to minimize the amount of particulate matter in suspension? Were turbidity measurements obtained?
- Was the proper equipment used to collect soil, surface water and sediment samples?
- Were samples collected for all the required analytical methods?

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- If samples for a complete suite of analytical parameters were obtained at one or two sampling points, were those locations representative?
- Were the samples placed in containers appropriate for each analytical method required?
- If field decontamination was not conducted, was a pre-cleaned Equipment Blank obtained? If field decontamination was conducted, was at least one field-cleaned Equipment Blank obtained?
- Were duplicate samples obtained as required? Were they collected from monitoring wells that provide useful data for comparison? [Clean or nearly clean wells are poor choices.]
- Were the samples preserved with ice, and with Hydrochloric, Nitric or Sulfuric acid when required? Were the correct preservatives used for each type of analysis required?
- Were the samples hand-delivered to the laboratory, or was a common carrier used? [If the latter, it may help explain a gap in transfer of containers.]
- How long did it take the samples to reach the laboratory? If more than two days, is there reasonable assurance that they were kept at or below 4°C during that time?
- Was the Chain of Custody provided by the party (laboratory or consulting company) that provided the sample containers? [If the laboratory provided the containers and the consulting company conducted the sampling, the first transfer episode in the Chain of Custody should correspond to the transfer of sample containers (although required, this information is missing in most cases).]
- Is the Chain of Custody complete? [The most common problems are lack of sampling dates and/or sampling times; and lack of signatures in one or more of the transfer episodes.]
- Was a sample receipt form filled out at the laboratory at the time the samples were received? Was the temperature of each cooler recorded? Were any problems noted?

C. Needed to evaluate the results of the laboratory analyses.

- Does the laboratory have a Comprehensive Quality Assurance Plan approved by the Department's Quality Assurance Section?
- Does the information on the laboratory report (sample identification, sampling dates and times) match the information listed on the Chain of Custody?

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- Were the sample temperatures recorded in the laboratory report? If any exceeded 4°C, is there a possibility that the samples were not given enough time to cool off? [This problem can occur if the samples are collected during the summer, are hand-delivered to the laboratory and analyzed soon after receipt; otherwise, it may be a preservation problem.]
- Is the pH of each sample (<2 or >2) recorded in the laboratory report? [Although important for volatiles, this information is rarely provided.]
- Were the correct analytical methods used for each set of samples?
- Were the appropriate Detection Limits used? [They should not exceed the Department's standards and guidance concentrations.] If a sample was diluted, is there an explanation for the reason that procedure was needed? Was any sample run at different dilutions in order to quantify different constituents? [Although the latter is not required, it is particularly useful when the sample contains some constituents at very high concentrations and one or more at low concentrations.]
- Were problems (such as surrogate recoveries outside acceptable ranges) encountered? If Quality Control requirements were not met for one or more analytes, is any of them significant at this site? [If a Quality Assurance Report was provided, it is often easier to evaluate problems because they are summarized by category.]
- Was there an acceptable correlation (<50% difference) between duplicate samples? Were the results (whether acceptable or not) discussed in the text of the technical report?
- Were the dates the extractions (if applicable) and analyses were conducted listed in the laboratory report? Were the appropriate holding times met?
- Was there any contamination identified in the Equipment Blank or Trip Blank (if included)? Was any of those contaminants identified also in the laboratory blank?

D. Needed to make an overall evaluation of the data set.

- Are the results consistent with the contaminants known to have been stored/dispensed at the site?
- Are the results consistent with the results of the soil assessment and with the determination of groundwater flow?
- Is the site unpaved, which would allow contaminants to infiltrate from the surface?

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- Was there a period of heavy rain before the sampling event?
- Is the site tidally-influenced?
- Is there a vertical hydraulic gradient present?
- If samples were obtained previously at some of the sampling points, is there any significant increase or decrease in relation to previous results? Is this difference consistent across the site, or is it restricted to one (or at the most a few) sampling points? Was there a change in groundwater flow direction or in water levels that could explain the differences? Was there any evidence of a recent release? [If the increase in contamination is very significant or free product is detected for the first time, tank and line tightness tests may have to be requested.]
- Was significant contamination identified at perimeter monitoring wells or at vertical extent monitoring wells?
- Is there a possibility that some or all of the contamination may be derived from an off-site source?

/gjw