

DEQ Industrial Stormwater Permits Guidance on Establishing Natural or Background Conditions

Background:

On August 10, 2006, the Department of Environmental Quality (DEQ) adopted revisions to NPDES Industrial Stormwater General Permits No(s). 1200-COLS, 1200-Z and 1200-A. The 1200-COLS permit became effective on September 1, 2006. The revisions to the 1200-Z and 1200-A permits became effective on July 1, 2007.

Schedule A of the permits requires permit holders to investigate the cause of a benchmark exceedance(s). Permit holders may determine that the exceedance was due to background or natural conditions not associated with their industrial activities at the site. The new permit requires permit holders to submit an Action Plan to DEQ or the local agent that contains a sampling plan and methodology for demonstrating that the elevated pollutant levels are due to background or natural conditions.

Guidance:

The purpose of this document is to provide guidance on determining whether benchmark exceedances are due to site-specific background/natural conditions and to provide suggestions on how to develop an acceptable sampling plan and methodology. It should be noted this is general guidance and not a technical protocol. There is no simple recipe, especially for metals, phosphorus, and bacteria. It is the responsibility of the permit holder to make a valid and defensible case supported by research, investigations, and data when attempting to establish that benchmark exceedances are caused by natural or background conditions.

Please note that some benchmark levels, including Oil and Grease, BOD₅ (5-day biochemical oxygen demand), and TSS (Total Suspended Solids) cannot be assessed with respect to background levels since they are technology based limits established under federal regulations or percentile reductions (85 % for TSS) established by DEQ. For the other benchmarks, many of which are water quality-based, each parameter will need a tailored approach in establishing the background level, described below.

pH:

Many areas of the state receive acid rain from time to time. Sites which continually or intermittently have low pH and cannot find any site-related reason for the exceedance should compare the pH of the stormwater runoff from the site to rainwater. Low background concentrations due to acid rain will vary with most rainfall occurrences. Permit holders must evaluate background concentrations for each sampling event. Permit holders should compare pH levels of rainwater and stormwater runoff. If the stormwater runoff has a lower pH than rainwater, the cause of the benchmark exceedance will not be considered background conditions.

Metals (Copper, Lead, Zinc):

An investigation of metals exceedances and the establishment of natural background levels may require an investigation of the historical use of the site as well as natural soil characteristics. This investigation can be used if the soils on the site are exposed to

stormwater (i.e., stormwater runoff from bare soil areas or from gravel areas where soil has migrated through the gravel). This investigation would be similar to the Phase I and Phase II Environmental Site Audit that is made during the prospective sale of a property and that determines if the elevated metals levels are due to soil contamination from previous site use or due to natural levels in the soil. If the metals levels are the result of soil contamination from current or historical activities at the site then the benchmark exceedance would not be considered the result of background conditions. If it appears that the metals concentrations cannot be attributed to current or historical operations or processes then further investigation into the soil concentration level of the parameter of concern must be made in order to establish a justification for the natural or background conditions. This investigation should consider the following:

1. Site evaluation:
 - Determine potential for current or historical contamination of the site from past practices or operations. If none, proceed to the next bullet:
 - Take a set of soil samples at a range of depths within the top soil layer on the site (up to 3 feet deep) at each of several locations on the site. These samples must be representative of soils. Depth-composited sampling at each sampling point is allowed.
 - Mix the samples with a volume of water 20 times the solids weight and discard settleable solids. Analyze for both total and dissolved metals of interest.
2. Reference site evaluation:
 - This may be from adjacent or nearby properties with the same general soil type and soil profile properties, but should not include any areas that may have been part of a larger operation which included the site to be evaluated in 1 above.
 - Determine potential for current or historical contamination of the reference site from past operations and practices.
 - Take representative soil samples from the reference site at depths similar to the site sample depths and compositing if performed.
 - Mix the samples with a volume of water 20 times the solids weight and discard settleable solids. Analyze for both total and dissolved metals.
3. Compare the site results to the reference site results.
 - If the results from the site and the reference site are similar, and the reference site metals concentration is greater than the benchmark for the parameter of interest, the permit holder has established that the benchmark exceedance is due to background conditions.

Phosphorous:

High phosphorous levels may come from sites that have leaking sanitary sewer systems, failed septic systems, many years of agricultural fertilizer application, populations of wild or domesticated animals, use soaps that contain phosphorus, or naturally high soil levels. Before looking for 'naturally' high sources of phosphorus, first check for leaks or spills from failed systems, or other human sources and take corrective actions to eliminate the phosphorus source. This investigation may include, but is not limited to the following:

- Surface runoff sampling at other locations than the regular sampling locations in order to try to localize the source.
- Visual Inspection of the stormwater discharge point(s) during dry weather. The easiest method to identify non-stormwater discharges is to inspect each discharge point for the presence of flow during dry weather. Keep in mind that drainage from a

storm event can continue for several days and groundwater may infiltrate the underground stormwater collection system. Also, non-stormwater discharges may be intermittent and require periodic inspections to ensure no discharge.

- Investigation of the sanitary or septic systems for leaks. This may include a camera survey of the condition of the drainage piping.
- Investigation of the site building and drainage plans to establish that there were no inadvertently designed illicit connections between the sanitary/septic system and the stormwater discharge drainage system.
- Dye checking the various drainage systems to verify that there were no cross connections to the wrong discharge system during construction. Get approval from DEQ before conducting any dye tests.
- Determine whether or not the phosphorus may be coming from washing activities involving vehicles, equipment, buildings, sidewalks, etc.

If the evaluation concludes that human sources are not responsible for the phosphorus levels then investigate potential natural sources:

- Groundwater source options:
 - If groundwater is influencing the stormwater discharge system, install a sampling well for shallow groundwater to establish a background concentration.
 - Sample the storm drainage system at a delayed time interval after surface water runoff has ceased and before the discharge from the system has stopped in order to test for shallow groundwater contributions to the system.
 - High phosphorous levels may be considered as site contamination rather than as natural background and a deeper well sampling may be needed to establish the natural background level.
- Wild animals: Photographic recording of the presence of wild animals on several different dates associated with and just prior to the regular sampling events. The evaluation must conclude regular or continued impact from wild animals is the source of the high phosphorous levels.

E. Coli:

Elevated levels of E. coli typically occur at sites which have leaking sanitary sewer systems, failed septic systems, cross connections between sanitary and storm sewer conveyance systems, or populations of wild or domesticated animals. E. coli originating from birds, raccoons and other wildlife may be present in large numbers in stormwater runoff. Impervious surfaces and piped stormwater conveyance often greatly reduce the time in which it takes these bacteria to reach a nearby stream. For example, E. coli deposited on a paved surface may be washed into a nearby stream within minutes via a piped stormwater conveyance system. However, in the absence of pavement and piping this runoff may take several days to reach surface waters. E. coli typically die-off in a matter of days so they are much less likely to survive natural overland transport, as evidenced by the low bacteria numbers seen in forested watersheds with abundant wildlife. Impervious surfaces and piped stormwater conveyance systems cause the quick transport of E. coli which may exacerbate impacts to nearby waterways.

First investigate anthropogenic (human sources) of E. coli. The investigation may include, but is not limited to the following:

- Surface runoff sampling at other locations than the regular sampling locations in order to try to localize the source.

- Investigation of the sanitary or septic systems for condition. This may include a video survey of the drainage piping for condition. Hire a contractor who can video photograph the line and identify connections between the sanitary/septic system and the stormwater conveyance system.
- Investigation of the site building and drainage plans to try to establish that there were no inadvertently designed illicit connections between the sanitary/septic system and the stormwater discharge drainage system. The piping schematic is a map of the site showing pipes and drainage systems used to carry wastewater, washwater, cooling water and sanitary wastewater. A review of the “as-built” piping schematic is a good way to determine if there are any cross connections to the stormwater collection system. In addition, inspect the path of floor drains in older buildings by following saw cuts in the concrete or asphalt. If the cuts lead to storm drain piping a cross connection may be present.
- Cross connections occur when sanitary sewer lines are inadvertently connected to the storm sewer system. A dye check of the various drainage systems to verify that there were no cross connections to the wrong discharge system during construction should be performed. A dye test can be performed by releasing dye into the sanitary and then observing the discharge points of the stormwater and sanitary collection system for discoloration. Please contact your local municipality or service district to report all dye testing activities prior to the dye release. Unreported dye tests can result in unnecessary investigations by regulatory or code staff.
- Smoke testing of wastewater and stormwater collection systems is used to detect connections between the two systems. During dry weather the stormwater collection system is filled with smoke and then traced to sources. For example, the appearance of smoke at the base of a toilet indicates that there may be a cross connection between the sanitary and the stormwater systems.

If the evaluation concludes that human sources are not responsible for the stormwater bacteria levels, then investigate the following:

- Potential natural sources, such as the presence of wild animals and provide the following: photographic recording of the presence of wild animals on several different dates associated with and just prior to the regular sampling events. The evaluation must conclude regular or continued impact from wild animals.
- An evaluation of the hydrologic impact of the site’s stormwater conveyance system. Changes to the system may be necessary in order allow for a more natural E. coli die-off rate before stormwater is discharged to local waterways.