

Groundwater-Surface Water (GSI) Compliance Options

Elaine Pelc
DEQ, Remediation and Redevelopment Division
989-705-3441/ Pelce@michigan.gov

Groundwater-Surface Water Interface Pathway Compliance Options – March 2018

- A technical reference to assist anyone conducting investigations and addressing the GSI pathway to demonstrate compliance and support risk management decisions.

What is the Groundwater Surface Water Interface?

- The location at which groundwater vents to surface water.
- Contaminated groundwater may pose a threat to surface water resources.
- If GSI is relevant pathway, statutory requirement to evaluate and manage contaminant plumes.

Relevancy

- GSI pathway relevant when:
 - Hazardous substances in groundwater enter “Waters of the State”.
 - Conceptual site models can be used to demonstrate GSI relevancy.

“Waters of the State”

- DEQ Water Resources Division determines what are waters of the state.
- Waters of the state can include
 - intermittent and ephemeral streams, creeks, brooks, ditches, drains, ponds, and wetlands.
- The GSI pathway is not applicable to water bodies not deemed waters of the state.
- Must be designated a “Water of the state” AND have a hydraulic connection with groundwater for the GSI pathway to be relevant and regulated.

Water Quality Standards

- Standards for hazardous substances are established pursuant to Part 31 Michigan’s Water Resources Protection Act. (Rule 57 Values Section)
- The standards are developed to protect public health and welfare and protect the states natural resources.
- Are used to evaluate the GSI Pathway for Part 201 and Part 213 sites of contamination.

Water Quality Standards and Current Part 201 Criteria

- While the Rule 57 values can be updated periodically when new information becomes available, the Part 201 criteria is promulgated into the Part 201 rules and cannot be changed without going through the promulgation process.

Municipal Separate Storm Sewers (MS4)

- MS4’s are NOT WWTP’s or Combined Sewers ONLY for Storm Water.
- MS4’s are cities with certain population thresholds and from certain urban areas that are regulated with a NPDES permit.
- All of MDOT’s storm sewers are considered MS4’s.
- The discharge of ANY groundwater contamination into an MS4 is considered an illicit discharge according to the Clean Water Act even if it may be entering the MS4 at or below GSI Criteria.
- Options to address illicit discharges to an MS4 include:
 - Line the sewer
 - Lower the water table
 - Move the sewer
 - Obtain a NPDES Discharge Permit
 - Treat the Groundwater

- Develop a plan with the municipality to eliminate the discharge

MS4's Aside

- Contaminated groundwater vents into a storm sewer (not an MS4) that discharges to a surface water.
- Complying with the GSI Pathway in storm sewers:
 - The point of compliance is at the outfall prior to reaching the surface water.
 - MW's can be installed adjacent to the sewer.
 - Request Mixing Zone Based Criteria for the receiving water body.
 - Demonstrate natural attenuation in the sewer prior to the outfall.
 - Monitor the contaminant plume where it enters the sewer, downstream from where it enters but upstream of the outfall or at the outfall prior to discharge.

GSI Compliance Options

- Approaches for Demonstrating GSI Compliance:
 - Direct Measurement of Contamination in Venting Groundwater.
 - Indirect Methods that use the Line of Evidence Approach to demonstrate that venting groundwater does not require remediation.

Achieve GSI Criteria

- *Completing response actions* that achieve GSI Criteria in groundwater monitoring wells or alternate monitoring points prior to discharging to surface water is still an option under the law!

Alternate Monitoring Points (AMPs)

- Collecting groundwater samples from the Hyporheic Zone or Transition Zone with Alternate Monitoring Points to demonstrate GSI Compliance
 - The primary function of the Hyporheic Zone include habitat for several species, spawning habitat, nutrient circulation, biogeochemical processes and riparian exchange.
- Remember - Indigenous aquatic life is a protected designated use for all Waters of the State!
- Samples collected from AMPs can be compared to criteria, mixing zone-based criteria in combination with upland vertical wells.
- AMP's are expected to be designed to allow for the collection of samples representative of venting groundwater at the GSI and representative of the higher concentrations of the contaminants venting to surface water.
- Hydraulic head conditions, geochemical parameters such as DO, temperature and conductivity are necessary to document that the water being sampled is venting groundwater in the hyporheic zone.

Request Mixing Zone Based GSI Criteria

- If compliance with generic GSI criteria cannot be achieved, Mixing Zone Based GSI Criteria can be requested.
- MZ Based Criterion are developed by WRD of the DEQ and considers:
 - The surface water body where the discharge is occurring.
 - Location, Nature and Chemical Characteristics of past and current sources.
 - Concentrations of contaminants in the groundwater at the GSI & upgradient.
 - The discharge rate in cubic feet per second of the groundwater that exceeds criteria.
 - If the venting groundwater is a new or increased discharge to the waters of the State or an existing loading.
 - MZ Based criteria can be requested early in the remedy evaluation of Part 201 & 213 sites to develop targeted goals and response actions to address groundwater contamination.
- The Procedure for requesting MZ Based Criteria is an attachment in the **GSI Resource Materials Document**.

Variance

- If the conditions that have created the GSI exceedance cannot be remedied without creating more environmental damage and it can be demonstrated that criteria are not achievable a variance can be granted.
- Considerations for a Variance include:

- Must conform to the anti-degradation requirements.
- Characterize any increased risk to Human Health & Environment associated with the variance.
- Public Notice is required of the preliminary decision & all other Great Lake States are notified.
- Variances are re-issued every five years and it is expected that progress toward attaining water quality standards would be demonstrated.

Ecological Assessments (EA)

- The GSI statutory provisions allow for the use of EAs to evaluate and determine compliance with the pathway using scientific valid methods.
- EAs are used to understand why & how organisms behave, survive and reproduce.
- EAs are most effective when information on trends over space & time provide the necessary background for an appropriate assessment.
- **Important!** An EA should only be conducted when the GSI criterion are based on aquatic life or wildlife value and **DOES NOT exceed human health values.**
- EA's are based upon site specific physical, chemical and ecological data and will by their very nature be very complex, involved and costly!
- Reach out early to Remediation and Redevelopment District Office staff if considering an EA to demonstrate compliance with the GSI pathway.
- Aquatic Biologists from WRD will need to be involved in the process.

De Minimus

- The statute allows for a demonstration of "De Minimus Effect" on surface water in determining if a response action is necessary to address the pathway.
- This term is not defined in statute or rules but is a concept that refers to some discharges that may be so small or of such short duration as to have no or little effect on the surface water.
- If a De Minimus determination is requested, the DEQ will rely on the CSM for the facility to determine:
 - mass flow of contaminants
 - maximum concentrations at the GSI
 - expected duration of the discharge
 - former source area contaminant contribution, if any
- Important Reminders for De Minimus:
 - The existing condition of an already degraded water body does not serve as a line-of-evidence for determining whether a contribution is de minimus.
 - Bioaccumulative Chemicals of Concern does not equal de minimus (Mercury Exception).
 - Final Acute Values Exceedances does not equal de minius.

Other Compliance Options

- Other Compliance Options for the GSI Pathway that are in the Resource Materials Document include:
 - Modeling
 - Technical Impracticability Waivers – Published Guidance by EPA
 - Natural Attenuation
 - Use Attainability Analysis for Wetlands Only – Requires EPA & MDEQ Approval

Resources for You

- First Line of Contact:
 - RRD District Office Staff involved with your 201 or 213 facility. Lansing Staff in Superfund or RCRA Program.
- GSI Technical Assistance & Program Support Team
 - Representative from each RRD District Office and Lansing staff (Superfund, WRD, Waste Management and Radiological Protection (WMRPD).
 - Review GSI Issues and offer compliance options for facilities at the request of District staff.
 - Provides recommendations to District Staff.
 - Outside parties and consultants are welcome to attend and present facility information.

