TRRP PLUME MANAGEMENT ZONES

Overview

Under the Texas Risk Reduction Program (TRRP; 30 TAC 350), a person conducting a corrective action for a Class 2 or Class 3 groundwater resource may choose to establish a Plume Management Zone (PMZ) to facilitate use of cost-effective groundwater remediation approaches. The PMZ is a defined area and depth interval within which institutional controls are applied to prevent potential human contact with affected groundwater, thereby allowing for application of less stringent groundwater cleanup objectives. Specifically, within the PMZ, exposure protection is provided by a deed notice or restrictive covenant that specifies the appropriate use restrictions; therefore, the affected Class 2 or Class 3 groundwater is no longer assumed to be subject to human consumption or incidental contact. Following implementation of a PMZ, groundwater response actions are based upon containment of affected groundwater and management of potential groundwater-to-air exposures ***inside*** the PMZ and protection of groundwater resources ***outside*** the PMZ. PMZs are not allowed for Class 1 groundwater resources.

For many sites, containment remedies applied within a PMZ can serve to achieve health and ecological protection goals at significantly less cost than conventional groundwater removal, treatment, or containment actions conducted without a PMZ. Key features of the PMZ planning, application, and implementation process for your site are summarized below.

Benefits of PMZ for Corrective Action Site

Approval of a PMZ provides the following key benefits with regard to a soil or groundwater corrective action program:

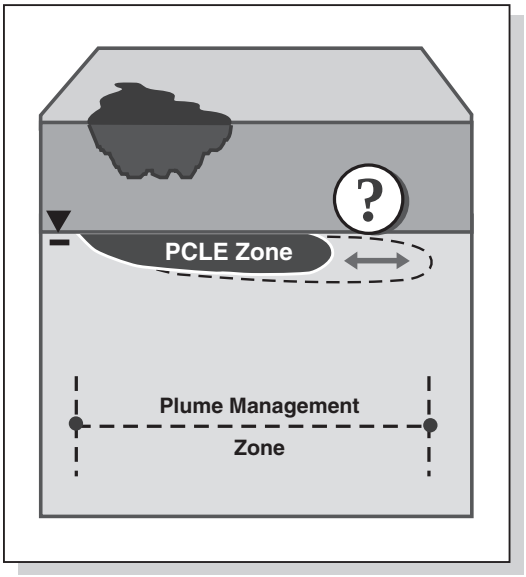
- **Reduced Groundwater Remediation:** Protective Concentration Levels (PCLs) for Class 2 groundwater ($^{GW}GW_{Ing}$) and Class 3 groundwater ($^{GW}GW_{Class3}$) do not apply within a PMZ. Rather, groundwater must only meet concentration limits ($^{Air}GW_{InhV}$) protective of vapor exposures on overlying properties and Attenuation Action Levels (AALs) protective of applicable groundwater PCLs at locations outside of the PMZ.
- **Shorter Duration of Monitored Natural Attenuation Program:** Natural attenuation monitoring within the PMZ may be curtailed when the affected groundwater plume is shown to be stable within the PMZ boundaries and may be terminated when the plume is shown to be shrinking with no threat of future impact on downgradient locations. Without a PMZ, groundwater monitoring must continue until plume concentrations are less than applicable PCLs at all locations.
- **Reduced Soil Remediation:** Within the PMZ, the soil PCL for the soil-to-groundwater leaching pathway ($^{GW}Soil_{Ing}$ or $^{GW}Soil_{Class3}$) is based upon the current maximum plume concentration or the AAL (whichever is less) rather than the Class 2 or 3 groundwater PCL, resulting in less stringent soil remediation requirements.
- **Reduced NAPL Remediation:** Within the PMZ, removal of non-aqueous phase liquids (NAPLs) is required "to the extent practicable," as defined based on risk-based performance criteria rather than physical limitations alone (see further discussion below).

Allowable Dimensions of PMZ

The person conducting the corrective action may choose to establish a PMZ over a portion of the groundwater PCL exceedance zone (PCLE zone), the entire groundwater PCLE zone, or an area extending beyond the groundwater PCLE zone, subject to the following limitations:

- **Maximum PMZ Length in Class 2 Groundwater Unit:** Within a Class 2 groundwater unit, the PMZ may extend beyond the residential PCLE zone (as determined at the time of the Response Action Plan submittal) by a maximum distance equal to the lesser of: **i)** 500 feet beyond the residential PCLE zone, **ii)** 25% increase in length of the residential PCLE zone, **iii)** a 2-year groundwater travel time upgradient of the first property line that is not subject to an institutional control allowing for the PMZ, or iv) a point of groundwater discharge to surface water. If the PCLE is already within a 2-year groundwater travel distance of a property line not subject to an institutional control, then the PMZ corresponds to the existing residential PCLE zone boundary. The PMZ can extend off-site onto a property that does not currently contain affected groundwater only if i) the off-site property owner approves of the institutional control and ii) it is shown that the off-site groundwater has no reasonably anticipated beneficial use (see 30 TAC 350.37(l)(3)).
- **Maximum PMZ Length in Class 3 Groundwater Unit:** Within a Class 3 groundwater unit, the PMZ may extend beyond the residential PCLE zone (as determined at the time of the Response Action Plan submittal) by a maximum distance equal to the lesser of: i) a 2-year groundwater travel time upgradient of the first property line that is not subject to an institutional control allowing for the PMZ or ii) a point of groundwater discharge to surface water.
- **Minimum PMZ Length:** The PMZ may be any size less than or equal to the maximum allowed length. If desired, a PMZ may be established to cover only a portion of the residential PCLE zone. For example, the PMZ may cover only the on-site portion of the plume or only the plume source area, leaving the rest of the plume to be remediated to PCLs.

FIGURE 1. Maximum Size of Plume Management Zone



Class 2 GW

PMZ is minimum of:

- ***500 ft*** **beyond current residential PCLE zone.**
- ***25 %*** **more than the current residential PCLE zone.**
- ***2-yr GW travel distance*** **from nearest unaffected downgradient off-site property (or edge of PCLE zone if within 2-yr GW travel of boundary).**
- **Distance to surface water POE.**

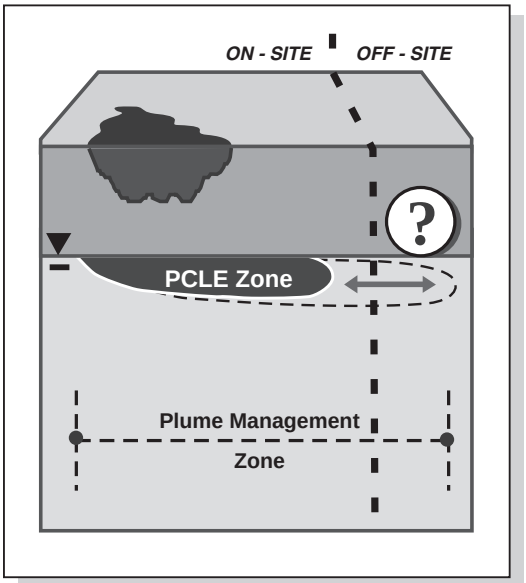
Class 3 GW

PMZ is minimum of:

- ***2-yr GW travel distance*** **from nearest downgradient property without institutional control.**
- **Distance to surface water POE.**

PCLE = PCL Exceedance Zone; POE = Point of Exposure

FIGURE 2. PMZs on Off-Site Property



Can PMZ Extend Onto Unaffected Off-Site Property?

Class 2 GW

Yes If . . .

- ***Institutional Control*** **Landowner consents to institutional control per 30 TAC 350.111** ***and***
- ***No Beneficial Use*** **No reasonably anticipated future beneficial use for GW (e.g., based on availability of superior water supply, no historical use, etc.)**

Class 3 GW

Yes If . . .

- ***Institutional Control*** **Landowner consents to institutional control per 30 TAC 350.111.**

- **Multiple Plumes in One PMZ:** Multiple on-site PMZs may be consolidated into a single PMZ if they have commingled or are within reasonable proximity (i.e., 500 feet) such that management as a single PMZ is feasible and appropriate.

PMZ Application Requirements

To establish a PMZ, you must submit a Response Action Plan (RAP) per TRRP requirements demonstrating satisfactory compliance with the following key application criteria:

1) No potential adverse effects on groundwater resources outside the PMZ (see 30 TAC 350.33(f)(4)(A)).

2) No potential adverse effects on hydraulically interconnected surface water resources (see 350.33(f)(4)(B)).

3) Proof of ability to establish appropriate institutional control providing notice of the PMZ and preventing exposure to affected groundwater within the PMZ. (Note: The actual institutional control is filed only following approval of the RAP, and proof of the filing must be provided to the TCEQ within 120 days following RAP approval.)

4) Following implementation of the proposed response action, there is no potential for affected groundwater to migrate beyond the PMZ so as to cause PCL exceedance downgradient of the PMZ.

5) No artificial penetrations are present providing a conduit for vertical migration of affected groundwater in the PMZ so as to cause a PCL exceedance in a deeper groundwater-bearing unit, as verified by field survey.

6) Adequate number and location of attenuation monitoring points will be established to demonstrate compliance with AALs protective of applicable PCLs downgradient of the PMZ (unless physical control used to prevent plume growth beyond the PMZ).

7) NAPLs will be removed from within the PMZ so as to recover readily removable NAPL and prevent the following risk conditions: i) explosive vapor condition, ii) NAPL discharge to ground surface, surface water, structures, or other groundwater-bearing units, iii) expansion of the NAPL plume, and iv) expansion of the dissolved-phase affected groundwater plume so as to exceed PCLs downgradient of the PMZ.

8) The RAP addresses the continuing obligation to implement additional response actions if monitoring shows that plume expansion has or will cause exceedance of PCLs in groundwater downgradient of the PMZ.

To prevent PCL exceedances beyond the PMZ, you may use removal/decontamination methods, physical control measures, or any combination thereof. Monitored Natural Attenuation (MNA) may be used as a decontamination method **i) *inside*** the PMZ, if the plume is not presently expanding beyond the PMZ at levels in excess of the applicable PCLs at the PMZ boundaries, and **ii) *outside*** the PMZ, if MNA will serve to achieve PCLs within a reasonable timeframe for that portion of the PCLE zone. Applicable institutional controls for establishing a PMZ include deed recordation, restrictive covenants, and government ordinances meeting the requirements of 30 TAC 350.31(g).

Practical Considerations for PMZs

In planning and processing your PMZ application, keep in mind the following points:

- **Multiple Groundwater-Bearing Units in One PMZ:** For purpose of efficiency, multiple groundwater-bearing units lying one over the other may be covered by a single PMZ, extending over the full depth of the affected groundwater zones.
- **Development of AAL Values:** As described in the TRRP-33 Guide, AALs, used for monitoring of groundwater conditions inside the PMZ, may be developed based either on monitoring or historical groundwater measurements. Of these two options, direct use of monitoring data represents the simpler and more reliable alternative.
- **PMZ Area:** The TRRP rule specifies the ***maximum*** dimensions of a PMZ, but does not address the ***minimum*** area. If desired, a PMZ can be implemented on the ***on-site*** portion of the affected property, and an active remedy implemented on the ***off-site*** portion, in the event that off-site landowner authorization for the PMZ cannot be obtained.
- **Plume Control in PMZ:** Options for control of plume migration beyond the PMZ include both active and passive remedies. If MNA will not suffice to prevent plume growth, consider use of containment measures, such as trench systems or barrier walls, to control the source area or groundwater pumping to reduce source concentrations.

For More Information

Further instructions for establishing PMZs can be found in the following TRRP rule sections and TRRP guidance documents:

- **TRRP Rule:** See 30 TAC 350.33(f)(4) for PMZ application and implementation requirements and 30 TAC 350.37 (l)-(m) for limitations on PMZ dimensions for Class 2 and 3 groundwater.
- **TRRP-33 Monitored Natural Attenuation Guide:** Describes how to locate Attenuation Monitoring Points (AMPs) and calculate associated AALs for use in a PMZ (issued October 2001).
- **TRRP-32 NAPL Recovery Guide:** Provides criteria for determining when “readily recoverable” NAPL has been sufficiently removed (currently under development).
- **TRRP-16 Institutional Control Guide:** Describes appropriate procedures and language for deed recordation and restrictive covenants for establishing PMZs (issued November 2002).

Also, please feel free to contact us at Groundwater Services, Inc. (GSI), with any questions you may have regarding establishment of a PMZ for your corrective action project. **Visit our website:** **www.gsi-net.com**

GLOSSARY OF ABBREVIATIONS:

AAL	Attenuation Action Level	**PMZ**	Plume Management Zone
MNA	Monitored Natural Attenuation	**RAP**	Response Action Plan
PCL	Protective Concentration Level	**TRRP**	Texas Risk Reduction Program
PCLE	PCL Exceedance		

GSI, Inc. ▼ Hot Topics in Corrective Action

◆ *TRRP Plume Management Zones (PMZs)* ◆

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■ *GSI WILL CONTINUE TO PROVIDE periodic updates regarding important regulatory developments in Texas. Should you have any questions regarding these or other upcoming issues, please feel free to contact us at 713-522-6300.*

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About GSI

Groundwater Services, Inc., (GSI), is an environmental engineering consulting company located in Houston, Texas, which specializes in the management of environmental risk. Since 1986, GSI has been providing industry with innovative solutions to soil, groundwater, surface water, and air pollution problems.