

TRRP-8: GROUNDWATER RESOURCE CLASSIFICATION



Overview

At all corrective action sites subject to the Texas Risk Reduction Program rule (TRRP, 30 TAC 350), the person conducting an Affected Property Assessment must determine the applicable groundwater resource classification for all affected (or potentially affected) groundwater-bearing units (GWBUs). To assist in this effort, the Texas Commission on Environmental Quality (TCEQ) has issued the TRRP-8 Groundwater Classification Guide (March 2003) providing practical guidelines for identification of GBWUs and designation of these GBWUs as Class 1, 2, or 3 groundwater resources. Key features of this classification process are described below.

Groundwater Resource Class Definitions

TRRP defines three classes of groundwater resources based on current use, water quality, and sustainable well yield:

- **Class 1 Primary Resource:** Affected groundwater zone could impact existing public water supply well within 0.5 miles, the GWBU is the only reliable source of groundwater in the area, or the GWBU is capable of producing a 100 gpm groundwater flow from a single 12-inch diameter well with a Total Dissolved Solids (TDS) content less than 3000 mg/L and meeting all Primary Drinking Water Standards.
- **Class 2 Potential Resource:** Affected groundwater zone could impact an existing non-public water supply well within 0.5 miles, or the GWBU is capable of producing greater than a 150 gallon per day groundwater flow from a single 4-inch diameter well with a TDS content less than 10,000 mg/L.
- **Class 3 Non-Potential Resource:** Affected groundwater zone could not impact any existing water supply well within 0.5 miles, and the GWBU is not capable of producing greater than a 150 gallon per day groundwater flow from a single 4-inch diameter well with a TDS content less than 10,000 mg/L.

Detailed classification criteria are shown on Figure 1.

Significance of Groundwater Resource Classification

The groundwater resource classification defines the assessment levels, Protective Concentration Levels (PCLs), and response objectives that will apply to each affected GWBU, as follows:

- **Non-Groundwater-Bearing Units:** Pore water within geologic units that are not GBWUs is not subject to groundwater assessment levels, groundwater PCLs, or groundwater remediation requirements. Rather, non-GBWUs are subject only to soil PCLs and associated soil response objectives, as well as applicable response objectives for non-aqueous phase liquids (NAPLs), if present.
- **Groundwater Assessment Levels:** For the Affected Property Assessment, affected Class 1 and 2 groundwater resources must be delineated to residential assessment levels, corresponding to Tier 1 residential PCLs, for relevant chemicals of concern (COCs). For Class 3 groundwater resources, the applicable Class 3 assessment level is 100x the applicable Class 1 or 2 value for each COC.
- **Groundwater PCLs:** Groundwater PCLs are specified in the TRRP Tier 1 tables issued by TCEQ and do not change under Tier 2 or Tier 3 PCL evaluations, unless a Plume Management Zone (PMZ) is approved or modification of a Risk-Based Exposure Limit (RBEL) is authorized. For Class 1 or 2 groundwater resources, the applicable PCLs correspond to the Tier 1 table values for the groundwater ingestion pathway ($^{GW}GW_{Ing}$). For Class 3 groundwater resources, the applicable PCL ($^{GW}GW_{Class3}$) is 100x the $^{GW}GW_{Ing}$ for each COC.
- **Soil PCLs:** For affected surface soils or subsurface soils, COC concentrations are not to exceed the ^{Soil}GW PCL in order to prevent impacts on an underlying GWBU due to leaching of COCs from the affected soil zone. For affected soils overlying Class 3 groundwater resources, the ^{Soil}GW PCL is based upon the $^{GW}GW_{Class3}$ groundwater PCL and is therefore 100x higher than the ^{Soil}GW PCL applied above Class 1 or 2 groundwater resources.
- **Plume Management Zones for Class 2 and 3 GBWUs:** If approved by TCEQ, a PMZ may be established for affected groundwater zones in GBWUs with either a Class 2 or 3 designation. Within the PMZ, the groundwater ingestion PCLs ($^{GW}GW_{Ing}$) and Class 3 groundwater management PCLs ($^{GW}GW_{Class3}$) do not apply. Rather, applicable response objectives are based upon assuring that these PCLs are not exceeded *outside* the PMZ and that other less stringent PCLs ($^{Air}GW_{Inh-v}$) are not exceeded *inside* the PMZ. In addition, the soil leaching PCL (^{Soil}GW) inside the PMZ is based upon the current maximum groundwater plume concentration or the attenuation action level (AAL), not the $^{GW}GW_{Ing}$ or $^{GW}GW_{Class3}$ PCLs, and is therefore significantly higher than areas outside the PMZ.
- **Class 1 Groundwater Response Objectives:** Class 1 groundwater resources must be remediated to $^{GW}GW_{Ing}$ PCLs in all cases, except for that portion of the affected groundwater zone where such remediation is shown to be technically impracticable. PMZs cannot be applied to Class 1 groundwater resources.

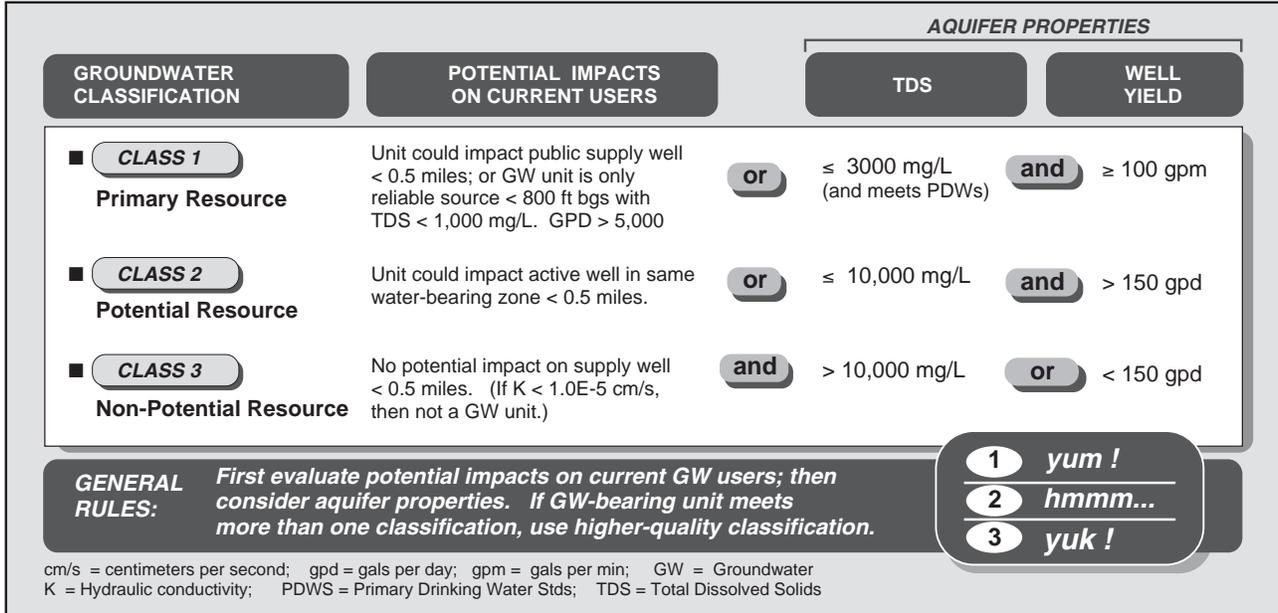


FIGURE 1. Groundwater Resource Classifications

Groundwater Classification Process

The groundwater resource classification is a function of i) the *current* use of the groundwater resource within a 0.5-mile radius around the affected groundwater zone and ii) the *potential* use of the groundwater resource, as determined by its salinity and sustainable well yield. The principal steps for determining the applicable groundwater resource classification for each affected or potentially affected GWBU are outlined below. Not all steps will be required at each site, depending on the nature of groundwater use, water quality, and well yield. (Also, please note that, in lieu of this classification process, you may always choose to assume a Class 1 designation for the groundwater resource, with no need for further evaluation or documentation, except for a survey of existing water well locations.)

- 1) **Identify Affected and Interconnected GBUs:** A GWBU is defined as a saturated geologic formation, group of formations, or part of a formation that has a hydraulic conductivity equal to or greater than 1.0E-5 cm/sec. Identification of GBUs involves: i) characterization of site-specific stratigraphy based on soil borings or other acceptable method, ii) identification of those strata that are water-saturated at any time of the year, and iii) characterization of representative hydraulic conductivity for each stratum based on aquifer pumping tests or the geometric mean value of 3 or more variable-head slug tests conducted on properly constructed wells. Potential hydraulic interconnection between affected and unaffected GBUs must also be identified.
- 2) **Characterize Current Groundwater Use:** For each affected GWBU and hydraulically interconnected GWBU, existing water wells must be identified based on a field reconnaissance within 500 feet and a records search for wells within 0.5 miles of the affected property. As indicated

on Figure 1, potential impacts on the existing wells trump all other considerations. If a plume could impact the production zone of a public water supply well or the affected GWBU is the sole reliable source of groundwater in the area, the GWBU classification is Class 1. If the plume could impact any other type of existing water supply well, the classification is Class 2.

You're Done If: GWBU is determined to be Class 1 based on current use.

- 3) **Evaluate Natural Groundwater Quality:** If the groundwater classification is not determined to be Class 1 based on current use, then further consideration of potential use factors, i.e., water quality and well yield, is needed to determine the applicable classification. To characterize natural water quality, groundwater samples must be collected from one or more background locations and analyzed for TDS content by USEPA Method 160.1. Composite samples and use of conductivity meters are not acceptable; however, if multiple sampling locations are employed, the representative TDS value can be calculated as the arithmetic mean of the measured values.

You're Done If: GWBU determined to be Class 3 based on no current use and TDS > 10,000 mg/L.

- 4) **Estimate Representative Well Yield:** Two options are provided in the TRRP-8 Guide for estimating the sustainable yield of a single well screened within the GWBU being evaluated:

- **Method 1: Idealized Well Function Equation:** Based on measured hydraulic conductivity, saturated thickness, and confining head of GWBU, determine upper bound sustainable well yield based on equations or

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charts provided in TRRP-8 Guide. If the result falls within +/- 20% of classification threshold (e.g., within 120 to 180 gpd), then Method 2 estimation must be used. Variable-head slug tests used to measure hydraulic conductivity (K) must be conducted on a minimum of 3 wells, 3 times each, using methods specified in the TRRP-8 Guide. The representative K corresponds to the geometric mean of the values from multiple locations in the GWBU.

- **Method 2: Direct Well Yield Test:** In all cases, the maximum well yield may be measured directly using

one of three simple test procedures specified in the TRRP-8 Guide. If tests are conducted at multiple locations, the representative well yield corresponds to the geometric mean of the individual test results.

All hydraulic conductivity tests and well yield tests must be conducted on properly constructed and developed wells, with a minimum 2-inch nominal diameter.

You're Done If: GWBU determined to be Class 3 based on no current use and representative well yield < 150 gpd.

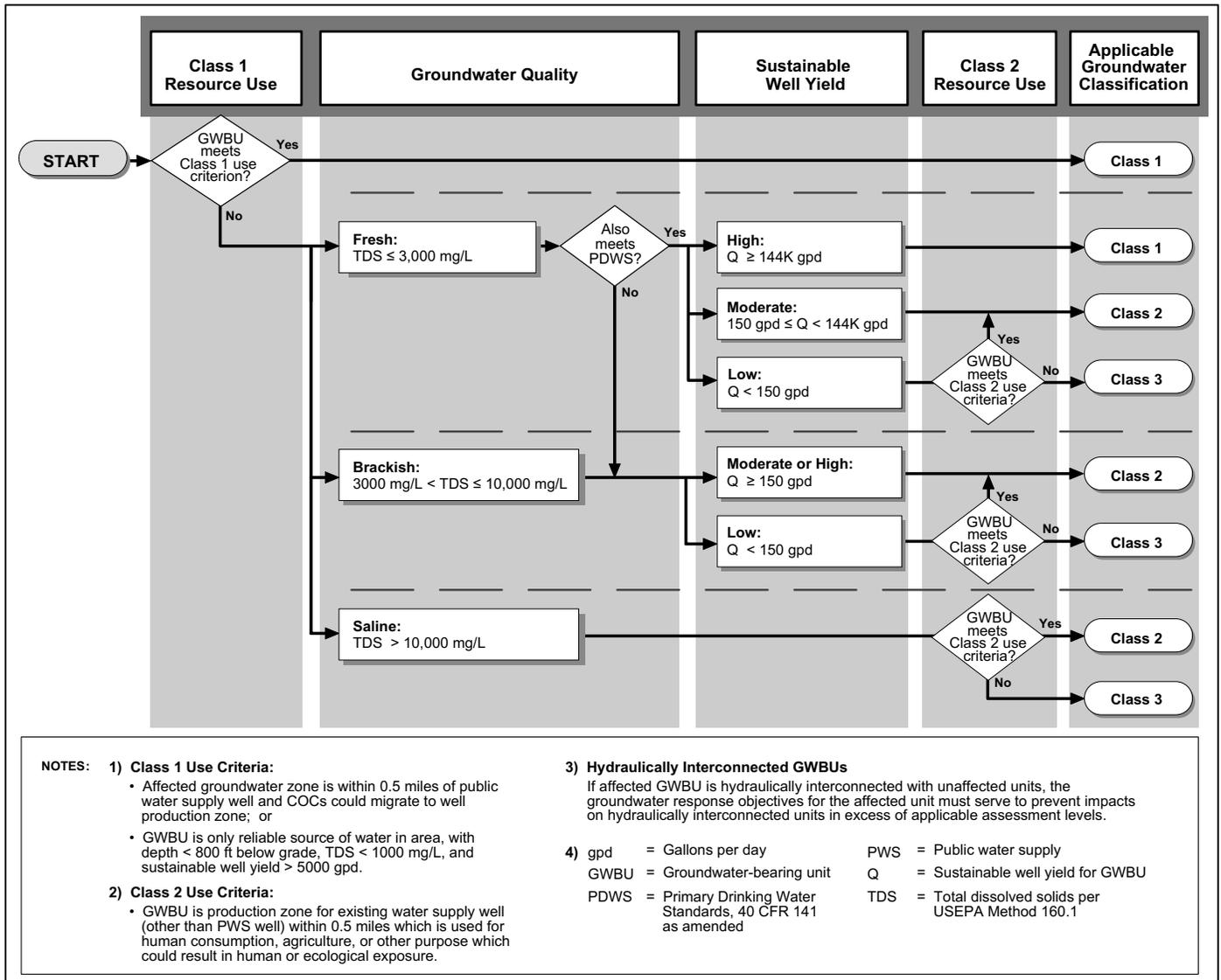


FIGURE 2. TCEQ Groundwater Resource Classification Process

6) **Document Results:** The groundwater resource classification must be documented in the Affected Property Assessment Report (APAR), using APAR Form 2.1 and the relevant attachments. The attachment text should provide all necessary supporting information, including current groundwater use, natural groundwater quality, and sustainable well yield estimates, to the extent needed to justify the proposed classification. In general, less justification will be needed for Class 1 or Class 2 designations than for Class 3 designations.

For More Information

Detailed discussion of classification criteria, test procedures, and calculation methods is provided in the TRRP-8 Guide, which can be downloaded at the TCEQ TRRP website <http://www.tnrcc.state.tx.us/permitting/trrp.htm>.

Also, please feel free to contact us at Groundwater Services, Inc. (GSI), with any questions you may have. Visit our website: www.gsi-net.com

GLOSSARY OF ABBREVIATIONS:

GWBU	Groundwater-Bearing Unit	TDS	Total Dissolved Solids
PCL	Protective Concentration Level	TRRP	Texas Risk Reduction Program
PMZ	Plume Management Zone		

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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.