United States Environmental Protection Agency

Office of Land and Emergency Management
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Beneficial Use Designation for Groundwater at Superfund Sites

Purpose and Use

The purpose of this document is to facilitate the evaluation and selection of beneficial use designations for groundwater at Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) National Priorities List and Superfund alternative approach sites. It is recognized that groundwater resources vary widely geographically in terms of both the underlying physical/chemical characteristics of the aquifers, such as quality and quantity of available groundwater, as well as the importance of the resource to the local population and economy. The Environmental Protection Agency (EPA) generally refers to these as beneficial use designations or groundwater classifications. This document does not create or alter any existing regulations or policy.

Background

The following is intended to highlight areas in existing guidance documents that offer direction regarding appropriate beneficial use designation of groundwater, which in turn may influence decisions regarding cleanup options. Current practice in determining groundwater uses at a particular site or facility varies somewhat among EPA programs. For the Superfund program, guidance on this issue is provided in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) Preamble, which recommends that the Agency's 1984 *Ground-Water Protection Strategy* (EPA 1984) and 1986 *Guidelines for Ground-Water Classification Under the EPA Ground-Water Protection Strategy* (EPA 1986) or a more stringent state classification system can be used as guidelines for determining future use of groundwater at a particular site.[1]

Groundwater is classified into specific categories based on the current and future value of the resource, particularly for drinking water. Such categorization is dictated by approved existing classification systems at the state, tribal, and federal levels.

[1] For the purpose of this document, the term "State" shall include the governing body of an Indian Nation or Tribe (see NCP §300.515(b), CERCLA §126 and Executive Order 13084, dated May 14, 1998), unless otherwise noted.

Comprehensive State Groundwater Protection Program (CSGWPP)

EPA-endorsed CSGWPPs provide an alternate groundwater classification option for sites located in those states with approved CSGWPPs. One of the primary purposes of a CSGWPP is to provide a framework for EPA to give greater flexibility to a state for management and protection of its groundwater resources. The *Final Comprehensive State Ground Water Protection Program* Guidance (EPA 1992) identified six Strategic Activities that should be included in a CSGWPP for EPA to consider them "adequate."

A 1997 Directive, *The Role of CSGWPPs in EPA Remediation Programs*, notes that EPA's groundwater remediation programs have an important stake in the CSGWPP process (EPA 1997). The Directive established the policy that EPA remediation programs generally should:

- Defer to state determination of current and future groundwater uses, when based on an EPA-endorsed CSGWPP that has provisions for site-specific decisions.
- Participate in EPA's review and endorsement of CSGWPPs.
- Use other CSGWPP provisions, as appropriate, for more effective or efficient implementation (e.g., increased program emphasis in geographic areas identified in a CSGWPP as having a higher source value or priority).

The Directive goes on to note that EPA remediation programs generally should defer to a state's determination of groundwater when a state has an EPA-endorsed CSGWPP applicable to Superfund. In this situation, the state groundwater classification can be used even when it differs from the use that would otherwise have been determined by EPA using the 1986 Classification Guidelines as long as it is still determined to be protective. As a result, EPA remediation programs should assess site risks (e.g., the Baseline Risk Assessment for Superfund sites) and establish remediation objectives and/or cleanup levels consistent with the CSGWPP determined groundwater uses.

The Directive acknowledges it may be appropriate to depart from a state's determination of current and future groundwater use if the state's determination:

- Is not consistent with the EPA-endorsed CSGWPP.
- Is not consistent with an existing, applicable state or federal statute or promulgated regulation.
- Is based on technically incorrect or erroneous information.
- Affects an interstate aquifer and is not consistent with the use determination for this aquifer in an adjacent state.
- Would lead to selection of a remedy that EPA considers not protective of human health and the environment.

The 1992 Final CSGWPP Guidance describes the process for developing a CSGWPP. During this process, it is possible that a state's groundwater protection program is not endorsed by the Superfund program. In some cases, there can be an approved CSGWPP, but the protection

program does not apply to Superfund because, for example, the CSGWPP cannot be used for site-specific decisions made by Superfund remediation programs. In general, a CSGWPP that provides no mechanism for distinguishing among groundwaters of the state provides less useful information for site-specific remediation decisions than a CSGWPP that draws distinctions among different groundwater resources. There are currently two states with CSGWPPs that are not endorsed for the Superfund program: Delaware and Washington. A list of current CSGWPPs is available at https://semspub.epa.gov/src/document/HQ/100003495. If a state does not have an EPA-endorsed CSGWPP, then the EPA classification should be used.

EPA Classification System

EPA's 1986 guidance, *Guidelines for Ground-Water Classification under the EPA Ground-Water Protection Strategy,* describes a baseline three-tiered federal classification system that can be employed in situations where no other approved guidance exists.

Class I – Special groundwater

Class I groundwaters are defined as resources of particularly high value. They are highly vulnerable and are either an irreplaceable source of drinking water for a substantial population or ecologically vital.

Class II – Groundwater currently or potentially a source for drinking water

Class II groundwaters include all non-Class I groundwater that is currently being used or is potentially available for drinking water or other beneficial use. There are two subclasses as described below:

- Class IIA is a current source of drinking water.
- Class IIB is a potential source of drinking water.

Class III – Groundwater not a potential source of drinking water and/or limited beneficial use

Class III groundwaters have waters with a total dissolved solids (TDS) equal to or greater than 10,000 parts per million (ppm) and/or a yield that is insufficient (less than 150 gallons per day [gpd]) to meet the minimum needs of an average household. In addition, these groundwaters are evaluated on their interconnectivity with adjacent waters, which may require a more active approach. There are two subclasses as described below:

- Class IIIA has an intermediate or high degree of interconnectivity with adjacent groundwater units and/or is likely interconnected with nearby surface waters.
- Class IIIB has a low degree of interconnectivity with adjacent groundwater units and/or is not believed to be interconnected with nearby surface water.

State Classification System

The Superfund program considers state groundwater classifications in determining future use, but the NCP Preamble advises that where state and EPA classifications result in different groundwater use scenarios, the classification leading to the more "stringent" remediation goals should be considered. Thus, groundwater at a given site is generally assumed to be a future source of drinking water if designated as such by the state or if considered to be a potential source of drinking water under the 1986 Classification Guidelines. For any use scenario, Superfund remedies must be protective of human health and the environment.

Overall Groundwater Management Strategy

The overall strategy for determining beneficial use designation of groundwater consists of three main actions: (1) identifying an applicable CSGWPP, (2) determining EPA groundwater classification, and (3) comparing state and EPA classifications. This section describes how to perform these main actions.

I. Identifying Applicable CSGWPP

Determine if the state has an EPA-endorsed CSGWPP that is applicable to Superfund. Refer to https://semspub.epa.gov/src/document/HQ/100003495 for a current list of CSGWPPs endorsed for the Superfund program. If the state has an endorsed CSGWPP, then the CSGWPP should be used. Otherwise, the EPA classification should be determined and used.

II. Determining EPA Classification

Follow the groundwater classification flowchart to determine the EPA groundwater classification (Attachment 1). Details about each of the seven steps in the flowchart are provided below (EPA 1986):

Step 1a: Ecologically Vital

Groundwater that provides base flow to or provides supporting water levels for a sensitive ecological system located in a groundwater discharge area that supports a unique habitat is considered ecologically vital. Unique habitats include those for endangered species listed or proposed for listing under the Endangered Species Act as well as certain federally managed and protected lands. In some cases, certain federal land management areas, congressionally designated and managed for the purpose of ecological protection may also be considered unique habitats for groundwater protection, regardless of the presence of endangered or threatened species per se. Among those most likely to be included are the following:

- Portions of National Parks
- National Wilderness Areas
- National Wildlife Refuges
- National Research Natural Areas

In addition, the relevant Regional Office of the U.S. Fish and Wildlife Service and the State Endangered Species coordinator or Heritage Program administrator may provide information regarding unique habitats and/or endangered or threated species. Groundwater discharge areas that support unique habitats may include (but not limited to) springs, streams, caves, lakes, wetlands, estuaries, coastlines, embayments, and playas.

Step 1b: Vulnerable

Highly vulnerable groundwater is characterized by a relatively high potential for contaminants to enter and/or be transported within the groundwater flow system. Some site-specific factors to consider when making a vulnerability determination may include an evaluation of soil/vadose zone characteristics, regional groundwater recharge rates, aquifer and groundwater flow system characteristics, topography, and landscape position/landform.

Step 1: Is the groundwater identified as ecologically vital AND vulnerable to contamination?

If yes, groundwater is Class I.

If no, proceed to Step 2.

Step 2: Current Drinking Water

Groundwater is considered a current source of drinking water if one or more operating drinking water wells (public and private) or springs used as sources of drinking water are present. Note it is not required that the entire classification area supply drinking water to qualify.

Step 2: Is the groundwater identified as a drinking water source?

If yes, proceed to Step 3.

If no, proceed to Step 4.

Step 3a: Irreplaceable Groundwater for a Substantial Population

To determine if the community use of the drinking water wells is considered substantial, the population of the area needs to be identified. Generally, a population of 500 or more is considered substantial. However, a population of less than 500 may warrant further evaluation to determine if the population is substantial for the site-specific conditions.

Groundwater is considered irreplaceable when replacement by water of comparable quality and quantity from alternative sources in the area would be economically infeasible or precluded by institutional barriers. The determination for irreplaceable for a substantial population is based on a three-step process:

- Identifying the presence of a substantial population.
- Applying screening tests designed to produce preliminary determination:
  - Uncommon pipeline distance
  - Institutional constraints
  - Comparable quantity
  - Comparable quality
  - Economic irreplaceability
- Reviewing relevant qualitative criteria to produce a final determination.

Step 3b. Vulnerable

As noted above, highly vulnerable groundwater is characterized by a relatively high potential for contaminants to enter and/or be transported within the groundwater flow system. Some site-specific factors to consider when making a vulnerability determination may include an evaluation of soil/vadose/groundwater zone physical and chemical characteristics (e.g., regional groundwater recharge rates, sorption properties, aquifer and groundwater flow system, topography, and landscape position/landform).

Step 3: Is the groundwater identified as irreplaceable for a substantial population AND vulnerable to contamination?

If yes, groundwater is Class I.

If no, groundwater is Class IIA.

Step 4: Protected Watershed

A protected watershed includes groundwater that discharges to a water supply reservoir (or portion of) that has been designated for water quality protection by either federal, state, tribal, or local government within the classification area. This area does not need to have drinking water wells or springs to be considered a protected watershed.

Step 4: Is the groundwater identified as a protected watershed?

If yes, groundwater is Class IIA.

If no, proceed to Step 5.

Step 5: Sufficient Yield

Yield is defined as the quantity of water that can be extracted or produced from the groundwater aquifer. For yield to be considered insufficient, it must be practically infeasible to produce a sufficient supply of groundwater to meet the minimum needs of an average-size household. An acceptable yield threshold of 150 gpd is used to make the determination of sufficient yield. A sufficient yield threshold should be sustainable over time without temporary (e.g., seasonal) depletion of the resource. Unless it is demonstrated otherwise, groundwater is presumed to meet the sufficient yield criterion.

Step 5: Does the groundwater have sufficient yield (>150 gpd)?

If yes, proceed to Step 6.

If no, proceed to Step 7.

Step 6: Total Dissolved Solids (TDS)

Groundwater is considered not a potential drinking water source or of limited beneficial use if salinity of the groundwater is above 10,000 ppm TDS. Unless it is demonstrated otherwise, groundwater is presumed to be below the 10,000 ppm TDS criterion.

Step 6: Does the groundwater have TDS less than 10,000 ppm?

If yes, groundwater is Class IIB.

If no, proceed to Step 7.

Step 7: Interconnection

Interconnectivity between hydrologic units is split into three categories: low, intermediate, and high. The type of boundary separating groundwater units reflects the degree of interconnection between those units. For example, groundwater units separated by extensive, low permeability

(non-aquifer) geologic units typically have low interconnectivity to adjacent groundwater or surface water and can be expected to have no, or very limited, impact on the quality of the adjacent waters. In contrast, intermediate or high interconnectivity can be expected to have significant potential impact on the quality of adjacent waters (i.e., groundwater or surface water). An intermediate or high degree of interconnection is inferred when the conditions for a lower degree of interconnection are not demonstrated. Intermediate or high interconnection is assumed to occur within a groundwater unit and where groundwater discharges to surface water.

Step 7: What is the degree of groundwater interconnection?

If intermediate or high, groundwater is Class IIIA.

If low, groundwater is Class IIIB.

III. Comparing EPA and State Classifications

Determine if EPA has a more stringent groundwater classification. If so, follow EPA classification scheme. If not, compare and determine which classification program to use.

Selection of Groundwater Classification without an Applicable Superfund CSGWPP

Generally, the EPA groundwater classification is the default classification. If there is no state groundwater classification, the EPA classification is used. If there is a state groundwater classification, it should be compared to the derived EPA groundwater classification. When a state groundwater classification is less stringent than the EPA classification, the EPA classification is used. When the state groundwater classification is more stringent, the state classification may be considered as the groundwater classification to be used at the Superfund site.

Groundwater Remediation Considerations

Groundwater classification is a consideration when determining groundwater remedial action objectives for a Superfund site. Cleanup levels and selected remedies often depend on the type of groundwater present. Class I, Class IIA, and Class IIB groundwaters have a goal of restoration to drinking water.

Another consideration for groundwater remedial action objectives relates to the connectivity of the groundwater to adjacent waters. Class IIIA aquifers with high connectivity to other groundwater or surface water may be best managed as Class I or Class II depending on the degree of connectivity and classification of connected waters. Class IIIB aquifers with low interconnectivity generally do not require restoration but may require management (e.g., institutional control) to prevent unacceptable exposure or unacceptable risk.

References

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Attachments

Attachment 1 – Procedural Groundwater Classification Flowchart

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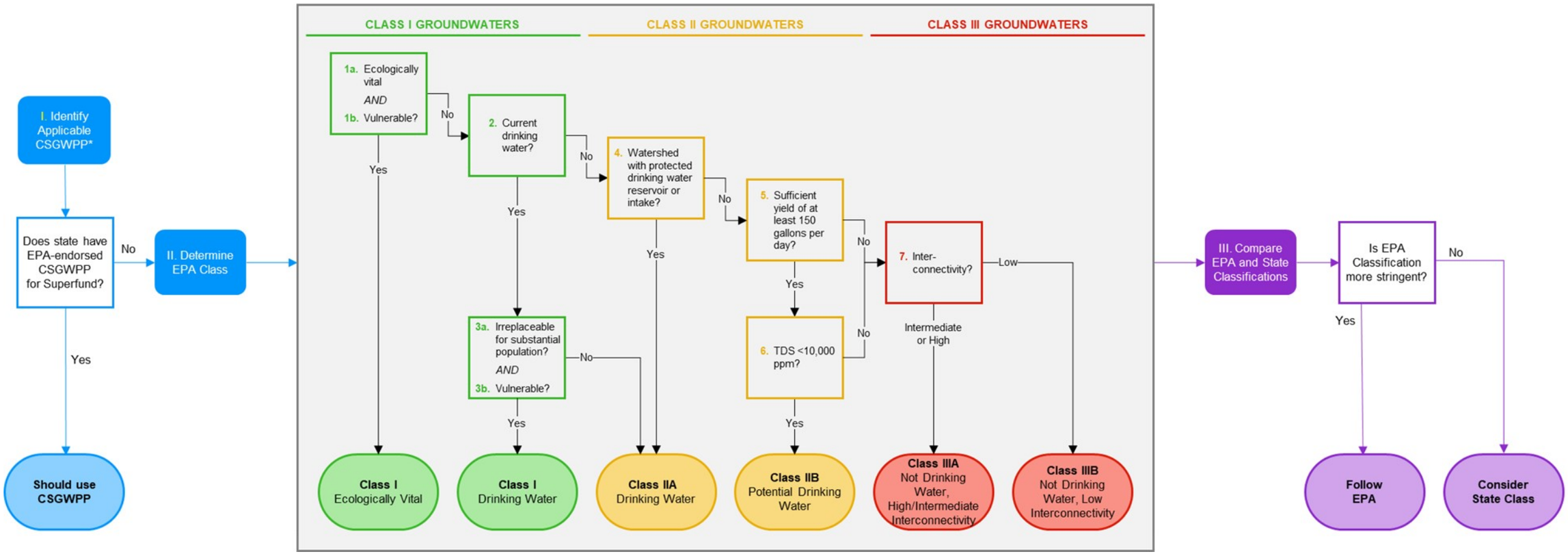

*CSGWPP: Comprehensive State Groundwater Protection Program.