UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

JUN 4 1993

OFFICE OF WATER

**MEMORANDUM**

**SUBJECT:** Assistance on Compliance of 40 CFR Part 191 with Ground Water Protection Standards

**FROM:** James R. Elder, Director
Office of Ground Water and Drinking Water
(WH-550)

**TO:** Margo T. Oge, Director
Office of Radiation and Indoor Air
(ANR-458)

Thank you for your memorandum of April 28, 1993, requesting our assistance on issues concerning the interface of ground water protection standards with the development of criteria for assessing compliance with the regulations for the management and disposal of spent nuclear fuel, high-level, and transuranic radioactive wastes, 40 CFR Part 191. There appears to be two issues you have indicated that are of the highest concern. The first issue is defining an underground source of drinking water (USDW) in specific enough terms to allow the regulating agencies to assess which aquifers need to be examined. The second issue is the proper testing method that needs to be applied in order to determine total dissolved solids (TDS) in ground waters for purposes of identifying USDWs.

Although we can provide you with preliminary information at this time regarding these issues, I believe that your staff should continue communicating with OGWDW and other Office of Water staff. Further assistance, supplemental material and documentation can be provided through such discussions.

## Defining A USDW

The definition of a USDW in 40 CFR 146.3 does not hinge on estimated daily human water consumption. To determine the degree of monitoring or protection necessary for USDWs, we must examine the underlying reasons for their designation. The UIC regulations were created to protect potentially usable aquifers from contamination due to activities related to underground injection of fluids. A 10,000 mg/l TDS level was chosen to ensure that adequate supplies (through future treatment technologies) are available for future generations. These ground

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waters are thus "protected" unless they meet the criteria for an aquifer exemption at 40 CFR 146 4.

Currently, we have no Agency policy guidance for bounding what volume of water a USDW should yield in order to constitute a public water supply. We did indicate in the regulations that there must be a sufficient quantity of ground water to supply a public water system. The 2 liter-per-day human water consumption figure is intended to be used in setting upper limits for contaminants in a drinking water supply. It is not an indication of the amount of water which a public water system needs to supply its customers. An important parameter in this respect is the need for instantaneous yield of water, i.e. the customer must be able to fill a glass of water in a matter of seconds. Another consideration is that the aquifer must replenish itself at a sufficient rate so that it can sustain continuous consumption.

The Ground Water Protection Division completed a draft final study entitled "Guidelines for Ground-Water Protection Strategy" in 1986 that suggested a per capita residential use of 50 to 75 gallons of water per day as sufficient to supply an average single family residence. Given the variability in regional aquifer characteristics and climate, a value of 150 gallons per day was selected as the cutoff for sufficiency in this report. If we multiply this number by 15, which is the minimum number of service connections necessary to define a public water supply system, the necessary yield of the aquifer will be at least 2,250 gallons per day. Other studies have indicated much higher estimates of water consumption (up to 2000 gal./per capita/day).

In general, drinking water wells are seldom drilled and completed unless an aquifer is capable of yielding more than a 2 gallon per minute flow rate, which equates to a 2880 gallon daily flow. Allowing for water storage practices, and in order to be extremely conservative, we would suggest that any aquifer yielding above 1 gallon per minute be afforded protection as a USDW. We will continue to research this issue and provide additional references for your evaluation.

Identifying TDS Testing Methods

In the UIC program, comprehensive fluid sampling effort to determine TDS of potential USDWs may be required for newly drilled wells. However, for old or existing wells where sampling was not performed, indirect methods may be employed to determine TDS levels.

As water sampling is not always feasible or necessary, indirect methods (hydrogeological atlases, piezometric maps, oil and gas maps, water catalogs, geophysical logs, etc.) are frequently employed. The most common method is geophysical logging, which allows reasonable approximations of the quality of

various ground-water formations penetrated by injection wells. Most operators of Class I and II injection wells have conducted a comprehensive suite of geophysical logs that will aid ground-water quality determinations. Before an extensive and costly sampling program for these facilities is initiated, an investigation as to whether indirect methods would yield adequate data should be considered.

Determining TDS concentrations from laboratory analysis of water samples is the most precise method available. Although the methods specified in 40 CFR 136 have validity, they are not required by the UIC regulations. The standard method for determining TDS in water samples is an evaporation technique where the sample is dried at constant temperature and the weight of the remaining solids represents the total solids. This method is described in "Standard Methods for the Examination of Water and Wastewater," 1983. It is also described in EPA's Method #160.2, "Non Filterable Residue Method." We can provide your staff with further references if they are needed.

If you have any additional questions or concerns on these issues, please call Ramona Trovato, or have your staff call the appropriate contacts in the Ground Water Protection Division at 260-7077.