May 26, 2010
Ms. Angela Nugent, Ph.D., Designated Federal Officer
EPA Science Advisory Board Staff Office
US Environmental Protection Agency, Mail code 1400F
1200 Pennsylvania Avenue, NW, Washington, DC 20460
nugent.angela@epa.gov, 202-343-9981
Re: Omission of science associated with wells (shafts) which emplace wastewater into deep tunnels.

Dear Ms. Nugent,

The enclosed information is for the Committee on Science Integration for Decision Making" (CSIDM). It identifies the method that EPA uses to omit science, existing regulations, and established law in policy and decision making by using deep tunnel systems for the management of wastewater. Although the majority of information is from Georgia, similar conditions exist throughout the United States.

An internal EPA R-4 technical memo (2001) explains that, "...releases from...storage tunnel(s) cannot be quantified but are highly likely. Potential contamination of the water table should be considered..." However, EPA allows wells to be used for emplacing wastewater into tunnels without requiring Underground Injection Control (UIC) permits. Tunnel systems have been used even after passage of the Safe Drinking Water Act (SDWA) which authorizes UIC permitting and after a 1997 Eleventh Circuit Court of Appeals decision. The Eleventh Circuit established the intent of Congress to create a regulatory strategy which prohibits *any* underground injection which is not authorized by a permit. It emphasized, "...it is clear that Congress dictated that *all* underground injection be regulated under the UIC programs."

It is important to understand the different purposes of permits which are used to regulate fluids such as wastewater. This letter contains brief background information about permit requirements under the Clean Water Act and the SDWA. We then provide a brief explanation of the importance for requiring SDWA/UIC permits for the subsurface emplacement of wastewater. A list of other documents follows.

Clean Water Act (CWA)
Congress passed the CWA which establishes goals for protecting public heatlh (humans); protecting the environment (flora and fauna); eliminating releases of water with high amounts of toxic substances; and ensuring that discharges into surface waters do not exceed permissible contaminant discharge limits which are established in national Water Quality Standards (NWQS).

Public entities build, operate, maintain, and own sewage treatment facilities. Such facilities include systems which collect and transmit sewage, usually through a shallow underground pipe network, to a Water Reclamation Center or Facility (WRC/WRF). At a WRC, sewage is treated so that potentially harmful contents are either completely removed or reduced to levels which do not exceed NWQS.

Treated water is intentionally discharged only to bodies of water which are deemed as being capable of receiving the discharges. Discharge systems are defined as "point sources" of pollution. Municipal collection, transmission, and treatment systems are called Publicly Owned Treatment Works (POTW).

POTWs may operate only after receiving a National Pollutant Discharge Elimination System (NPDES) permit. The NPDES permit program controls water pollution by regulating point sources that discharge pollutants into surface waters of the United States. Once a permit is received, discharges must be tested on a regular schedule to assure that NWQS are not exceeded.

The procedures of permitting and assuring compliance with the CWA are often managed by EPA in partnership with state environmental agencies. States can enter into agreements with EPA to establish their own Water Quality Standards; rules for environmental impact reviews; permitting; compliance; enforcement; etc.; all of which, as a minimum, must be at least as stringent as EPA's. These states are designated as "primacy states" and they assume primary enforcement responsibility for implementing the CWA. EPA retains oversight and enforcement authority. Georgia is a Primacy State for the CWA.

Safe Drinking Water Act (SDWA)

Congress passed the SDWA to protect public health (humans). This law focuses on all waters which actually or potentially are available for drinking use, whether from above ground or underground sources. Part 144 of the SDWA establishes the Underground Injection Control (UIC) program and it can be viewed on the Government Printing Office (GPO) website at:

http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&rgn=div5&view=text&node=40:22.0.1.1.6&idno=41#PartTop

The regulatory term for the subsurface emplacement of fluids through a well is "underground injection" and "wells" are defined, generally, as, "...bored, drilled, or driven shafts and dug holes whose depths are greater than their largest surface dimension; or, an improved sinkhole; or, a subsurface fluid distribution system". The term “injection” is often misunderstood to mean that pressurization of the fluid is required but the term “emplacement” is used to describe injection by gravity flow or under pressure.

There are five classes of UIC wells and permits for all classes must be obtained before construction of the well begins. Permits require that emplaced fluids which contain contaminants must not enter underground sources of drinking water (USDWs). By definition, Class V (Class 5) UIC wells include all underground injection not included in Class I-IV wells. Class I-IV wells are for highly specialized purposes which do not pertain to managing wastewater with tunnel systems.

Generally, a USDW is a regulatory classification for a type of water supply aquifer. Aquifers feed lakes and provide recharge to streams and rivers particularly during dry periods and can be the primary source of fresh water to surface water bodies. The UIC program requires permits for wells that emplace fluids (injectates) of all kinds into subsurface rock formations. It also requires that injectates with contaminants be separated from and not endanger USDWs. USDWs do not have to be an active source of water to a public or private system in order to be a potential source that must be protected.

More specifically, a USDW is an aquifer or part of an aquifer which (a) supplies or contains a sufficient quantity of ground water (one gallon/minute) to supply a public system with water for human consumption, or (b) contains fewer than 10,000 milligrams/liter of Total Dissolved Solids (TDS); and (c) is not an exempted aquifer. Exemption of an aquifer as a USDW requires a process that includes public hearings, field study and analysis, and final approval by the Director of the State regulatory authority.

The SDWA also authorizes EPA to establish National Safe Drinking Water Quality Regulations (NSDWQR) which are codified as permissible maximum contaminant levels (MCLs) of pollutants. The standard for protection of USDWs is that injectates will not exceed MCLs when measured at the point of injection. If untreated wastewater is diverted down an injection well at the surface, then the surface location becomes the point at which testing for compliance with the NSDWQR is determined. For the same reasons that Georgia has Primacy for the CWA, Georgia also has Primacy for the SDWA.

Importance of UIC Permitting

EPA improves compliance with the CWA by failing to enforce the SDWA. Failure to require UIC permits for the ***shafts*** which emplace wastewater into deep tunnels removes scientific study which demonstrates that USDWs will not be contaminated and that human health will be protected. In particular:

> Subpart B §144.12 - Prohibition of movement of fluid into underground sources of drinking water
> No owner or operator shall construct, operate, maintain, convert, plug, abandon, or conduct any other injection activity in a manner that allows the movement of fluid containing any contaminant into underground sources of drinking water, if the presence of that contaminant may cause a violation of any primary drinking water regulation under 40 CFR part 142 or may otherwise adversely affect the health of persons. *The applicant for a permit shall have the burden of showing that the requirements of this paragraph are met*. (Emphasis added)

Construction of a UIC well without authorization issued under the UIC program is prohibited. Without UIC permits for wastewater injection, regulatory agencies are neither authorized to enforce the regulations nor are they accountable for any adverse impacts.

Also, when the permit process is eliminated, public participation in the process is eliminated. The application process and the on-going operation of UIC wells are subject to public review. A few questions which must be answered in the permit application process include:

- Does the injectate contain any contaminants which exceed Maximum Contaminant Levels?
- Will the injection be near (horizontally), above, into, or underneath the lowermost USDW?
- Is there a risk of endangering an USDW?
- In the case of wastewater tunnel systems, will the UIC well (the shaft) and/or the tunnel allow contaminants found in wastewater to escape into the underground environment? This includes exfiltration of fluid and/or the escape of bacterial colonies, viruses, and cysts which might reach USDWs.
- What is the underlying and overlying geology of the tunnel system? The rock permeability, rock density, fracture density, fracture orientation, compression strength, and chemistry must be evaluated to determine the suitability of the rock mass to contain an injectate or to allow the injectate to migrate to groundwater and surface water bodies.
- What is the hydrology (groundwater flow characteristics) in the vicinity of the well/tunnel? This requires an assessment to identify the potential for contaminant transport, motility, and flow direction which is needed to safeguard the subsurface environment. Simulation modeling should be used to analyze the likely future state of the subsurface as a result of the injection process.

Conditions Applicable to all UIC permits

There are conditions which apply to all UIC permits and specific conditions for particular UIC wells can be attached to a permit. The complete list of conditions which apply to all UIC permits can be viewed on the GPO website, (*See* Subpart E, §144.51, Conditions applicable to all permits.) We ask that the committee simply browse/skim this list in order to gain a sense of the variety of concerns which are addressed through UIC permits. None of the conditions are enforceable unless permits are issued.

Two examples of important conditions include:

> (A) A requirement that the owner/operator of an UIC well must collect monitoring data in order to determine if the system is performing as required. (See §144.54, Requirements for recording and reporting of monitoring results). Scientific analysis is applied to the data to ensure that any leak or change of subsurface conditions as a result of emplacement will be detected at the earliest possible time. The review of data requires the same level of scientific study as that applied in the permit application phase.
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> (B) "Corrective action plans" can be required before a permit is issued in the event that, after operation begins, any releases of contamination that reach an USDW will be recaptured. Also, permittees can be required to show evidence of financial responsibility for implementing a corrective action plan through a requirement that a surety bond be obtained or by demonstrating other adequate assurance of financial capability.

We are submitting seven documents for consideration by the committee. They are:

1) 1-May-26-2010-Nugent-SAB letter.doc - This letter which provides background information.

2) 2-Glossary of Terms.doc - A glossary of terms which are used in item three, below.

3) 3-Mar-4-2010-EPA-HQ ltr-distrib.pdf - A letter to Peter Silva and Cynthia Giles, both Assistant Administrators at EPA-HQ. It contains references to supporting exhibits some of which are excerpted in item four - a companion document. The letter is written in "legalese" and for easier reading, we have placed legal citations in < gray font > and references to exhibits/excerpts are highlighted in yellow. We suggest that readers skim the letter first without referring to the excerpts and then read the letter a second time and incorporate excerpts.

4) 4-Mar-4-2010-Exhibits-Excerpts.pdf - This is the companion document for item three. The first page is a list of all exhibits. The subsequent pages contain excerpts.

5) 5-Jul 3-2001-Pollard-EPA Memo.pdf - This is the complete EPA Technical Memorandum from July 3, 2001, prepared by Solomon Pollard, Jr., PhD., Senior Toxicologist, EPA-Region 4 from which excerpts are taken and incorporated into the March 4th letter.

6) 6-Nov 24-2008-Wright Legal Opinion.pdf - This is the complete legal opinion (without exhibits), prepared by Hal Wright, a Georgia attorney. This legal opinion underlies of all allegations that EPA is disregarding the requirement that wastewater tunnel systems be permitted under the UIC program.

7) 7-2003-3Mar-4-Red Star Yeast Appeal.pdf - Lesaffre (Red Star) Yeast Appellate decision, Milwaukee

We are including this case because it shows that the concern about groundwater contamination is real, i.e., not hypothetical or conjectural. The question behind the litigation is whether there was an inverse condemnation (a "taking") of Lesaffre's water supply well by the Metropolitan Milwaukee Sewer District (MMSD). That the production well could not be used again was not challenged. The following chronological series of events can be found in the decision:

Lesaffre (Red Star) Yeast v. MMSD Appeal No. 02-1685, Wisconsin.

- 1948 - Red Star installed a 1700-foot deep, high capacity production water supply well.
- Late 1993 - Red Star tested its water to determine the well condition and groundwater quality. Those samples showed no coliform or fecal coliform contamination.
- 1994 - MMSD began operation of the Deep Tunnel with the unlined Crosstown segment of the tunnel running within 660 feet of the Red Star well.
- 1996 - When MMSD notified Red Star of a surge in pressure, Red Star sampled the well water and detected coliform bacteria; however, the presence of coliform bacteria typically subsided after a few days and eventually disappeared.
- Spring 1999 - Samples from the Red Star well consistently tested positive for total coliform bacteria, fecal coliform, and E. coli. Red Star immediately discontinued use of the well and increased its use of city water. Red Star's attempts to chlorinate the well to kill the bacteria were unsuccessful and the well could not be used again.

Red Star closed its facility before any final decision about the litigation was reached. However, MMSD eventually placed a restriction on the "fill-level" of the tunnel.

Thank you for distributing our information to the CSIDM for their consideration. EPA's omission of science associated with wells which emplace wastewater into tunnels jeopardizes public health and the environment. We are available to answer any questions and provide supplemental documentation.

Sincerely,

Bob Schreiber, MS

Chuck Budinger, PG

William McEwen, PE (Ret.)