

CHPRC Response to EPA Comments of March 2, 2009

Nitrite Limits

EPA Question: *“So does this mean the oxidation reactions are achieved through the synergistic action of high intensity UV light in combination with hydrogen peroxide treatment to generate highly reactive hydroxyl radicals(OH•) that react with and destroy most organic chemical compounds. If complete mineralization is achieved in the reaction, the final products of the process are carbon dioxide, water and salts.”*

CHPRC Answer: That is correct.

EPA Question: *“And if UV is reduced hydrogen peroxide is increased?”*

CHPRC Answer: If by this statement you mean as the UV light exposure is reduced the amount of residual hydrogen peroxide in the discharge is increased that again is true because less of the H₂O₂ fed to the process is catalyzed to hydroxyl radicals.

EPA Question: *“Put another way does this mean through direct photolysis, the UV light reacts with the H₂O₂ to generate hydroxyl radicals (OH•), which are highly reactive. The hydroxyl radicals then attack the organic molecules resulting in the destruction of organic compounds. The reaction is aided by the direct photolysis of the organic molecule by the UV light which can break or activate certain atomic bonds making the molecule more susceptible to oxidation.”*

CHPRC Answer: Correct.

EPA Question: *“Is Hanford increasing the concentration of H₂O₂ to compensate for a reduction in or to maintain UV photolysis?”*

CHPRC Answer: No. We have had to increase the H₂O₂ and the UV exposure in order to try and reduce the NO₂ below permit levels. All of this is based on full scale testing with the actual wastewater. The testing showed that there needs to be enough H₂O₂ available to generate sufficient hydroxyls to oxidize the NO₃ to NO₂ and there needs to be UV light exposure to catalyze that decomposition. If there is insufficient light energy then there will not be enough hydroxyl radicals formed no matter how much H₂O₂ is fed. If there is insufficient H₂O₂ concentration sufficient hydroxyl concentration cannot be obtained no matter much UV exposure is applied. The optimal set points for these can change.

EPA Question: *“If so this article states hydrogen peroxide increases nitrite in drinking water.”*

CHPRC Answer: While articles on drinking water disinfection system tests are helpful to understand concepts and get ideas, the findings are not always applicable to industrial treatment systems. It is easier to inactivate an organism than it is to blow apart molecules down to ppb levels so I believe industrial units like the one we have is higher powered. For example, during the full scale tests the H₂O₂ feed concentration was raised from 10 ppm to 30 ppm with all other parameters remaining the same and there was a resulting decrease in NO₂ discharge concentration from 102 ppb to 45 ppb and the residual H₂O₂ concentration only went from 4 ppm to 10 ppm. To test the pH effect the pH was raised from 6.9 to 8.1 and the NO₂ increased from 57 ppb to 93 ppb, all other parameters remaining the same. I am confident that if we were to go out right now and drop the H₂O₂ to 5 ppm or less the discharge would exceed the NO₂ permit limit.

EPA Question: "Please explain the impacts of the increased addition of H₂O₂ on nitrite levels at TEDF."

CHPRC Answer: See comments above. In short, there must be sufficient H₂O₂ to produce enough hydroxyl radicals to oxidize enough of the NO₂, whose formation in the system cannot be prevented, back to NO₃ to meet the NO₂ discharge limits. Based on our experience and testing the H₂O₂ feed concentration normal range to meet the requirement is 10 to 30 ppm.

Radionuclides from 100K Outfall

You proposed to add the following language into the final permit:

"Discharges of process water such as dust suppression water and stormwater from Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Cleanup actions are prohibited from Outfall 004."

We understand that this language is aimed at AEA radionuclides detected in the 004 outfall. We have determined, after internal review and discussion with our client, that this language would not be an appropriate addition to the NPDES permit for the following four reasons:

1. **The NPDES regulations themselves do not apply to AEA radionuclides.** This rule is acknowledged in Section IV.B of the Fact Sheet concerning the current permit application, as well as in the current NPDES permit. 40 CFR 122.2 defines "pollutant" in this way:

"Pollutant means dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials (except those regulated under the Atomic Energy Act of 1954, as amended (42 U.S.C. 2011 et seq.)) . . . Note: Radioactive materials covered by the Atomic Energy Act are those encompassed in its definition of source, byproduct, or special nuclear materials. Examples of materials not covered include radium and accelerator-produced isotopes. See Train v. Colorado Public Interest Research Group, Inc., 426 U.S. 1 (1976)." [Emphasis added]

The cited case is an 8 to 0 ruling by the US Supreme Court that upheld this exclusion in the CWA regulations, even though it does not appear in the statutory definition of "pollutant", on the grounds that the legislative history of the CWA showed Congress clearly intended to give the Atomic Energy Act priority in regulating nuclear materials.

The Supreme Court said: "The legislative history of the FWPCA [Federal Water Pollution control Act or CWA] speaks with force to the question whether source, byproduct, and special nuclear materials are "pollutants" subject to the Act's permit program. The House Committee Report was quite explicit on the subject:

"The term `pollutant' as defined in the bill includes `radioactive materials.' These materials are those not encompassed in the definition of source, byproduct, or special nuclear materials as defined by the Atomic Energy Act of 1954, as amended, and regulated pursuant to that

Act. `Radioactive materials' encompassed by this bill are those beyond the jurisdiction of the Atomic Energy Commission. Examples of radioactive material not covered by the Atomic Energy Act, and, therefore, included within the term `pollutant,' are radium and accelerator produced isotopes." H. R. Rep. No. 92-911, p. 131 (1972), 1 Leg. Hist. 818 (emphasis added)."

2. **NPDES regulations do not apply to CERCLA actions.** One of the exclusions from NPDES permitting identified in 40 CFR 122.3 is "(d) Any discharge in compliance with the instructions of an On-Scene Coordinator pursuant to 40 CFR part 300 (The National Oil and Hazardous Substances Pollution Contingency Plan) or 33 CFR 153.10(e) (Pollution by Oil and Hazardous Substances). " In other words, discharges incidental to performance of CERCLA response actions conducted at the direction of the lead CERCLA agency (which the National Contingency Plan, 40 CFR 300.5, clearly defines as DOE) do not require NPDES permits.
3. **CERCLA preempts NPDES permits.** A permit of any kind that purports to regulate an onsite CERCLA activity is preempted by Section 121(e)(1) of CERCLA, which states that "No Federal, State, or local permit shall be required for the portion of any removal or remedial action conducted entirely onsite, where such remedial action is selected and carried out in compliance with this section."
4. **Only Atomic Energy Act standards apply to AEA radionuclides.** The only legal path by which NPDES standards (as distinct from a NPDES permit) could apply to a CERCLA activity would be through the ARARs process in CERCLA Section 121(d). Because AEA radionuclides are not "pollutants" regulated under NPDES, there are no "applicable" standards that would serve as a substantive standard applicable to CERCLA response actions under the CERCLA Section 121(d) ARARs process. Therefore, only pollutants other than AEA radionuclides can be addressed in an ARAR derived from the NPDES regulations. In other words, radionuclide standards are not an "applicable" requirement that would govern these materials in the absence of the CERCLA Section 121(e)(1) exemption. It is the DOE Order 5400.5 standards that apply.

It is therefore clear from EPA 's own CWA regulations, the CERCLA statute, and the 1976 ruling by the Supreme Court, that there is no legal basis for including the proposed language into the NPDES permit.

You also indicated that Ecology had provided a comment asking for additional monitoring for radionuclides discharged from outfall 004. As noted above, AEA radioactive materials in the effluent are governed exclusively by DOE Order 5400.5 and CERCLA, and not the NPDES permit. While DOE-RL shares the data it acquires with EPA and Ecology, there is no legal authority in the NPDES permit to require monitoring and reporting to Ecology of AEA radionuclides.