N60200.AR.007136
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LETTER AND COMMENTS FROM U S EPA REGION IV REGARDING REVIEW OF PROPOSED PLAN OPERABLE UNIT 2 (OU2) NAS CECIL FIELD FL
7/21/1995
U S EPA REGION IV

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 4

345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365

Date: July 21, 1995

Subject: Proposed Plan, Cecil Field NAS OU2, Jacksonville, Florida

From: William N. O'Steen, Environmental Scientist
Ground Water Technology Support Unit

To: Bart Reedy, Remedial Project Manager,
Federal Facilities, DOD Remedial Section

Through: David Hill, Chief N.L. Bethune for
Ground Water Technology Support Unit

This memorandum responds to your request for comments on the Proposed Plan for OU2.

Remedial Alternative GW-2, natural attenuation, has a predicted 15-year time frame to attain the remedial action objectives. There are no reliable calculations in either the Remedial Investigation (RI) or Feasibility Study (FS) reports which support this remedial time frame.

The projected remedial time frame for natural attenuation is based on literature values of organic contaminant degradation rates (OU2 FS Report Section 7.5.1). While such data may provide rough estimates of site-specific organic degradation rates, this estimation approach leaves a great deal of uncertainty about the effectiveness of natural attenuation for attaining the remedial action objective at either site 5 or site 17 of OU2 within a reasonable amount of time. In order to adequately define the biodegradation element of natural attenuation at sites 5 and 17, a site-specific study of both the ongoing extent of biodegradation and the suitability of site 5 and site 17 for biodegradation would be necessary. Such a study would include such areas of interest as an investigation of microbial nutrient availability, a definition of ground water oxygen concentrations, identification and study of contaminant-degrading microbes, the presence of microbial degradation byproducts in the ground water, and so forth. Without such a site-specific study, the effectiveness of natural attenuation as a ground water remedial process is unknown, relative to more active ground water remedial actions discussed in the OU2 FS Report.

In Section 7.5.1 of the OU2 FS Report, the presumption that natural attenuation is a significant process at Site 17 appears to primarily be based on the apparent retardation of ground water contaminant migration, relative to the estimated average ground water velocity in the uppermost part of the surficial aquifer.

This estimated average ground water velocity is subject to some uncertainty regarding its accuracy. For example, in the RI Report, the median hydraulic conductivity and hydraulic gradient of the uppermost part of the surficial aquifer could have reasonably been used rather than the arithmetic averages of these variables to estimate the average annual ground water velocity. Also, a larger value of the effective porosity of the surficial aquifer is possible. Considering the median values of 2.16 ft/day hydraulic conductivity and 0.00625 hydraulic gradient, if the effective porosity of the aquifer is assumed to be 0.3 rather than 0.25, the annual ground water velocity is predicted to be 16.425 ft/year. This value is considerably less than the 26 ft/year average ground water velocity reported in Section 5.2.3 of the OU2 RI Report. With these reasonable alternative estimates of the variables influencing ground water velocity, the estimated distance of contaminant migration since ground water contamination began at site 17 would be 328.5 feet, rather than the 510-foot distance estimated in Section 5.2.3 of the OU2 RI Report. That section of the RI Report itself notes the uncertainties in the estimated ground water velocity, such that the actual distance conservative ground water contaminants may have moved downgradient of the site 17 source area could be less than either of these estimates of the average ground water velocity. With less contaminant retardation predicted, the degree of natural attenuation presumed for site 17 would be presumed to be proportionately less.

Clearly, based on the analysis presented above, the effectiveness of natural attenuation as a ground water remedial process at site 17, relative to the active ground water remedial action alternatives, is questionable. This uncertainty should be fully reflected in the Proposed Plan's presentation of the natural attenuation ground water remedial time frame (i.e. Figure 8) and in the comparative discussion of the ground water alternatives in Section 4.2 of the Proposed Plan.

As a general comment, any remedial alternative which relies primarily (or as a critical element) on bioremediation, without a critical, site-specific analysis of the potential bioremediation effectiveness, is typically viewed unfavorably by EPA in the selection of remedial alternative. This policy is particularly correct in cases where the risk assessment indicates that potential risks from exposure to ground water are well above EPA's acceptable carcinogenic risk range and the acceptable hazard index is greatly exceeded.

To summarize my concern about the natural attenuation alternative (selected in Section 5.0 of the Proposed Plan as the preferred alternative for site 17), there is inadequate information presented in the RI and FS reports for OU2 to document the effectiveness of this process as a remedial alternative, relative to more active

remedial responses to ground water contamination. The mechanisms of natural attenuation are inadequately quantified for the OU2 areas. Because natural attenuation encompasses several processes such as contaminant volatilization, biodegradation, sorption, dispersion, and/or precipitation, it is important to understand the degree to which each process is important at a particular location. Some type of natural attenuation occurs to some extent at every site where there is contaminated ground water. Thus, the natural attenuation of ground water contaminants is not disputed as a process occurring at either site 5 or site 17 of OU2. However, the relative effectiveness of natural attenuation as a ground water remedial process, and the specific factors which result in natural attenuation, are in question for the two CU2 sites.

I recommend that if natural attenuation is considered as either a possible remedial alternative or as an element of a ground water remedial alternative at site 17, site 5, or elsewhere, Dr. John Wilson, EPA's expert on bioremediation of ground water contaminants, should be consulted. He is at the Robert S. Kerr laboratory in Ada, Oklahoma. There is also a recent article in Environmental Science and Technology (Vol. 28, No. 5, 1994, pages 769-775) which may provide useful information on the types of organic contaminant (primarily chlorinated solvents) biodegradation indicators which should be investigated or considered in the evaluation of natural attenuation.

Considerations (not presented in the Proposed Plan) of an OU2 site 17 ground water remedial action which combines a short-term active ground water remedial action with a more long-term natural attenuation biodegradation remedial action may be ill advised. This process may result in too rapid a removal from the ground water of the nutrient mass necessary to maintain a viable population of degrading microbes. Conversely, certain organic compounds could be toxic to microorganisms at high concentrations. Treatability testing, site analysis, and consultation with experts on bioremediation are probably necessary before proceeding with any such plans.

If you have any questions about this memorandum, or need further technical assistance, please contact me.