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OCT 14 2005
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OFFICE OF WATER AND WATERSHEDS

October 11, 2005

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Mr. Brian Winter
Olympic National Park
826 E Front St Suite A
Port Angeles, WA 98362

Mr. Dick Bauman
United States Bureau of Reclamation
826 E Front St Suite A
Port Angeles, WA 98362

RE: Elwha River Restoration Project - Polyaluminum Chloride (PAC)

Dear Mr. Winter and Mr. Bauman,

The National Park Service is preparing to remove the two dams on the Elwha River, Clallam County, Washington. In addition for hopes of restored salmon runs, dam removal will again allow river sediments to move through the riverine system as well as enter the Strait of Juan De Fuca. The removal of the dams will contribute to the restoration of ecological functions in this area.

The initial removal of the dams is expected to release a substantial amount of sediment. This will continue for the first few months after each staged lowering of the dams. The proposed Elwha River Treatment Plant will remove sediment-laden water, treat it with PAC, discharge clean water to current users in the basin, and release the remaining turbid water back into the Elwha River. Polyaluminum chloride (PAC) was chosen as the flocculent to be used for this treatment.

Toxicity testing of PAC has been conducted to evaluate its environmental safety for use during the dam removal project. The tests were performed by URS Corporation (URS) under the guidance of Mr. Randall Marshall, Washington State Department of Ecology (Ecology). Results from a wide variety of toxicity tests concluded that potential of adverse effects from the use of PAC were highly unlikely (Marshall, 2005).

Based on the results from the URS toxicity testing, Ecology agrees that polyaluminum chloride can be used in the Elwha River Water Treatment Plant during the dam removal project on the Elwha River. The use of PAC will be in accordance with standard practices for operation of conventional surface water coagulation and sedimentation process as identified in the Draft Final Report of Treated Water and Residual Solids Toxicity (URS) dated April 19, 2004." The use of PAC must also fall within the parameters accounted for in the toxicity tests.

Sincerely,

Kelly Susewind, P.E., P.G.
Water Quality Program
Southwest Regional Office

Enclosure: Executive Summary, July 20, 2005, by Randy Marshall, Ecology

cc: Cameron Ochiltree, URS
Kris Turschmid, URS
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Bryan Yim, EPA
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Joan Marchiaro, WA Attorney General
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Koko Cronin, USACE Seattle District Regulatory Branch
Thom Hooper, NOAA/NMFS
Steve Gray, Clallam County
Gary Dougherty, Clallam County
Randall Marshall, Ecology

Evaluation of Toxicity Test Results on Sediments Treated with Polyaluminum Chloride

Executive Summary

July 20, 2005

Background

Toxicity tests have been conducted on sediments generated from turbid water treated with polyaluminum chloride (PAC) in order to evaluate the environmental safety of returning the solids back to the Elwha River. The Water Quality Program usually does not approve the return of a pollutant back to the wastestream from which it has been removed. This situation is, however, unique. The removal of the dams and restoration of the salmon runs has been determined to be beneficial to both this state and the nation.

The removal of the dams will release huge amounts of sediment from behind the dams. In addition to restoring salmon runs, dam removal will allow these sediments to again enter the marine system of the Strait of Juan De Fuca where they are needed for maintenance of sand spits. The river will be carrying a maximum amount of solids for the first few months after each staged lowering of the dams. Not only will the returned solids from the treatment be a relatively small fraction of the solids in the river but the river will already be so seriously impaired that the returned solids cannot make it any worse.

The solids that originated in the river will be returned to the river along with some of the PAC treatment chemical. Because the treatment chemical will be the only element of the discharge that did not originate in the river, a decision was made to run several freshwater and marine sediment toxicity tests on solids generated by the bench scale treatment of water to which sediments from behind the dam had been added. Sediments from behind the dam were used in order to provide environmental realism.

Results

The freshwater sediment tests conducted were the 10-day amphipod (*Hyalella azteca*) survival test, the 96-hour rainbow trout survival test, and the 10-day midge (*Chironomus tentans*) survival and growth test. The marine sediment tests conducted included the 10-day amphipod (*Eohaustorius estuaries*) survival, emergence, and reburial test, the 20-day polychaete (*Neanthes arenaceodentata*) survival and growth test, and the 48-hour blue mussel embryo-larval survival and development test. Test organism response in the first mussel survival and development test did not meet control performance criteria in the untreated control sediment. The problem may have been due to the use of a freshwater sediment from behind the dam with this marine organism or due to the size of the sediment particles. A clean marine sediment that has produced good performance in past mussel tests was subsequently used to get acceptable reference sediment performance and allow for meaningful statistical comparisons.

The bivalve test development endpoint was the most sensitive. None of the other tests showed toxicity even at the highest concentration (500% of the intended PAC dose). Bivalve normal development was significantly less at both 250% and 500% PAC. The bivalve survival endpoint was anomalous and excluded from the evaluation.

Conclusion

Most of the tests indicated no significant effects at PAC concentrations up to 500% of the intended use concentration. The only significant toxic responses were to bivalve development at 250% PAC (only a 4% reduction in normal development) and 500% PAC (a 58% reduction in normal development). Based upon the results of a wide variety of toxicity tests ranging up to 20 days in duration and assessing survival, growth, development, and behavioral endpoints, PAC concentrations in sediments resulting from dosing near the 100% level are so highly unlikely to have adverse effects in the river that it is reasonable to grant approval for the use of PAC for this project. In addition, there are two large safety margins for this conclusion. 1. Dilution by river water and the untreated sediments in the river will be huge and was not factored into this evaluation. 2. The solids loading in the river during times of treatment will be so large that little or no aquatic life will be present until the river reaches the Strait of Juan de Fuca.