



Many Voices Working for the Community

Oak Ridge Site Specific Advisory Board

January 14, 2010

Mr. John Eschenberg
Assistant Manager for Environmental Management
DOE-Oak Ridge Operations
P.O. Box 2001, EM-90
Oak Ridge, TN 37831

Dear Mr. Eschenberg:

Recommendation 183: Recommendation on the Preferred Alternative for the Removal of Hexavalent Chromium in Mitchell Branch at East Tennessee Technology Park

At our January 13, 2010, meeting the Oak Ridge Site Specific Advisory Board approved the enclosed recommendation regarding the preferred alternative for reducing the levels of hexavalent chromium in Mitchell Branch at East Tennessee Technology Park.

ORSSAB recommends that the Department of Energy Oak Ridge Office of Environmental Management adopt Alternative 3, Ex Situ Treatment, Chromium Reduction, as the method for the non-time critical removal action for removing hexavalent chromium in Mitchell Branch.

We appreciate your consideration of this recommendation and look forward to receiving your response by April 13, 2010.

Sincerely,

A handwritten signature in black ink, appearing to read "Ron Murphree".

Ron Murphree, Chair, PE, CPE
rm/rsg
Enclosure

cc/enc:

Dave Adler, DOE-ORO
Cate Brennan, DOE-HQ
Mike Farmer, Roane County Mayor
Pat Halsey, DOE-ORO
Connie Jones, EPA Region 4

Local Oversight Committee
Rex Lynch, Anderson County Mayor
Melissa Nielson, DOE-HQ
Oak Ridge City Manager
John Owsley, TDEC



Oak Ridge Site Specific Advisory Board Recommendation 183: Recommendation on the Preferred Alternative for the Removal of Hexavalent Chromium in Mitchell Branch at East Tennessee Technology Park

Background

Mitchell Branch flows through the northern portion of East Tennessee Technology Park (ETTP) and discharges into Poplar Creek, which in turn discharges into the Clinch River. Mitchell Branch passes through a heavily industrialized section of ETTP with a watershed area that has been used for almost 70 years for a wide variety of activities including production facilities, maintenance operations, waste management facilities, burial ground disposal operations, decontamination facilities, and extensive utility support systems. Based upon biological monitoring evaluations, the stream historically has shown signs of being impacted from industrial operations.

Over the years a number of actions have been taken under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) to reduce the amount of contaminants going into Mitchell Branch.¹

The release of hexavalent chromium into Mitchell Branch from the Storm Drain-170 outfall and from seeps at the headwall of the Storm Drain-170 discharge point resulted in levels of hexavalent chromium that exceeded State of Tennessee ambient water quality criterion. Immediately below Storm Drain-170, hexavalent chromium levels were measured at levels as high as 0.78 mg/L, which exceeded the State of Tennessee hexavalent chromium water quality chronic criterion of 0.011 mg/L for the protection of fish and aquatic life.

Since chromium has not been used at ETTP for more than thirty years, the release of hexavalent chromium into Mitchell Branch is a legacy problem and not an ongoing operations problem. Therefore, the Department of Energy (DOE) determined that the appropriate response to this release was a CERCLA time-critical removal action. On November 5, 2007, DOE notified the Environmental Protection Agency and the Tennessee Department of Environment and Conservation of its intent to conduct a CERCLA time-critical removal action to install a grout barrier wall and groundwater collection system to intercept the chromium-contaminated water discharging from the Storm Drain-170 outfall and headwall seeps into Mitchell Branch.

Groundwater contaminated with hexavalent chromium discharges into Storm Drain-170 and its bedding material and flows from there into Mitchell Branch. The originating source has not been found, but the point at which groundwater from the bedrock formation surfaces and the process for its entry to the Storm Drain-170 gravel bedding material is known. The hexavalent chromium contamination is limited to groundwater and does not include surrounding soil.

The current problem to be addressed is the reduction of hexavalent chromium into Mitchell Branch that causes an exceedance of the State of Tennessee hexavalent chromium ambient water quality chronic criterion of 0.011 mg/L for the protection of fish and aquatic life. This release also contains

¹ Engineering Evaluation/Cost Analysis (EE/CA) for the Reduction of Hexavalent Chromium Releases into Mitchell Branch at ETTP (DOE/OR/01-2244&D1), pp 2-3.

uranium and trichloroethylene (TCE). Uranium and TCE do not exceed standards, but their removal was considered when evaluating process options.

DISCUSSION

At the December 9, 2009, meeting of the Oak Ridge Site Specific Advisory Board (ORSSAB), Sid Garland, Bechtel Jacobs, Co., provided a presentation that outlined the problem of hexavalent chromium releases into Mitchell Branch and the proposed alternatives for removal of the chromium as described in the Engineering Evaluation/Cost Analysis (EE/CA) for the Reduction of Hexavalent Chromium Releases into Mitchell Branch at ETP (DOE/OR/01-2244&D1).

Mr. Garland provided a similar presentation to ORSSAB's Environmental Management Committee on December 16, 2009.

The seven alternatives proposed alternatives are:

1. Alternative 1, No Action
2. Alternative 2, Direct Discharge to the Clinch River
3. Alternative 3, Ex Situ Treatment, Chromium Reduction
4. Alternative 4, Ex Situ Treatment, Central Neutralization Facility (CNF)
5. Alternative 5, Ex Situ Treatment, Modified Central Neutralization Facility
6. Alternative 6, Ex Situ Treatment, Waste Water Treatment System
7. Alternative 7, In Situ Treatment, Reactive Zone

He said all of the alternatives were evaluated on the basis of effectiveness, implementability, and cost. All alternatives (except No Action), are based on the assumption of treating the groundwater for 30 years. However, since the source and size of the source of the chromium is unknown, it is possible that treatment could be longer than 30 years. Results of treatment activities, regardless of the chosen method, will be reported in the annual Remediation Effectiveness Report.

Based on the criteria of effectiveness, implementability, and cost the preferred option is Alternative 3, Chromium Reduction.

Under the Chromium Reduction alternative, the existing extraction wells will pump the groundwater to the air stripper sump at the CNF, a reducing agent will be added, and from there it will be pumped through the existing air stripper to the Clinch River via the existing pipeline. The components of this alternative are the extraction well, grout barrier wall, chemical reduction (to reduce hexavalent chromium to trivalent chromium, which is less toxic), air stripper (to reduce volume of volatile organic compounds discharged to the Clinch River), discharge of treated effluent to the Clinch River, surveillance and maintenance, and long-term monitoring.

According to the evaluation of Alternative 3 in the EE/CA, Alternative 3 is effective for the long-term and easy to implement with a capital cost of approximately \$80,000 and annual operating and maintenance costs of approximately \$250,000. The total un-escalated cost for 30 years is approximately \$7.7 million.

It should be noted that Alternative 2, Direct Discharge to the Clinch River, meets the evaluation criteria for effectiveness, implementability, and cost. In fact, it is estimated to be less expensive than Alternative 3 (\$65,000 capital cost, \$190,000 operations and maintenance, and approximately \$6 million un-escalated cost over 30 years).

However, Alternative 2 does nothing to reduce the toxicity of hexavalent chromium by reducing it to trivalent chromium. DOE believes, and the ORSSAB Environmental Management Committee agrees, that reducing the toxicity of the chromium prior to discharge will be more acceptable to the public. The cost difference is about \$1.7 million over 30 years.

RECOMMENDATION

After reviewing the material provided at the December 9 ORSSAB meeting and the December 16 ORSSAB Environmental Management Committee meeting, ORSSAB recommends that the Department of Energy Oak Ridge Office of Environmental Management adopt Alternative 3, Ex Situ Treatment, Chromium Reduction, as the method for the non-time critical removal action for removing hexavalent chromium in Mitchell Branch at ETP.