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ADDENDUM 1

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1,4 DIOXANE ACTION PLAN

KEEFE ENVIRONMENTAL SERVICE SITE EPPING, NEW HAMPSHIRE

Prepared for

New Hampshire Department of Environmental Services

July 6, 2004

Prepared by

Woodard & Curran

Woodard & Curran has prepared this action plan to outline the proposed change in scope for additional evaluation, design, installation, optimization and operation and maintenance activities to be conducted at the Keefe Environmental Services Site (Site). These proposed activities are being performed to supplement the primary remedial alternative (groundwater pump and treat via air stripping) currently operating at the USEPA-lead Long-Term Response Action (LTRA) Site. The revisions are based on an evaluation of data collected at the site under the Amendment 10 site activities (September 2002 through August 2003) and preliminary work conducted under the current Amendment 11 contract (September 1, 2003 to September 30, 2004). This action plan was requested by the New Hampshire Department of Environmental Services (NHDES) and the USEPA to address the recent discovery of the 1,4 dioxane issue at the site. This action plan will become an addendum to the modified Exhibit A - Scope of Work submitted in May 2004 as part of revised Amendment 11.

The tasks listed under this plan will address actions required to convert the existing treatment system of air stripping to a system that is capable of treating the recently detected 1,4 dioxane in the groundwater. EPA has agreed to extend the long-term remedial action for and additional nine months, through June 30, 2005, to allow for the evaluation, design and installation of a treatment system capable of treating the 1,4 dioxane present in the site groundwater. In addition, the nine month extension will allow for two optimization periods (late fall, early spring) and system maintenance related to the winter shut down period (rebound). The tasks and associated costs will include, at a minimum, testing of groundwater and treatment system influent/effluent, system design, installation, operation and optimization, including procurement and lease of the treatment system.

It is estimated that operation of the new system will be needed for approximately 2 years to determine the efficiency of the system and to determine groundwater restoration trends. The EPA's nine month extension of the LTRA will therefore cover the costs for operation/optimization of the system through June 30, 2005. The Site will then be transferred to the State for continued operation and maintenance and any future site activities including future monitoring and demobilization (future O&M costs have been estimated at 250,000 per year).

Woodard & Curran will supervise all work plan activities under the direction of the NHDES and the EPA. The proposed tasks associated with the 1,4 Dioxane Action Plan are presented herein.

Background

The recently confirmed presence of 1,4 Dioxane at the site has altered the planned Site Transfer Activities. The Long Term Remedial Actions (LTRA) pertaining to the groundwater restoration will now be complete as of June 30, 2005, when the site will be transferred to the State of New Hampshire for Operation and Maintenance of the Groundwater Collection and Treatment Facility (GWCTF).

For samples collected in March 2004, 1, 4 Dioxane was detected in 13 of 17 off-site wells and 15 of 18 on-site wells at maximum levels of 42 ppb and 400 ppb, respectively. The extent of the 1,4-dioxane contamination plume is significantly larger than that of the residual VOC contamination (ROD parameters.) This is typically of 1,4-dioxane plumes noted at several other sites.

Action Plan

Woodard & Curran has investigated several options for addressing the recent discovery of 1,4 dioxane and has determined, based on the limited data available, that advanced oxidation by the addition of hydrogen peroxide, ozone and/or UV light is a most promising remediation technique for the compound. The existing GWCTF unit processes is not designed to treat 1,4-dioxane. Studies have shown that air stripping is not an effective means to remove 1,4-dioxane from groundwater. The following list of activities outlines the steps which will be taken through June 30, 2005, to address the 1,4-dioxane issue at the site, and the anticipated costs.

Task 1 - Project Management through June 30, 2005

Woodard & Curran will provide ongoing project management during the nine month LTRA extension to ensure all activities are completed by the June 30, 2005 transfer date. Project management activities will include weekly phone conference calls, a monthly activity summary report, site meetings (as needed) and project oversight. More frequent meetings/calls may take place, as necessary to ensure continuous communication.

Task 2 – Development/Upgrade of Site Specific Plans

Development of and or modification of existing Work Plans, Health and Safety Plans, QAPPs, etc. for the installation, testing and operation of a system for the treatment of the 1,4 dioxane. A Final Work Plan for the 1,4 dioxane activities will need to be completed.

Task 3 – Data Collection and Evaluation

Continued testing of the existing system to determine 1,4-dioxane influent and effluent concentrations are required to evaluate the current and proposed system. This task allows for the collection of weekly/monthly performance samples for 1,4 dioxane and VOCs. The EPA laboratory in Chelmsford, Massachusetts will be utilized for the 1,4 dioxane testing. The VOC testing will be performed by a Woodard & Curran subcontracted laboratory. Woodard & Curran will also provide assistance with the collection of biannual groundwater and surface water samples for 1,4 dioxane. Costs of the analyses by the EPA have not been included. The task includes labor and expenses for the collection, transportation, data evaluation and data management.

Task 4 – Evaluation of Treatment Alternatives

Woodard & Curran has conducted a preliminary evaluation of 1,4 dioxane treatment alternatives and will use this evaluation, along with the additional site data from the May 2004 sampling round, to complete an evaluation of treatment alternatives. The evaluation will review the effectiveness of three methods for 1,4 dioxane treatment including activated carbon, peroxide/UV destruction and peroxide/ozone destruction. The evaluation will provide a basis for the selection of a treatment method for the 1,4 dioxane present in the groundwater at the Keefe Site. Under this task, Woodard & Curran will issue a minimum of three Request for Qualifications for various treatment systems to compare cost effectiveness and availability.

Task 5 – Bench Scale Teatability/System Design Study

Collection of representative samples of site groundwater (influent) will be completed and the samples will be used to run a bench scale treatability study. The study will provide design data needed to estimate hydrogen peroxide usage and ozone demand. This is essential to accurately designing the system and estimating future operating costs.

Task 6 – Design and Construction of Selected Treatment System

Design and construction of the treatment plant upgrade to treat for 1,4 dioxane. Need to design system and install unit into existing GWCTF. Woodard & Curran will evaluate all existing data and propose to the NHDES and the EPA, a treatment alternative for 1,4 dioxane. The treatment system upgrade will be designed and constructed under this task. It is anticipated that some modifications will be made to the extraction system to enhance removal of 1,4 dioxane and a new unit process will be installed to treat the 1,4 dioxane. Woodard & Curran will also evaluate and plan for additional controls to facilitate the operation and maintenance of the system.

Under this task, Woodard & Curran will issue a minimum of three Request for Proposals for the selected treatment systems to ensure cost effectiveness and availability. Installation of unit is anticipated of occur in the Fall of 2004.

Task 7 – Operation and Optimization of the Upgraded Treatment System

Purchase/Lease of selected unit process for 24 months. Operation of the new treatment facility through June 30, 2005 in pulse mode (operate late fall/early spring, with a winter shut down) to provide hydraulic containment and prevent further migration of 1,4-dioxane. Woodard & Curran will provide all labor, technical support and materials need to operate, maintain optimize the treatment system during the nine month extension of the LTRA.

Task 8 – Develop O&M Manual for the Modified Treatment System

Develop and Submit a draft and final Operation and Maintenance Manual for the new treatment system by June 30, 2005. Woodard & Curran will update the current O&M manual to reflect the plant modifications and optimizations.

Task 9 – Miscellaneous Site Closure / Transfer Activities

Final miscellaneous site closure activities associated with the transfer of the site to the State on June 30, 2005, may include additional activities associated with the new treatment system, decommissioning activities, etc. as needed to complete the transfer.

Table 1				
1,4 Dioxane Action Plan				
Cost Summary Table				
Task	Description	Cost Estimate		
1	Project Management	\$37,440		
2	Development/Upgrade of Site Specific Plans	\$48,020		
3	Data Collection and Evaluation	\$38,540		
4	Evaluation of Treatment Alternatives	\$5,660		
5	Bench Scale Treatability/System Design Study	\$4,500		
6	Design and Construction of Selected Treatment System	\$75,000		
7	Operation and Optimization of the Treatment System through June 30, 2005 (with 24 month unit lease)	\$275,000		
8	Develop O&M Manual for the Modified Treatment System	\$25,000		
9 Miscellaneous Site Closure / Transfer Activities		\$50,000		
Total		\$559,160.00		

All tasks will be completed on a time & material basis as estimated in Table 1 - Cost Summary Table. No costs will be incurred in excess of the aggregate budget estimate without prior approval. The leased 1,4 dioxane treatment unit can be purchased for approximately \$150K to \$180K. The 24 monthly lease is budgeted in Task 7 based on a \$3,500 per month fee. The residual purchase option after 24 months is approximately \$75,000.

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Keefe Environmental Services Site - Transfer from LTRA to O&M (November 2004)

The original transfer date from LTRA to O&M for the current pump & treat system at the Keefe site was September 2004. In late 2003, EPA and NHDES embarked on a groundwater sampling program to ensure that 1,4-dioxane was not a contaminate of concern at the site. Unfortunately, 1,4-dioxane was discovered in several onsite monitoring-extraction wells as high as 712 ppb. Additional groundwater sampling has confirmed the existence of 1,4-dioxane in groundwater across the site, but at lesser concentrations (though still 1 - 300 ppb). Private residential wells, located down gradient of the site, did not indicate the presence of 1,4 dioxane.

In the spring-summer of 2004, EPA regional staff discussed the finding of 1,4-dioxane with EPA headquarters and NHDES personnel. At that time, it was agreed that EPA would extend the transfer date by nine months, to June 30, 2005. This would enable modifications to the current treatment system to be installed and optimized with 90% funding contribution by EPA using existing Special Account funds. This agreement was embodied in a State Cooperative Agreement which was issued to NHDES in September 2004; the agreement goes before the State's Governor and Council for approval on November 10, 2004. The current groundwater collection and treatment system is scheduled to be modified to address 1,4-dioxane treatment by December 2004.

NHDES has stated to EPA that "(S)since 1,4-dioxane is not covered by the current ROD (neither its existence nor treatment), NHDES reserves the right to petition EPA for further LTRA extensions and accompanying 90% EPA funding contributions. NHDES is of the opinion that since 1,4-dioxane is a new contaminant-of-concern and requires a new treatment process for its removal from the aquifer, the new remedial action may warrant a new ten-year LTRA." EPA has responded to this by funding all capitals costs for the new system, prior to June 2005, thereby reducing the states long term costs for operation and maintenance, once the transfer to the state for long term O&M occurs in June of 2005.