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ATTACHMENT D

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**WORK PLAN
FOR THE ASSESSMENT OF
AQUIFER RESTORATION**

Prepared For:

**SPARTON TECHNOLOGY, INC.
Coors Road Facility
Albuquerque, New Mexico**

Prepared By:



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1.0 INTRODUCTION

Sparton Technology, Inc. (Sparton) has agreed to install, test and operate an off-site containment well near the leading edge of an off-site plume of solvents thought to be associated with past operations at its Coors Road Facility in Albuquerque, New Mexico. The containment well (CW-1) and two observation wells (OB-1 and OB-2) were installed in the summer of 1998; a step-drawdown test and a three-day constant-rate test were conducted on the well between December 4 and 12, 1998, in compliance with the terms of the "Work Plan for the Installation of Additional Wells and Conducting a Pump Test in the Area of the Leading Edge of the Contaminant Plume Originating from the Sparton Technology, Inc. Coors Road Facility", effective July 7, 1998 (PI Work Plan).

The results of these tests and data on the hydraulic gradient of the aquifer and on the extent of the plume was used to estimate the pumping rate required to contain the plume (see Interim Report on Off-Site Containment Well Pumping Rate¹). This pumping rate was used to conduct a 30-day containment-feasibility test on the well between December 31, 1998 and January 30, 1999, in accordance with the terms of the PI Work Plan. Since the completion of this test, Sparton is continuing to operate the well at the same pumping rate, and will conduct an evaluation of its performance after six months of continuous operation [see Attachment C - Work Plan for the Off-Site Containment System (Off-Site Containment Plan)].

Sparton is also proposing to install and operate a source containment well immediately downgradient of its Coors Road Facility [see Attachment F - Work Plan for the Installation of a

¹ S. S. Papadopoulos & Associates, Inc., 1998, *Interim Report on Off-Site Containment Well Pumping Rate*: prepared for Sparton Technology, Inc., Coors Road Facility, Albuquerque, New Mexico, December 28.

Source Containment System (Source Containment Plan)]. Groundwater pumped by the well will be treated at an on-site air-stripper and it is anticipated it will be returned to the aquifer through a series of on-site infiltration ponds. This proposed well will address potential on-site sources as discussed in the Source Containment Plan.

In addition, Sparton operated an on-site soil vapor extraction (SVE) system between April and October 1998 to reduce contaminant concentrations in the vadose zone, and has recently proposed additional investigations aimed at obtaining data for implementing a modified SVE system (see Attachment E - Vadose Zone Investigation Workplan).

The goal of these corrective measure activities is to restore the contaminated groundwater to its beneficial use. Specifically, the goal is to reduce groundwater contamination to the more stringent of either the federal drinking water standards (Maximum Contaminant Levels, or MCLs, established under the Safe Drinking Water Act) or the maximum allowable concentrations in ground water set by the New Mexico Water Quality Control Commission (NMWQCC). If it is determined that such goal is technically impracticable or technically infeasible, as determined from all relevant data including information obtained during the operation of the off-site containment and the on-site source containment systems, and subject to all necessary regulatory requirements, alternate cleanup standards may be submitted for approval.

The purpose of this Work Plan is to describe the procedures that will be used to assess progress in aquifer restoration, evaluate alternate remedial measures, and determine the feasibility of restoring the aquifer to beneficial use.

2.0 DATA AND MONITORING REQUIREMENTS

To assess progress in aquifer restoration, evaluate alternate remedial measures, and determine the feasibility of restoring the aquifer to beneficial use, the following data will be needed:

1. Hydrogeologic data on the lithology and stratigraphy of the aquifer, on transmissivity, recharge, water levels, and pumping rates;
2. Water-quality data from monitoring and containment wells, and/or the influent to the treatment facilities;
3. Data on the fate and transport properties of the aquifer and of the constituents of concern;
4. Operational data from the containment systems; and
5. Data on alternate remedial technologies.

Data on the lithology and stratigraphy of the aquifer are available from regional studies, from reports that have been prepared on site conditions, and from the logs of wells that have been drilled at the site and its vicinity. Information on the aquifer transmissivity is available from an on-site test and from the off-site tests that were conducted under the terms of the PI Work Plan; additional information will be obtained from the effects of the continuous operation of the off-site and source containment systems. Information on regional recharge rates is available from regional groundwater studies, and recharge rates from the proposed on-site infiltration ponds and the off-site infiltration gallery will be estimated as part of the evaluations to be conducted under this Work Plan.

Operational data from the source and off-site containment systems, data on fate and transport properties, and on alternate remedial technologies will be developed during the evaluations that will be conducted under this Work Plan.

Data on water-levels and water-quality in monitoring wells have been collected in the past under ongoing monitoring programs; these data will continue to be collected in compliance with Attachment A - Ground Water Monitoring Program Plan (Monitoring Plan). Data on the off-site containment well pumping rate and water quality were collected during the 30-day containment-feasibility test and continue to be collected during the current continuous operation of the well. After the air stripper and the infiltration gallery for the off-site system have been installed and begin operating, data on treatment plant influent and effluent quality will also be collected in compliance with the Monitoring Plan. Similarly, after the source containment system is installed and begins operating, data on the source containment well pumping rate and water quality, and treatment plant influent and effluent quality will be collected in compliance with the Monitoring Plan.

3.0 ASSESSMENT OF AQUIFER RESTORATION

The tasks that will be performed to assess progress in the restoration of the aquifer, evaluate alternate remedial measures, and determine the feasibility of restoring the aquifer to beneficial use will be:

- Task 1 - Assemble and evaluate hydrogeologic data;
- Task 2 - Evaluate water-quality data and assess progress in restoration;
- Task 3 - Develop groundwater flow and contaminant transport model;
- Task 4 - Prepare Annual Reports.

Each of these is briefly discussed below.

3.1 Task 1 - Hydrogeologic Data Evaluation

Available regional and site-specific reports on the lithology and stratigraphy and the overall hydrogeologic setting of the site and its vicinity will be assembled, reviewed and evaluated to determine the conceptual framework that would be appropriate for use in developing a model needed for predicting future progress in aquifer restoration and for evaluating alternate remedial measures. This task will also include the assembly of data on transmissivity, water levels, and containment well pumping rates that will be collected and evaluated under the terms of other data collection and evaluation programs (PI Work Plan, Monitoring Plan, Off-Site Containment Plan, Source Containment Plan). Operational data on the treatment systems will be evaluated to estimate recharge through the infiltration gallery and ponds. The evaluation of hydrogeologic data will be completed within the first year of off-site containment system operation, and the results will be reported in the first Annual Report. Adjustments to these results, if any, that may be indicated by subsequent data will be reported in subsequent Annual Reports.



predict spatial and temporal changes in concentration. Model predicted concentrations and changes in concentration will be compared to actual data from the site, and adjustments to transport parameters will be made to minimize the difference between the computed and observed results.

Development of the initial flow and transport model will be completed during the first year of operation of the source and off-site containment systems; it is estimated that this development will take approximately four months. The structure of the model and the results of the initial model calibration will be reported in the first Annual Report of the site. This first Annual Report will also include predictions on water-quality conditions at the end of the second year of containment system operation. At the end of the second year, actual conditions will be compared to the predicted conditions, and adjustments to the model and model parameters will be made as necessary; predictions will again be made for conditions at the end of the next year. Starting with this second year, an assessment will be made to determine the reliability of the model in making long-term predictions of plume behavior and in evaluating the need for additional remedial measures. This assessment will also include an evaluation of whether additional data are necessary to improve the model and increase its reliability because the process of aquifer restoration may be long term and information obtained over the short term may not provide a sufficient basis for predicting longer term aquifer response. The results of this assessment will be reported in the second Annual Report.

If any additional data needs have been identified, a Groundwater Investigation Work Plan will be prepared to implement a data collection program. This process will be repeated at the end of each subsequent year and the results will be reported in the Annual Report of each year, until all data necessary for developing the model have been collected and the model has been deemed capable of making reliable predictions of future conditions.

3.4 Task 4 - Preparation of Annual Reports

Reference has been made to the site's Annual Reports in this Work Plan and in both the Off-Site Containment Plan and the Source Containment Plan. The purpose of these Annual Reports will be to present within a single report all data that have been collected during each year of containment system operation and any data interpretations and evaluations that have been conducted during the year. These Annual Reports will be submitted for review and approval in accordance with procedures set forth in the Consent Decree. The information to be presented in the Annual Reports will include the following:

- Background information on the site and a brief description of the remedial measures that have been implemented;
- Estimates of the initial pore volume of contaminated water and of the contaminant mass in place;
- Operational data on the containment and treatment systems; hours of operation versus hours available during the year; problems and their resolution;
- Operational data on the SVE system; hours of operation versus hours available during the year; problems and their resolution;
- Operational data on any other remedial systems that may be implemented in the future;
- Containment well flow rates; treatment system influent and effluent rates;
- SVE system air flow rates;
- Water-level data from monitoring, containment and observation wells;
- SVE system pressure measurements;

- Water-quality data from monitoring and containment wells, and comparison of these data with media standards (the more stringent of MCLs for drinking water or the maximum allowable concentrations in ground water set by NMWQCC);
- Water-quality data from the influent to and effluent from the treatment systems;
- Air-quality data from the SVE system;
- Pertinent data from any other remedial systems that may be implemented in the future;
- Plots of monthly extraction rates and of cumulative volume of water pumped, and comparison with the contaminant pore volume;
- Evaluation of water-level data; maps showing water levels and the capture zones of the containment wells and interpretation of these maps with respect to the performance of the containment systems; if capture of the off-site plume or of on-site source areas is not achieved, a discussion of additional measures that may be required to achieve capture;
- Plots of monthly mass removal rates and of cumulative removal of constituents of concern, and comparison with the mass in place;
- Isoconcentration and change in concentration maps for constituents of concern; plots of constituent concentration against time in monitoring wells; interpretation of these maps and plots with respect to progress in remediation;
- If the monitoring well to be installed on-site (see Source Containment Plan) is completed as monitoring well MW-72 (rather than a piezometer), evaluation of water-quality data from this well with respect to the performance goal of the source containment well (during the first four years of operation); at the five year mark, an

evaluation of whether any source areas remain uncaptured based upon all available data; if such source areas are identified, proposals for specific measures to define and/or to capture those areas;

- Evaluation of data from any other remedial systems that may be implemented in the future;
- Discussion of any adjustments to the pumping rates of the containment wells; reason for such adjustments and expected results;
- Interpretation of flow rate, air-quality and pressure data from the SVE system with respect to the performance goals of the system;
- Modifications to the SVE system; reason for such adjustments and expected results;
- Compliance with site permits; problems, if any, and their resolution;
- Summary of contacts during the year with representatives of the local community, public interest groups, and state and federal parties;
- Summary of progress in aquifer restoration;
- Discussion of whether reliable predictions of future conditions can be made, and if not, discussion of the reasons; and
- Conclusions and plans for next year.

During the early years of operation, when model development is in progress, and alternate remedial systems and/or technologies are being evaluated for potential implementation at the site, the Annual Reports will also include the following information:

- Description of progress in developing the flow and transport model;
- Detailed description of data inputs required to develop the flow and transport model, and discussion of any identified additional data needs;

- A plan and schedule for the collection of needed data, if any;
- Documentation of the flow and transport model;
- Model predictions for the next year, and discussion of the reliability of the model in predicting future conditions;

If reliable predictions of future conditions can be made, additional evaluations will be conducted, and the Annual Report will, therefore, also include the following results of these evaluations:

- Predicted future progress in restoration and projected restoration time with the existing containment systems, and discussion of the feasibility of restoration within a reasonable time period;
- Evaluation of alternate remedial systems involving groundwater extraction (e.g., center of mass extraction), the estimated time in which each alternative remedial system will achieve the restoration goal, and a discussion of its effectiveness, including cost-effectiveness, in accelerating aquifer restoration;
- Evaluation of alternate technologies, other than groundwater extraction, and discussion of their applicability to aquifer restoration at the site;
- Detailed discussion of any alternate remedial system, or technology, proposed for implementation at the site;
- If an alternate system or technology is not proposed for implementation, detailed discussion of the reasons why an alternative system or technology cannot be effectively implemented at the site; and
- Conclusions and recommendations for future actions, including an evaluation of whether attainment of cleanup standards is technically impracticable, as defined in

federal regulations or guidance documents, or technically infeasible as defined under state regulations or guidance documents, or the necessity and appropriateness of seeking alternate abatement standards from NMWQCC.

ATTACHMENT E

To the Consent Decree In

Albuquerque v. Sparton Technology, Inc., No. CV 07 0206 (D.N.M.)

Vadose Zone Investigation and Implementation Workplan