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**Sparton Technology, Inc.
Former Coors Road Plant
Remedial Program**

**Work Plan for Installing
Monitoring Well MW-80**

Prepared by:



S.S. PAPADOPULOS & ASSOCIATES, INC.
Environmental & Water-Resource Consultants

and

METRIC Corporation, Los Lunas, New Mexico

**May 4, 2010
Revised May 25, 2010**

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S.S. PAPADOPULOS & ASSOCIATES, INC.
ENVIRONMENTAL & WATER-RESOURCE CONSULTANTS



May 25, 2010

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Subject: Sparton Technology, Inc. Former Coors Road Plant Remedial Program
Work Plan for Installing Monitoring Well MW-80

Gentlemen:

On behalf of Sparton Technology, Inc., S. S. Papadopoulos & Associates, Inc. (SSP&A) is pleased to submit a revised Work Plan for the Installation of Monitoring Well MW-80. The Work Plan was originally submitted on May 4, 2010, but it has been revised to address comments received from the agencies on May 21, 2010. As was the case with the original, this revised Work Plan was also prepared by SSP&A in cooperation with Metric Corporation.

I certify under penalty of law that this document and all attachments were prepared under my direction and supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based upon my inquiry of either the person or persons who manage the system and/or the person or persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I further certify, to the best of my knowledge and belief, that this document is consistent with the applicable requirements of the Consent Decree entered among the New Mexico Environment Department, the U.S. Environmental Protection Agency, Sparton

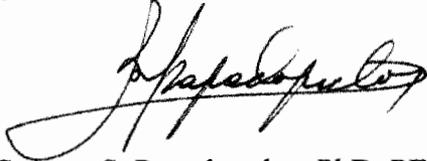
United States Environmental Protection Agency
New Mexico Environment department
May 4, 2010
Page 2

Technology, Inc., and others in connection with Civil Action No. CIV 97 0206 LH/JHG, United States District Court for the District of New Mexico. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

If you have any questions concerning the report, please contact me.

Sincerely,

S.S. PAPANOPULOS & ASSOCIATES, INC.



Stavros S. Papadopoulos, PhD, PE, NAE
Founder & Senior Principal

cc: Secretary, Sparton Technology, Inc., c/o Mr. Joseph S. Lerczak
Mr. Gregory A. Slome, Senior Vice President and Chief
Financial Officer of Sparton Corporation
Mr. Joseph S. Lerczak, Director of Treasury and Forecasting
and Secretary of Sparton Corporation (3 copies)
Mr. James B. Harris, Thompson & Knight LLP
Mr. Tony Hurst, Hurst Engineering Services (2 copies)
Mr. Gary L. Richardson, Metric Corporation

**Sparton Technology, Inc.
Former Coors Road Plant
Remedial Program**

**Work Plan for Installing
Monitoring Well MW-80**

Prepared for:

**Sparton Technology, Inc.
Schaumburg, Illinois**

Prepared by:



**S.S. PAPADOPULOS & ASSOCIATES, INC.
Environmental & Water-Resource Consultants**

and

METRIC Corporation, Los Lunas, New Mexico

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INTRODUCTION

The former Coors Road Plant (*Site*) of Sparton Technology, Inc. (*Sparton*) is located at 9621 Coors Boulevard NW, Albuquerque, New Mexico. Under the terms of the Consent Decree signed on March 3, 2000¹, Sparton implemented an off-site and a source containment system to address groundwater contamination, and is currently operating these systems. Each containment system consists of an extraction well, CW-1 and CW-2, and associated water treatment and recharge facilities. To evaluate the performance of these systems data are collected on the flow rates and the water levels of the two extraction wells, the quality of the influent to and effluent from the two treatment plants, and the quality of the groundwater and/or the water level in 67 monitoring wells. These data and their interpretation with respect to the performance of the containment systems are presented every year in Annual Reports that are submitted to the United States Environmental Protection Agency (*USEPA*) and to the New Mexico Environment Department (*NMED*).

In their comments on the 2007 Annual Report,² USEPA and NMED expressed concern that “[t]he toe of the plume has only one remaining sentinel well location, at wells MW-68/69, even though the plume is generally about 1600’ wide. This one location is not downgradient of the furthest-downgradient contaminated wells, MW-65 and OB-2, so there is inadequate data to verify that the plume extent is defined or that the plume has been fully contained.” Based on this concern, the agencies requested that one or more wells or well clusters be installed “west-to-northwest of MW-65 and OB-2.”

On behalf of Sparton, S. S. Papadopoulos & Associates, Inc. (*SSP&A*) responded to this request indicating that Sparton was not prepared to install any additional wells citing several reasons, including the fact that the current (2007) extent of the plume was not significantly different than the initial (1998) plume which was prepared using the same number of wells along its leading edge and which was accepted by the agencies and became a part of the Consent Decree.³ Negotiations between representatives of USEPA, NMED, and Sparton to resolve this disagreement began on March 17, 2009 and continued until April 23, 2010 when agreement was reached between the parties on all outstanding issues concerning the installation of a “sentinel” well (hereafter MW-80). Some of the milestones in reaching this agreement were:

March 30, 2009 Sparton agrees to install MW-80 as a downgradient monitoring well.

¹ Consent Decree, 2000, *City of Albuquerque and The Board of County Commissioners of the County of Bernalillo, plaintiffs, v. Sparton Technology, Inc., defendant*. Civil Action No. CIV 97 0206, U.S. District Court for the District of New Mexico, filed March 3.

² Letter dated December 30, 2008 from Chuck Hendrickson of USEPA, Region 6 and John Kielsing of NMED to Tony Hurst of Hurst Engineering Services, Re: 2003-2007 Annual Reports, Sparton Technology, Inc., Former Coors Road Plant, Sparton Technology, Inc., Consent Decree, Civil Action No. CIV 97 0206 LH/JHG, EPA ID No. NMD083212332, with enclosure on “EPA/NMED Comments on Spaton, Inc., Annual Reports for 2003-2007.”

³ Letter dated February 12, 2009 from Charles B. Andrews of SSP&A to Chuck Hendrickson of USEPA, Region 6 and John Kielsing of NMED with Subject: Response to EPA/NMED comments on Sparton Technology, Inc., Former Coors Road Plant Remedial Program, 2003-2007 Annual Reports.

| | |
|--------------------|--|
| August 12, 2009 | The parties agree on a location for MW-80 (see Figure 1). |
| August 13, 2009 | Sparton proposes to complete the well with a 30-foot screen between elevations of 4910 and 4940 feet MSL. |
| August 28, 2009 | The agencies respond requesting three separate 30-foot screened intervals. |
| September 12, 2009 | Sparton proposes to install 11 diffusion bags in well OB-1 and select one screened interval for MW-80 based on the results; the agencies accept the proposal. |
| December 17, 2009 | Based on the diffusion bag results, Sparton proposes that MW-80 be completed with a 10-foot screen between elevation 4910 and 4920 feet above MSL. |
| March 26, 2010 | USEPA/NMED send a letter to Sparton requesting that MW-80 be completed with a 40-foot screen between elevation 4895 and 4935 feet above MSL, and that a concentration profile be generated using low-flow sampling techniques. |
| April 19-23, 2010 | The parties agree on the approach to be used in installing, sampling, and completing MW-80. A summary of the agreement is approved by USEPA on April 22 and by NMED on April 23. |

The agreed upon approach for installing, sampling, and completing MW-80 was as follows:

1. Sparton will install MW-80, at the location shown in Figure 1, as a 4-inch well with a 40-foot screen between elevations 4895 and 4935 ft MSL;
2. The well will be sampled after installation using standard sampling techniques;
3. If the analysis of that sample indicates that the constituents of concern (trichloroethylene [TCE], 1,1-dichloroethylene [DCE], and 1,1,1-trichloroethane [TCA] are not detected (ND) at a detection limit of 1 µg/L, the well will be deemed complete and included in the quarterly sampling schedule;
4. If the analysis of the initial sample indicates the presence of a constituent of concern above the detection limit of 1 µg/L, then the NMED, at its own cost, will obtain a concentration profile along the 40-foot screened interval using the low-flow sampling approach;
5. After the results of the concentration profile are available, the agencies will have the option of leaving the well as is or select a 10-foot interval for monitoring; and
6. If the agencies select a 10-foot interval for monitoring, Sparton will re-complete the well as a 2-inch well within the original 4-inch well for quarterly monitoring of the selected 10-foot interval.

The purpose of this Work Plan is to provide details on the installation, sampling, and completion of MW-80 and present a schedule for implementing these tasks. The Work Plan was originally submitted to USEPA/NMED on May 4, 2010. On May 21, 2010, the agencies commented on the Work Plan requesting some additional details.⁴ This revised version of the Work Plan provides the details requested by the agencies.

⁴ E-mail sent on May 21, 2010 from Baird Swanson of NMED to Gary Richardson of Metric, Brian Salem of NMED, and Charles Hendrickson of USEPA, with cc to William Moats of NMED on the subject of NMED/EPA comments on the Sparton MW-80 Work Plan.

WELL INSTALLATION

To determine the depth to which the well should be drilled so that its screened interval lies between elevations of 4895 and 4935 feet above MSL, the agreed upon location of the well will be surveyed by a licensed surveyor registered in the State of New Mexico to determine the ground elevation, and a temporary bench mark will be established for later use in determining the top of casing elevation and well coordinates. The depth corresponding to an elevation of 4895 feet MSL will be determined from this survey, and a 7-7/8-inch hole will be drilled to this depth plus 5 feet using a rotary mud drilling rig.⁵ All spent drilling mud will be hauled to the on-site area and stored in a storage tank that will be installed near the source containment well (CW-2) treatment facility. All drill cuttings will also be hauled to the CW-2 treatment facility. During drilling, cutting samples will be obtained every 5 feet and examined for color, sorting, and texture; after the completion of drilling, a boring log will be prepared using these data to show the lithology encountered at the well site; an example of the information that will be included in the boring log is presented in Figure 2.

A 4-inch diameter screen and casing assembly consisting of a 40-foot screen with a plug or cap at the bottom, and casing extending to the ground surface will then be lowered into the hole. The casing will be made of 4-inch, flush-joint-threaded (FJT), Schedule 40 PVC pipe; the screen will be made of 4-inch, FJT, Schedule 40 slotted PVC pipe with 0.020-inch slots.⁶ Centralizers will be installed on the bottom of the screen, and at 6 and 16 feet above the top of the screen. A sand-pack consisting of 10-20 sand will be placed by tremie into the annular space between the screen and the hole and into any vacant space that may have remained at the bottom of the hole; this sand-pack will extend to 2 feet above the top of the screen, and an additional 2 feet of finer 20-40 sand will be placed on the top to prevent the downward seepage of the grout that will be placed into the remainder of the annular space to the ground surface also by tremie. The tremie will be of 1-inch or 1-1/4-inch galvanized steel with external couplings, and the grout will consist of 5 percent bentonite-cement; the grout will be installed in three stages of about 90 feet each with a minimum of 12 hours of drying time between stages.

Note that centralizers beyond the three at the bottom and above the screen are not proposed for the remainder of the casing. While centralizers are easy to handle when a well is completed within surface casing that was advanced during drilling, they usually create problems when the well is completed within an open hole. Problems created by centralizers in completing a well in an open hole include:

- Getting stuck on the wall of the hole during the introduction of the casing and thus preventing the casing from going down the hole;
- Entangling a tag line thereby preventing its use; and most commonly

⁵ The hole will be drilled to 5 feet below the bottom of the planned screened interval to allow for the storage of debris that may fall into the hole as the casing/screen assembly is lowered into the hole.

⁶ A screen with 0.010-inch slots will be used if the formation across the screened interval has a large percentage of fine-grained materials.

- Causing the tremie pipe couplings to get stuck and thus making it necessary to cement the tremie in the hole or, in the worst case, causing the casing to break during attempts to get the tremie unstuck.

To avoid these potential problems, additional centralizers are not proposed. The three centralizers at the bottom and above the screen will insure that the screen is centered in the hole and that the bentonite-cement grout above the sand-pack forms a complete seal in the lower 20 or more feet of the casing to isolate the screened interval from the upper parts of the hole.

After the grout has set, the well will be completed by cutting the casing below ground surface, and installing an 8-inch diameter locking well head and a manhole with cover to protect the well-head. The well will then be surveyed by a New Mexico licensed surveyor to determine its location coordinates and the elevation of its “measuring point” to the accuracy standards specified in Procedure P-9 of Attachment A to the Consent Decree.⁷ A completion diagram showing the construction details of the well will be then prepared; an example of the information that will be included in the completion diagram is presented in Figure 3.

⁷ Consent Decree, City of Albuquerque and the Board of County Commissioners of the County of Bernalillo v. Sparton Technology, Inc., U.S. District Court for the District of New Mexico, CIV 97 0206, entered on March 3, 2000.

WELL DEVELOPMENT AND SAMPLING

The well will be developed using the development procedures described in Procedure P-6 of Attachment A to the Consent Decree (see Footnote 7) for 4-inch wells. Water produced during development will also be stored in the storage tank at the on-site treatment facility to allow for the settlement of most of the suspended materials. Water from the tank will be later filtered and routed to the treatment facility for treatment and return to the aquifer through the infiltration ponds. The settled materials will be sampled, and appropriately disposed based on the sampling results.

When the well has been adequately developed, a sample will be obtained from the well and sent to the laboratory to be analyzed for Volatile Organic Compounds (VOCs). Sample handling and analysis methods will be as specified in the Site's Groundwater Monitoring Plan (Attachment A of the Consent Decree). The NMED will be notified prior to the sampling of the well, and given the opportunity to obtain a split sample if they so desire.

If the results of the analysis indicate that the well is free of COCs (TCE, DCE, and TCA) at a detection limit of 1 $\mu\text{g/L}$, a permanent submersible sampling pump will be installed in the well and the well will be included into the Site's quarterly sampling schedule for water levels and water quality.

If, on the other hand, the analysis results indicate the presence of a COC above the specified detection limit, Sparton's representatives will coordinate with NMED the low-flow sampling of the well by NMED to develop a concentration profile for the screened interval of the well. Sparton will have the option of obtaining split-samples during this low-flow sampling event. Based on the results of this sampling, USEPA and NMED will decide whether the well should be left as completed, with a permanent submersible pump installed in the well for quarterly sampling, or whether the well should be modified as discussed below to sample only one 10-foot interval to be selected by USEPA/NMED.

WELL MODIFICATION

If the 10-foot interval selected for monitoring is above the bottom of the 4-inch well, then the bottom of the well below the selected interval will be plugged with a mixture of 50% granular bentonite and 50% 10-20 sand. A 2-inch screen and casing assembly consisting of a 10-foot screen with a plug or cap at the bottom, and casing extending to the ground surface will be lowered into the well to the top of the bentonite/sand mixture. The casing will be made of 2-inch, FJT, Schedule 40 PVC pipe; the screen will be made of 2-inch, FJT, Schedule 40 slotted PVC pipe with 0.020-inch slots. Centralizers will be installed on the casing at 6 and 16 feet above the top of the 2-inch screen, to insure that a complete seal can be placed above the sand-pack surrounding the screen, and at depths of 100 and 200 feet below ground surface. A sand-pack consisting of 10-20 sand will be placed into the annular space between the inner and outer screen; this sand-pack will extend to about 1 foot above the top of the inner screen, and an additional 2 feet of finer 20-40 sand will be placed on the top to prevent the downward seepage of the grout that will be placed into the remainder of the annular space between the 2-inch casing and the 4-inch screen or casing. The grout will consist of 5 percent bentonite-cement and will be installed in the annular space using a ¾-inch flexible polyethylene tremie pipe in one stage; the grout will be allowed to dry for a minimum of 12-hours. A permanent bladder sampling pump will be installed in the well, and the well will be included in the quarterly schedule for water-level and water-quality monitoring. A revised completion diagram will be prepared to show the modifications to the construction details of the well.

REQUIRED PERMITS AND SCHEDULE

Permits required for the installation of the well at the agreed upon location, except for a Monitoring Well Drilling Permit, have been already obtained by Sparton. Upon approval of this Work Plan by USEPA and NMED, Sparton will apply to the New Mexico State Engineer's office for a Monitoring Well Drilling Permit. Also, if the decision is made to modify the well, a Clean and Deepen Permit will be required to work-over the well and make these modifications. Sparton will apply to the New Mexico State Engineer's office for this permit as soon as the agencies notify Sparton of their decision to modify the well. It is anticipated that obtaining each of these permits may take as much as 4 weeks.

A schedule for the installation and sampling of the well, and for its completion as a 4-inch monitoring well with a 40-foot screen is presented in Figure 4a. As shown in this figure, the installation and sampling of the well, up to the point when a decision can be made on whether low-flow sampling would be necessary, will take 17 weeks (about 4 months) after the Work Plan approval by the agencies. If low-flow sampling is not necessary, an additional week will be needed to purchase and install a permanent sampling pump in the well.

If the results of the sampling indicate that low-flow sampling is necessary, a schedule for completing this sampling and modifying the well, if required by the agencies, and for installing a permanent sampling pump, is presented in Figure 4b. It is estimated that low-flow sampling by NMED can be made within 2 weeks, analytical results can be obtained within another 2 weeks, and that the agencies can reach a decision on whether the well should be left as is or modified in another 2 weeks.

FIGURES

FIGURES

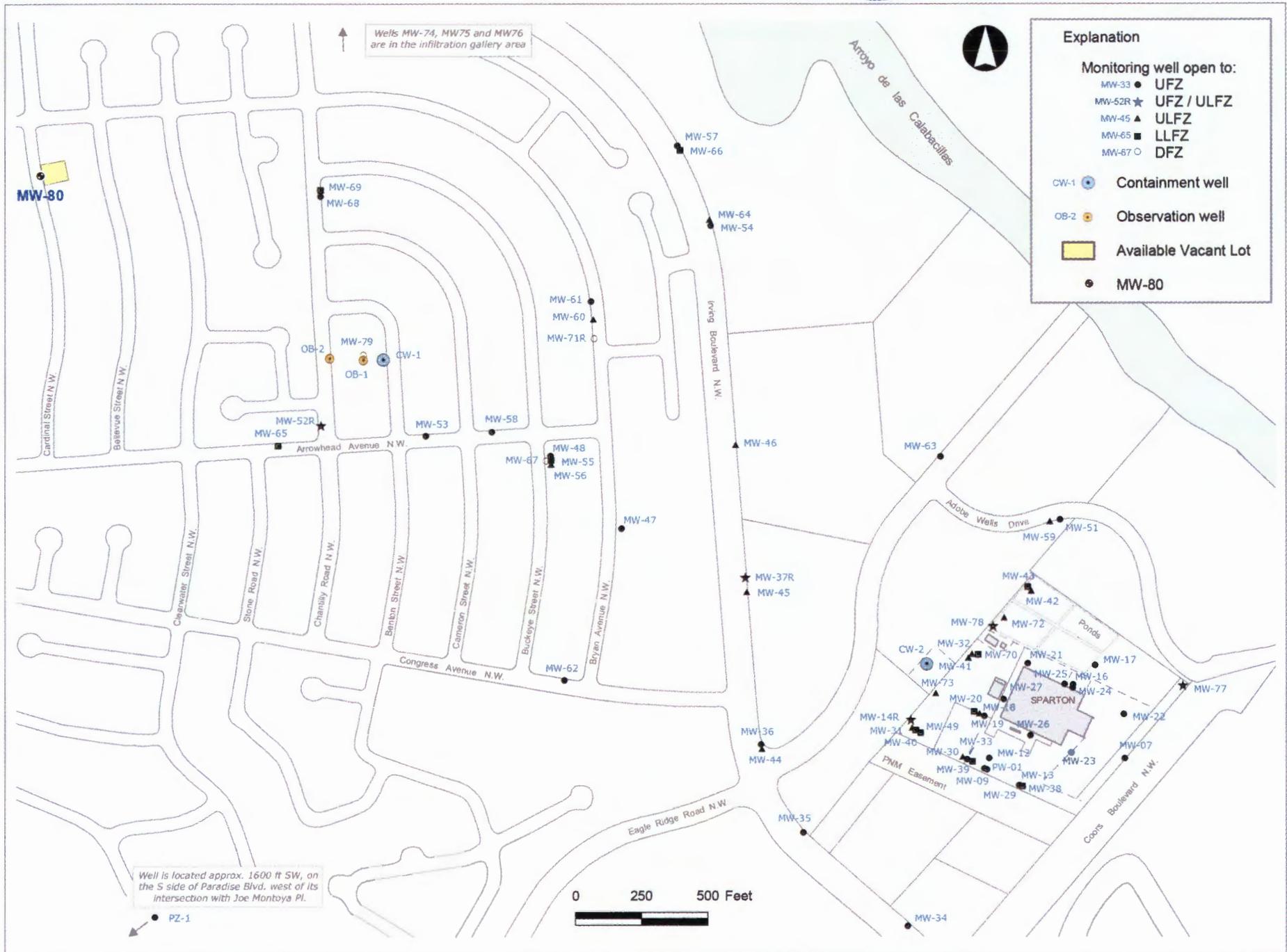


Figure 1 Location of Monitoring Well MW-80

METRIC

Corporation

SAMPLE LOG

Borehole Number MW-77 Borehole Location N. 1524374.2, E. 377754.9
 Property Owner Sparton Technology, Inc.
 Sample Logger Joe Sandoval & Peter Metzner, METRIC Corporation
 Driller Rodgers Environmental Services
 Drilling Medium Hollow stem auger
 Date of Completion June 2001 Ground Elevation 5045.5 ft.

| Depth (feet) | Thickness (feet) | Stratigraphic Description |
|-----------------|---------------------|---|
| 0 - 60 | 60 | Pale yellowish brown (10YR 6/2), medium sorted, subangular to subrounded, very fine to medium sand with some pebble gravel. |
| 60 - 68 | 8 | Grayish orange (10YR 7/4), poorly sorted, subangular to subrounded, very fine to coarse sand. |
| 68 - 70.5 | 2.5 | Grayish orange (10YR 7/4), poorly sorted, subangular to subrounded, very fine sand to pebble gravel. |
| 70.5 - 73 | 2.5 | Pale yellowish orange (10YR 6/6) very fine silty sand. |
| 73 - 90 | 17 | Sandy (no recovery). |

Figure 2 Example of boring log

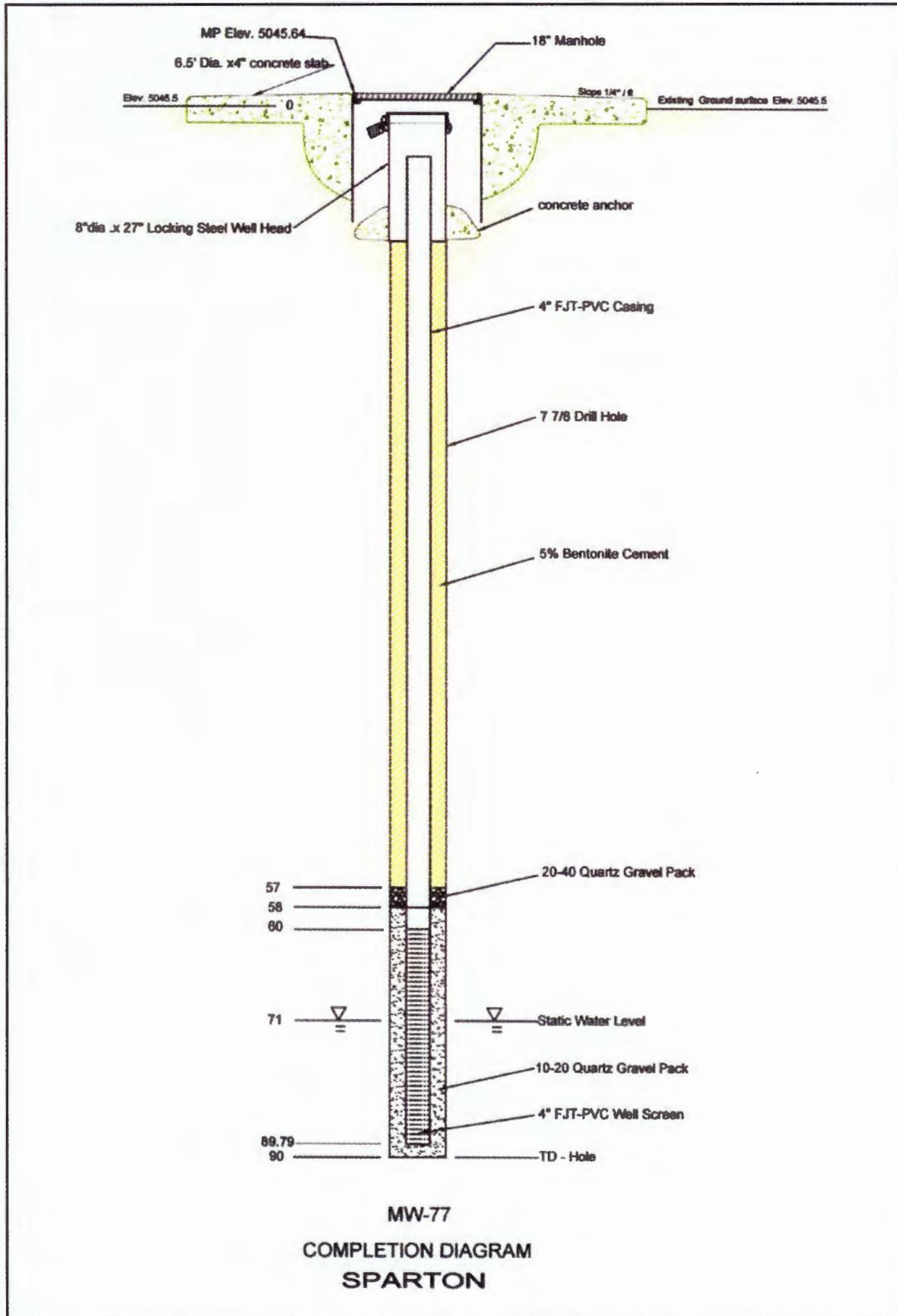


Figure 3 Example of completion diagram

Figure 4a Schedule for the Installation and Sampling of the Well

| Task | Description | Duration, weeks | Weeks after USEPA/NMED Approval of Work Plan | | | | | | | | | | | | | | | | | |
|------|--|-----------------|--|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|
| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 1 | USEPA/NMED Approval of Work Plan | 0 | ▽ | | | | | | | | | | | | | | | | | |
| 2 | Obtain Drilling Permit from NM State Engineer | 4 | ■ | ■ | ■ | ■ | ■ | | | | | | | | | | | | | |
| 3 | Prepare Well Specifications | 1 | ■ | | | | | | | | | | | | | | | | | |
| 4 | Survey Well Location | 1 | | ■ | ■ | | | | | | | | | | | | | | | |
| 5 | Schedule Driller | 4 | | | | ■ | ■ | ■ | ■ | | | | | | | | | | | |
| 6 | Drill Well and Install Casing and Screen | 2 | | | | | | | | ■ | ■ | | | | | | | | | |
| 7 | Install Well Head | 1 | | | | | | | | | | ■ | | | | | | | | |
| 8 | Develop Well | 2 | | | | | | | | | | | ■ | ■ | | | | | | |
| 9 | Sample the Well | 0 | | | | | | | | | | | | | | | | | ▽ | |
| 10 | Obtain Analytical Results | 2 | | | | | | | | | | | | | ■ | ■ | | | | |
| 11 | Decision on Low-Flow Sampling by NMED | 2 | | | | | | | | | | | | | | | | | ▽ | |
| 12 | Purchase & Install Permanent Submersible Sampling Pump | 1 | | | | | | | | | | | | | | | | | ■ | |

Figure 4b Schedule for Low-Flow Sampling and Modification of the Well

| Task | Description | Duration, weeks | Weeks after Decision on Low-Flow Sampling | | | | | | | | | | | | | | | | | |
|------|--|-----------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|
| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 1 | Low-Flow Sampling by NMED | 2 | ■ | ■ | ■ | | | | | | | | | | | | | | | |
| 2 | Obtain Analytical Results | 2 | | | ■ | ■ | ■ | | | | | | | | | | | | | |
| 3 | Decision on Interval to be Monitored | 2 | | | | | | | | ▽ | | | | | | | | | | |
| 4a | Purchase & Install Permanent Submersible Sampling Pump | | | | | | | | | ■ | | | | | | | | | | |
| OR | | | | | | | | | | | | | | | | | | | | |
| 4b | Obtain Work-Over Permit from NM State Engineer | 4 | | | | | | | | | ■ | ■ | ■ | ■ | | | | | | |
| 5 | Modify Well | 2 | | | | | | | | | | | | ■ | ■ | | | | | |
| 6 | Order & Install Permanent Bladder Sampling Pump | 4 | | | | | | | | | | | | | | ■ | ■ | ■ | ■ | |