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

**Work Plan for Plugging and
Abandoning Three Monitoring
Wells and for Installing a
Replacement Well**

Prepared by:



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

November 22, 2011

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November 22, 2011

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Albuquerque, NM 87109

Subject: Sparton Technology, Inc. Former Coors Road Plant Remedial Program - Work Plan for Plugging and Abandoning Three Monitoring Wells and Installing a Replacement Well

Gentlemen:

Groundwater levels at Sparton Technology, Inc.'s (Sparton's) Former Coors Road Plant and its vicinity have been declining causing some of the shallower monitoring wells to become dry. Sparton's 2010 Annual Report¹ on remedial activities recommended that two of three wells that were dry during the last several years, wells MW-58 and MW-61, be plugged and abandoned and that the third well, well MW-47, be deepened. The 2010 Annual report and the recommendation on the plugging or deepening of these three wells were approved by the U. S. Environmental Protection Agency and the New Mexico Environment Department on September 23, 2011.² Inspection of the three wells to determine the best approach for implementing the agency approved modifications indicated, however, that the location of well MW-47 presents difficulties to his deepening. The well is located in the landscaped front yard of a residence, and bringing a drilling rig on the property is not possible without major damage to the landscaping. Sparton,

¹ S.S. Papadopoulos & Associates Inc. 2011. Sparton Technology, Inc., Former Coors Road Plant Remedial Program, 2010 Annual Report. Report prepared for Sparton Technology, Inc. in association with Metric Corporation. June 20.

² Letter from John E. Kieling of NMED and Chuck Hendrickson of USEPA to Joseph S. Lerczak of Sparton, Re: 2010 Annual Report Approval with Modification, Sparton Tecnology Inc., EPA ID No.:NMD083212332.



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

therefore, proposes that well MW-47 be also plugged and abandoned, and replaced with a new well, well MW-47R, located in front of an adjacent vacant lot and on the public right-of-way between the sidewalk and the street curb.

This Work Plan, submitted on behalf of Sparton, presents a brief description of the procedures that will be used to plug and abandon the three existing wells and to install the proposed replacement well.

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 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 Work Plan, please contact me.

Sincerely,

S.S. PAPADOPULOS & 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)

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Former Coors Road Plant
Remedial Program**

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Replacement Well**

Prepared for:

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

Prepared by:



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

November 22, 2011

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REPORT

INTRODUCTION

The Sparton Technology Inc. (Sparton) Former Coors Plant Remedial Program is operated in accordance with the terms of a Consent Decree entered in March 3, 2000. Under these terms, Sparton collects water-level and water-quality data from a number monitoring wells. Groundwater levels at the site and its vicinity have been declining causing some of the shallower monitoring wells to become dry. As wells become dry, they are plugged and abandoned, or deepened, with the approval of the U. S. Environmental Protection Agency (USEPA) and the New Mexico Environment Department (NMED).

During the last several years three additional monitoring wells, wells MW-47, MW-58 and MW-61 became dry or could not be sampled because they did not have sufficient water (see Figure 1 for well locations). The water level in well MW-47 has been below the bottom of its screen, or was reported as dry, since the 3rd quarter of 2010 and the well has not been sampled because of insufficient water since November 2008. Similar water-level conditions existed in well MW-58 during the 2nd quarter of 2009 and since the 4th quarter of 2009, and in well MW-61 since the 3rd quarter of 2008. Well MW-58 could not be sampled since November 2006 and well MW-61 since November 2007. Since these wells could no longer be used for water-level and water-quality monitoring, Sparton's 2010 Annual Report¹ on remedial activities recommended that wells MW-58 and MW-61 be abandoned and that well MW-47 deepened. The 2010 Annual report and the recommendation on the plugging or deepening of these three wells were approved by USEPA and NMED on September 23, 2011.² Inspection of the three wells to determine the best approach for implementing the agency approved modifications indicated, however, that the location of well MW-47 presents difficulties to his deepening. The well is located in the landscaped front yard of a residence (see Figure 2a); bringing a drilling rig on the property is not possible without major damage to the landscaping. Sparton, therefore, proposes that well MW-47 be also plugged and abandoned, and replaced with a new well, well MW-47R, located in front of an adjacent vacant lot and on the public right-of-way between the sidewalk and the street curb (see Figure 2b).

This Work Plan presents a brief description of the procedures that will be used to plug and abandon the three existing wells and to install the proposed replacement well.

¹ S.S. Papadopoulos & Associates Inc. 2011. Sparton Technology, Inc., Former Coors Road Plant Remedial Program, 2010 Annual Report. Report prepared for Sparton Technology, Inc. in association with Metric Corporation. June 20.

² Letter from John E. Kielsing of NMED and Chuck Hendrickson of USEPA to Joseph S. Lerczak of Sparton, Re: 2010 Annual Report Approval with Modification, Sparton Tecnology Inc., EPA ID No.:NMD083212332.

PLUGGING AND ABANDONMENT OF WELLS

Well MW-47 is about 160 feet deep, well MW-58 is about 185 feet deep, and well MW-61 is about 175 feet deep. All three wells are completed with 4-inch diameter PVC casing and 15 feet of screen at the bottom. These three wells will be plugged and abandoned in a manner that will prevent migration of surface runoff or ground water along the length of the well casing.

Well MW-58 is located on the public right-of-way between the sidewalk and the curb along Arrowhead Avenue within a manhole whose cover is flush with a concrete slab that was installed between the curb and the sidewalk (see Figure 3a). To plug and abandon this well, the concrete slab between the sidewalk and the curb will be broken down and the manhole around the well will be removed; the broken down concrete will be hauled away for disposal. The locking steel well head around the well casing will also be removed, and an attempt will be made to remove the casing from the well. If this is successful, then the well will be plugged by placing into the borehole bentonite-cement grout consisting of 5 lbs of powdered bentonite, 94 lbs of Portland cement, and 6.5 to 8.5 gallons of clean water. The bentonite-cement grout will be placed using a tremie pipe, from the bottom of the borehole to about one foot below ground surface. If the attempt to remove the casing is not successful, the upper three feet of the casing will be drilled out, and the bentonite-cement grout will be placed into the well, again using a tremie pipe from the bottom of the well to about one foot below ground surface. Under both grouting approaches, after the grout has set, the upper one foot of the hole will be filled with soil and/or gravel, as appropriate, to blend with the surrounding right-of-way.

Well MW-61 was also installed on the public right-of-way along Bryan Avenue, but its location is now part of a concrete driveway for a residence; the well is within a manhole flush with the driveway (see Figure 3b). To plug and abandon this well, the section of the driveway that contains the well will be broken down and the manhole around the well will be removed; the broken down concrete will be hauled away for disposal. The procedures described for well MW-58 will then be followed to plug the well, except that, in this case, the grout will extend from the bottom of the well to an elevation near the bottom of the driveway slab. After the grout has set, the section of the driveway will be restored to its original condition.

For well MW-47, whose location precludes the use of a drilling rig, the well cover and concrete pad around it will be removed. The soil around the casing will be excavated to a depth of about three feet, and the casing will be manually cut at that depth. The bentonite-cement grout will then be placed into the well and into the hole that was dug around the well, again using a tremie pipe, from the bottom of the well to about one foot below the ground surface. The upper one foot of the hole will be filled with soil and the landscaping restored.

INSTALLATION OF REPLACEMENT WELL

Well MW-47 is 159 feet deep with a 15-foot screen at the bottom, between elevations 4,961.4 and 4,976.4 feet MSL; the 2010 elevation of the water table at the well location was about 4,961 feet MSL near or below the bottom of the screen. The replacement well, well MW-47R, will be 185 feet deep with a 20-foot screen at the bottom, between elevations 4935 and 4955 feet MSL. To install the well, a 5-7/8 inch hole will be drilled to a depth of 190 feet³ using a rotary mud drilling rig. 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; these data will be used after the completion of drilling to prepare a boring log showing the lithology encountered at the well site; an example of the information that will be included in the boring log is presented in Figure 4.

A 2-inch diameter screen and casing assembly consisting of a 20-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 2-inch, flush-joint-threaded (FJT), Schedule 40 PVC pipe; the screen will be made of 2-inch, FJT, Schedule 40 slotted PVC pipe with 0.020-inch slots.⁴ Centralizers will be installed on the bottom of the screen, and at 6 and 22 feet above the top of the screen.⁵ 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 two stages of about 80 feet each with a minimum of 12 hours of drying time between stages. After the grout has set, the well will be developed using the development procedures described in Procedure P-6 of Attachment A to the Consent Decree⁶ for 2-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.

³ The hole will be drilled to 5 feet below the planned screened interval to allow for the storage of debris that may fall into the hole during the casing/screen assembly installation.

⁴ 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.

⁵ Due to difficulties usually encountered in installing casing with centralizers into an open hole, centralizers beyond these three are not proposed for the remainder of the casing; 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.

⁶ 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.

After development, the well will be completed by cutting the casing below ground surface, and installing an 6-inch diameter locking well head and an 18-inch manhole with cover to protect the well-head. A concrete slab will be placed around the manhole, extending from the sidewalk to the curb and to both sides of the manhole to match sidewalk markings. 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.⁶ 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 5.

REQUIRED PERMITS

The plugging and abandonment of MW-47, MW-58, and MW-61 requires Well Plugging Plan of Operations permit from the New Mexico State Engineer's Office. Because these wells are monitoring wells, the State Engineer's Office may require proof that their plugging has been approved by the regulatory agencies.⁷ The approval of this Work Plan will provide this proof.

In the next few weeks, Sparton will start the process of obtaining a permit from the City of Albuquerque for the installation of the replacement well MW-47R at the proposed location on the right-of-way between the sidewalk and the curb. Installation of this well will also require a Monitoring Well Drilling Permit from the New Mexico State Engineer's office. Upon approval of this Work Plan by USEPA and NMED, Sparton will apply to the New Mexico State Engineer's office for this permit.

Sparton has been using the services of Rogers & Co., Inc. of Albuquerque for plugging, deepening, or installing monitoring wells associated with the site. This firm will again be used to do the work outlined in this Work Plan, and they will be prepared to proceed upon approval of the Work Plan and the issue of all necessary permits.

⁷ Applications to the New Mexico State Engineer's Office for the permits to plug well MW-58 and MW-61 were inadvertently filed by Rogers & Co., Inc. on October 24, 2011. The State Engineer's Office issued the permit to plug MW-58 on October 28, 2011 but denied the permit for MW-61 on November 2, 2011 due to lack of proof of regulatory agency approval. New applications for this well and for well MW-47 will be submitted upon approval of the Work Plan.

FIGURES

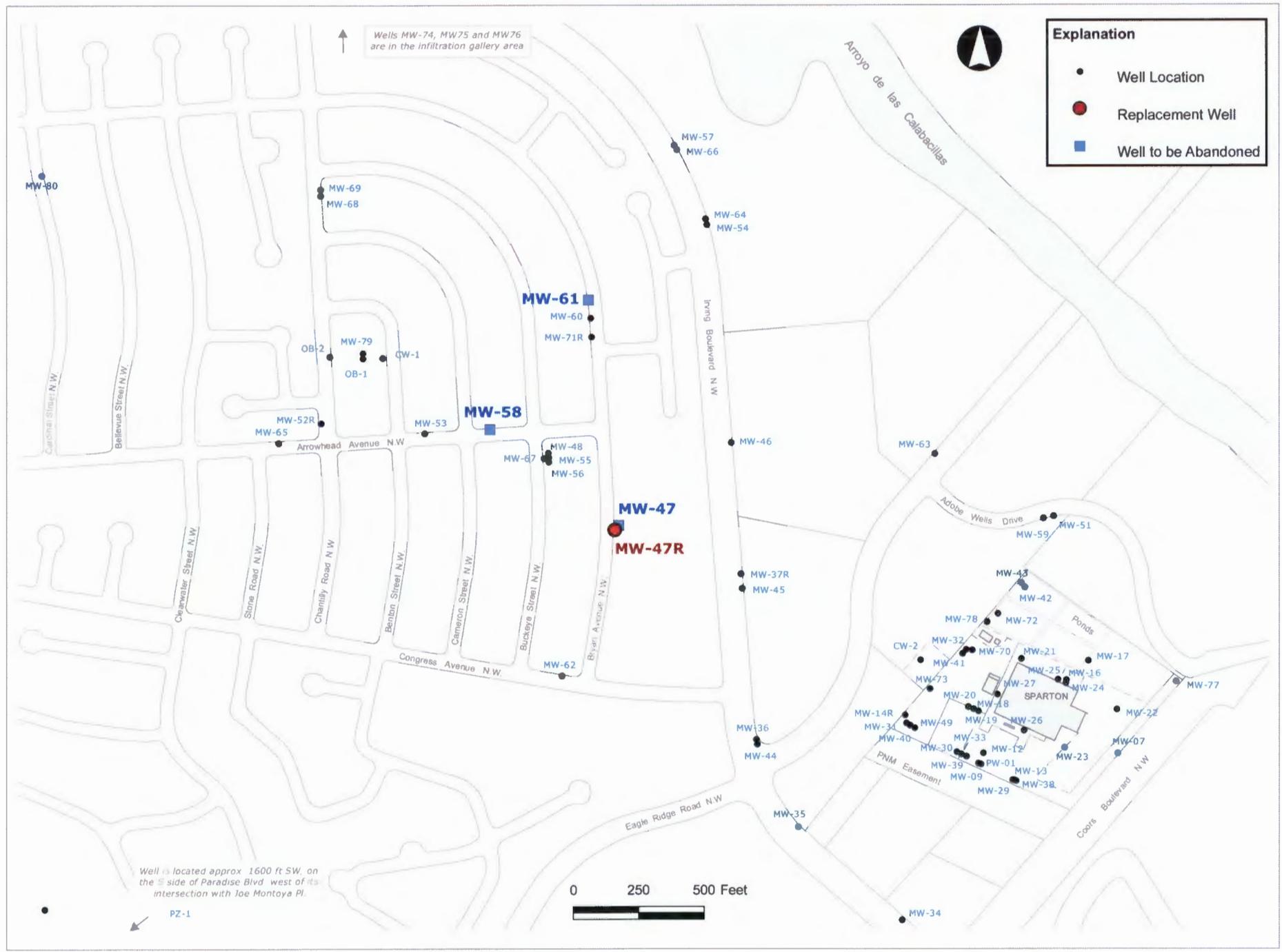


Figure 1 Well Location Map



Figure 2a Location of Existing Well MW-47



Figure 2b Location of Proposed Replacement Well MW-47R



Figure 3a Location of Well MW-58

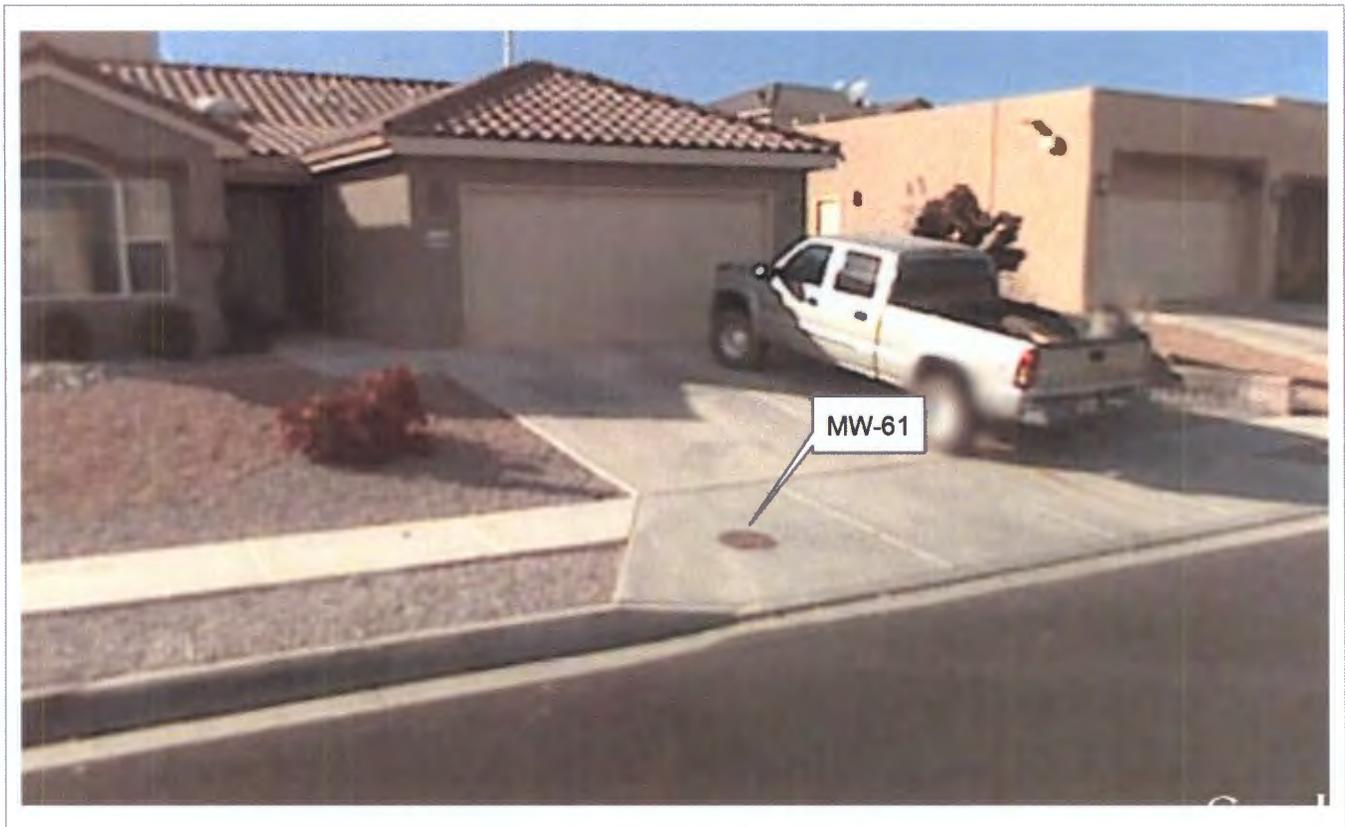


Figure 3b Location of Well MW-61

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 4 Example of Well Boring Log

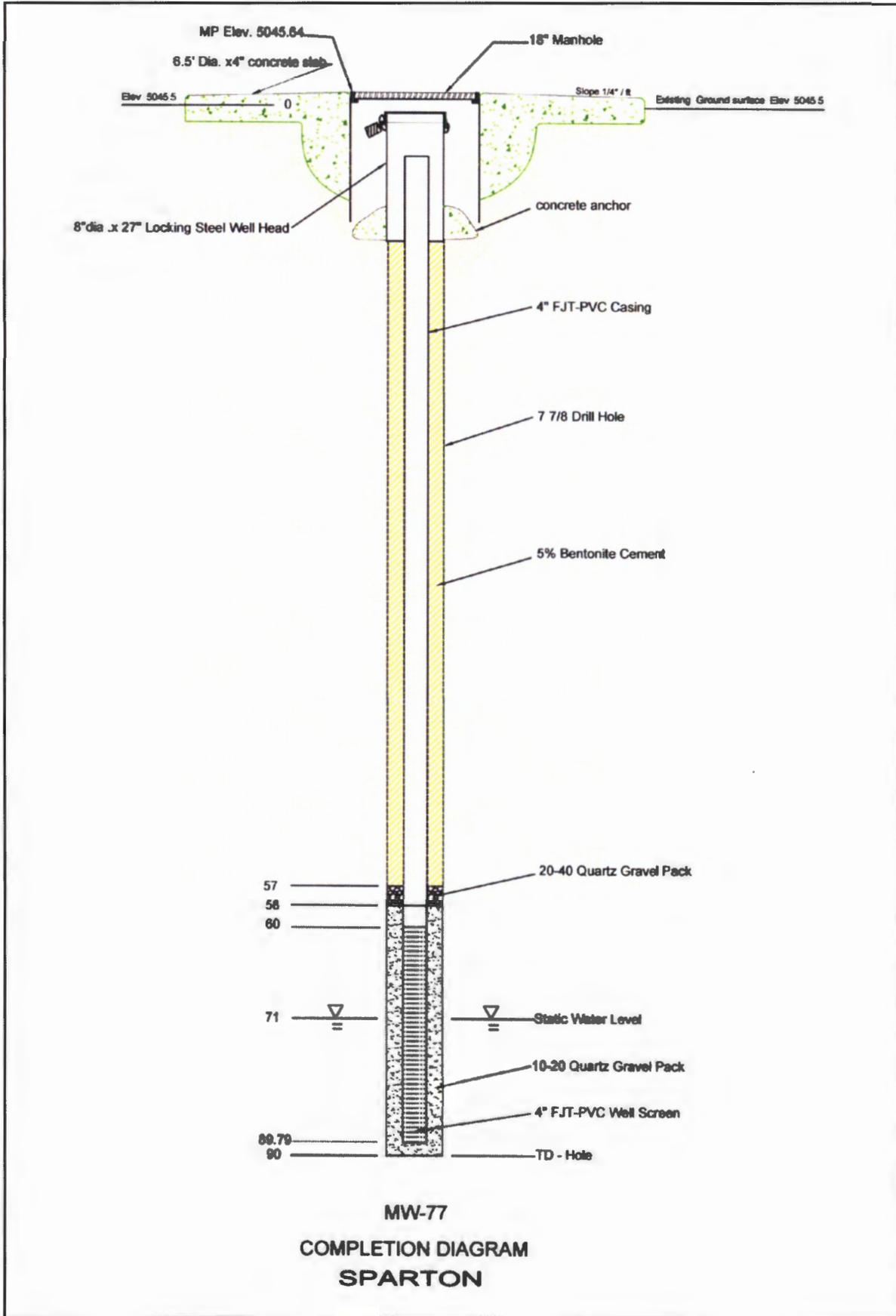


Figure 5 Example of a Well Completion Diagram