WORK PLAN
FOR THE INSTALLATION OF
A SOURCE CONTAINMENT SYSTEM

Prepared For:

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1.0 INTRODUCTION

Sparton Technology, Inc. (Sparton) is currently operating an on-site groundwater recovery system at its Coors Road Facility in Albuquerque, New Mexico. The system consists of eight shallow monitoring wells completed across the water table (referred to as the Upper Flow Zone or UFZ) and which were converted to recovery wells; the water recovered from these wells is treated by an on-site air stripper and the treated water is discharged into the City of Albuquerque sewer system. In an earlier proposal[1], Sparton proposed to replace these eight shallow on-site recovery wells with a deeper single recovery well installed immediately downgradient of the site and which pumping at a rate of 20 gallons per minute (gpm) would capture most of the constituents of concern leaving the Sparton property.

In this Work Plan, Sparton proposes to install a source containment well pumping at 50 gpm instead of the 20-gpm recovery well proposed earlier. This 50-gpm well will not only capture a greater percentage of the constituent mass currently leaving the Sparton property, but will also contain potential on-site source areas. The water pumped by the well will be treated at a new air stripper to be installed on-site and returned to the aquifer through a series of rapid infiltration ponds.

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[1] *Proposal to Install a Recovery Well and Associated Facilities at the Sparton Technology, Inc. Coors Road Facility, Albuquerque, New Mexico*: transmitted on behalf of Sparton Technology, Inc. by April 23, 1998 letter to Michael T. Donnellan, Esq. of the U. S. Department of Justice by Stavros S. Papadopulos of S. S. Papadopulos & Associates, Inc.

The purpose of this Work Plan is to present details on the design of this source containment system, and to describe a groundwater investigation that will be conducted to confirm that all on-site sources are contained by the system.

2.0 SITE CONDITIONS

The current distribution of constituents of concern on the Sparton property is illustrated in Figure 1 by the distribution of trichloroethylene (TCE), the primary volatile organic constituent at the site. This figure was prepared by interpolating logarithmically the TCE concentrations measured in monitoring and recovery wells in January and February 1998; for wells which were not sampled at that time, the most recent available measurement prior to that time was used. The figure represents an horizontal projection of the TCE distribution based on data from wells open either to the UFZ or to the LFZ; at monitoring well cluster locations, data from the well with the highest concentration at that cluster was used, regardless of its depth. As shown in Figure 1, near the center of the property there is an area where TCE concentrations exceed 5,000 µg/l. The concentrations in monitoring wells within this area are close to one percent of the effective solubility of TCE, and suggest the potential presence of sources within this area[2].

The current vertical distribution of TCE concentrations near the northwestern boundary of the Sparton property is shown in Figure 2. As shown on this figure, TCE concentrations along the northwestern property boundary are relatively low near the water table; the highest concentrations,

[2]Pankow, J. F. and J. A. Cherry, 1996. *Dense Chlorinated Solvents and other DNAPLs in Groundwater:* Waterloo Press, Portland, Oregon.

and hence the greatest mass discharge across this boundary, occur at depths of about 20 to 40 feet below the water table.

Water-level contours, based on January 1998 measurements in wells open to the LFZ, and the average direction of groundwater flow across the Sparton property are shown in Figure 3. The hydraulic gradient across the property, calculated from these contours, is 0.00465 foot per foot. The transmissivity of the aquifer underlying the property has been previously determined to be 18,000 gallons per day per foot (gpd/ft) from a pumping test conducted on well PW-01 (see Figure 3 for well locations).

As stated earlier, the water pumped by the proposed 50-gpm source containment well will be treated and then returned to the aquifer through a series of rapid infiltration ponds. To obtain data for the design of these ponds, a series of vertical permeability tests were recently conducted by Metric Corporation[3]; the tests were conducted at a depth of 1.5 feet near the northeastern boundary of the Sparton property using the "Designation E-18" method of the Bureau of Reclamation[4]. The results of these tests indicate an average vertical hydraulic conductivity of about 180 feet per year (0.5 feet per day).

These available data were used in the design of the proposed source containment well and of the associated rapid infiltration ponds.

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[3]Gary L. Richardson of Metric Corporation, personal communication, July 21, 1998.

[4]U. S. Department of Interior, Bureau of Reclamation, 1974, *Earth Manual*: A Water Resources Technical Publication, Second Edition.

3.0 SOURCE CONTAINMENT WELL AND ASSOCIATED FACILITIES

The proposed location of the source containment well is shown in Figure 4. This proposed location is within an 80-foot easement on a property owned by Adobe Wells Partnership; therefore, installation of the well at this location is subject to reaching an agreement with Adobe Wells Partnership on an easement to install the well and a pipeline between the well and the treatment facilities on the Sparton property. The well will be completed with 4-inch nominal diameter casing and screen; the screened interval will extend from the water table to a depth of 50 feet below the water table.

After treatment, the water pumped from the source containment well will be discharged into three of six rapid infiltration ponds located within an approximately 3.6-acre fenced area within and along the northeastern boundary of the Sparton property (see Figure 4). The six ponds cover an area of about 2.2 acres and each pond is designed to accept one third of the 50-gpm discharge of the source containment well, or about 17 gpm; thus, at any given time three ponds will be utilized to discharge the treated-water. This six-pond design provides flexibility for switching between ponds for rehabilitation, maintenance and repair operations. To allow for the potential partial clogging of the pond bottoms during the operation of the ponds, a vertical hydraulic conductivity equal to 20 percent of the field-determined value was assumed in their design[3]. As also shown in Figure 4, the air stripper (a new 50-gpm air stripper) will be installed within the fenced area and the existing control building will also be moved into this area.

4.0 CAPTURE ZONE OF THE SOURCE CONTAINMENT WELL

The areal limit of the capture zone of the proposed 50-gpm source containment well is shown in Figure 5. As shown in this figure, the capture zone of the well will contain the potential on-site sources, and will extend considerably beyond this area. With the potential sources under control, constituents remaining outside the limit of the capture zone will be flushed out by naturally flowing groundwater and by water infiltrating from the ponds, and will eventually be captured by the off-site containment well.

The depicted capture zone of the well was determined using the transmissivity and hydraulic gradient values mentioned in Section 2.0 and the software AqModel[5]. The effects of the infiltration ponds were incorporated into this analysis by simulating each pond by multiple injection wells. Based on pan evaporation data from the Los Lunas Experiment Farm near Albuquerque, the evaporation rate from the ponds was calculated as 4.3 feet per year[6]; this approximately corresponds to a five percent evaporation loss[7] from the ponds and it was taken into account in simulating the pond effects. As shown in Figure 5, recharge from the infiltration ponds will cause the capture zone to be somewhat skewed with respect to the average direction of groundwater flow. There will also be a slight change in the limit of the capture as discharge of the treated water is switched from one three-pond set to the other; however, the width of the capture zone along the northwestern property boundary will remain essentially the same, about 480 feet. The vertical projection of this width of the capture zone along the property boundary is shown in Figure 6, superimposed on the current

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[5]O'Neill, G. T., 1992, *AqModel Version 2.1 User's Manual*: WellWare™, 3160 Woods Circle, Davis, California 95616

[6]Gary L. Richardson of Metric Corporation, personal communication, July 22, 1998.

[7]Sparton is currently evaluating cost-effective ways to further reduce this evaporative loss.

vertical distribution of TCE concentrations. Based on these TCE concentrations, the mass of TCE to be captured by the source containment well is calculated to be about 85 percent of the TCE mass currently leaving the Sparton property across this boundary.

The horizontal and vertical extent of the capture zone presented in Figures 5 and 6 are based on calculations that assume a well fully penetrating the saturated interval corresponding to the transmissivity of 18,000 gpd/ft. Because the proposed source containment well will be partially penetrating this interval, its capture zone could be wider and shallower[8].

After the source containment well is put into operation, pumpage from the existing on-site shallow recovery wells will be discontinued.

5.0 EVALUATION OF CONTAINMENT SYSTEM PERFORMANCE

The procedures that will be used to evaluate the performance of the source containment system will be similar to those that have been proposed for the evaluation of the performance of the off-site containment system[9]. Pumping-rate and water-level data for these evaluations will be collected in accordance with the Ground Water Monitoring Program Plan (Monitoring Plan), that should be finalized this month (October, 1998). The capture zone of the well will be determined from water-level data and the limits of the capture zone will be compared to the extent of the potential source areas. Water-quality data will be also evaluated to determine whether they provide information on the performance of the containment system. If these evaluations indicate that the

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[8] Bair, Scott E. and Terry D. Lahm, 1996, *Variations in Capture-Zone Geometry of a Partially Penetrating Pumping Well in an Unconfined Aquifer*, Ground Water, v. 34, no. 5, pp 842-852.

[9] S. S. Papadopulos & Associates, Inc., 1998, *Work Plan for the Off-Site Containment System*: prepared for Sparton Technology, Inc., Coors Road Facility, Albuquerque, New Mexico, October 23, 1998.

operation of the infiltration ponds has affected water-quality in monitoring well MW-59, an assessment will be made to determine whether an additional monitoring well needs to be installed in that area.

Evaluations of water-quality data will be performed annually and the results reported in the site's Annual Reports.

6.0 GROUNDWATER INVESTIGATION

The proposed source containment system has been designed to contain all potential on-site source areas that have been defined on the basis of the available water-quality data. To confirm that there are no other on-site sources outside the capture zone of the containment system, additional groundwater investigation will be conducted. This groundwater investigation will consist of the installation and sampling of a new monitoring well. The new monitoring well will be located along the northwest boundary of the Sparton property, at the midpoint between existing monitoring wells MW-15 and MW-42/43, as shown in Figure 7.

The well will be installed by drilling a 7.5-inch hole to the top of a clayey, finer-material layer that has been encountered in monitoring wells MW-49 and MW-70 at a depth of about 120 feet. The drill cuttings will be examined to identify the most permeable materials within 30 feet above the top of the clayey layer and within 40 feet below the water table, and a 10-foot interval will be selected across these most permeable material for the completion of the well. If this interval is above the top of the clayey layer, the hole will be backfilled to the bottom of the completion interval with 3/4-inch granular bentonite. A 2-inch nominal diameter casing and screen assembly, with 10-foot screen, will be installed into the hole, the well will be naturally or artificially gravel packed

across the screened interval, and completed by filling the annular space above the gravel pack with a bentonite/cement grout to the land surface.

After completion and development, the well will be surveyed to determine its location coordinates and the elevation of the top of casing, and will be sampled using the procedures specified in the Monitoring Plan. The sample will be analyzed for VOC's, particularly TCE, using the analytical method specified in the Monitoring Plan. The results of this initial sampling event will be reported in a letter report which will be prepared within four weeks after the sampling of the well. In addition to the results of the sampling and supporting documentation, this report will include the drilling and completion log of the well, a revised TCE isoconcentration cross-section along the northwest boundary of the site and a revised TCE isoconcentration map for the on-site area and its vicinity, and the action that will be taken in response to the sampling results.

The action to be taken in response to the sampling results will be as follows. If the TCE concentration in the sample is less than or equal to1,000 µg/l, the well will be designated as a piezometer (PZ-2); the Monitoring Plan will be updated to include this piezometer in the list of wells that will be monitored quarterly for water levels (see Table 4-1 of Monitoring Plan). No further sampling of the well will be required. However, if the TCE concentration in the sample from the well is higher than 1,000 µg/l, the well will be designated as a monitoring well (MW-72), and in addition to being monitored quarterly for water levels, it will be sampled semi-annually for a period of five years. The samples will be analyzed for VOC's, and the Monitoring Plan will be updated to reflect the above stated sampling frequency and period, and the analytical constituents for this monitoring well.

The water quality data to be collected from the well, and annual evaluations of these data will be included in the site's Annual Reports. After five years of data collection, Sparton will submit a Source Containment Investigation Report presenting the results of the investigation and discussing whether the source containment system needs to be modified.

7.0 INSTALLATION OF SOURCE CONTAINMENT SYSTEM

The source containment well and the new monitoring well will be installed in accordance with the design presented in this Work Plan, following procedures similar to those employed for the installation of the off-site containment well and of other monitoring wells at the site and its vicinity. Drill cuttings and liquid wastes will be disposed of in accordance with the RCRA Facility Investigation Work Plan[10]. Installation of these two wells will begin simultaneously, upon approval of this Work Plan by the United States Environmental Protection Agency (USEPA), and after obtaining the required authorizations and permits for the installation and operation of the source containment system, including the on-site air stripper and infiltration ponds. The installation of the source containment well is included in the existing Health and Safety Plan; the plan will be revised, however, to also include the installation of the new monitoring well.

Documents related to the installation of the on-site air stripper and infiltration ponds are discussed in the following sections.

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[10]Harding Lawson Associates, 1988, *RCRA Facility Investigation Work Plan, Sparton Technology, Inc., Coors Road Facility, Albuquerque, New Mexico*: December 29, revised March 3, 1989.

7.1 Design Plans and Specifications

Site plans, architectural plans (where appropriate) for the air stripper and the infiltration ponds, and specifications for equipment and materials as needed for the construction of these facilities by licensed contractors, will be submitted for approval within two weeks of approval of this Work Plan. Appendices will include design data (tabulations of significant data used in the design effort), equations (sources for major equations used in the design process will be listed and described), sample calculations, and laboratory or field test results. USEPA shall within seven days of submission of plans and specifications for an air stripper and an infiltration ponds, that have a capacity to handle the pumping rate identified in this Work Plan, approve such plans and specifications subject to issuance of all permits necessary for such work. Construction of the air stripper and the infiltration ponds will commence upon USEPA approval of the design plan and specifications.

7.2 Construction Work Plan

A Construction Work Plan will be submitted prior to the commencement of the construction of the air stripper and the infiltration ponds. This Work Plan will identify the Project Manager, present the Project Schedule, and discuss construction contingency procedures. All construction work will be performed by licensed contractors.

7.3 Health and Safety Plan

Construction of the air stripper and infiltration ponds will not involve potential exposure to hazardous substances; therefore, a Health and Safety Plan is not required for this work.

7.4 Construction Completion Report

Upon completion of construction, Sparton will provide a certification from a registered professional engineer that the system has been constructed in substantial compliance with the design plans and specifications.

7.0 OPERATION AND MAINTENANCE PLAN

Sparton will prepare an Operation and Maintenance Plan (O&M Plan) which will to describe operation and maintenance management (including a thirty-day notice of any change by Sparton of personnel assigned to this matter), a complete set of "as built" drawings, normal operation and maintenance procedures, replacement schedules, waste management practices, and contingency plans in the event of breakdowns or operational failures. A preliminary O&M Plan will be submitted within four weeks after the beginning of continuous operation of the source containment system. The final O&M Plan will be developed during the first year of operation, and will be submitted at the end of the first year.

A revised Health and Safety Plan will also be submitted with the preliminary O&M Plan to address all activities involving potential exposure to hazardous substances during the operation of the systems, as required by OSHA 29CFR1910.120.

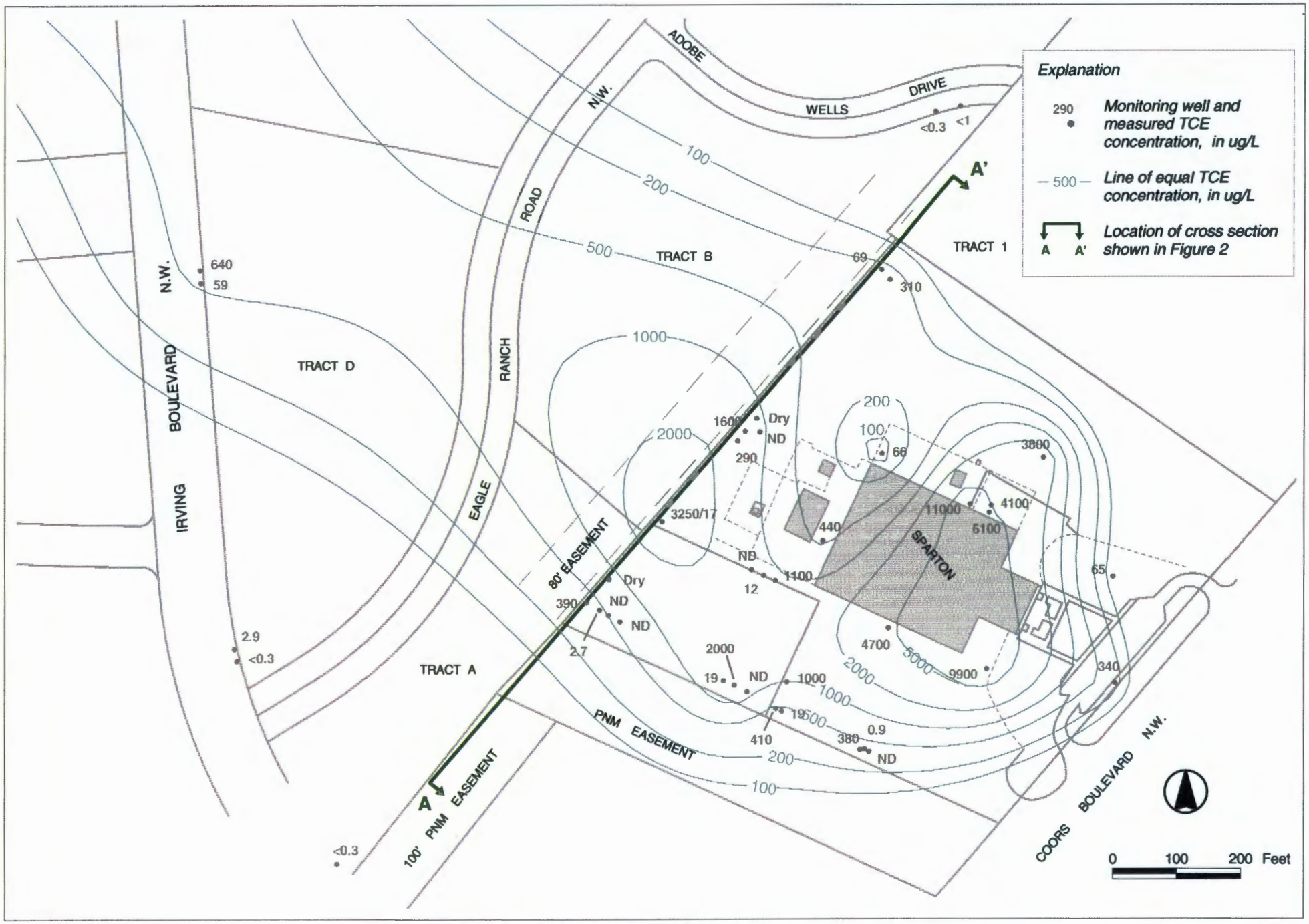

Figure 1 Distribution of TCE Concentrations at the Sparton Property and Vicinity

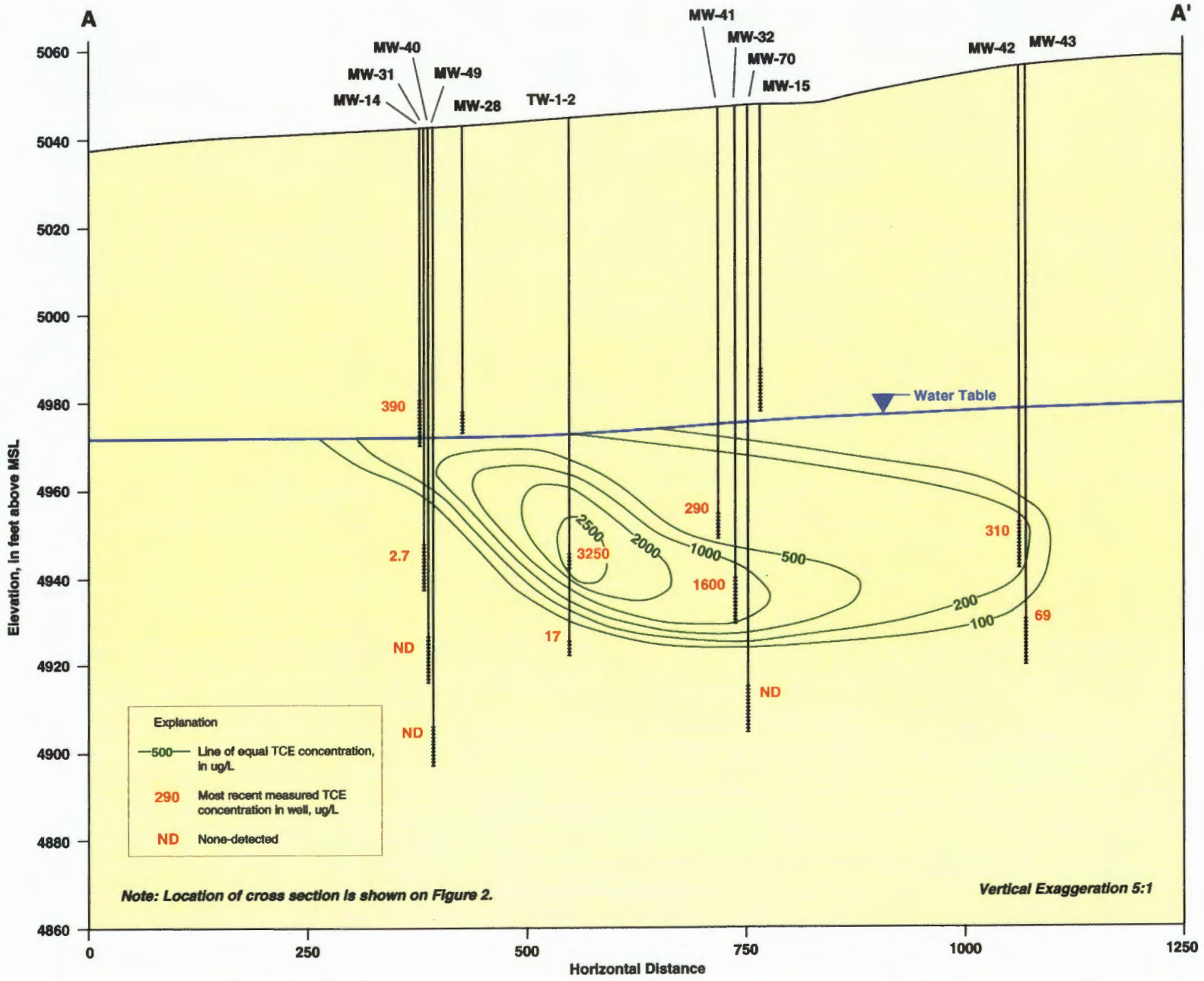

Figure 2 Vertical Distribution of TCE Concentrations along the Northwestern Property Boundary

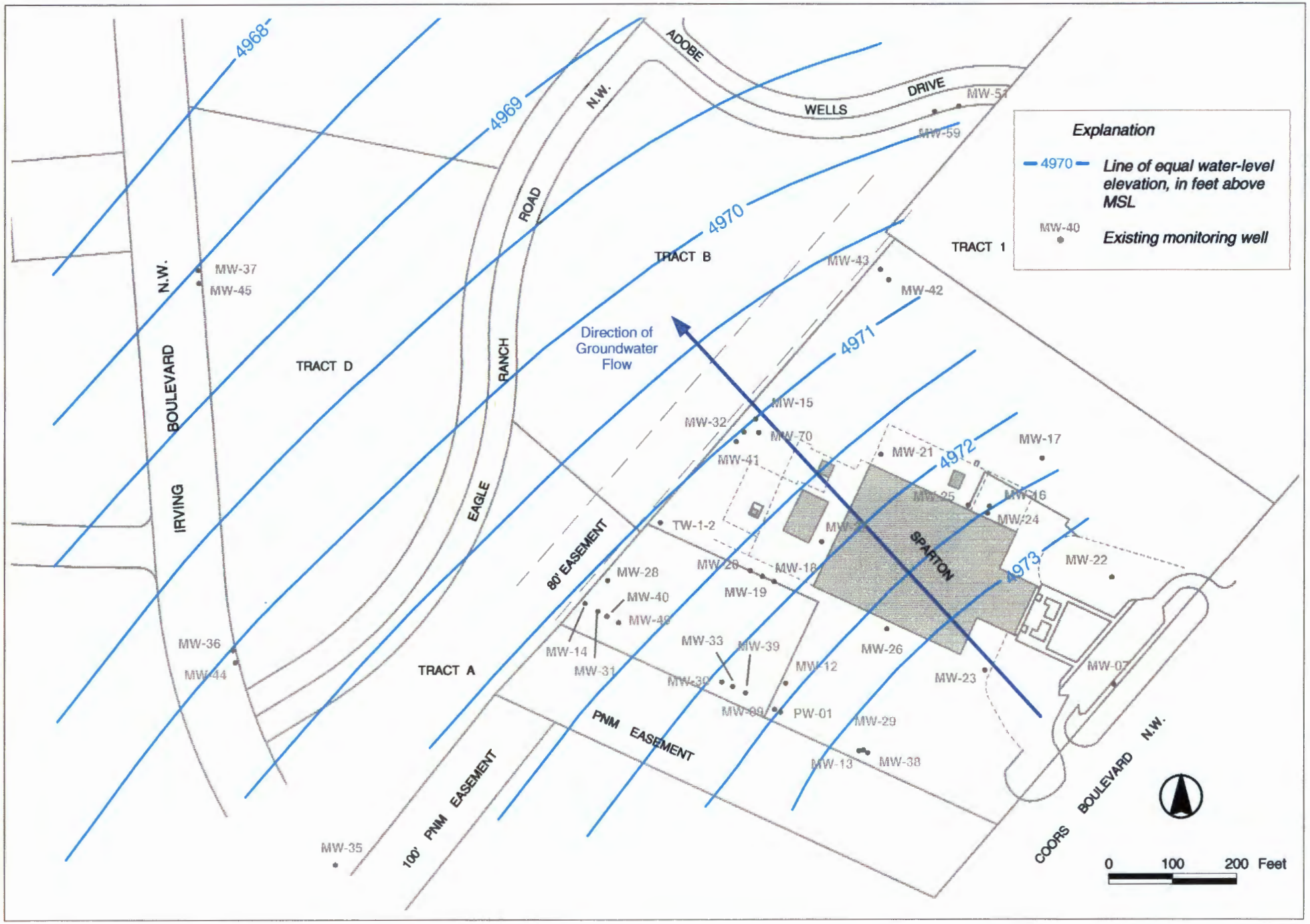

Figure 3 Water Levels and Direction of Groundwater Flow in the Lower Flow Zone

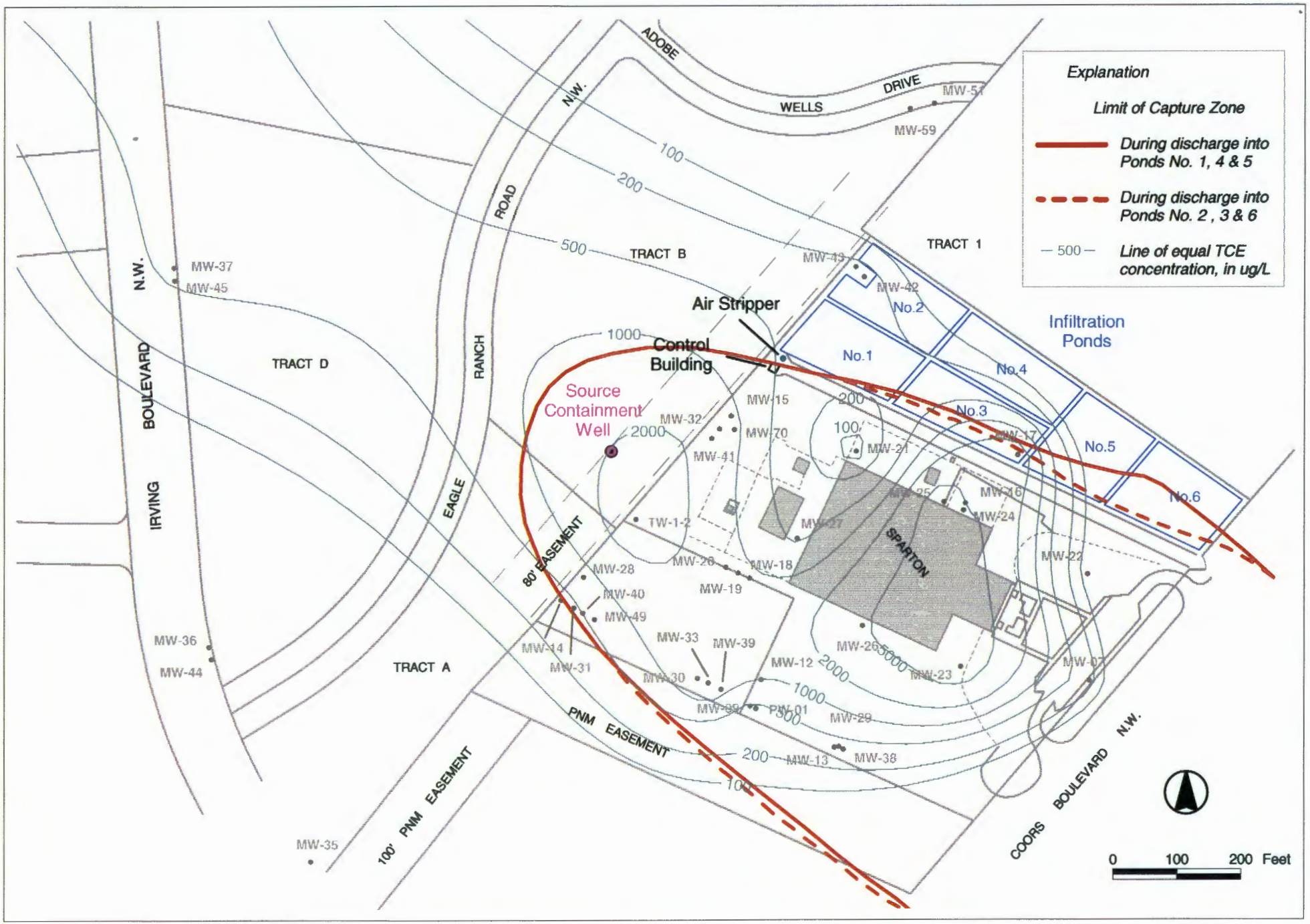

Figure 5 Areal Limit of the Capture Zone of the Proposed Source Containment Well

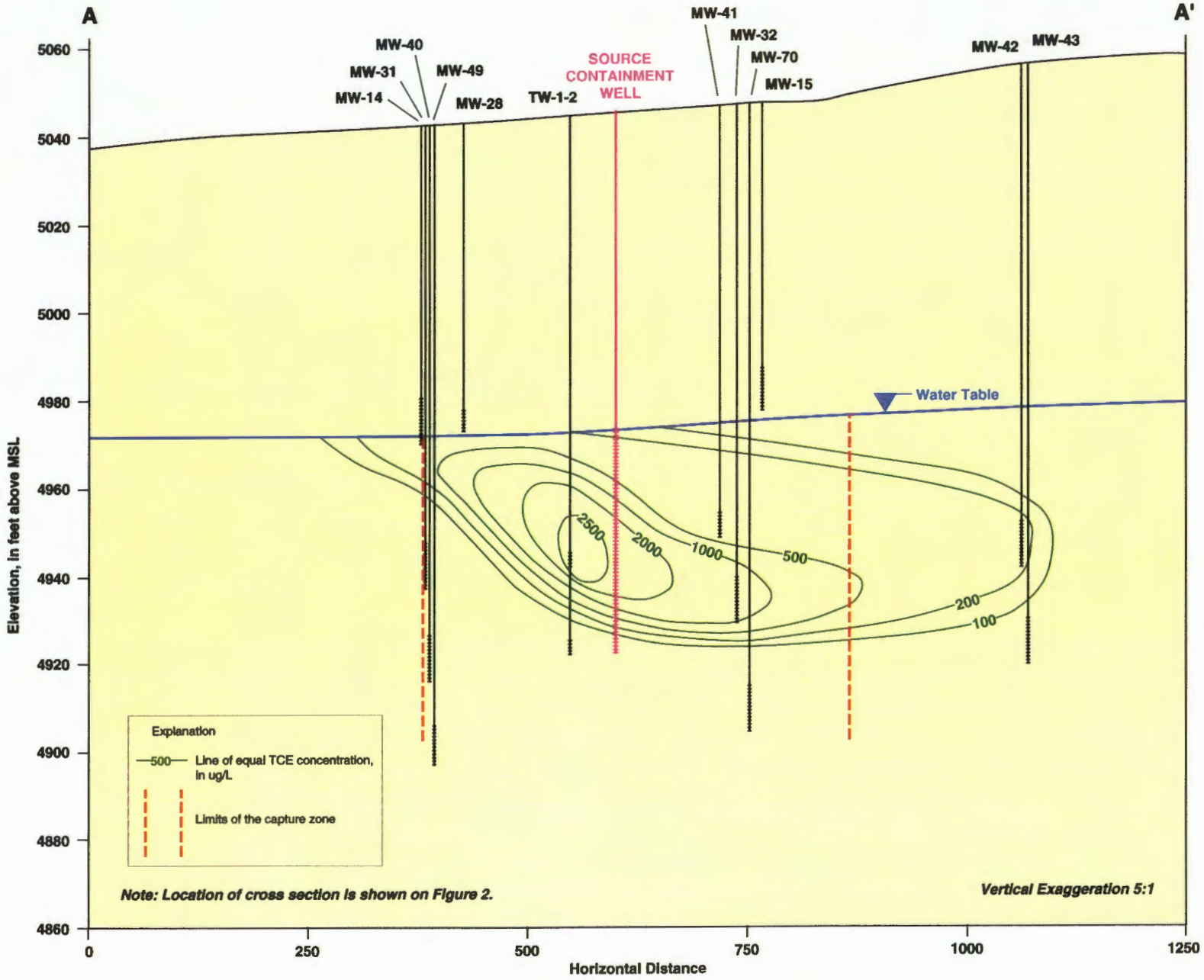

Figure 6 Vertical Limit of the Capture Zone of the Proposed Source Containment Well

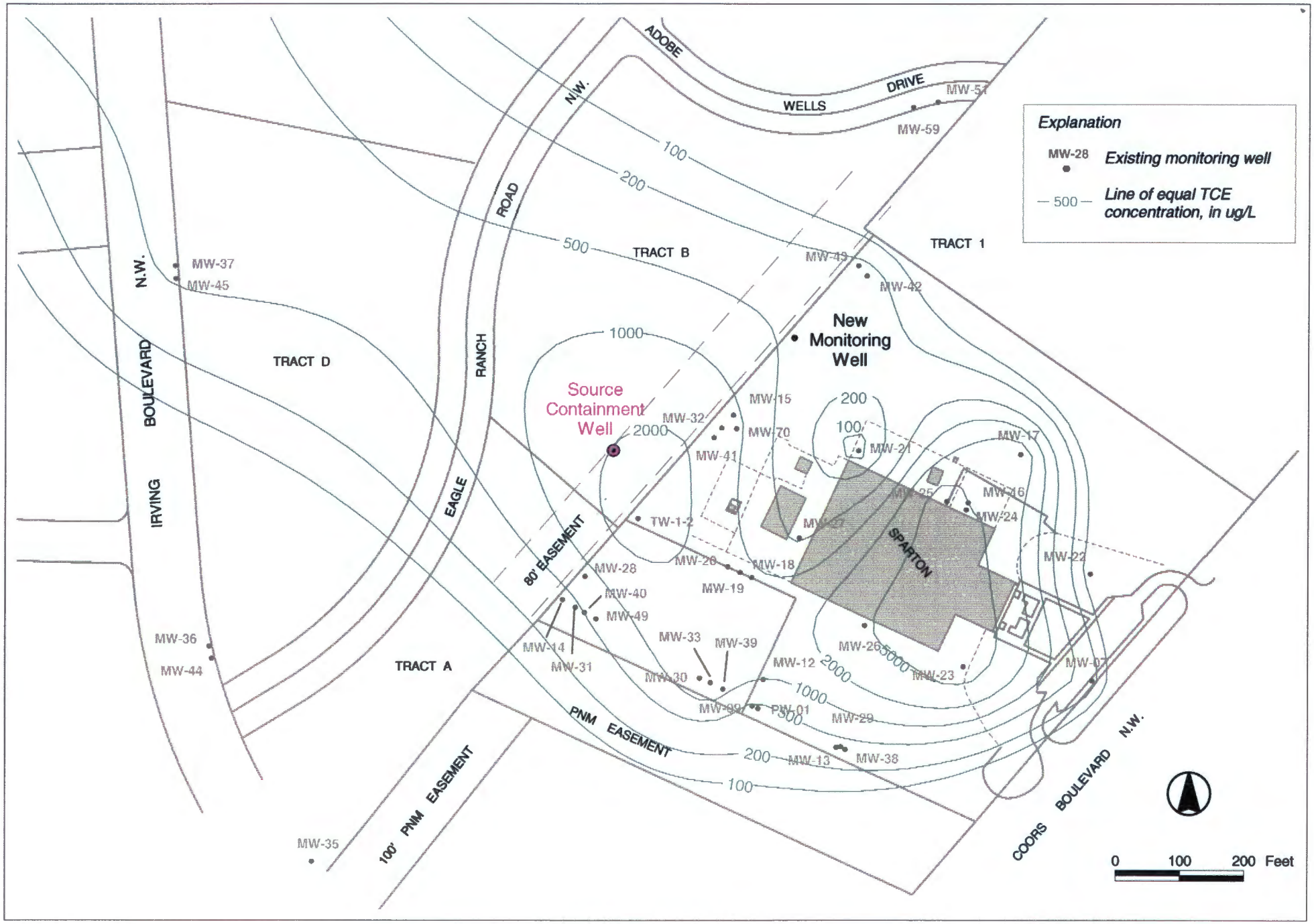

Figure 7 Location of Proposed New Monitoring Well