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

February 12, 2009

Mr. Chuck Hendrickson
U.S. Environmental Protection Agency
Multimedia Planning and Permitting Division
1445 Ross Avenue
Dallas, TX 75202-2733

Mr. John Kieling
Permits Program Manager HWB
New Mexico Environment Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505-6303

Subject: **Response to EPA/NMED comments on Sparton Technology, Inc., Former Coors Road Plant Remedial Program, 2003-2007 Annual Reports**

Dear Messrs. Hendrickson and Kieling:

Reference is made to EPA/NMED Comments 1 through 16 on the 2003-2007 Annual Reports transmitted to Sparton's representative, Mr. Tony Hurst of Hurst Engineering Services, by your letter dated December 30, 2008 and received by Mr. Hurst on January 26, 2009.

Sparton appreciates your approval of the 2003 through 2006 Annual Reports. Sparton also appreciates your approval of the plugging and abandonment of several dry monitoring wells (Comment 1) and of the discontinuance of the collection of DO and ORP data (Comment 16). Sparton's responses to the remaining comments (Comments 2 through 15) are presented below. Each comment is presented in italics followed by Sparton's response in regular type.

You will note that in some of the responses Sparton agrees to make the modifications or conduct the work suggested by the comment or by part of the comment. Sparton proposes, however, since the 2008 Annual Report is in the process of being prepared, that any such modification or work be included in the 2008 Annual Report rather than in a revised and resubmitted 2007 Annual Report. Therefore, Sparton requests that the 2007 Annual Report be approved as is, especially since it has the same format and evaluations as the earlier reports that have been approved.

Comment 2.

Section 2.6.1.4, Dissolved Contaminant Mass, and Section 6.2.2: The initial estimate of 2178 kg of dissolved TCE in the plume has needed to be adjusted up to the current 6,881 kg to account for plume remediation results thus far. Relevant to this, we note that high TCE concentrations have persisted in well MW-60. MW-60 had 11,000 µg/L TCE in November 1999. This is 1% of TCE's water solubility of 1,100 mg/L. The well's water reached 18,000 µg/L TCE in 2004. Empirical evidence has shown that groundwater containing a NAPL (non-aqueous-phase liquid) contaminant at 1-2% of its solubility indicates a nearby NAPL source. Since MW-60 is about 1/3 mile off site, we might reach the conclusion that NAPL has traveled from the site, and down-strata, to an area near MW-60; this would bode for a very long remediation period. Alternatively, this might conceivably be a fairly cohesive slug of highly contaminated groundwater with no associated NAPL; only time will tell, when and if this slug passes. This report needs to address this potential for offsite NAPL, effects of such NAPL, and ways in which the remedial system and modeling may need to be altered if this NAPL is present.

The changes in TCE concentration at CW-1 since production began indicate that areas with high concentrations of dissolved TCE, such as those observed in MW-60, have existed in the area between CW-1 and on-site production well CW-2. The breakthrough curve from well MW-60 (Attachment 1) indicates that the high concentrations of TCE observed in this well are consistent with two slugs of groundwater with high concentration of dissolved TCE, one of which peaked in November 1999 and the second one in November 2004.[1] The presence of slugs of highly contaminated water that have migrated from the site is consistent with the dissolved TCE concentrations above 10,000 µg/L and as high as 73,000 µg/L observed in samples from several on-site UFZ wells in the mid 1980s. There is no plausible physical mechanism by which TCE NAPL could migrate horizontally for a distance of over 2,000 feet from the site within a shallow horizon of a thick and fairly homogeneous aquifer. NAPL has never been observed in any on-site boring or in any on-site monitoring well samples. This discussion will be expanded in the 2008 Annual Report, but since there are no current NAPL sources, Sparton sees no need to discuss the effects of such a NAPL source or the "ways in which the remedial system and model may need to be altered if this NAPL is present."

[1] See discussion on first paragraph of page 5-4 of 2007 Annual Report. Also note that, as shown in Attachment 1, the TCE concentration in the well continued to decline during 2008 from 5,700 µg/L in November 2007 to 4,800 µg/L in November 2008.

Comment 3

Plume Presentation: The contaminated aquifer is about 200' thick, modeled three-dimensionally with 13 model layers. But there is no figure in the report that presents the groundwater plume three-dimensionally (in 3-D). Figures 6.4-6.6 are useful as horizontal slices, but are not adequate for evaluation of plume capture across the vertical extent of the aquifer. We note that these three figures seem to indicate lack of full capture of the plume. The report needs to include illustrations showing the plume and capture zones in 3-D. Use fence diagrams, or propose an alternate depiction method.

During negotiations leading to the Consent Decree, and based on data available at that time, the parties agreed that contamination extends to the top of the 4,800-ft clay, and Sparton agreed to install an off-site containment well (well CW-1) that was designed to capture contaminants that may exist at any depth between the water table and the top of the 4,800-ft clay unit, that is, a fully penetrating well, screened throughout this interval. Determining the vertical distribution of contaminants, therefore, became unnecessary. Instead, the horizontal extent of the plume was determined from November 1998 data and presented in a report issued in December 1998[2] and approved by the agencies. The approach used in developing this initial plume was discussed in this report and also incorporated in Attachment C of the Consent Decree. At locations where multiple wells were present, this approach used the data from the well with the highest concentration regardless of this depth. As a consequence, this horizontal extent of the plume represents the maximum extent of the area where contaminants may be found at some depth and is the target of capture by the off-site containment well. This approach is also being used in developing the plume maps presented in each annual report. Since the off-site containment well is fully penetrating the interval above the 4,800-ft clay, the horizontal extent of the capture zone of this well at any depth within this interval is similar[3] (similar to that shown in Figures 5.1 through 5.12) and adequate for the evaluation of plume capture. Given that the vertical distribution of contaminants is somewhat uncertain and that it would not contribute to the evaluation of plume capture, Sparton sees no need for developing 3-D depictions of the plume or capture zone. We note, though, that a 3-D representation of the plume is incorporated in the groundwater model. The initial concentration distribution specified for each of the 11 layers in the groundwater model above the 4800-foot clay unit is based on interpolation of TCE concentrations from each of the monitoring wells that factors in the depth of the screen interval of the monitoring well.

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[2] S. S. Papadopulos & 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.

[3] Except during periods of heavy rainfall or of surface water flow in the Arroyo de las Calabacillas when the capture zone near the water table may extend to the arroyo to capture recharge coming from the arroyo.

Comment 4

Figures 2.14 & 5.3: The 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. MW-65 was originally a sentinel well, but is now contaminated, so it should be replaced with another sentinel well in a downgradient location. There is currently not enough information to know whether the plume is wholly within die capture zone of well CW-1 or whether some contaminants of concern (COCs) are escaping capture by well CW-1 (as illustrated in Figures 5.2,5.10, 5.11, 5.15,6.4,6.5, and 6.6 in the 2006 report; in Figures 5.11, 5.15.6.4,6.5, and 6.6 in the 2007 report). Any unmapped contaminants much beyond MW-65 or OB-2 may have escaped containment and continued flow downgradient. Therefore, one or more wells or well clusters need to be emplaced west-to-northwest of MW-65 and OB-2, preferably just outside of the calculated capture zone to verify plume capture. Sparton shall submit a work plan for siting and installation of this well or these wells.

There are several issues that need to be discussed in responding to this comment. First, the "initial" plume extent shown in Figure 2.14 is identical to that presented in the December 1998 report mentioned above (see footnote 2). The agencies did not find the data inadequate for defining this plume and accepted it as representing the horizontal extent of groundwater contamination at the time of the entering of the Consent Decree without any requirements for additional "sentinel" wells. There is not a significant difference between the then extent of the plume and the current, November 2007, extent of the plume (see Figure 5.18) that would now require the installation of any additional well or wells. In addition, under current conditions with extraction at CW-1, groundwater at the downgradient extent of the plume is within the capture zone of CW-1 and is flowing towards CW-1.

Second, well MW-65 was not a sentinel well at the time of the Consent Decree; it had 13 μg/L of TCE in November 1998; the November 2007 TCE concentration in the well was lower, 11 μg/L, and it declined further in 2008 to 5.7 μg/L in November (see Attachment 2); the breakthrough curves shown in Attachment 2 indicate that contaminants in this well may soon be at levels below detection limits. Note also that well OB-2 is not on the Monitoring Plan (Attachment A of the Consent Decree) and that it has not been sampled since September 1998. As shown in Figure 5.15, groundwater that was near and beyond OB-2 at that time was already pumped out by CW-1 within the first two years of operation.

Third, the groundwater model is an approximation of the real system. Capture, therefore, must be evaluated using the collected data rather the model results. None of the data-based figures cited above show lack of containment,[4] even though the "toe" of the plume coincides with the capture zone in Figures 5.2, 5.10 and 5.11 of the 2006 Annual Report.

Finally, as is discussed in the response to Comment 5, the contaminants detected in well MW-65, or any contaminants that may be beyond the limit of the off-site containment well capture zone in this area, are part of a separate plume that did not originate from the Sparton facility.

Based on all of the above, Sparton is not prepared to install additional wells downgradient from MW-65.

Comment 5

Fig. 2.15 & 5.16, DCE Plume maps: Well MW-65 became clean soon after well CW-1 extraction operations began, but then became re-contaminated two years later. This new contamination has predominant DCE and significant TCA, in about the same proportions as in well MW-62 but quite different from the main plume. We believe that another, related, plume runs from the source area (the Sparton facility site) through MW-62 to MW-65, where it is at least partially drawn to well CW-1. The maps and model should be adjusted according to this scenario. Consider whether more wells are needed to characterize this plume area.

Sparton agrees that the contaminants detected in well MW-62, and in well MW-65 since 2001, are due to a different plume than the main plume. In fact, it appears that the contaminants detected in well MW-52R also belong to this separate plume. The TCE concentration history of MW-65 (see Attachment 2) indicates that the TCE that was present in this well prior to the start of pumping from CW-1, and which was most likely associated with the main plume, cleaned up soon after the beginning of the off-site system operation. The TCE that appeared in this well in 2001, at the same time as the DCE and TCA, is clearly associated with a separate plume.

Sparton disagrees, however, that this plume originated at the Sparton facility site. Backward tracking from well MW-65 (see Attachment 3), using water level data collected since 1992, indicates that the source of this plume is somewhere along, or in the vicinity of, a line whose backward projection crosses Coors Boulevard about 1,000 feet south of the Sparton facility. The trajectory of this plume, that is the areas where this plume could have migrated prior to the

[4] Figure 5.15 shows the original location of the groundwater that was pumped during each of the periods specified in the figure and should not be interpreted in terms of whether the system provides full capture of the plume. The water that was within the outer circle around CW-1 in 1998 had already moved next to the well and was pumped out in 2007. Similarly, the water that was in the toe of the plume in 1998 is now much closer to CW-1 and will be pumped out in the next few years.

operation of Sparton's off-site and source containment systems, is also shown in Attachment 3. The breakthrough curves for the contaminants that arrived to MW-65 in 2001 (see Attachment 2) indicate that the capture zone that developed after the start of the off-site containment system diverted this plume, or part of this plume, towards MW-65 and CW-1; the north side of the plume first arrived at MW-65 in 2001, its axis arrived in 2005, and now concentrations are decreasing as the plume is moving further towards CW-1 and MW-65 remains in the area between the axis and the south side of the plume. The well is expected to become clean again after the south side of the plume passes through.

In the 2008 Annual Report, data from wells MW-65, MW-62, and MW-52R will not be used in defining the extent of the plume emanating from the Sparton facility; data from these wells will be used to delineate a separate plume with uncertain extent. Since this plume is not originating from the Sparton facility and since Sparton's off-site containment well is capturing most, and possibly all of, this plume, Sparton does not believe that characterizing this plume is necessary. Also, since the purpose of the model is to simulate the plume emanating from the Sparton facility and to evaluate the effects of the remedial measures on this plume, Sparton does not believe that the model needs to be adjusted to include the separate plume whose origin and extent is uncertain.

Comment 6

Figure 6.7, Comparison of Calculated to Observed Water Levels: A residuals map (calculated versus observed water levels) should be presented; it will be useful by showing where high and low residual values are located in the model area.

Maps presenting the distribution of residuals for the average 2008 water levels will be included in the 2008 Annual Report and in any other future annual report that is issued after a re-calibration of the model.

Comment 7

Deep Flow Zone (DFZ) monitoring: As noted in Section 2.6.1.1 of the 2007 report, there is now enough data to map groundwater flow in the DFZ (Deep Flow Zone). Provide a potentiometric surface map for the DFZ; on the map, show the deep zone contaminant plume present in MW-71R. EPA's potentiometric surface mapping of the DFZ (based on MW-67, MW-71R, and MW-79 data) indicates that MW-79 is about 30° off from groundwater flow paths through MW-71R. So MW-79 is of limited use for monitoring downgradient of MW-71R. MW-71R monitoring results show sustained contamination in the DFZ. Previous speculation about vertical plume migration *through former monitoring well MW-71 is moot at this point, years after the 2001 pressure-grouting abandonment of the well. This situation should be noted in the report with an evaluation of potential future actions related to the DFZ.*

Although the average direction and gradient in the upper part of the DFZ can be estimated from the three DFZ wells, these data are not sufficient for preparing a "potentiometric surface" map of the DFZ.

Several actions were taken by Sparton to address the contaminants detected in well MW-71R and its predecessor MW-71. A discussion is presented in the last paragraph of page 2-13 and in page 2-14 of the 2007 Annual Report. Well MW-79 was installed after an agreement was reached with the agencies and in accordance with a Work Plan approved by the agencies. The actions to be taken after this well was installed sampled and tested were also specified in the approved Work Plan. There were no conditions in the Work Plan of any further action if the well is not exactly downgradient from MW-71R.

The fact that both well MW-79 and MW-67 remain free of any contaminants indicates that there is limited TCE in the DFZ. The breakthrough curve of well MW-71R (see Attachment 4) also indicates that this may be a slug of limited extent.

Sparton will continue to monitor the concentrations in the DFZ wells to determine if any future action might be necessary, but it does not believe that any action is needed at this time.

Comment 8

Figure 2.3 and 2.4: We recommend several changes to the schematic cross-section of the plume area in order to update and more fully illustrate site conditions. First, move the cross-section line to pass through CW-1 and CW-2. Extend the cross-section farther northwest to include the typical extent of well CW-1's capture zone. Add the screened intervals of CW-1, OB-1, OB-2, and the DFZ wells; this addition will require vertical expansion of the cross-section on 11"x17" paper. Show the pump inlet depths for both CW-1 and CW-2. Show the 4800-foot aquitard. Show the current (2007 in this case) water table along this cross-section through wells CW-1 & CW-2, including estimated cones of depression and the divergent UFZ/ULFZ potentiometric surfaces in the area of the 4970-foot silt/clay. Also, show the original pre-remedial 1998 potentiometric surface(s) on the cross-section.

Rather than modifying the schematic cross-section of Figure 2.4, whose primary purpose is to illustrate the depth intervals referred to as UFZ, ULFZ, and LLFZ and the relative position of monitoring well screens within these intervals, the 2008 Annual Report will include a new cross-section, most likely in Section 5, that starts about 750 feet west of OB-2, goes through OB-1, CW-1, MW-58, MW-67, MW-47, MW-45, CW-2, MW-20, MW-38, and extends about 500 feet beyond MW-38. The November 1998 and 2008 water tables and the other information requested in this comment will be included on this cross-section.

Comment 9

Page 6-2: The 4th bullet lists a modeling assumption: "the head drop across the 4800-foot silt/clay unit is about 6 ft." Please add explanatory text on the cause of this head differential and discuss its potential effects on contaminant migration.

Explanatory text on the cause of this head differential and a discussion of its potential effects on contaminant migration will be included in the 2008 Annual Report.

Comment 10

Section 5.1, Hydraulic Containment: We note that there have been significant system shutdown events: 120 hours for the offsite system in 2006; 277 hours and 127 hours for the on-site system in 2006 and 2007, respectively (see Section 3.2). Long system shutdowns lead to concerns over maintaining full capture of the contaminant plume. The footnote on page 5-2 attempts to address this concern. Add to the report an analysis of the amounts of time that wells CW-1 and CW-2 can be either shut down or operated under reduced pumping rates before there is irretrievable loss of any of the plume, assuming a range of pumping rates and a range of several reasonable distances between the plume boundary and the normal capture zone.

An analysis of the amount of time that well CW-1 can be shut down before there is irretrievable loss of any of the plume will be included in the 2008 Annual Report. This analysis will be based on the position of the leading edge of the plume, as defined by the November 2008 data, and the non-pumping hydraulic gradients near this leading edge (based on the water levels shown in Figure 2.12). If this analysis results in an "allowable shut-down time" of less than 30 days, then the effects of reduced pumping rates will also be evaluated. A similar analysis for CW-2 is not necessary because shut down of this well does not result in the irretrievable loss of any of the plume as the capture zone of CW-1 encompasses CW-2.

Comment 11

Section 6: The groundwater system and model are stable. Thus, the model should be able to reliably predict future conditions. Therefore, Sparton should now include in the annual reports the evaluations listed on pages 12 & 13 of Attachment D in the Consent Decree. These evaluations include predicted future progress in restoration, projected restoration time, and alternate remedial systems. These evaluations can start with the 2007 Annual Report.

Sparton believes that the model can not be used to calculate reliable predictions of future conditions. As pointed out in EPA/NMED Comment 12 the model continues to predict lack of plume containment, a prediction that is not supported by the data. Also, adjustments to the initial mass of TCE have been necessary every year to simulate mass production by the containment wells, although these adjustments have been rather minor during the last few years. In the next few months the model will be updated and recalibrated with data that have been collected during 2008. An evaluation of whether the model can be reliably used for future predictions will be made after this recalibration and the results will be discussed in the 2008 Annual Report. If the model is deemed ready for the evaluations requested in this comment, these evaluations will be conducted after the Annual Report is issued and the results will be presented in a separate report.

Comment 12

Section 7.1, Summary and Conclusions, Page 7-2,1st bullet: "The offsite containment well continued to operate during the year at an average discharge rate of 223 gpm, sufficient for containing the plume." Information in the report indicates that this conclusion may not be correct (see Comment 4, for example) for full containment. Further, the groundwater model predicted lack of full containment, as illustrated in Figures 6-4 to 6-6. Also, some of the figures show containment barely met, based on groundwater levels. But the contours and plume boundaries on these maps are not closely constrained, so they could readily be shifted to show lack of full containment. Therefore, potential additional measures should be evaluated in the Annual Report. We believe that one of those measures includes installation of sentinel monitoring wells downgradient of the plume.

The issues raised in this comment have been addressed in the response to earlier comments. It should be noted, however, that the method used for determining the location of the capture zone near the leading front of the plume is very thorough. Water levels in the vicinity of well CW-1 are assumed to obey the following equation:

$$H = A + B X + C Y + D \ln r$$

where H is the water level at any point around CW-1, X and Y are the location coordinates of that point, r is the radial distance to that point from CW-1, and A, B, C, and D are constants that are determined by regression using data from wells in the vicinity of CW-1.[5] Once these constants are determined, the above equation is used to calculate the water level at a number of points around CW-1,[6] and these calculated water levels are added to the measured water-level data set before kriging to develop the water-level maps.

This process is used in developing both the UFZ/ULFZ and the LLFZ water-level maps, and results in the accurate determination of the limit of the capture zone downgradient of CW-1. The wells used in calculating the constants A, B, C, and D for the UFZ/ULFZ and for the LLFZ, and the 2007 results are summarized in Attachment 5. Note that the residuals, the differences between the measured and calculated water levels, are very small. Therefore, the process provides reliable estimates of the water levels at distances of less than 1,000 feet from CW-1, and accurately depicts the actual capture zone of CW-1.

Comment 13

Figure 6.10, Predicted Extent of TCE Plume -November 2007: This figure has been predicting the cleanup of well MW-65 for six years, but the well is still contaminated. This discrepancy is another indication that the groundwater model should be adjusted. Consider modifications to the model to correct the discrepancy.

As discussed in the response to Comment 5, the contaminants detected in well MW-65 since 2001 are due to a separate plume that does not originate at the Sparton facility. The model does not include this plume and, therefore, correctly predicts that the operation of CW-1 quickly cleaned up the contaminants that were present in the MW-65 at the start of its operation, and that the well remains clean of contaminants originating at the Sparton facility since then.

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[5] This is equivalent to assuming that the water levels in the vicinity of CW-1 in the absence of pumping can be represented by a plane. The water levels in the vicinity of CW-1 when pumping occurs can be calculated by subtracting the drawdowns caused by the pumping well from this plane; the constants B and C are the X and Y components of the non-pumping hydraulic gradient and D is equal to $Q_{int}/ 2\pi T_{int}$ where Q_{int} and T_{int} are, respectively, the amount of water pumped from and the transmissivity of the interval to which this approach is applied. This method of calculating water levels in the vicinity of pumping wells is described in the article *"Kriging Water Levels with a Regional-Linear and Point-Logarithmic Drift"* by M. Tonkin and S. Larson published in Ground Water, Volume 40, pages 185-193.

[6] The approach is similar to making a semi-logarithmic distance-drawdown plot and preparing a drawdown map by estimating the drawdown at different distances from the pumped well using this plot.

As also stated in the response to Comment 5, the purpose of the model is to simulate the plume emanating from the Sparton facility and to evaluate the effects of the remedial measures on this plume. Sparton does not believe that the model needs to be adjusted to include the separate plume whose origin and extent is uncertain.

Comment 14

Page 5-6: "the contaminants detected in MW-65 during the last several years may represent a separate source, or spill, south of the Sparton Site." We see no reason to invoke a separate source for this contamination. The primary contaminants in MW-65 and MW-62, namely TCE, 1,1,1-TCA, and 1,1-DCE, have all also been.primary contaminants in about 32 of the plume wells, most notably at high levels on the Sparton Site. Sparton should not dismiss this contamination; rather, Sparton should fit this contamination information into both the conceptual model and the mathematical groundwater model.

The response to Comment 5 addresses this comment.

Comment 15

Plume Containment: Figures 5.10 thru 5.12 and 6.4 thru 6.6 compare November 2007 containment areas to November 2006 plume extents. Since the contemporaneous November 2007 plume extent is available (see Figure 5.15), it should be used instead of the 2006 interpretation. Also, add to Figures 6.4 through 6.6 the date of the calculated capture zones.

Effective with the 2008 Annual Report the plume extent used in Figures 5.10 through 5.12 and 6.4 through 6.6 will be that determined from data collected during the November (fourth quarter) sampling event of that year.[7] Please note, however, that the calculated water levels presented in Figures 6.4 through 6.6, and hence the capture zones shown in these figures, represent the average water levels for the year and the capture zones corresponding to these average water levels rather than to a specific date.[8]

[7] It is assumed that the agencies want the plume extent from November of the previous year to continue to be used in Figures 5.1 through 5.9.

[8] See Section 6.1.4 of 2007 Annual Report.

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 this letter or need further information, please contact me at the phone or email listed on page one of this letter.

Sincerely,

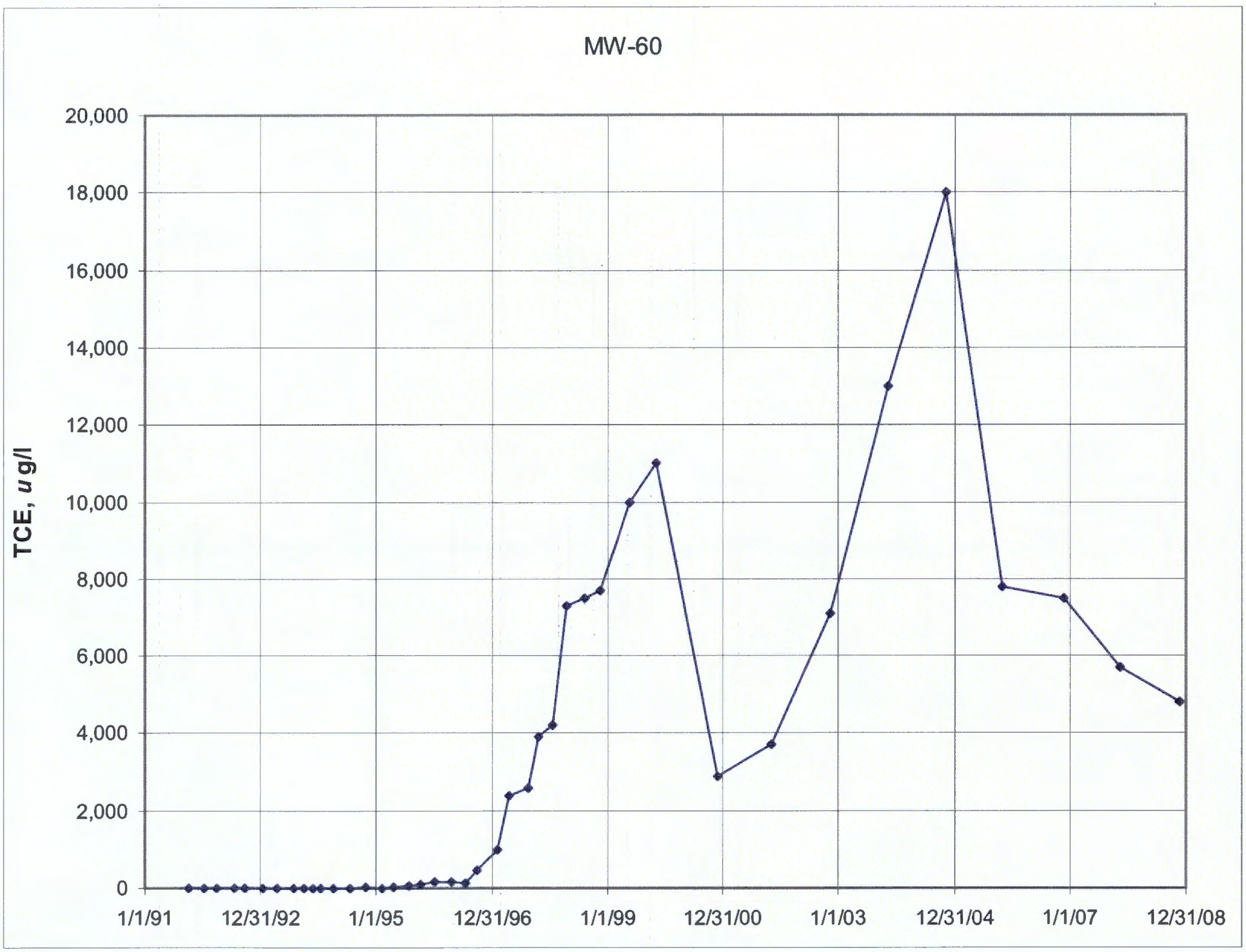
S.S. PAPADOPULOS & ASSOCIATES, INC.

Charles B Andrews

Charles B. Andrews
President

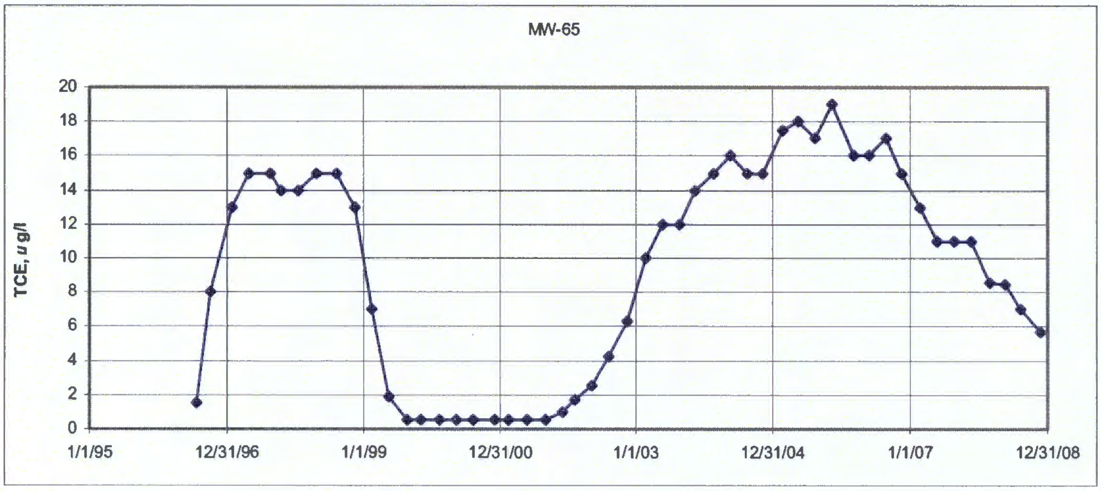
cc: Ms. Susan Widener
Mr. James B. Harris
Mr. Tony Hurst
Mr. Gary L. Richardson

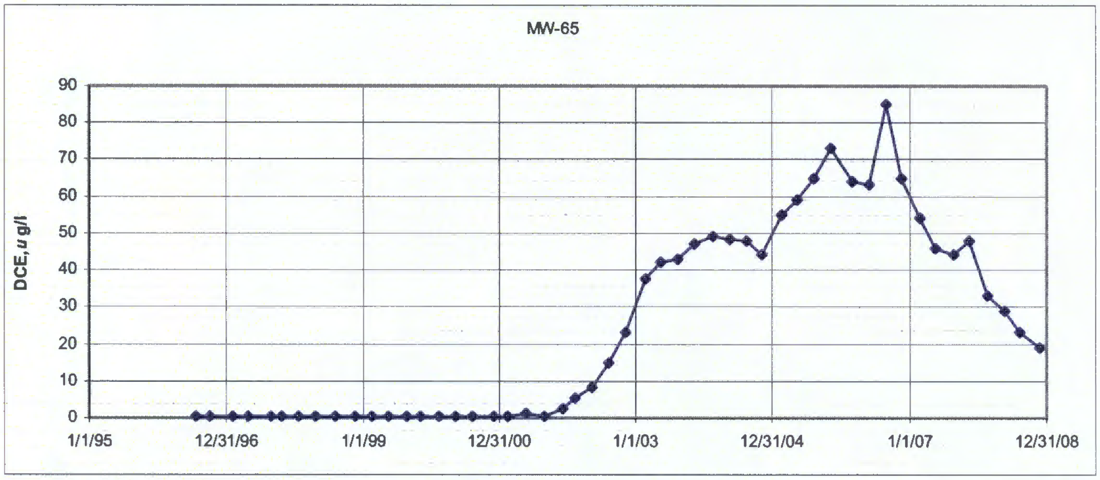
Attachments

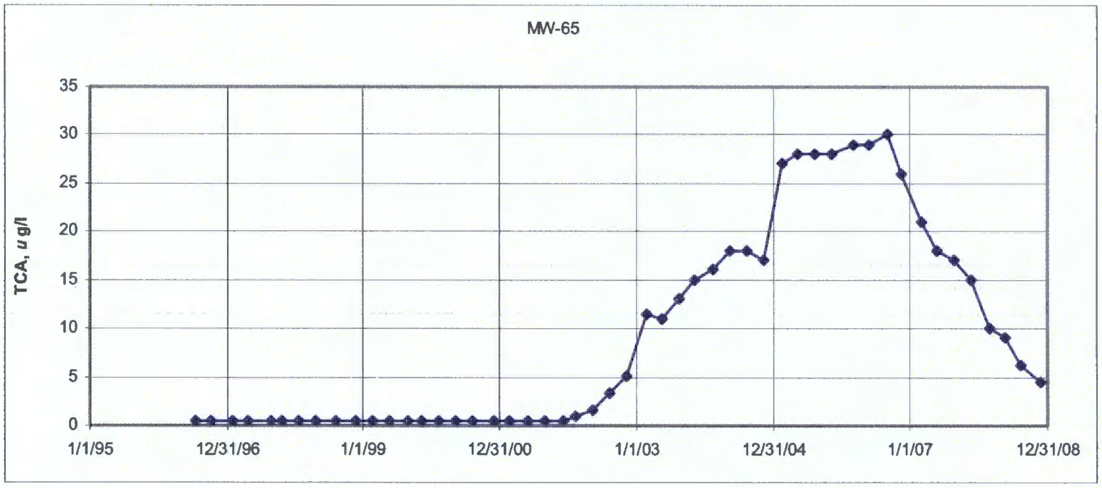


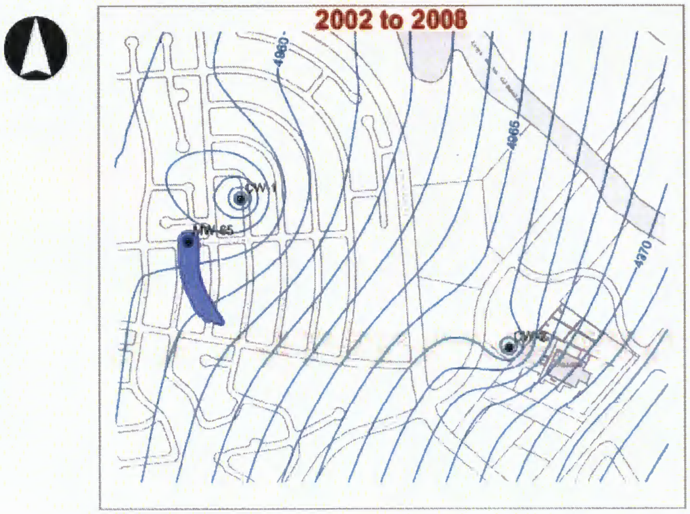
ATTACHMENT 1

ATTACHMENT 2

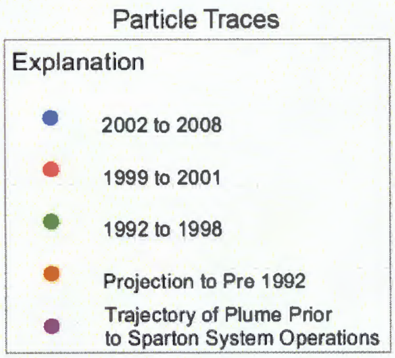


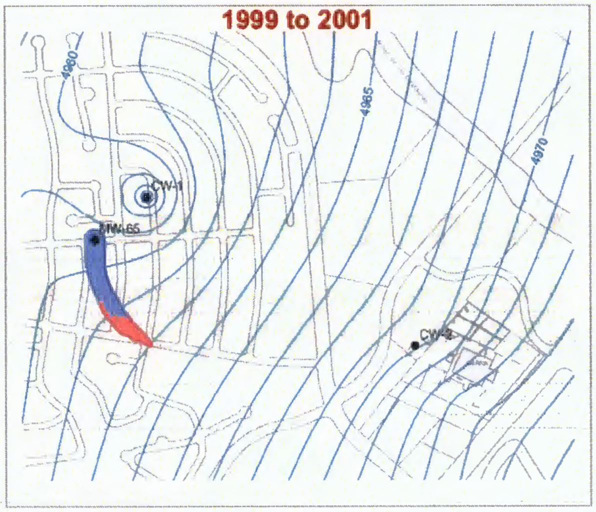




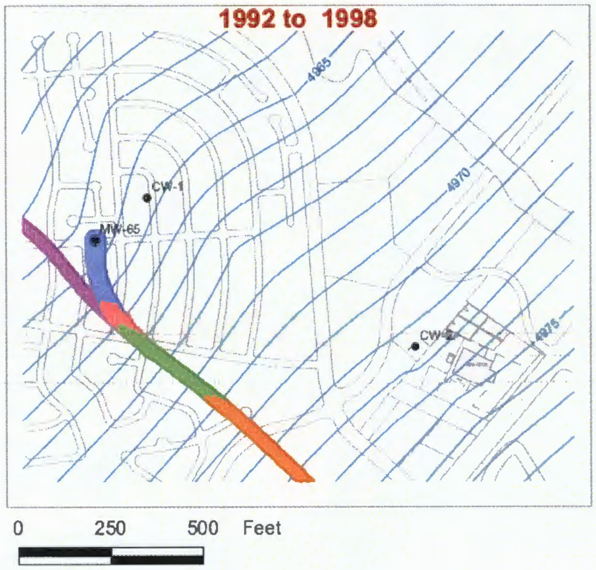


Reverse Particle Tracking Results during CW-1 and CW-2 Pumping with Average Water Levels 2002-2008





Reverse Particle Tracking Results during CW-1 Pumping with Average Water Levels 1999-2001



Reverse Particle Tracking Results during Water Level Monitoring Period 1992-1998, Prior to Remedial Pumping