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RESPONSES TO U.S. EPA AND OEPA TECHNICAL REVIEW COMMENTS ON DESIGN FOR REMEDIATION OF THE GREAT MIAMI AQUIFER IN THE WASTE STORAGE AND PLANT 6 AREAS

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO

COPY

JUNE 2001

U.S. DEPARTMENT OF ENERGY

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RESPONSES TO U.S. EPA TECHNICAL COMMENTS ON THE DESIGN FOR REMEDIATION OF THE GREAT MIAMI AQUIFER IN THE WASTE STORAGE AND PLANT 6 AREAS

GENERAL COMMENT

1. Commenting Organization: U.S. EPA Commentor: Saric
Section #: Not applicable (NA) Pg #: Line #: C: G
Original General Comment #: 1

Comment: The document includes plans for installing five groundwater extraction wells in Phase-I and two additional groundwater extraction wells in Phase II to reduce groundwater uranium concentrations in the waste storage area (WSA). The text also states that WSA groundwater is projected to take 5 years longer to remediate than originally stated in the "Baseline Remediation Action Strategy Report" because of higher than anticipated levels of contamination in the WSA-Phase I area. Although installation and use of the proposed extraction wells may be sufficient to reduce groundwater uranium concentrations to the total uranium final remediation level, continued groundwater monitoring and performance evaluations of the groundwater extraction system are required to determine whether additional extraction wells will be needed to remediate groundwater uranium concentrations in the WSA. The text should be revised to address this issue.

Response: DOE agrees that continued groundwater monitoring and performance evaluations of the Waste Storage Area Module are required. Consistent with the South Field and South Plume Optimization Modules, monitoring of the Waste Storage Module will be addressed as part of a Start-up Monitoring Plan and, after the initial start-up period, routine monitoring will become part of the IEMP. The performance evaluations will be conducted in an ongoing manner. Consistent with current practice for the various operating modules, performance results will be reported as part of the IEMP reporting protocol and, as needed during the weekly site update teleconferences.

Action: Monitor and evaluate the performance of the Waste Storage Area Module as noted in the response. Report the results of the monitoring and performance evaluations via the established reporting vehicles as noted in the response.

SPECIFIC COMMENTS

2. Commenting Organization: U.S. EPA Commentor: Saric
Section #: 2.1 Pg #: 2-3 and 2-4 Line #: NA C: C
Original Specific Comment #: 1

Comment: The text states that the southern, eastern, and northern extent of the uranium plume has been well defined. However, the western extent of the plume has not been completely defined. The text should be revised to provide a rationale for not collecting groundwater samples at geoprobe locations north and west of sampling locations 2108 and 3108 to more fully define the western extent of the plume.

Response: DOE agrees that additional explanation could have been provided. As stated on page 2-3: "The uranium concentrations in the aquifer west of the present location of Paddys Run are believed to be residuals left by infiltration from the ditch before Paddys Run was relocated." The reasons additional characterization was not completed north and west of Monitoring Wells 2108 and 3108 are as follows:

The primary source for the contamination in this area of the aquifer was the infiltrating flow from the Pilot Plant Drainage Ditch to the former channel of Paddys Run, just south of these wells. The groundwater gradient in this area is due east, toward the new extraction wells, except when there is significant flow in Paddy's Run. When significant flow occurs in Paddys Run (usually in the Spring of each year), infiltration causes a

transient mounding of the water table in this area, which in turn causes temporary changes to the groundwater gradient in this area. These temporary gradient changes are believed to be responsible for pushing the contamination slightly north and perhaps slightly west of the source area, as evidenced by the relatively low uranium concentration in Wells 2108/3108 and at direct push sampling Location 12722. This transient mounding is clearly shown in the April 2000 quarterly aquifer water level map provided in the 2000 Annual Site Environmental Report (Figure A.3-2) and is absent in the other three quarterly water level maps for 2000 (Figures A.3-1, A.3-3, and A.3-4). For the commentor's convenience, copies of these figures are included as Attachment 1 to these responses.

An additional reason that more geoprobes were not completed to the north and west of Wells 2108/3108 is the groundwater modeling provided in Section 3 of the Design Report. The modeling indicates the commentor's area of concern is well within the area to be affected by the new extraction wells (Figures 3-6 and 3-7).

Action: No additional action required. The response provides the requested explanation.

3. Commenting Organization: U.S. EPA Commentor: Saric
Section #: 3.1 Pg #: 3-1 Line #: NA C: C
Original Specific Comment #: 2

Comment: The text refers to extraction well WSA#3 as one of three extraction wells to be installed in the pilot plant drainage ditch. However, Figure 3-1 does not show extraction well WSA#3. The text or figure should be revised to be consistent.

Response: The text should have referred to the wells as 1, 2, and 4 to be consistent with the numbering used in the model as shown on the Section 3 figures.

Action: No additional action required.

4. Commenting Organization: U.S. EPA Commentor: Saric
Section #: 3.3.3 Pg #: 3-6 Line #: NA C: C
Original Specific Comment #: 3

Comment: The text states that the additional pumping time required in the design presented is due in part to the recently characterized higher levels of contamination in the pilot plant drainage ditch; however, no other rationale for the additional pumping time is stated. The text should be revised to define any additional factors contributing to the additional pumping time.

Response: As shown in Table 5.1 of the Baseline Remedial Strategy Report (BRSR, DOE 1997), ten Waste Storage Area Extraction Wells were scheduled to pump for two years: 2004 and 2005. The pumping time in the current design has been increased due to three factors:

1) characterization of higher total uranium concentrations under the Pilot Plant Drainage Ditch as delineated by recent direct push sampling results;
2) a reduction from ten to five extraction wells due to the higher total uranium concentrations over a smaller plume area, and
3) the absence in this design of the Kd transition modeled in BRSR.

Model scenarios in the BRSR contained a Kd transition from 1.78 Liters/Kilogram (L/Kg) to 17.8 L/Kg after initial pore flushing at the end of the second year of pumping. This Kd transition resulted in a proportionate redistribution of total uranium mass in the model from a dissolved to a sorbed state. The Kd transition was not modeled in the current design due to operational experience with the South Field and South Plume groundwater extraction modules. Experience with these modules has indicated that the transition from sorption to desorption dominated processes may not occur as rapidly after the initial pore flushing as assumed for the BRSR model scenarios. Additional modeling

work (the VAM3D/Data Fusion groundwater model upgrade project) is ongoing and laboratory work to determine kinetic reaction parameters for the model is being planned.

Action: No additional action required. The comment response provides the requested information.

RESPONSES TO OEPA COMMENTS ON THE DESIGN FOR REMEDIATION OF THE GREAT MIAMI AQUIFER IN THE WASTE STORAGE AND PLANT 6 AREAS

COMMENTS

5. Commenting Organization: Ohio EPA Commentor: DSW
Section #: Pg #: Line #: Code: G
Original Comment #: 1
Comment: This design document and accompanying drawings do not address sediment and erosion controls specific to this project. Specific areas that need to be addressed include (but are not limited to): showing surface water flow patterns, placement of silt fences, detail on placement of roads and pipelines (there was discussion in the field about moving one road pipeline to minimize impact to established forest canopy and none of this detail is shown in the design documents), additional surface water controls that may be needed (there was discussion in the field about the high flow of surface water that occurs at the corner of the parking lot and that precaution will be needed during construction here, none of the detail of how this water will be handled is shown in the design documents).
Response: As agreed to in a field walk-down of the proposed layout with Ohio EPA staff on May 8 2001, the pipe line mentioned in Comment #1 has been relocated to minimize impact to established forest canopy and the new routing has been incorporated into the revised design drawings. The contractor's responsibility for erosion control is covered in Section 02270 of the specifications. Location of silt fencing and other erosion control barriers have been shown on the revised design drawings. The contract documents require the contractor to maintain existing surface water flow routes.
Action: As noted in the response.

6. Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: 3.2 Pg.#: 3-3 Line #: 5 Code: C
Original Comment #: 2
Comment: The text should summarize how the new extraction wells were represented in the model. The layer that each well is simulated in should be specified. In addition, the anticipated screen interval should be provided.
Response: As outlined in the table below, the extraction wells were represented in the model based on the anticipated elevation of screen tops and bottoms. The proportionate length of screen open to each model layer was used to establish pumping rate allocations for each layer.

Extraction Well No.	Screen Top (ft. AMSL)	Screen Bottom (ft. AMSL)	Model Layer(s) and Pumping Rates Layer No. - Rate (gpm)
WSA #1	517.6+	482.6+	2 – 80
32761			3 – 320
WSA #2	518*	478*	2 – 30
33062			3 – 270
WSA #4	518*	478*	2 - 30
33063			3 – 270
WSA #5	**	**	3 – 100
WSA #6	**	**	2 - 35
			3 – 57
			4 - 8

\+ Actual screen depths as installed
* Anticipated screen depths per Project Specific Plan
** Screen depths for these wells will be provided in future documention as Phase II design progresses

Action: No additional action required. The response provides the requested information

7. Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: 3.2 Pg.#: 3-3 Line #: 16 Code: C
Original Comment #: 3

Comment: Although the text does not specify, it is assumed that the particle tracks shown on the figures are for layer 2. The particle tracking results should also be presented in cross section or in three dimensions. Concentrations above the current FRL level of 20 μg/L are present in model layer 4. What is the vertical extent of the capture zone for the proposed extraction wells?

Response: Particle tracks for the VAM3D groundwater model are generated by a third-party commercial software package called TecPlot developed by AMTEC Engineering. Inc. Therefore, particle tracking is not done by model layer but by initial depth within the velocity field from the VAM3D model. The particle tracks shown in Figures 3-8 through 3-11 are 3D tracks seeded within model layer two at a constant depth of 510 feet Above Mean Sea Level (AMSL). The particles are tracked backward in time by TecPlot through the modeled velocity field and viewed from above to produce the subject figures.

Additional displays of these tracks seeded at 510.0 ft AMSL and tracks from particles seeded at 505.0, 495.0, and 485.0 ft AMSL (along the length of well screens) are shown in the figures included as Attachment 2 to these responses. As shown from these figures, the vertical extent of capture extends down to below 460 ft. AMSL. Based on the plume cross section shown in Figure 2-3 of the design report, the plume is under complete vertical capture at this depth.

Action: No additional action required. The response and attached figures provide the requested information.

8. Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: 3.2 Pg.#: 3-3 Line #: 16 Code: C
Original Comment #: 4

Comment: Review of the aquifer test report revealed that potential errors exist in the drawdown corrections that were applied to the test data prior to analysis. Re-analysis of the data with the revised drawdown corrections implemented resulted in a calculated hydraulic conductivity value approximately 30 percent less than the value used for Zone 7 in the modeling discussed in the text. Particle tracking analyses using the lower conductivity value, however, showed that the impact of the lower value on the computed capture zone is relatively minor. The resulting capture zones are slightly expanded relative to those presented in the text.

Response: As stated in the response, the impact to the design report raised by this comment is minor, and supportive of the current design in that the commentors evaluation results in slightly expanded capture zones. This comment is similar to Comment #3 received from the Ohio EPA on the Pumping Test Report, Pilot Plant Drainage Ditch Uranium Plume, Aquifer Restoration and Wastewater Project. Therefore, this comment will be further addressed in the Comment Response Document assembled to address comments on that report.

Action: As noted in Response.

9. Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: 3.2 Pg.#: 3-3 Line #: 19 Code: C
Original Comment #: 5

Comment: A significant source of mass that is not included in this analysis is the existing mass of uranium sorbed on to the aquifer. Uranium will desorb from the aquifer material throughout the period of the remediation and likely will, as a result, significantly prolong the pumping time. Analysis of the uranium concentrations in the aquifer material samples collected during the pumping test control well installation would provide needed insight with regard to characterizing the sorbed uranium mass and for including its effects in the overall cleanup time. Simulation of kinetic mass transfer is also needed rather than

the linear kd used in the model.

Response: Modeling for this design assumed a linear equilibrium isotherm with a constant KD of 1.78 L/Kg for all model zones. The most recent version of VAM3D contains the functionality to model kinetic mass transfer. However, there are unresolved comments/issues on this version of VAM3D and DOE has committed not to use the code for routine modeling tasks until these issues have been resolved. Responses to these unresolved comments are currently in preparation and will be forwarded to EPA and Ohio EPA as soon as they are completed. Furthermore, even though the most recent version of VAM3D contains the functionality to model kinetic mass transfer, additional laboratory tests are required to gain additional information on the sorption/desorption parameters for the aquifer. This additional Kd work is currently scheduled to begin in FY02.

Action: As noted in the response

10. Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: 3.3.1 Pg.#: 3-4 Line #: 1st complete paragraph Code: C
Original Comment #: 6

Comment: The text describes how hand-contoured concentrations and vertical concentration data from direct-push sampling was used to assign initial concentrations to model blocks in layers 2 and 3. Figure 3-12 shows an elevated concentration area (maximum contour of 30 μg/L) in model layer 2 that straddles the northeastern boundary of the PPDD Plume. Figure 2-4 does not show data that supports the existence of this elevated concentration area. We are not clear what data was used to set the initial concentrations. Perhaps an overlay showing the model grids would clarify this.

Response: Initial concentrations were set using the most recent monitoring well and direct push sampling data. This data is presented in Figure 1-3, and in Appendix C. DOE believes that Figures 3-12 and 2-4 are consistent. The subject area above 30 ppb concentration presented in Figure 3-12 is supported by the 46 ppb concentration recorded at Direct Push Location 12717, as shown in Figure 2-4. The data for Direct Push Location 12717 is presented in Table C-19.

Action: No action required.

11. Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: 3.3.3 Pg.#: 3-6 Line #: 4 Code: C
Original Comment #: 7

Comment: The model indicates that after seven years of pumping, concentrations in the aquifer will be reduced to levels below the 30 μg/L level. The transport model should be run for a sufficient time period following pump shutdown to evaluate potential rebound effects. This action assumes that the simulation will be performed with the specification of a kinetic kd.

Response: DOE agrees the potential exists for rebound effects after pump shutdown and that this potential needs to be evaluated with additional transport model runs. As pointed out in the comment, these transport runs should be performed with the kinetic mass transfer options now in the VAM3D model code. However, as discussed in the response to comment 4b above, DOE has committed not to use the kinetic mass transfer functionality in VAM3D until outstanding comments/issued with this code have been resolved. The additional laboratory work scheduled to begin in FY02 to further evaluate sorption/desorption parameters will also be critical to the study of rebound effects.

Action: As stated in the response.

12. Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: 3.3.3 Pg.#: 3-6 Line #: 19 Code: C
Original Comment #: 8

Comment: Based on the kd value and simulated plume concentrations, a significant amount of uranium is sorbed on to the aquifer matrix during the waste storage area pumping action. Table 3-4 should track the sorbed mass of uranium together with the mass removed, bypassed, etc.

Response: The aquifer remedy for the Great Miami Aquifer is concentration based. Therefore, the additional mass sorbed onto the aquifer matrix is immaterial in tracking remedy performance.

Action: None Required.

Comments on the Technical Specifications, Waste Storage Area Extraction System Phase 1 and SFES Supplemental Well

13. Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: NA Pg.# NA Line #: NA Code: G
Original Comment #: 9

Comment: The package does not contain specifications for the extraction wells. Are we correct in concluding that this is a preliminary design and that details necessary for construction will appear in subsequent versions?

Response: The specifications for the design, installation and development of the extraction wells #26, 27 and 28 were not intended to be part of the technical specifications for the Waste Storage Area Extraction System Phase 1 and SFES Supplemental Well project. The wells are being installed under a separate drilling contract and the specifications for the drilling, installation and development of the extraction wells are covered in a Project Specific Plan (PSP) for the installation of the wells. The well installation PSP was submitted to Ohio EPA on May 15, 2001 (DOE letter: DOE-0575-01).

Action: No additional action required.

14. Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: NA Pg.# NA Line #: NA Code: E
Original Comment #: 10

Comment: At numerous locations in the technical specifications and in the drawings, the extraction wells are mis-numbered.

Response: The drawings and specifications have been reviewed and revised to correct the miss - numbering of the extraction wells.

Action: As noted in the response.

15. Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: 02667 Pg.#: 8 Line #: 3.4.B Code: C
Original Comment #: 11

Comment: The following line should read:
Ap = Test Pressure (Operating Pressure + 50 psi = ~~110~~100 psi + 50 psi)@
so as to be consistent with using 100 psi as the operating pressure for testing purposes.

Response: The specifications have been revised to eliminate the typo and are now consistent with using 100 psi as the operating pressure for testing purposes.

Action: As noted in the response.

16. Commenting Organization: Ohio EPA Commentor: DSW
Section #: 02900 Pg #: Technical Specification Line #: NA Code: C
Original Comment #: 12
Comment: This is not the current version of 02900, Soil Preparation and Seeding. There have been many substantive changes to this specification. Please obtain the new specification from the Natural Resources Group.
Response: Section 02900 of the specifications has been revised to include the latest changes to the specification for Soil Preparation and Seeding.
Action: As noted in the response.

17. Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: 13400 Pg:# 7 Line #: 2.1.A Code: C
Original Comment #: 13
Comment: This line refers to drawing 95X-5900-E-0277, which is not included as a part of this spec package. Reference should be deleted, or the drawing should be included.
Response: The reference to drawing 95X-5900-0277 has been deleted in the revised specifications.
Action: As noted in the response.

18. Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: 13400 Pg.#: 13 Line #: 3.6.A.3 Code: C
Original Comment #: 14
Comment: There is not an attached Instrument Data Sheet for the Extraction Well Level Indicating Transmitters.
Response: The reference to an attached data sheet for Level Indicating Transmitters has been deleted in the revised specifications.
Action: As noted in the response.

19. Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: 13400 Pg.#: 13 Line #: 3.6.B.1-5 Code: C
Original Comment #: 15
Comment: There are no Instrument Installation Details attached for Items 1-5.
Response: Instrument Installation Detail sheets have been attached for Items 1-5 in the revised specifications.
Action: As noted in the response.

20. Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: 13401 Pg .#:8 Line #: 3.4.A Code: C
Original Comment #: 16
Comment: No panel layout diagram is attached to Section 13401.
Response: The panel layout diagram has been attached to Section 13401 in the revised specifications.
Action: As noted in the response.

21. Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: 15060 Pg.#: Attachment B Line #: Code: C
Original Comment #: 17
Comment: The correct P&ID drawing for Well Houses 26, 27, and 28 are 95X-5500-N-02044, not 95X-5900-N-00190 as currently indicated.
Response: The listing in Attachment B for the P&ID drawing for well houses 26, 27 and 28 has been corrected to read 95X-5500-N-02044 in the revised specifications.
Action: As noted in the response.

22. Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: 16483 Pg.#.: Attachment A Line #: Code: C
Original Comment #: 18
Comment: There is nothing in Attachment A (no Cincinnati Electric Bill of Material).
Response: The reference to "Attachment A, Cincinnati Electric Bill of Materials" has been deleted from the revised specifications.
Action: As noted in the response.

23. Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: Dwg 95X-5500-G-02006 Pg.#: NA Line #: 2 and #3 Code: C
Original Comment #: 19
Comment: Both Lines #2 and #3 have pipe inverts depicted, but not labeled. What type of pipes are these?
Response: Lines #2 and #3 have been labeled HDPE pipe on the revised drawing.
Action: As noted in the response.

24. Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section#: Dwg. 95X-5500-A-02007 Pg.#: NA Line #: NA Code: C
Original Comment #: 20
Comment: The 3" Pipe Discharge Location label should reference wells EW-25 through EW-28 (currently there are no wells listed), and should refer to Note 5, not Note 6.
Response: It is not necessary to reference EW25 – EW28 for the location of the 3" floor drain discharge pipe since the location for all 4 well houses is the same. The location label for the 3" pipe has been referred to Note 5 on the revised drawing.
Action: As noted in the response.

25. Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section#: Dwg. 95X-5500-A-02007 Pg#: NA Line #: NA Code: C
Original Comment #: 21
Comment: The EF-(25,26,27,28) label should refer to Note 6, not Note 7.
Response: The EF- (25,26,27,28) label has been referred to Note 6 on the revised drawing.
Action: As noted in the response.

26. Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section#: Dwg. 95X-5500-A-02008 Pg.#: NA Line#: NA Code: C
Original Comment #: 22
Comment: There are two different Section Bs depicted. The Section B with the concrete pad (upper Section B) indicates a 6' concrete pad, while the section drawn on the Floor Plan on A02007 indicates a 4' concrete pad. These discrepancies should be addressed.
Response: The section identifier for the 4' sq.- 6" thick concrete pad at the entrance to the well house has been changed to "G" on revised drawings 95X-5500-A-02007 and 02008. Drawing 95X-5500-A-02007 indicates the concrete pad to be 4' sq. while the section on 95X-5500-A-02008 indicates the concrete pad to be 6" thick.
Action: As noted in the response.

27. Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section#: Dwg. 95X-5500-E-02023 Pg.#: NA Line#: NA Code: C
Original Comment #: 23
Comment: Elevation 13 is cited as being drawn on Drawing E02032; however, there is no Elevation 13 on Sheet E02032. Where is this Elevation 13 from?
Response: It was in error to cite Elevation 13 as being drawn on drawing E-02032. Drawing 95X-5500-E-02023 has been revised to <u>reference</u> drawing E-02032 to Elevation 13. The intent of Elevation 13 is to show the typical arrangement and construction of the electrical service entrance to the well houses. It is not from a specific drawing but is a stand-a-lone detail.
Action: As noted in the response.

ATTACHMENT 1

Figures in support of:

Response to Comment 2 (USEPA Original Specific Comment 1)

Quarterly Water Level Maps for the Great Miami Aquifer, Year 2000

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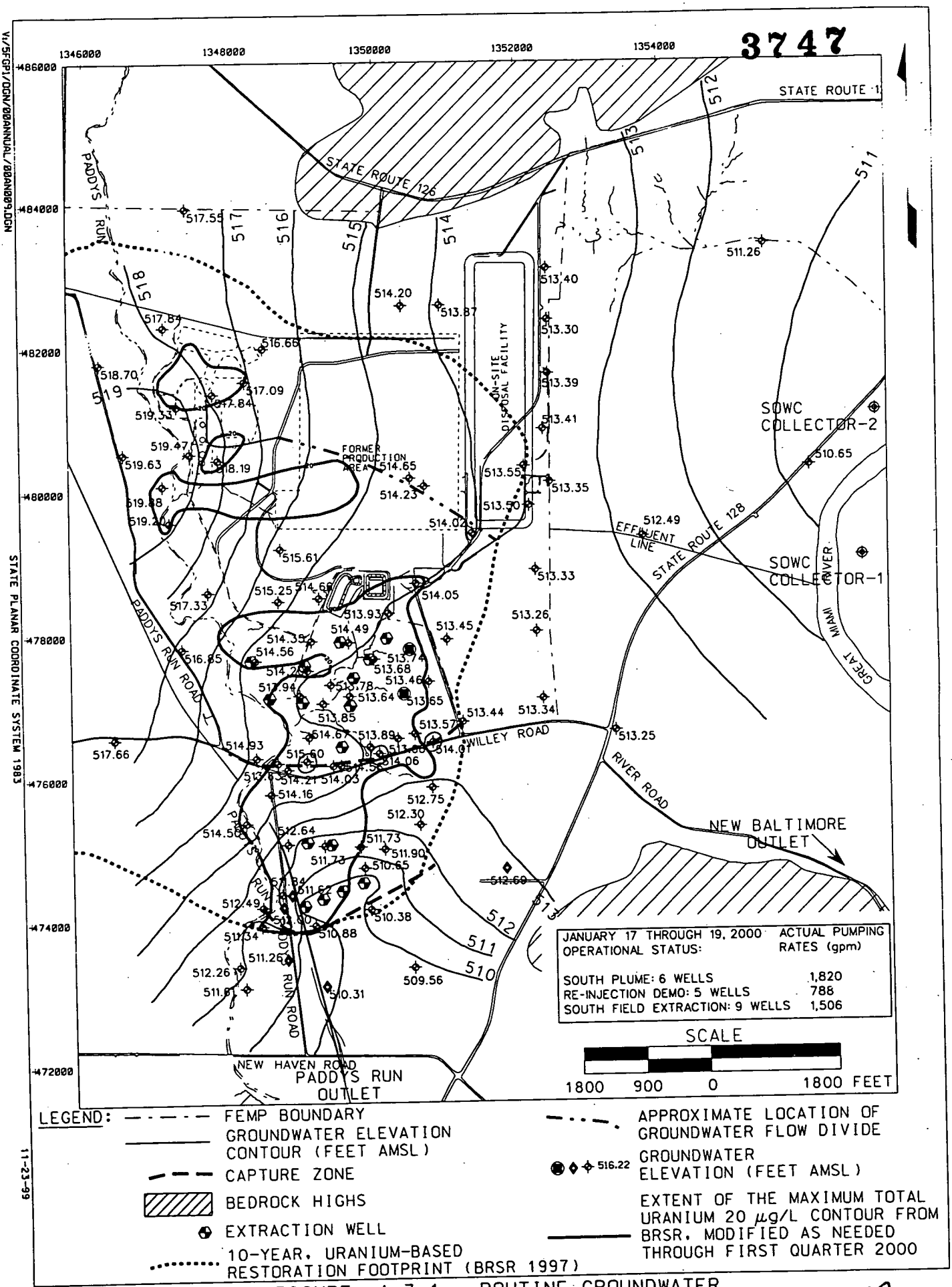


V:/5FGP1/DGN/00ANNUAL/00AN009.DGN

STATE PLANAR COORDINATE SYSTEM 1983

11-23-99

FIGURE A.3-1. ROUTINE GROUNDWATER ELEVATIONS FOR TYPE 2 WELLS, JANUARY 2000

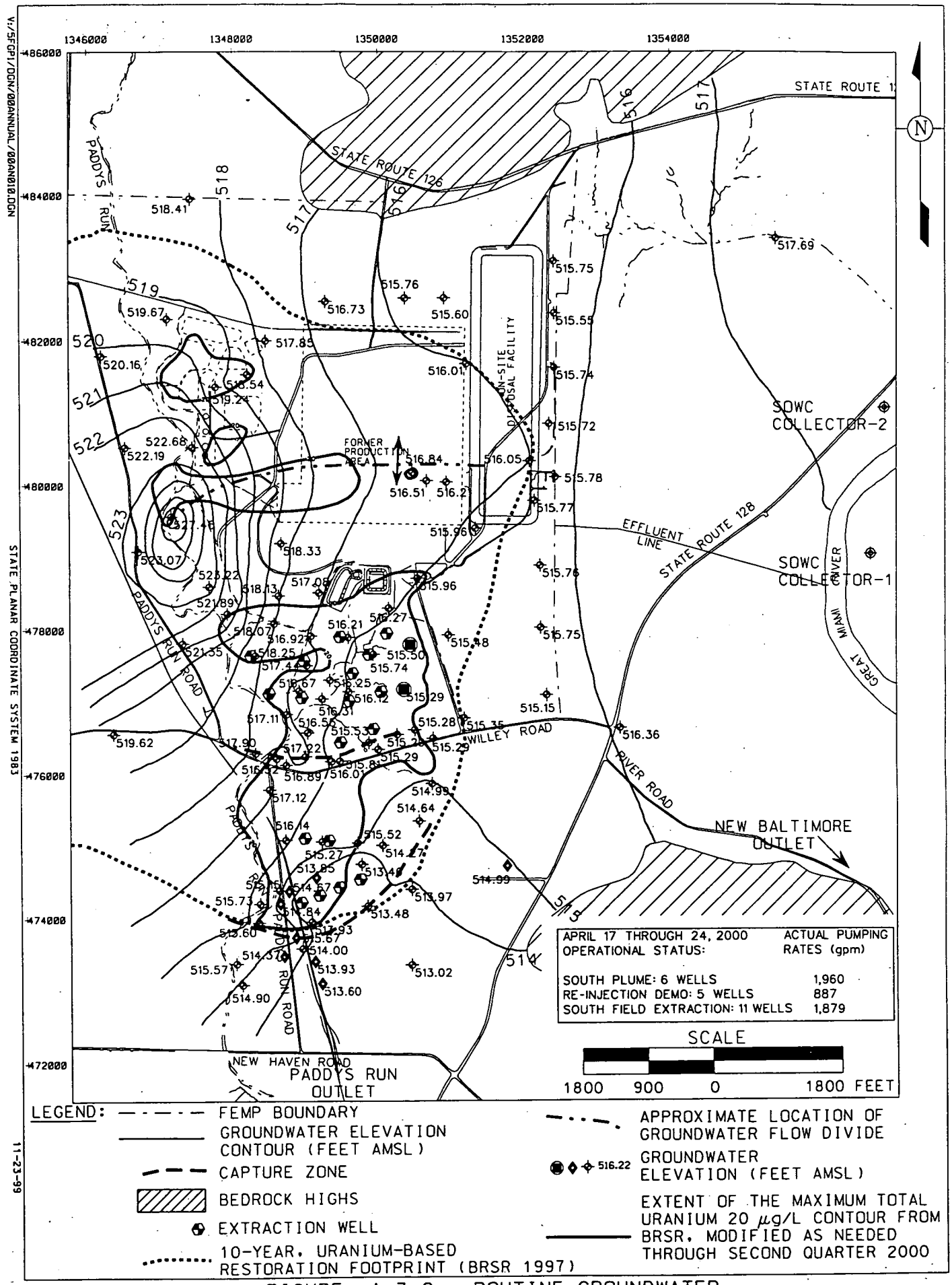


FIGURE A.3-2. ROUTINE GROUNDWATER ELEVATIONS FOR TYPE 2 WELLS, APRIL 2000

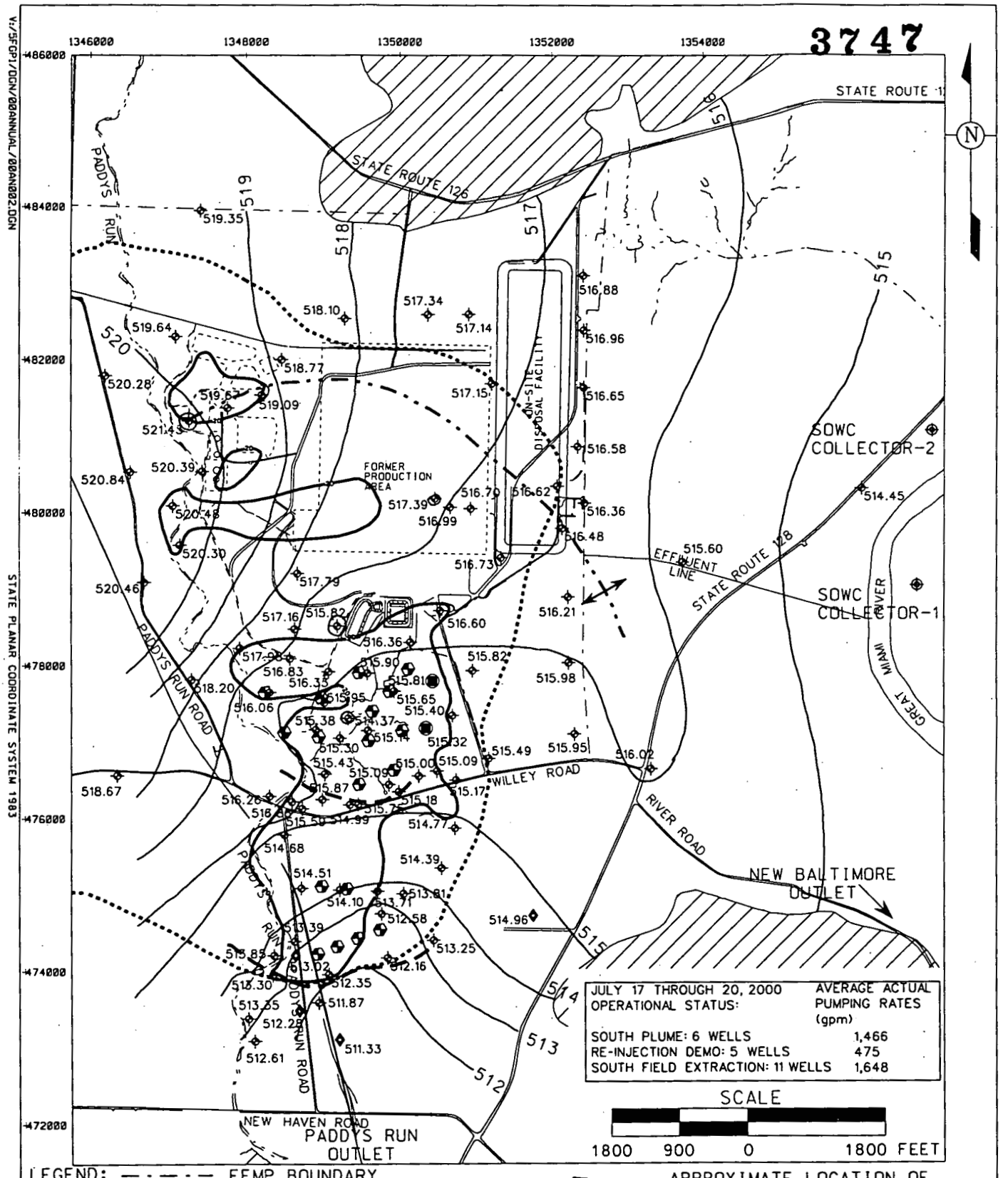


FIGURE A.3-3. ROUTINE GROUNDWATER ELEVATIONS FOR TYPE 2 WELLS, JULY 2000

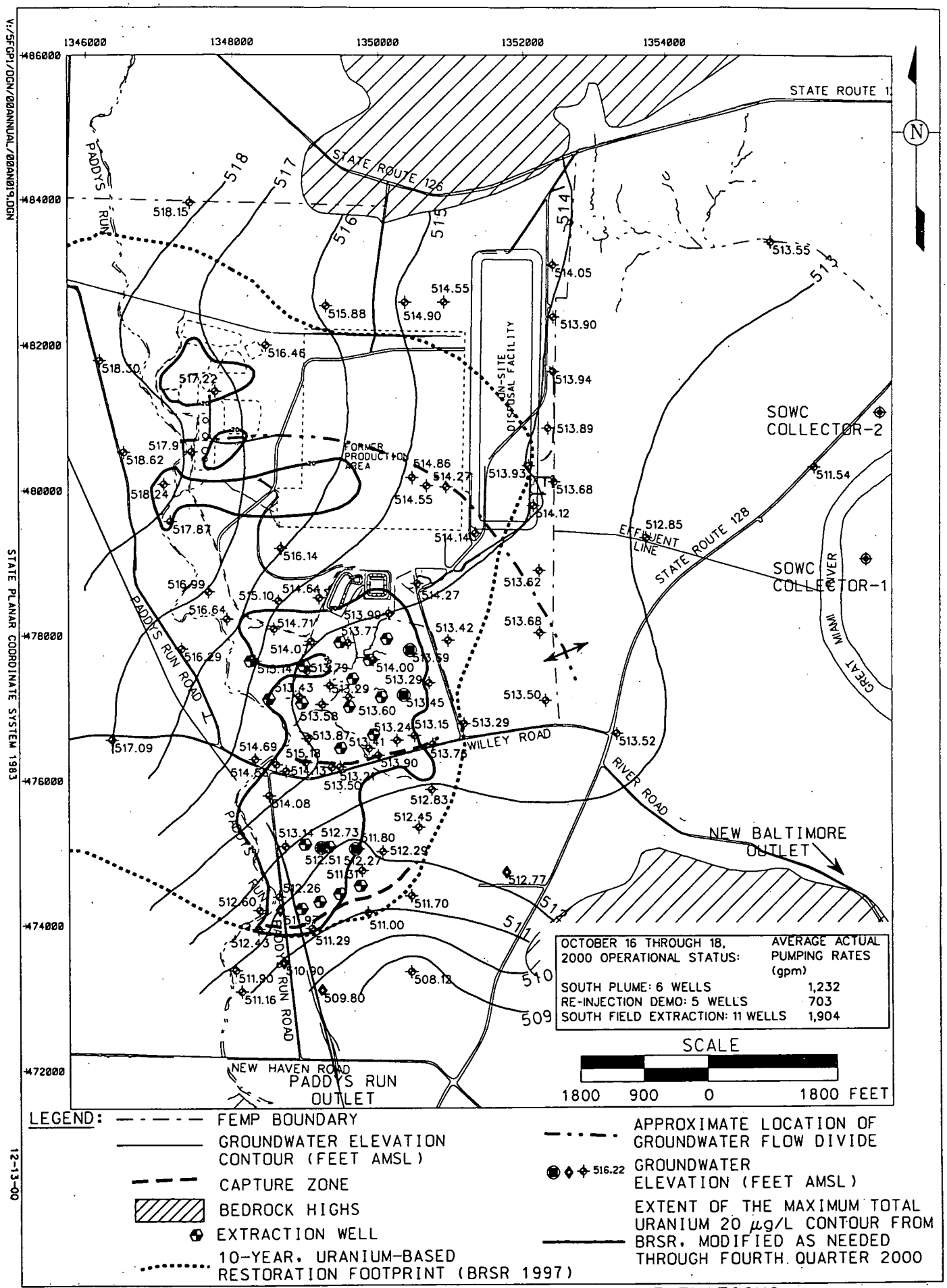


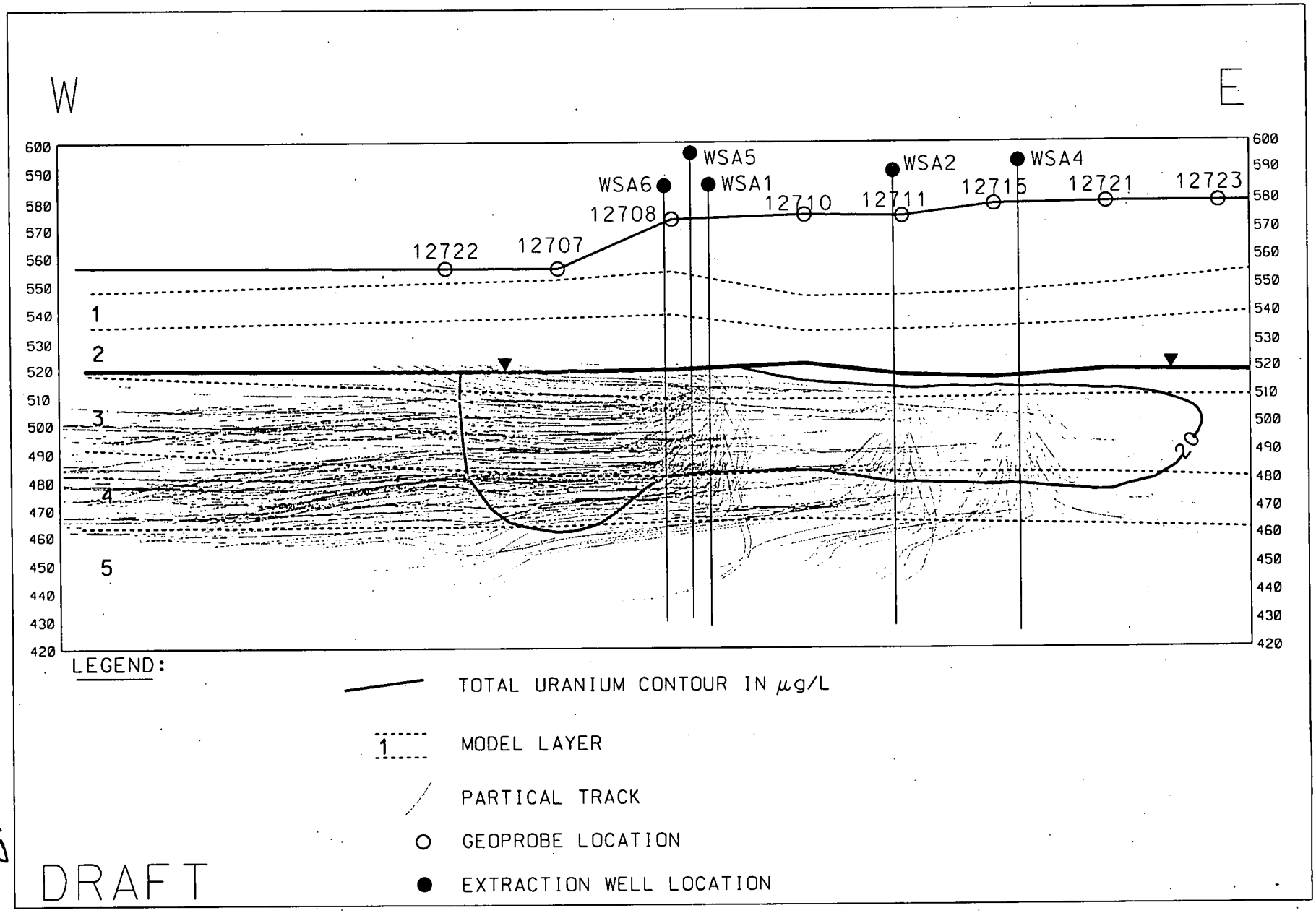
FIGURE A.3-4. ROUTINE GROUNDWATER ELEVATIONS FOR TYPE 2 WELLS, OCTOBER 2000

ATTACHMENT 2

Figures in support of:

Response to Comment 7 (Ohio EPA Original Comment 3)

Cross Sections of Particle Tracks for Wet and Dry Conditions



DRY CONDITIONS

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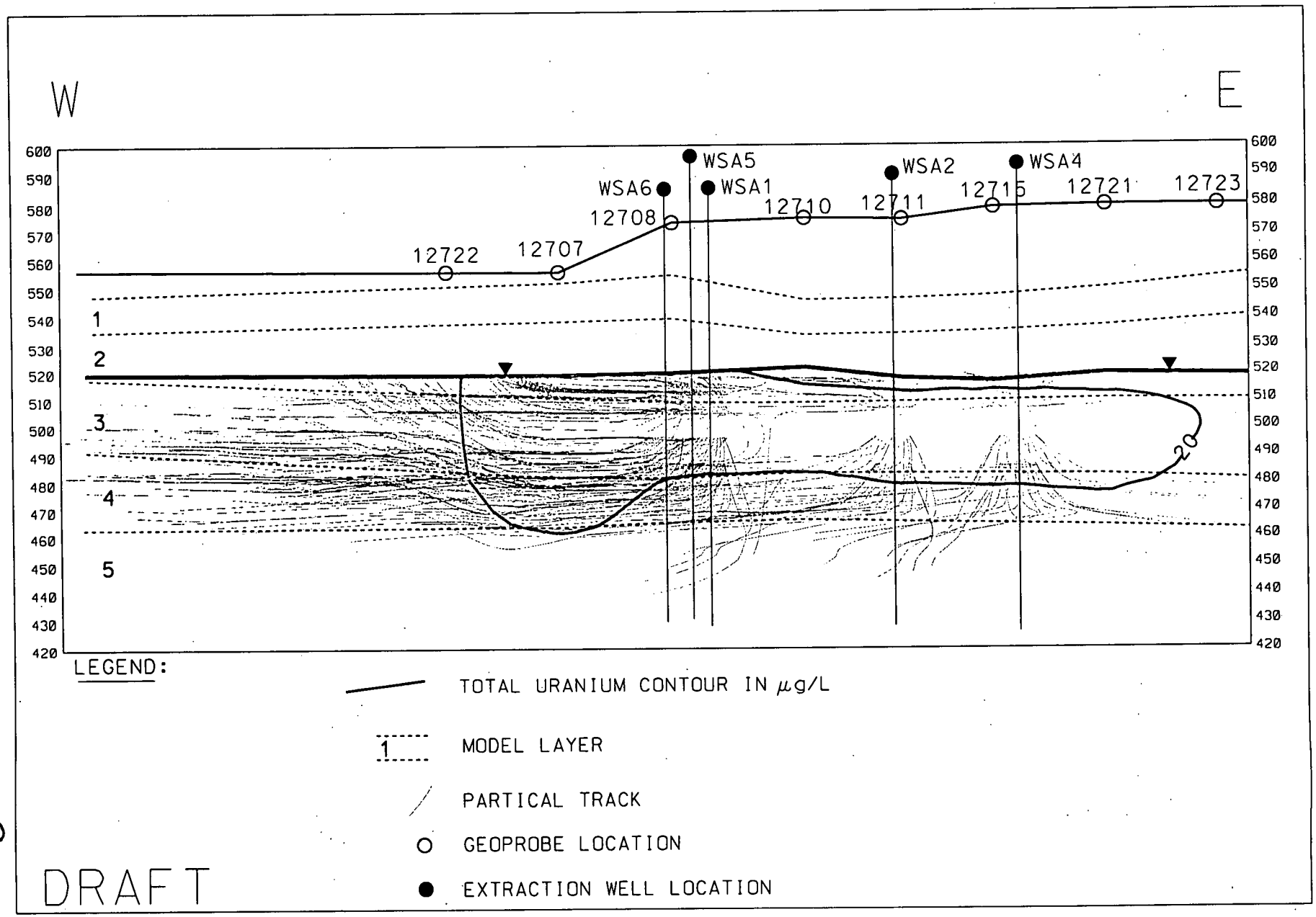

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WET CONDITIONS