PROJECT SPECIFIC PLAN FOR THE INSTALLATION OF EXTRACTION WELLS 33061, 33062, 33063 AND MONITORING WELL 63064

PROJECT NUMBER 52424-PSP-0002

MAY 2001

Prepared by

Fluor Fernald

Prepared for

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3675

APPROVAL:

Jack Hughes, Manager
Aquifer Restoration Project, Eng./Const. Section

Date: 5/15/01

William Hertel, Manager
Aquifer Restoration Project, Hydrogeology Section

Date: 5-15-01

Karen Voisard, Manager
Water Monitoring Section

Date: 5-15-01

Frank Thompson
Quality Assurance

Date: 5-14-01

Keith Lanning
Health and Safety

Date: 5-10-01

TABLE OF CONTENTS

3675

Section Page

1.0 Introduction 1

2.0 Management and Organization 3

3.0 Field Activities 5
3.1 Drilling and Installation of the Extraction Wells 33061, 33062, and 33063 5
3.1.1 Collection of Sediment Cores Using Rotosonic™ Drilling 5
3.1.2 Extraction Well Installation 6
3.1.3 Well Development 8
3.2 Drilling and Installation of Monitoring Well 63064 10

4.0 Equipment Decontamination 12

5.0 Waste Disposal 13

6.0 Health & Safety 14

7.0 Quality Assurance/Quality Control Requirements 15
7.1 Project Requirements for Surveillance 15
7.2 Changes to the Project Specific Plan 15

LIST OF TABLES

Table 1 Target Drilling Depths 16

LIST OF FIGURES

Figure 1 Location Map 17

1.0 INTRODUCTION

3675

This Project Specific Plan (PSP) serves as the controlling document for the installation of three extraction wells (33061, 33062, and 33063), and one monitoring well (63064). The locations of all four wells are shown on Figure 1. Extraction Well 33061 will be a component of the South Field Groundwater Restoration Module. Extraction Wells 33062 and 33063 will be components of the Waste Storage Area Restoration Module. Monitoring Well 63064 is being drilled to replace Monitoring Well 2551, which had to be plugged and abandoned last year.

Information supporting the location of Extraction Well 33061 in the South Field was issued to the EPAs on April 20, 2001 in a letter that also transmitted the Design for Remediation of the Great Miami Aquifer in the Waste Storage and Plant 6 Areas (DOE 2001). The design report establishes the basis for the locations of Extraction Wells 33062 and 33063. In the Design Report, Extraction Wells 33062 and 33063 are identified as WSA-2 and WSA-4, respectively.

This PSP outlines a management strategy to reduce mobilization costs for the rotosonic drilling rig by having the same rig that will be used to collect core at the three extraction wells, also drill the boring needed to install Monitoring Well 63064.

The drilling strategy for the three extraction wells will be to first collect a rotosonic core from each drilling location to support design of the well screens. Samples of aquifer material taken from the core will be sieved. The grain size results will be used to select the most efficient slot size possible for the screen, and to decide if the well will be completed naturally or using an artificial filter pack. The objective of the screen design will be to maximize screen-transmitting capacity while maintaining an average entrance velocity of < 0.1 ft/sec.

Following the collection of the rotosonic core, a 24-inch diameter borehole will be drilled, using a Cable Tool Drilling Rig. A 14-inch diameter stainless steel extraction well will be installed that is capable of delivering a minimum of 300 gpm of groundwater with a screen entrance velocity of < 0.1 ft/sec. The boreholes will be advanced to pre-selected target drilling depths. The target drilling depths are listed in Table 1. Table 1 also lists estimated easting, northing and surface elevation of each extraction well location, and an estimated depth to water and target depth interval for the well screens. The target drilling depths and well screen intervals are based on the estimated ground surface elevation and the known depth and thickness of the >20 μg/L total uranium plume at each drilling location. Each screen

will have a five-foot sump at its base. These estimates will need to be confirmed; as actual survey data becomes available. The depth and thickness of the total uranium plume at each extraction well location have already been adequately defined by recently collected direct push groundwater samples. The technical lead identified in Section 2 of this PSP is responsible for determining the final design depth interval for the well screens and the final design target drilling depth.

The extraction wells will be completed using an artificial filter pack. The artificial filter pack will extend to a height above the well screen a minimum of one-half the length of the well screen. A layer of "transition sand" will be installed above the artificial filter pack sand. This transition sand will have a finer grain size than the artificial filter pack sand surrounding the well screen. The transition sand will have a minimum thickness of five feet. A five foot thick bentonite seal (pellets) will be installed above the transition sand. No bentonite pellets will be installed below the water table. A backfill of grout slurry above the bentonite seal shall extend to three feet below the ground surface. A three-foot thick concrete plug will complete the annular seal.

The drilling strategy for Monitoring Well 63064 will be to direct-push sample in the immediate area of the well prior to drilling the well. The direct-push samples will be used to determine the exact thickness of the uranium plume. Using this information, the well screen in the monitoring well (with a minimum thickness of 10-feet) will be set to intercept the uranium plume. The direct-push sampling will not be included in the scope of this PSP. The direct-push sampling is a routine activity at the FEMP, and will be conducted by writing a variance to the Project Specific Plan for Conducting Direct-Push Sampling in the Former Inactive Flyash Pile/ South Field Area (Project Number 52462-PSP-001).

All drilling and sampling field activities will conform to the guidelines set forth in the Sitewide CERCLA Quality Assurance Manual (SCQ), unless otherwise specified in this PSP. Performance of the requirements specified in Standard Operating Procedure ADM-02, *Field Project Prerequisites,* shall precede all field activities.

2.0 MANAGEMENT AND ORGANIZATION

3675

A qualified subcontractor under, the direct supervision of Fluor Fernald (FF), will conduct drilling activities. All sampling activities defined in this PSP will be performed by FF. Descriptions of some of the key technical responsibilities of project personnel or organizations are provided below:

The DOE Operable Unit 5 Team Leader is responsible for:

- Providing direction and oversight to the completion of PSP activities
- Acting as the point of contact within DOE and for the regulators and stakeholders for all communications concerning work carried out under this PSP.

The FF Aquifer Restoration/Wastewater Project (ARWWP) Manager is responsible for:

- Providing overall project management and technical guidance to the FF team
- Ensuring the necessary resources are allocated to the project for the efficient and safe completion of PSP activities
- Overseeing and auditing PSP activities to ensure that the work is being performed efficiently and in accordance with all regulatory requirements and commitments, DOE Orders, site policies and procedures, and safe working practices.

The FF Project Lead is responsible for:

- The safe and prompt completion of work outlined in the PSP
- Oversight and programmatic direction of sampling activities
- Providing a technical lead for the collection and interpretation of sampling data
- Establishing and maintaining the scope, schedule, and cost baseline
- Reporting to the DOE Operable Unit 5 Team Leader and FF Aquifer Restoration Project Manager on the status of PSP activities and on the identification of any problems encountered in the accomplishment of the PSP
- Obtaining the necessary funding to complete the sampling and data analysis activities

The FF Technical Lead is responsible for:

- Reporting to the FF Project Lead on the progress of PSP activities
- Assisting field personnel as required to complete work described in this PSP
- Assuring that data needed for screen and well design is collected.

The key project personnel are listed below.

KEY PROJECT PERSONNEL

TITLE	PRIMARY	ALTERNATE
DOE Operable Unit 5 Team Leader	Rob Janke	
ARWWP Project Manager	Dave Brettschneider	
Project Lead	Dick Butterfield	Jack Hughes
Technical Lead	Ken Broberg	Bill Hertel
Field Geologist	John Walters	Karen Voisard
Field Lead (Direct Push Sampling)	Jim Hey	Tom Buhrlage
Laboratory Contact	Brenda Collier	Denise Arico
Quality Assurance Contact	Scott Wheeler	Frank Thompson
Health & Safety Contact	Keith Lanning	

3.0 FIELD ACTIVITIES

The extraction wells will be installed using both a rotosonic and a cable tool-drilling rig. A rotosonic-drilling rig will first be used to collect a core of the aquifer sediment for the purpose of conducting sieve analyses on the samples. The actual well bore will then be drilled using a cable-tool-drilling rig. Monitoring Well 63064 will be installed using only the rotosonic drilling rig.

Field activities will include:

3.1 DRILLING AND INSTALLATION OF THE EXTRACTION WELLS 33061, 33062, AND 33063

- 3.1.1 Collection of Sediment Cores using Rotosonic™ Drilling
- 3.1.2 Extraction Well Installation, and
- 3.1.3 Extraction Well Development.

3.1.1 Collection of Sediment Cores Using Rotosonic™ Drilling

As explained in the introduction, a Rotosonic drilling rig will be used to collect a sediment core at each extraction well location prior to drilling and installing the extraction wells. Soil samples will be collected in accordance with DRL-02, *Solids Sampling in Drilled Boreholes*. A four-inch diameter rotosonic core will be obtained from the target well screen depth interval presented in Table 1 for each extraction well location. A geologist shall prepare brief lithologic descriptions of the soil materials and transcribe the information onto a *Visual Classification of Soils Form*. The lithology of the core will be described in approximately five feet intervals. Soil samples (500 ml) will be collected from the core and submitted to the on-site laboratory for particle size analysis via sieves to support the selection of screen slot size and screen length. The depth interval presented in Table 1 for each well are being targeted based on previous water quality sampling results and the estimated surface elevation of the drilling location provided in Table 1. As a result of the sieving process, submitted samples will be divided into size fractions based upon the size and number of sieve screens that the sediments were passed through. Sieve samples will not be re-mixed following completion of the sieving operation. The individual size sediment fractions will be archived individually and identified with a unique sample number that indicates well identification, sample depth, and size fraction. These individual size sediment fractions may be analyzed (at a later date) for total uranium to correlate uranium concentration with sediment size. The technical lead will assist the field geologist in determining which samples will be submitted for sieve analysis. Leftover core from the screen target intervals will be archived in wooden core boxes. The FF Technical Lead will work with the Field Geologist to identify the exact core interval for archiving.

The rotosonic borehole will be allowed to collapse naturally up to the water table. If available, a Cable Tool rig will be moved over the boring and drilling of the well bore will begin without abandoning the Rotosonic™ boring. If the cable tool rig is not available, the borehole above the water table will be filled with a mixture of bentonite and sand. This technique has been used at the FEMP before. A ratio of 750 pounds of bentonite (15-50 pound bags) to 300 pounds of sand was used to temporarily abandon the Rotosonic™ holes at Extraction Wells. Care should be taken when grouting borehold 33063 due to the high probability of encountering surface contamination. Grout will be tremied through the casing as the casing is removed from the borehold making sure at least 5 feet of grout is maintained at the bottom of the casing. Water from the rotosonic drilling will need to be containerized from the well in the production area.

3.1.2 ExtractionWell Installation

Exact surface elevations will be surveyed prior to drilling. Estimated surface elevations are provided in Table 1, along with estimated drilling depths and well screen completion intervals.

A cable tool rig shall be used to advance a 24-inch diameter borehole to the target drilling depths listed in Table 1. The geologist will document drilling-, installation-, and development activities on standard Field Activity and Well Completion Logs.

Well installation shall be performed in accordance with the requirements outlined below and, unless otherwise specified shall follow the general guidelines set forth in Appendix J of the SCQ. The well screen shall be 14 inches in diameter, wire-wrapped and made of 304 stainless steel. Criteria, which will be used to determine the length and slot size of the well screen, are as follows:

- The depth and thickness of the > 20 μg/L total uranium plume in the water column:
- The presence of the blue clay layer.
- The lithology and grain size of the aquifer material within the > 20 μg/L total uranium plume. If developed naturally, a slot size will be selected that will keep 30% to 50% of the aquifer material from passing through the well screen and entering the well. If developed using an artificial filter pack, a slot size will be selected that will keep 90 percent of the artificial filter pack material from passing through the well screen and entering the well.
- Given the anticipated pumping range for the well, the screen will be designed to minimize induced drawdown within the well screen.

A five-foot long, 14-inch diameter sump shall be attached to the bottom of the well screen. Well risers shall be constructed of 14-inch diameter 304 stainless steel. A 40 foot depth interval (60 feet bgs to

100 feet bgs) is being targeted to place the well screen in extraction Wells 33061, 33062 and 33063. These depths intercept the thickness of the >20 μg/L total uranium contamination plume identified at each location. The actual length and depth of the screen will be designed after sieve analysis results have been obtained. The technical lead will advise the field geologist at what depth to place the top of the well screen. The depth selected for the screen will also consider the dynamic water level, which will be achieved during the aquifer restoration when the entire aquifer system is operating. A 2-inch diameter SS observation well, with a 5-foot long, 0.010 inch slot screen, and a 2 ½ foot sump, will be installed in the filter pack of the well, just outside of the 14-inch screen. The base of the observation well will be positioned at a depth that corresponds to the base of the 14-inch diameter screen.

The artificial filter pack will extend to a height above the well screen that is, at a minimum, equal to one-half the thickness of the well screen. A layer of "transition sand" will be installed above the artificial filter pack sand. This transition sand will be a minimum of five feet thick. This transition sand will be a finer grain size than the filter pack sand surrounding the well screen. A five foot thick bentonite seal (pellets) will be installed above the transition sand. No bentonite pellets will be installed below the water table. A backfill of grout slurry above the bentonite seal shall extend through the till/aquifer interface to three feet below the ground surface. A three-foot thick concrete plug will complete the annular seal.

The well riser shall terminate approximately three feet above the ground surface. The well will be secured with a lockable well cap. During installation of the well, the field geologist will be responsible for documenting that the correct thickness of annular fill material is being installed, and that the well screen is installed at the correct depth. Frequent measurements of the depth to the top of the annular fill need to be collected to verify the installation process. If installation work is interrupted, the field geologist will verify that the depths measured prior to the interruption are the same depths measured prior to resuming installation activities.

3.1.3 Well Development

Well development shall be performed as outlined below. Well development shall be initiated no sooner than 48 hours following completion of well installation.

3.1.3.1 General Requirements for Well Development

Development will be conducted using the same protocols used to develop the previous South Field and South Plume Optimization Module Extraction Wells. This development strategy has proven to be very successful. Development will begin by surging the well for a maximum of 24 hours. After the well screen has been designed, the FF Technical Lead will determine a surging plan for the screen, based on the stroke length of the development rig being used. The stroke length of the development rig determines the length or interval of screen that is surged by the surge block during a particular event. For the purpose of this PSP, this screen length will be called the "surge interval". Each surge interval of the well screen will be surged for one hour; the sand contained in the well after one hour of surging will be measured and removed prior to raising or lowering the surge blocks to surge the next interval of screen. Surging will begin slowly and gradually increase (i.e., operate the rig slowly then gradually increase power or stroke length if possible).

Following surging, a six-hour pumping test will be conducted for the purpose of measuring the sand content of the pumped water and the specific capacity of the well. The goal of development will be to produce a well capable of delivering water with a sand content of 10 parts per million (ppm) or less. If the sand content of the pumped groundwater is below 10 ppm at the conclusion of the pumping test, development is complete. If the sand content of the pumped groundwater is above 10 ppm at the end of the pumping test, the development cycle shall be repeated until the FF Technical Lead determines that development is complete.

3.1.3.2 Project-Specific Requirements for Well Development

1. Measure the depth to the bottom of the well. Record the depth in the comment section of the Well Development Form.

2. Lower the surge block to the lower surge interval of the well screen and surge the well for one hour.

3. Remove the surge block from the well and measure the depth to the bottom of the well to record how much sediment was brought into the well as a result of the surging.

4. Bail or air lift as much sediment from the well as possible. Measure the total depth of the well to document how much sand was removed.

5. Raise the surge block to the next higher surge interval of the screen and surge for one hour.

6. Repeat Steps 3 through 5 until the top surge interval of the screen has been surged.

3675

7. After surging the top surge interval of the screen, repeat Steps 3 through 6, but lower the surge block after each hour of surging instead of raising it.

8. Upon reaching the lower surge interval of the screen, repeat Steps 3 through 6 again. Follow this procedure of surging up and down the screen for a maximum of 24 hours, unless the technical lead determines that the well has reached an acceptable development state sooner than 24 hours.

3.1.3.3 Step Test

The pumping test will be performed as follows:

1. Measure the total depth and the static water level of the well and record the information on the Field Activity Log.

2. Pump the well for two hours. The technical lead will provide the pumping rates to be used. Measure the water level of the pumping well approximately every 20 minutes. Collect a total U sample at the end of each 2-hour pumping interval.

3. Conduct a sand content test after 15 minutes, 30 minutes, 60 minutes, 90 minutes, and 120 minutes of pumping. Steps for conducting a sand content test are provided below.

4. After two hours of pumping, increase the pumping rate as specified by the technical lead. Pump the well for two hours and repeat the measurements described in 2 and 3 above.

5. Increase the pumping rate as specified by the technical lead. Pump the well at this rate for two hours and repeat the measurements in 4 and 5 above.

6. After approximately six hours of pumping, stop the pumping.

7. Measure the recovery rate of the well by taking water level measurements every 30 seconds until the water level is to within one foot of the static water level recorded before the start of pumping six hours earlier.

3.1.3.4 Sand Content Testing

Sand content will be measured by passing a sample of the pumped well water through a centrifugal sand sampler. The centrifugal sand sampler will be installed in the discharge line used for development, just slightly down gradient of the well head. Operation of the sand content sampler is described below:

1. Install the centrifugal sand content tester as directed by the manufacturer. The inlet should be located on the horizontal centerline of the discharge pipe and as close to the discharge head as possible.

2. Open the inlet valve to the tester wide open. Adjust the outlet valve to one-half gpm. (This will fill one quart in 30 seconds or one gallon in two minutes).

3. Close the inlet valve, remove, clean, and replace the glass tube.

4. When ready to start the sand content test, record the start time and open the inlet valve wide open.

5. After five minutes, record the amount of accumulated sand in the glass tube. Calculate the sand rate by dividing the amount of accumulated sand by five minutes (the amount of time to accumulate the sand).

6. Periodically check the flow rate through the tester during each run. If the flow rate is not one half gpm, repeat the test.

7. Calculate the rate of sand production per unit of water according to the following calculation:

$$\frac{[\text{sand rate (ml/min)}]}{[0.5\ \text{gpm} \times 231\ \text{in}^3/\text{gallon} \times 16.387\ \text{ml/in}^3]*1E6=\text{ppm}}$$

3.2 DRILLING AND INSTALLATION OF MONITORING WELL 63064

Prior to drilling Monitoring Well 63064, direct push sampling will be conducted. A variance will be issued on the Project Specific Plan for Conducting Direct-Push Sampling in the Former Inactive Flyash Pile / South Field, Project Number 52462-PSP-001 to direct field activities. Direct push samples will be used to define a vertical profile of the uranium plume. The final depth of the monitoring well, screen length and placement will be based on results of the direct push sampling activity. The well screen will be placed across the interval where the highest uranium concentrations are found with the direct push sampling.

A Rotosonic drilling rig will be used to advance a six-inch or greater diameter borehole to an estimated total depth that will be determined from direct-push sampling discussed above. It is anticipated that the monitoring well will be less than 50 feet deep. Well installation shall be conducted in accordance with guidelines set forth in Appendix J of the SCQ.

Monitoring Well 63064 will be a 2-inch diameter PVC well and have a 0.010-inch slot size screen and 2 1/2-inch sump, and an artificial filter pack. Existing monitoring wells in the immediate area are completed with a similar design and yield representative groundwater samples from the aquifer. The primary filter pack will consist of Global #7 sand that is well-sorted, fine-grain, quartz sand. The individual grains of this filter pack material are well rounded and consist of less than five- percent non-siliceous material. The size of the primary filter pack sand was selected so that 90 percent of the filter pack material will be held back by the 0.01 inch slot screen, and the uniformity coefficient of the filter pack material will not exceed 2.5. The primary filter pack will extend five feet above the top of the well screen. A secondary filter pack of slightly smaller sized material (Global #8 sand) will extend from the top of the primary filter pack sand to a height of five feet above the water table. The filter pack sands will be installed utilizing the gravity emplacement method (either a tremie line or hand poured). The vibration of the rotosonic casing will help to settle the sand and prevent bridging. A five-foot bentonite

seal (pellets) will be installed above the artificial filter pack. Allow one-hour for pellets to hydrate. No bentonite will be installed below the water table. A backfill of grout slurry above the bentonite seal shall extend to three feet below ground surface. A three-foot thick concrete plug will complete the annular seal. The riser shall terminate approximately three feet above the ground surface. The well will be secured with a lockable well cap. A protective casing and concrete pad will be installed as outlined in the SCQ.

During installation of the well, the field geologist will be responsible for documenting that the correct thickness on annular fill material is being installed, and that the well screen is installed at the correct depth. Frequent measurements of the depth to the top of the annular fill need to be collected to verify the installation process. If installation work is interrupted, (i.e., lunch, carry over to the next day, etc.) the filed geologist will verify that the depth measured prior to the interruption are the same depths measured prior to resuming installation activities.

Monitoring Well 63064 will be developed according to site procedure DRL-03 titled, "Monitoring Well Development."

4.0 EQUIPMENT DECONTAMINATION

If drilling and sampling equipment are being moved from a FEMP Controlled Area, the equipment shall be decontaminated to Level I, using a pressure washer to remove visible materials, prior to transport to the drilling location. Decontamination of the drilling equipment will not be necessary if the equipment has been used previously in a FEMP uncontrolled area. Upon completion of drilling and sampling activities, decontamination of tools and equipment shall be performed to fulfill the Level I specification of the SCQ (Reference Section K).

5.0 WASTE DISPOSAL

The disposal of drill cuttings will be coordinated with and approved by the Manager of the WAO group. Options include spreading the drill cuttings out on the ground surface at the drilling site, or transporting the cuttings to a holding area for later disposal into the OSDF. Final directions for the disposal of the cuttings will be issued prior the commencement of drilling activities for the installation of the well.

Discharged pumping water (generated during well development) will be sent to the headworks of the AWWT. Temporary discharge lines will be utilized to connect each drilling location to discharge flowpaths. When temporary lines are used, efforts will be made to minimize road crossings, etc., by threading the temporary lines through existing trenches, and culverts. Field personnel will work closely with Wastewater Treatment Operations Personnel to assure that they are aware of the temporary lines and the schedule for the line's use.

The field geologist will be responsible for assuring that proper coordination with the Waste Water Treatment Operations Group has been achieved prior to the discharge of any water into the headworks of the AWWT. The Field Geologist will call the AWWT Supervisor at extension 3830 a day prior to the pumping test. The Field Geologist will also call the AWWT Supervisor just prior to pumping to assure that coordination is complete and discharge can begin at an agreed to time.

6.0 HEALTH & SAFETY

EM personnel and project subcontractor personnel shall conform to precautionary surveys performed by the personnel representing the Utility Engineer, Industrial Hygiene, and Radiological Control. Concurrence with applicable safety permits (indicated by the signature of personnel assigned to this project) is expected from all project personnel in the performance of their assigned duties.

The EM Field Supervisor will ensure that all EM and subcontractor personnel performing project related activities have read or been briefed on the Project Health and Safety Matrix (PHSM) and the applicable surveys that protect worker safety and health. Signing the PHSM is an acknowledgment of reading and understanding it. It is a requirement for all personnel involved in the drilling and sampling activities associated with the well installation. A copy of applicable safety permits/surveys issued for worker safety and health shall be available for reference/review at each sample location. At the completion of the project, the completed forms shall be submitted for incorporation into the project files.

7.0 QUALITY ASSURANCE/QUALITY CONTROL REQUIREMENTS

Well Installation and Development work follows Quality Assurance/Quality Control (QA/QC) protocol.

7.1 PROJECT REQUIREMENTS FOR SURVEILLANCE

Self-assessment of work processes and operations may be undertaken to assure quality of performance. Self-assessments may be performed by the Project Lead and field leads identified in Section 2.0 of this PSP, and shall encompass technical and procedure requirements. Such self-assessment may be conducted at any point in the project.

Independent assessment may be performed by the FF QA organization by conducting a surveillance. At a minimum the surveillance will consist of monitoring/observing ongoing project activity and work areas to verify conformance to specified requirements. Surveillances shall be planned and documented in accordance with Section 12.3 of the SCQ.

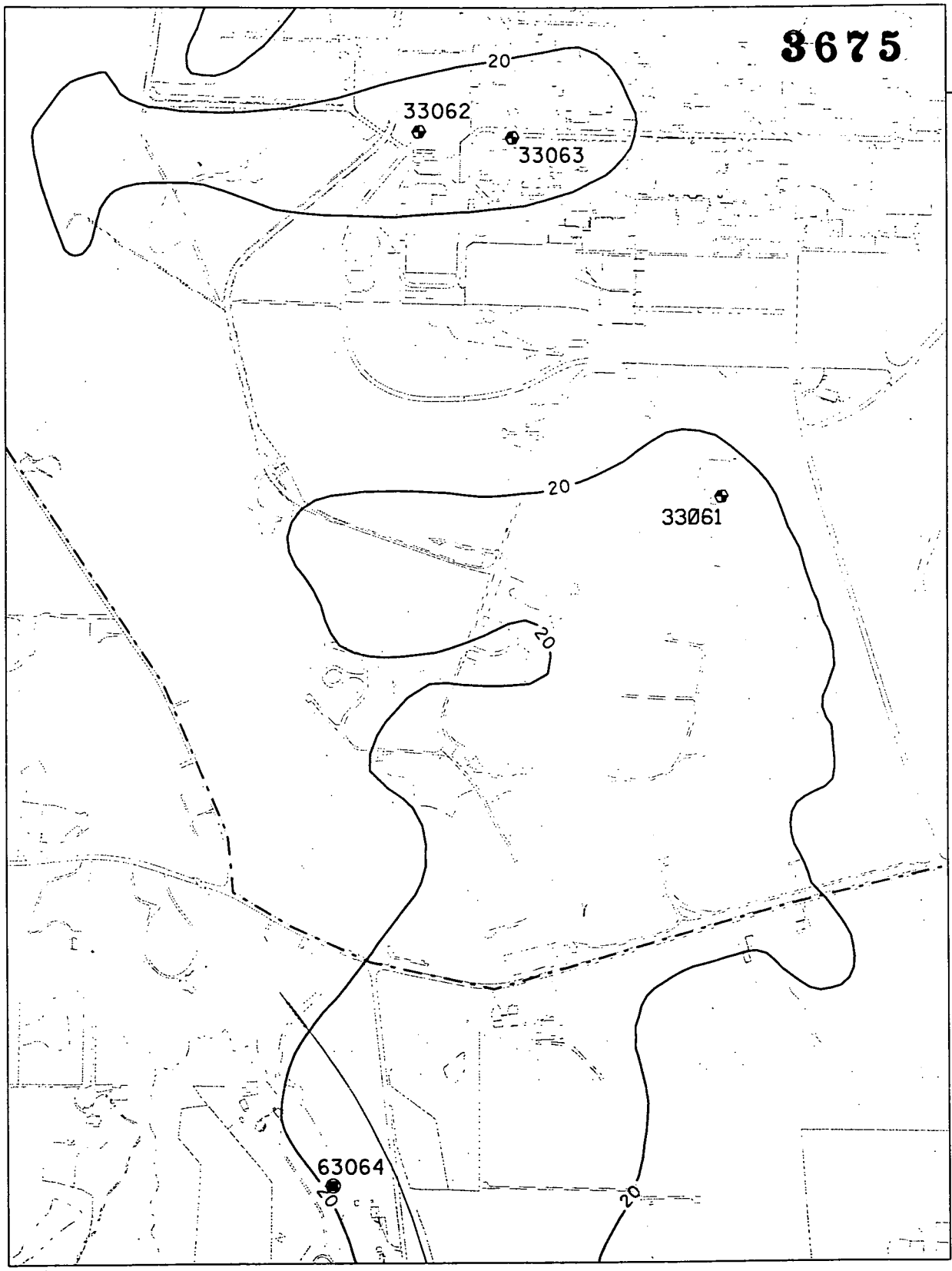
7.2 CHANGES TO THE PROJECT SPECIFIC PLAN

Prior to the implementation of changes, the Project Lead and/or Technical Lead shall be informed of the proposed field changes. Once approval has been obtained from the Project Manager and/or Technical Lead and QA representative for the changes to the PSP, the field changes may be implemented. Variances shall be processed per Section 15.3 of the SCQ.

TABLE 1

TARGET DRILLING DEPTHS

	Well Numbers		
	EW-33061	EW 33062	EW 33063
Estimated Easting:	1347675.59	1348096.81	1348536.45
Estimated Northing:	475092.30	480037.01	480008.27
Estimated Elevation:	575 feet amsl	578 feet amsl	578 feet amsl
Estimated Depth to Water:	60 feet bgs	60 feet bgs	60 feet bgs
Target Depth for the Well Screens (This depth will be refined by the technical lead prior to the installation of the well.):	60 - 100 feet bgs	60 - 100 feet bgs	60 - 100 feet bgs
Target Drilling Depth (This depth will be finalized by the technical lead prior to the drilling of the well.):	120 feet bgs	120 feet bgs	120 feet bgs



LEGEND:

FEMP BOUNDARY

EXTRACTION WELL

MONITORING WELL

20 TOTAL URANIUM CONTOUR IN μg/L

SCALE

700 350 0 700 FEET

DRAFT

FIGURE 1. LOCATION MAP

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v:\scr\w2\dgn\ken_b\ken00089.dgn

STATE PLANAR COORDINATE SYSTEM 1983

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